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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 218

Docket No. 201135-7135-01

RIN 0648-BG65

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the U.S. Air Force 86 Fighter Weapons Squadron Conducting Long Range Strike Weapons System Evaluation Program at the Pacific Missile Range Facility at Kauai, Hawaii

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

ACTION: Proposed rule; request for comments.

SUMMARY: NMFS has received an application, pursuant to the Marine Mammal Protection Act (MMPA), from the U.S. Air Force 86 Fighter Weapons Squadron (86 FWS) for authorization to take marine mammals incidental to Long Range Strike Weapons System Evaluation Program (LRS WSEP) activities in the Barking Sands Underwater Range Expansion (BSURE) area of the Pacific Missile Range Facility (PMRF) off Kauai, Hawaii, for the period of August 23, 2017, through August 22, 2022. NMFS is proposing regulations to govern that take, and requests comments on the proposed regulations.

DATES: Comments and information must be received no later than [*insert date 30 days after date of publication in the FEDERAL REGISTER*].

ADDRESSES: You may submit comments on this document by either of the following methods:

- *Electronic submission*: Submit all electronic public comments via the Federal e-Rulemaking Portal. Go to *www.regulations.gov*, enter 0648-BG65 in the “Search” box, click the “Comment Now!” icon, complete the required fields, and enter or attach your comments.
- *Mail*: Comments should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East West Highway, Silver Spring, MD 20910.

Instructions: NMFS may not consider comments if they are sent by any other method, to any other address or individual, or received after the end of the comment period. Attachments to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. To help NMFS process and review comments more efficiently, please use only one method to submit comments. All comments received are a part of the public record and will generally be posted on *www.regulations.gov* without change. All personal identifying information (*e.g.*, name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information. NMFS will accept anonymous comments (enter N/A in the required fields if you wish to remain anonymous).

FOR FURTHER INFORMATION CONTACT: Jaclyn Daly, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Availability

A copy of 86 FWS's application and any supporting documents, as well as a list of the references cited in this document, may be obtained online at: *www.nmfs.noaa.gov/pr/permits/incidental/military.htm*. In case of problems accessing these documents, please call the contact listed above (see **FOR FURTHER INFORMATION CONTACT**). The following associated documents are also available at the same internet address: list of the references used in this document, the seasonal parameters memo, and 86 FWS's Environmental Assessment (EA) titled, "Environmental Assessment/Overseas Environmental Assessment for the Long Range Strike Weapon Systems Evaluation Program at the Pacific Missile Range Facility at Kauai, Hawaii." Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

Purpose and Need for Regulatory Action

This proposed rule, to be issued under the authority of the MMPA, would establish a framework for authorizing the take of marine mammals incidental to LRS WSEP activities in the BSURE area of the PMRF off Kauai, Hawaii. We received an application from 86 FWS requesting 5-year regulations and authorization for the take, by Level B harassment, of 16 species of marine mammals, and, by Level A harassment of 4 of those species. The regulations would be valid from August 23, 2017, to August 22, 2022. Please see *Background* below for definitions of Level A and Level B harassment.

Legal Authority for the Proposed Action

Section 101(a)(5)(A) of the MMPA (16 U.S.C. 1371(a)(5)(A) directs the Secretary of Commerce to allow, upon request, the incidental, but not intentional taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region for up to five years if, after notice and public comment, the agency makes certain findings and issues regulations that set forth permissible methods of taking pursuant to that activity, as well as monitoring and reporting requirements. Section 101(a)(5)(A) of the MMPA and the implementing regulations at 50 CFR part 216, subpart I provide the legal basis for issuing this proposed rule containing five-year regulations, and for any subsequent Letters of Authorization (LOA) issued pursuant to those regulations. As directed by this legal authority, this proposed rule contains mitigation, monitoring, and reporting requirements.

The National Defense Authorization Act for Fiscal Year 2004 (Section 319, Public Law 108–136, November 24, 2003) (NDAA of 2004) removed the “small numbers” and “specified geographical region” limitations indicated earlier and amended the definition of harassment as it applies to a “military readiness activity” to read as follows (Section 3(18)(B) of the MMPA, 16 U.S.C. 1362(18)(B)): “(i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild” (Level A Harassment); “or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered” (Level B Harassment).

Summary of Major Provisions within the Proposed Rule

Following is a summary of some of the major provisions in this proposed rule for 86 FWS’s LRS WSEP activities. We have preliminarily determined that 86 FWS’s adherence to the proposed mitigation, monitoring, and reporting measures listed below would achieve the least practicable adverse impact on the affected marine mammals. They include:

• Restricting time of activities to missions that will occur only during day-light hours, only on weekdays, and only during the summer or fall months.

• Conducting visual aerial surveys before and after mission activities each day.

• Delaying mission activities if a protected species is observed in the impact zones, and resuming only after one of the following conditions is met: (1) the animal is observed exiting the impact area; or (2) the impact area has been clear of any additional sightings for a period of 30 minutes.

• If daytime weather and/or sea conditions preclude adequate monitoring for detecting marine mammals and other marine life, delaying LRS WSEP strike operations until adequate sea conditions exist for monitoring to be undertaken.

• Using mission reporting forms to track the use of the PMRF for missions and protected species observations.

• Submitting a summary report of marine mammal observations and LRS WSEP activities to the NMFS Pacific Islands Regional Office (PIRO) and the Office of Protected Resources 90 days after expiration of the current authorization.

• Using Passive Acoustic Monitoring (PAM) by using the Navy's hydrophones within the PMRF to collect data before, during, and after LRS WSEP missions. This data will be stored at Space and Naval Warfare Systems Command (SPAWAR) to be analyzed as funding allows.

• If unauthorized takes of marine mammals (*i.e.*, serious injury or mortality) occur, ceasing operations and reporting to NMFS and to the respective Pacific Islands

Region stranding network representative immediately and submitting a report to NMFS within 24 hours.

Background

Sections 101(a)(5)(A) and (D) of the MMPA(16 U.S.C. 1371(a)(5)(A) and (D)) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

Summary of Request

On June 23, 2016, NMFS received a request for regulations from 86 FWS for the taking of small numbers of marine mammals incidental to LRS WSEP activities in the BSURE area of the PMRF off Kauai, Hawaii. We received revised drafts on November 29, 2016, and December 21, 2016, which we considered adequate and complete. On January 6, 2017, we published a notice of receipt of 86 FWS's application in the **Federal Register** (82 FR 1702), requesting comments and information for thirty days related to 86 FWS's request. We received comments from private citizens, one marine mammal research organization, and six non-governmental organization (NGOs), which we considered in the development of this proposed rule.

The 86 FWS proposes taking marine mammals incidental to LRS WSEP activities by Level B harassment of 16 species of marine mammals and by Level A harassment of 4 of those species. NMFS has previously issued an incidental harassment authorization (IHA) to 86 FWS authorizing the taking of marine mammals incidental to LRS WSEP activities in the BSURE area of the PMRF in 2016 (81 FR 67971; October 3, 2016). The regulations proposed in this action, if issued, would be effective from August 23, 2017, through August 22, 2022.

Description of the Specified Activity

Overview

The 86 FWS proposes to conduct air-to-surface missions in the BSURE area of the PMRF. The LRS WSEP test objective is to conduct operational evaluations of long range strike weapons and other munitions as part of LRS WSEP operations to properly train units to execute requirements within Designed Operational Capability Statements, which describe units' real-world operational expectations in a time of war. Due to threats to national security, an increasing number of missions involving air-to-surface activities have been directed by the Department of Defense (DoD). Accordingly, the U.S. Air Force seeks the ability to conduct operational evaluations of all phases of long range strike weapons within the U.S. Navy's Hawaii Range Complex (HRC). LRS WSEP objectives are to evaluate air-to-surface and maritime weapon employment data, evaluate tactics, techniques, and procedures in an operationally realistic environment and to determine the impact of tactics, techniques, and procedures on combat Air Force training. The munitions associated with the proposed activities are not part of a typical unit's training allocations and, prior to attending a WSEP evaluation, most pilots and weapon systems officers have only dropped weapons in simulators or used the aircraft's simulation mode. Without WSEP operations, pilots would be using these weapons for the first time in combat. On average, half of the participants in each unit drop an actual weapon for the first time during a WSEP evaluation. Consequently, WSEP is a military readiness activity and is the last opportunity for squadrons to receive operational training and evaluations before they deploy.

LRSWSEP missions involve the use of multiple types of live and inert munitions (bombs and missiles) scored above, at, or just below the water's surface in the BSURE (Table 1). The ordnance may be delivered by multiple types of aircraft, including bombers and fighter aircraft. Weapon performance will be evaluated by an underwater acoustic hydrophone array system as the weapons strike the water surface. Net explosive weight of the live munitions ranges from 23 to 300 pounds (lbs). Missions will occur annually over five years from 2017 and 2021 (see Table 1), primarily during the summer but may occur in the fall as well. All missions will be conducted during daylight hours. LRS WSEP missions could potentially take 16 species of marine mammals by Level B harassment, and additionally, 4 of those species by Level A harassment.

Dates and Duration

The specified activity may occur during the summer months, or less likely in fall months, during the five-year period of validity of the proposed regulations. Missions will occur only on weekdays during daytime hours. Missions will occur, on average, approximately five days per year on consecutive days. The LOA would be valid from August 20, 2017, through August 19, 2022.

Specified Geographical Region

The specific planned impact area is approximately 44 nautical miles (nmi) (81 kilometers (km)) offshore of Kauai, Hawaii, in a water depth of about 15,240 feet (ft) (4,645 meters (m)). (see Figure 2-2 of 86 FWS's application). All activities will take place within the PMRF, which is located in Hawaii off the western shores of the island of Kauai and includes broad ocean areas to the north, south, and west (see Figure 2-1 of 86 FWS's application).

Within the PMRF, activities would occur in the BSURE area, which lies in Warning Area 188A (W-188A). The BSURE consists of about 900 nmi^2 of instrumented underwater ranges, encompassing the deep-water portion of the PMRF and providing over 80 percent of the PMRF's underwater scoring capability. The BSURE facilitates training, tactics, development, and test and evaluation for air, surface, and subsurface weapons systems in deep water. It provides a full spectrum of range support, including radar, underwater instrumentation, telemetry, electronic warfare, remote target command and control, communications, data display and processing, and target/weapon launching and recovery facilities. The underwater tracking system begins 9 nmi (17 km) from the north shore of Kauai and extends out to 40 nmi (74 km) from shore. The LRS WSEP missions would employ live weapons with long flight paths requiring large amounts of airspace, and would conclude with weapon impact and surface detonations within the BSURE instrumented range.

Detailed Description of Activities

The LRS WSEP training missions, classified as military readiness activities, refer to the deployment of live (containing explosive charges) missiles and bombs from aircraft toward the water surface. Depending on the requirements of a given mission, munitions may be inert (containing no explosives or only a "spotting" charge) or live (containing explosive charges). Live munitions may detonate above, at, or slightly below the water surface. The actions include air-to-surface test missions of the Joint Air-to-Surface Stand-off Missile/Joint Air-to-Surface Stand-off Missile-Extended Range (JASSM/JASSM-ER), Small Diameter Bomb-I/II (SDB-I/II), High-speed Anti-Radiation Missile (HARM), Joint Direct Attack Munition/Laser Joint Direct Attack Munition (JDAM/LJDAM), and Miniature Air-Launched Decoy (MALD), including detonations above the water, at the water surface, and slightly below the water surface (Table 1).

Aircraft used for munition releases would include bombers and fighter aircraft. Additional airborne assets, such as the P-3 Orion or the P-8 Poseidon, would be used to relay telemetry and flight termination system streams between the weapon and ground stations. Other support aircraft would be associated with range clearance activities before and during the mission and with air-to-air refueling operations. All weapon delivery aircraft would originate from an out base and fly into military-controlled airspace prior to employment. Due to long transit times between the out base and mission location, air-to-air refueling may be conducted in either W-188 or W-189. Bombers, such as the B-1, would deliver the weapons, conduct air-to-air refueling, and return to their originating base as part of one sortie. However, when fighter aircraft are used, the distance and corresponding transit time to the various potential originating bases would make return flights after each mission day impractical. In these cases, the aircraft would temporarily (less than one week) park overnight at Hickam Air Force Base (HAFB) and would return to their home base at the conclusion of each mission set. Multiple weapon release aircraft would be used during some missions, each potentially releasing multiple munitions. Each LRS WSEP mission set will occur over a maximum of five consecutive days per year. Approximately 10 Air Force personnel would be on temporary duty to support each mission set.

Aircraft flight maneuver operations and weapon release would be conducted in W-188A. Chase aircraft may be used to evaluate weapon release and to track weapons. Flight operations and weapons delivery would be in accordance with published Air Force directives and weapon operational release parameters, as well as all applicable Navy safety regulations and criteria established specifically for the PMRF. Aircraft supporting LSR WSEP missions would primarily operate at high altitudes—only flying below 3,000 ft for a limited time as needed for escorting non-military vessels outside the hazard area or for monitoring the area for protected marine species (*e.g.*, marine mammals and sea turtles). Protected marine species aerial surveys would be temporary (approximately 30 minutes) and would focus on an area surrounding the weapon impact point on the water. Post-mission surveys would focus on the area down current of the weapon impact location. Range clearance procedures for each mission would cover a much larger area for human safety. Weapon release parameters would be conducted as approved by the PMRF Range Safety. Daily mission briefs would specify planned release conditions for each mission. Aircraft and weapons would be tracked for time, space, and position information. The 86 FWS test director would coordinate with the PMRF Range Safety Officer, Operations Conductor, Range Facility Control Officer, and other applicable mission control personnel for aircraft control, range clearance, and mission safety.

Joint Air-to-Surface Stand-off Missile/Joint Air-to-Surface Stand-Off Missile-Extended Range (JASSM/JASSM-ER)

The JASSM is a stealthy precision cruise missile designed for launch outside area defenses against hardened, medium-hardened, soft, and area type targets. The JASSM has a range of more than 200 nmi (370 km) and carries a 1,000-lb warhead with approximately 300 lbs of 2,4,6-trinitrotoluene (TNT) equivalent net explosive weight (NEW). The specific explosive used is AFX-757, a type of plastic bonded explosive (PBX). The weapon has the capability to fly a preprogrammed route from launch to a target, using Global Positioning System (GPS) technology and an internal navigation system (INS) combined with a Terminal Area Model when available. Additionally, the weapon has a Common Low Observable Auto-Routing function that gives the weapon the ability to find the route that best utilizes the low observable qualities of the JASSM. In either case, these routes can be modeled prior to weapon release. The JASSM-ER has additional fuel and a different engine for a greater range than the JASSM (500 nmi (926 km)) but maintains the same functionality of the JASSM.

Small Diameter Bomb-I/Small Diameter Bomb-II (SDB-I/SDB-II)

The SDB-I is a 250-lb air-launched GPS-INS guided weapon for fixed soft to hardened targets. SDB-II expands the SDB-I capability with network enabling and uses a tri-mode sensor infrared, millimeter, and semi-active laser to attack both fixed and movable targets. Both munitions have a range of up to 60 nmi (111 km). The SDB-I contains 37 lbs of TNT-equivalent NEW, and the SDB-II contains 23 lbs NEW. The explosive used in both SDB-I and SDB-II is AFX-757.

High-speed Anti-Radiation Missile (HARM)

The HARM is a supersonic air-to-surface missile designed to seek and destroy enemy radar-equipped air defense systems. The HARM has a proportional guidance system that homes in on enemy radar emissions through fixed antenna and seeker head in the missile nose. It has a range of up to 80 nmi (148 km) and contains 45 lbs of TNT-equivalent NEW. The explosive used is PBXN-107.

Joint Direct Attack Munition/Laser Joint Direct Attack Munition (JDAM/LJDAM)

The JDAM is a smart GPS-INS weapon that uses an unguided gravity bomb and adds a guidance and control kit, converting it to a precision-guided munition. The LJDAM variant adds a laser sensor to the JDAM, permitting guidance to a laser designated target. Both JDAM and

LJDAM contain 192 lbs of TNT-equivalent NEW with multiple fusing options, with detonations occurring upon impact or with up to a 10-millisecond delay.

Miniature Air Launched Decoy/Miniature Air Launched Decoy-Jamming (MALD/MALD-J)

The MALD is an air-launched, expendable decoy that will provide the Air Force the capability to simulate, deceive, decoy, and saturate an enemy's threat integrated air defense system (IADS). The MALD production has recently transitioned to include the MALD-J variant, which has the same decoy capability of the MALD plus the addition of jamming IADS. The MALD and MALD-J have ranges up to 500 nmi (926 km) to include a 200 nmi (370 km) dash with a 30-minute loiter mode. It has no warhead, and no detonation would occur upon impact with the water surface.

Releases of live ordnance associated with 2017 – 2021 missions would result in either airbursts, surface detonations, or subsurface detonations (10-ft (3 m) water depth). Up to four SDB I/II munitions could be released simultaneously, such that each ordnance would hit the water surface within a few seconds of each other. Aside from the SDB-I/II releases, all other weapons would be released separately, impacting the water surface at different times. There will be a total of five mission days per year during the time frame of 2017 to 2021.

A typical mission day would consist of pre-mission checks, safety review, crew briefings, weather checks, clearing airspace, range clearance, mitigations/monitoring efforts, and other military protocols prior to launch of weapons. Potential delays could be the result of multiple factors, including adverse weather conditions leading to unsafe take-off, landing, and aircraft operations, inability to clear the range of non-mission vessels or aircraft, mechanical issues with mission aircraft or munitions, or presence of protected species in the impact area. These standard operating procedures are usually done in the morning, and live range time may begin in late morning once all checks are complete and approval is granted from range control. The range would be closed to the public for a maximum of four hours per mission day.

Each long range strike weapon would be released in W-188A and would follow a given flight path with programmed GPS waypoints to mark its course in the air. Long range strike weapons would complete their maximum flight range (up to 500 nmi distance for JASSM-ER) at an altitude of approximately 18,000 ft (equivalent in kms) mean sea level (MSL) and terminate at a specified location for scoring of the impact. The cruise time would vary among the munitions but would be about 45 minutes for JASSM/JASSM-ER and 10 minutes for SDB-I/II. The time frame between employments of successive munitions would vary, but releases could be spaced by approximately one hour to account for the JASSM cruise time. The routes and associated safety profiles would be contained within W-188A boundaries. The objective of the route designs is to complete full-scale evasive maneuvers that avoid simulated threats, and would not consist of a standard "paper clip" or regularly shaped route. The final impact point on the water surface would be programmed into the munitions for weapons scoring and evaluations. The JDAM/LJDAM munitions would also be set to impact at the same point on the water surface.

All missions would be conducted in accordance with applicable flight safety, hazard area, and launch parameter requirements established for the PMRF. A weapon hazard region would be established, with the size and shape determined by the maximum distance a weapon could travel in any direction during its descent. The hazard area is typically adjusted for potential wind speed and direction, resulting in a maximum composite safety footprint for each mission (each footprint boundary is at least 10 nmi from the Kauai coastline). This information is used to establish a Launch Exclusion Area and Aircraft Hazard Area. These exclusion areas must be verified to be clear of all non-mission and non-essential vessels and aircraft before live weapons are released. In addition, a buffer area must also be clear on the water surface so that vessels do not enter the exclusion area during the launch window. Prior to weapon release, a range sweep of the hazard area would be conducted by participating mission aircraft or other appropriate aircraft, potentially including S-61N helicopter, C-26 aircraft, fighter aircraft (F-15E, F-16, F-22), or the Coast Guard’s C-130 aircraft.

The PMRF has used small water craft docked at the Port Allen public pier to keep nearshore areas clear of tour boats for some mission launch areas. However, for missions with large hazard areas that occur far offshore from Kauai, it would be impractical for these smaller vessels to conduct range clearance activities. The composite safety footprint weapons associated with LRS WSEP missions is anticipated to be rather large; therefore, it is likely that range clearing activities would be conducted solely by aircraft.

The Range Facility Control Officer is responsible for establishing hazard clearance areas, directing clearance and surveillance assets, and reporting range status to the Operations Conductor. The Control Officer is also responsible for submitting all Notice to Airmen (NOTAMs) and Notice to Mariners (NOTMARs), and for requesting all Federal Aviation Administration airspace clearances.

The 86 FWS would also like to use a maximum of eight target boats and a maximum of 5,000 20-mm gunnery rounds each year. The gunnery rounds would be inert (do not contain explosives), which would minimize the potential for fragmentation and creation of marine debris, and would be fired against a target boat. Because the use of target boats with inert munitions does not have an acoustic component, it would not take any marine mammals, and is therefore not discussed further.

Table 1. Summary of Proposed Testing at the PMRF from 2017 to 2021.

Type of Munition	Live or Inert	NEW (lb)	Type of Aircraft	Detonation Scenario	Number of Proposed Releases				
					2017	2018	2019	2020	2021
JASSM/JASSM-ER	Live	300	Bomber, Fighter	Surface	6	6	6	6	6
SDB-I	Live	37	Bomber, Fighter	Surface	30	30	30	30	30
SDB-II	Live	23	Bomber, Fighter	Surface	30	30	30	30	30
HARM	Live	45	Fighter	Surface	10	10	10	10	10
JDAM/LJDAM	Live	192	Bomber, Fighter	Subsurface[1]	30	30	30	30	30
MALD/MALD-J	Inert	N/A	Fighter	N/A	4	4	4	4	4

HARM = High Anti-Radiation Missile; JASSM = Joint Air-to-Surface Standoff Missile; JASSM-ER = Joint Air-to-Surface Standoff Missile – Extended Range; JDAM = Joint Direct Attack Munition; lb = pounds; LJDAM = Laser Joint Direct Attack Munition; MALD = Miniature Air Launched Decoy; MALD-J = Miniature Air Launched Decoy – Jamming; N/A = not applicable (inert); SDB = Small Diameter Bomb

[1]Assumes a 10-millisecond time-delayed fuse resulting in detonation occurring at an approximate 10-foot water depth.

Description of Marine Mammals in the Area of the Specified Activity

There are 25 marine mammal species with potential or confirmed occurrence in the proposed activity area; however, not all of these species occur in this region during the project timeframe. Table 2 lists and summarizes key information regarding stock status and abundance of these species. Please see NMFS' draft 2016 Stock Assessment Reports (SAR), available at *www.nmfs.noaa.gov/pr/sars* for more detailed accounts of these stocks' status and abundance.

Table 2. Marine Mammals that could occur in the BSURE Area.

Species	Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance (CV, Nmin, most recent	PBR[3]	Occurrence in BSURE Area

			abundance survey)[2]		
Order Cetartiodactyla – Cetacea – Superfamily Mysticeti (baleen whales)					
Family: Balaenopteridae					
Humpback whale (*Megaptera novaeangliae*)[4]	Central North Pacific	N; Y	10,103 (0.300; 7,890; 2006)	83	Seasonal; throughout known breeding grounds during winter and spring (most common November through April)
Blue Whale (*Balaenoptera musculus)*	Central North Pacific	Y; Y	81 (1.14; 38; 2010)	0.1	Seasonal; infrequent winter migrant; few sightings, mainly fall and winter; considered rare
Fin whale (*Balaenoptera physalus*	Hawaii	Y; Y	58 (1.12; 27; 2010)	0.1	Seasonal, mainly fall and winter; considered rare
Sei whale (*Balaenoptera borealis)*	Hawaii	Y; Y	178 (0.90; 93; 2010)	0.2	Rare; limited sightings of seasonal migrants that feed at higher latitudes
Bryde's whale (*Balaenoptera brydei/edeni)*	Hawaii	-; N	798 (0.28; 633; 2010)	6.3	Uncommon; distributed throughout the Hawaiian Exclusive Economic Zone
Minke whale (*Balaenoptera acutorostrata)*	Hawaii	-; N	n/a (n/a; n/a; 2010)	Undet.	Regular but seasonal (October-April)
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)					
Family: Physeteridae					
Sperm whale (*Physeter macrocephalus*)	Hawaii	Y; Y	3,354 (0.34; 2,539; 2010)	10.2	Widely distributed year round; more likely in waters > 1,000 m depth, most often > 2,000 m
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)					
Family: Kogiidae					
Pygmy sperm whale (*Kogia breviceps*)	Hawaii	-; N	n/a (n/a; n/a; 2010)	Undet.	Widely distributed year round; more likely in waters > 1,000 m depth
Dwarf sperm whale (*Kogia sima*)	Hawaii	-; N	n/a (n/a; n/a; 2010)	Undet.	Widely distributed year round; more likely in waters > 500 m depth
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)					
Family delphinidae					
Killer whale (*Orcinus orca*)	Hawaii	-; N	101 (1.00; 50; 2010)	1	Uncommon; infrequent sightings
False killer whale (*Pseudorca crassidens*)	Hawaii Pelagic	-; N	1,540 (0.66; 928; 2010)	9.3	Regular
	NWHI Stock	-; N	617 (1.11; 290; 2010)	2.3	Regular
Pygmy killer whale	Hawaii	-; N	3,433 (0.52;	23	Year-round resident

(*Feresa attenuata*)			2,274; 2010)		
Short-finned pilot whale (*Globicephala macrorhynchus*)	Hawaii	-; N	12,422 (0.43; 8,872; 2010)	70	Commonly observed around Main Hawaiian Islands and Northwestern Hawaiian Islands
Melon headed whale (*Peponocephala electra*)	Hawaii Islands stock	-; N	5,794 (0.20; 4,904; 2010)	4	Regular
Bottlenose dolphin (*Tursiops truncatus*)	Hawaii pelagic	-; N	5,950 (0.59; 3,755; 2010)	38	Common in deep offshore waters
Pantropical spotted dolphin (*Stenella attenuata*)	Hawaii pelagic	-; N	15,917 (0.40; 11,508; 2010)	115	Common; primary occurrence between 100 and 4,000 m depth
Striped dolphin (*Stenella coeruleoala*)	Hawaii	-; N	20,650 (0.36; 15,391; 2010)	154	Occurs regularly year round but infrequent sighting during survey
Spinner dolphin (*Stenella longirostris*)	Hawaii pelagic	-; N	n/a (n/a; n/a; 2010)	Undet.	Common year-round in offshore waters
Rough-toothed dolphins (*Steno bredanensis*)	Hawaii stock	-; N	6,288 (0.39; 4,581; 2010)	46	Common throughout the Main Hawaiian Islands and Hawaiian Islands EEZ
Fraser's dolphin (*Lagenodelphis hosei*)	Hawaii	-; N	16,992 (0.66; 10,241; 2010)	102	Tropical species only recently documented within Hawaiian Islands EEZ (2002 survey)
Risso's dolphin (*Grampus griseus*)	Hawaii	-; N	7,256 (0.41; 5,207; 2010)	42	Previously considered rare but multiple sightings in Hawaiian Islands EEZ during various surveys conducted from 2002-2012
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)					
Family:Ziphiidae					
Cuvier's beaked whale (*Ziphius cavirostris*)	Hawaii	-; N	1,941 (n/a; 1,142; 2010)	11.4	Year-round occurrence but difficult to detect due to diving behavior
Blainville's beaked whale (*Mesoplodon densirostris*)	Hawaii	-; N	2,338 (1.13; 1,088; 2010)	11	Year-round occurrence but difficult to detect due to diving behavior
Longman's beaked whale (*Indopacetus pacificus*)	Hawaii	-; N	4,571 (0.65; 2,773; 2010)	28	Considered rare; however, multiple sightings during 2010 survey
Order – Carnivora — Superfamily Pinnipedia (seals, sea lions)					
Family: Phocidae					
Hawaiian monk seal (*Neomonachus*	Hawaii	Y; Y	1,112 (n/a; 1,088; 2013)	Undet.	Predominantly occur at Northwestern

schauinslandi)					Hawaiian Islands; approximately 138 individuals in Main Hawaiian Islands

[1]Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR (see footnote 3) or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

[2]CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance. In some cases, CV is not applicable. For certain stocks, abundance estimates are actual counts of animals and there is no associated CV. The most recent abundance survey that is reflected in the abundance estimate is presented; there may be more recent surveys that have not yet been incorporated into the estimate. All values presented here are from the 2015 Pacific SARs, except humpback whales- see comment 4.

[3]Potential biological removal (PBR), defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population size (OSP).

[4]Values for humpback whales are from the 2015 Alaska SAR.

Of these 25 species, 5 are listed as endangered under the Endangered Species Act (ESA) and as depleted throughout their range under the MMPA. These are: blue whale, fin whale, sei whale, sperm whale, and the Hawaiian monk seal. Only one of these species, the sei whale, may be impacted by 86 FWS’s activities.

Of the 25 species that may occur in Hawaiian waters, only certain stocks occur in the impact area during the season in which LRS WSEP activities may occur. Sixteen species are considered likely to be in the impact area during the five days of project activities. Although sperm whales are frequently detected in this area and have even been satellite-tagged with presence in this area of the PMRF (Baird 2016), because of the low density of this species and the short duration of mission activities, take was not requested for this species. Similarly, large baleen whales like the fin and blue whales occur in this area in all or most months of the year; however, their densities during the time of the 86 FWS’s activities are very low (or 0) that the probability they will be impacted by the mission activities during the 4 hours per day on the 5 days over the course of the year is minimal, and no take was modeled or requested for these species.

We have reviewed 86 FWS's species descriptions, including life history information, distribution, regional distribution, diving behavior, and acoustics and hearing, for accuracy and completeness. We refer the reader to Sections 3 and 4 of 86 FWS's application and to Chapter 3 in 86 FWS's EA, rather than reprinting the information here.

Below, for those 16 species that are likely to be taken by the activities described, we offer a brief introduction to the species and relevant stock as well as available information regarding population trends and threats, and describe any information regarding local occurrence.

Humpback whale

Humpback whales are found worldwide in all ocean basins. In winter, most humpback whales occur in the subtropical and tropical waters of the Northern and Southern Hemispheres (Muto *et al.*, 2015). These wintering grounds are used for mating, giving birth, and nursing new calves. Humpback whales migrate nearly 3,000 mi (4,830 km) from their winter breeding grounds to their summer foraging grounds in Alaska.

There are five stocks of humpback whales, one of which occurs in Hawaii: the Central North Pacific Stock, which consists of winter/spring populations in the Hawaiian Islands, which migrate primarily to northern British Columbia/Southeast Alaska, the Gulf of Alaska, and the Bering Sea/Aleutian Islands (Muto *et al*., 2015). The current abundance estimate for the Central North Pacific stock is 10,103 animals, with potential biological removal (PBR) at 83 animals, and this stock is considered a strategic stock (Muto *et al.*, 2015). Humpback whales occur seasonally in Hawaii, with peak sightings between December and May each year; however, sightings have occurred in other months in very low numbers. Most humpback whales congregate off the island of Maui in the shallow protected waters, but can be seen off all of the islands, including the Northwestern Hawaiian Islands (Baird 2016).

Humpback whales were listed as endangered under the Endangered Species Conservation Act (ESCA) in June 1970. In 1973, the ESA replaced the ESCA, and humpbacks continued to be listed as endangered. NMFS recently evaluated the status of the species, and on September 8, 2016, NMFS divided the species into 14 distinct population segments (DPS), removed the current species-level listing, and in its place listed four DPSs as endangered and one DPS as threatened (81 FR 62259, September 8, 2016). The remaining nine DPSs were not listed. There is one DPS that occurs in the action area: the Hawaii DPS, which is not listed under the ESA (81 FR 62259). Because this rule resulted in the designation of DPSs in the North Pacific, a parallel revision of MMPA population structure in the North Pacific is currently being considered.

Sei whale

Sei whales occur seasonally in Hawaii in the winter and spring months and feed in higher latitude feeding grounds in the summer and fall (Carretta *et al*., 2014). Sightings of this species are rare in Hawaii. This species stays offshore of the islands in deeper waters (Baird 2016). Average group size for this species is 3.1 animals (Bradford *et al.*, 2017).

The abundance estimate for this stock from a 2010 survey is 178 animals (Carretta *et al*., 2014). More recent estimates, based on the 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, estimate the Hawaii stock of sei whales to be 391 individuals (Bradford *et al.*, 2017). PBR is currently 0.2 sei whales per year (Carretta *et al*., 2014). The main threats to this stock are fisheries interactions and increasing levels of anthropogenic sound in the ocean (Carretta *et al*., 2014). This stock is listed as endangered under the ESA, and is considered a depleted and strategic stock under the MMPA.

Minke whale

Minke whales occur seasonally in Hawaii (Carretta *et al*., 2014). Sightings of this species are rare; however, acoustic detection of their “boing” sounds are common. An acoustic study from 2007-2008 at a location 100 km north of the island of Oahu detected boings throughout the winter and spring months from October until May, with a peak in March (Baird 2016).

The current abundance estimate for this stock is unknown and, therefore, PBR is also unknown (Carretta *et al*., 2014). There is insufficient data to determine trends in the population. The main threat to this stock is the increasing level of anthropogenic sound in the ocean (Carretta *et al*., 2014). This stock is not listed as endangered or threatened under the ESA and is not considered strategic or designated as depleted under the MMPA (Carretta *et al*., 2014).

Pygmy sperm whale

Pygmy sperm whales are found in tropical and warm-temperate waters throughout the world (Ross and Leatherwood 1994). This species prefers deeper waters with observations of this species in greater than 4,000 m depth (Baird *et al.,* 2013); and, based on stomach contents from stranded individuals, pygmy sperm whales forage between 600 and 1,200 m depth (Baird 2016). Sightings are rare of this species, but observations include lone individuals or pairs, with an average group size of 1.5 individuals (Baird 2016).

There is a single stock of Pygmy sperm whales in Hawaii. Current abundance estimates for this stock are unknown. A 2002 survey in Hawaii estimated 7,138 animals; however, this data is outdated and is no longer used. PBR cannot be calculated due to insufficient data. (Carretta *et al*., 2014). The main threats to this species are fisheries interactions and effects from underwater sounds such as active sonar (Carretta *et al.,* 2014). This stock is not listed as endangered or threatened under the ESA and is not considered strategic or designated as depleted under the MMPA (Carretta *et al.*, 2014).

Dwarf sperm whale

Dwarf sperm whales are found throughout the world in tropical to warm-temperate waters (Carretta *et al*., 2014). They are usually found in waters deeper than 500 m, most often sighted in depths between 500 and 1,000 m, but they have been documented in depths as shallow as 106 m and as deep as 4,700 m (Baird 2016). This species is often alone or in small groups of up to two to four individuals (average group size of 2.7 individuals), with a maximum observed group size of eight individuals (Baird 2016). When there are more than two animals together, they are often loosely associated, with up to several hundred meters between pairs of individuals (Baird 2016).

There is one stock of dwarf sperm whales in Hawaii. Sighting data suggests a small resident population off Hawaii Island (Baird 2016). There are no current abundance estimates for this stock. In 2002, a survey off Hawaii estimated the abundance at 17,159; however, this data is outdated and is no longer used. PBR cannot be calculated due to insufficient data. It has been suggested that this species is probably one of the more abundant species of cetaceans in Hawaiian waters (Baird 2016). One of their main threats is interactions with fisheries; however, dwarf sperm whales are also sensitive to high-intensity underwater sounds and navy sonar testing. This stock is not listed as endangered under the ESA and is not considered strategic or designated as depleted under the MMPA (Carretta *et al*., 2014).

Pygmy killer whale

Pygmy killer whales are found in tropical and subtropical waters. The Hawaii stock occurs year round in Hawaii and has a small resident population within the main Hawaiian islands (Carretta *et al.,* 2014). This resident group stays within 20 km of shore (Carretta *et al.*, 2014) in water depths between 500 and 3,500 m (Baird 2016), while other populations may move farther offshore. The resident population is less common off the islands of Kauai and Niihau (Baird 2016). This stock forms stable social groups, with group sizes ranging from 2 to 33 individuals, and with average group sizes of 9 individuals (Baird 2016). Other research suggests a larger average group size of 25.7 animals (Bradford *et al.*, 2017), but most of these sightings were farther offshore in pelagic waters.

The most recent abundance estimate for this group in the SAR is 3,433 animals with PBR at 23 animals (Carretta *et al.*, 2014). More recently, the abundance estimate for this stock, based on a 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, is 10,640 animals (Bradford *et al.*, 2017). The main threats for this stock include fisheries interactions and increases in underwater sound in the ocean (Carretta *et al.*, 2014). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.*, 2014).

Short-finned pilot whale

Short-finned pilot whales are found primarily in tropical and warm-temperate waters (Carretta *et al.*, 2014). This species prefers deeper waters, ranging from 324 m to 4,400 m, with most sightings between 500 m and 3,000 m (Baird 2016). There are multiple resident populations in Hawaii, with small home ranges around one or two islands, as well as a pelagic population (Baird 2016). This stock forms stable social groups, with average group size of 18 individuals, but may form large aggregations of close to 200 individuals (Baird 2016). Other research suggests a larger average group size of 40.9 individuals (Bradford *et al.*, 2017), but most of these sightings were farther offshore in pelagic waters.

The most recent abundance estimate for this group in the SAR is 12,422 animals with PBR at 70 animals (Carretta *et al.,* 2014). More recently, the abundance estimate for this stock, based on a 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, is 19,503 animals (Bradford *et al.,* 2017). The main threat to this stock is interactions with fisheries (Carretta *et al.*, 2014). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.*, 2014).

Melon-headed whale

Melon-headed whales are found in tropical and warm-temperate waters (Carretta *et al.,* 2014). There are two demographically-independent populations in Hawaii, the Hawaiian Islands stock and the Kohala resident stock (Carretta *et al.*, 2014). The resident stock have a small range restricted to the shallow waters around Hawaii Island, whereas the Hawaiian Islands stock are found all throughout the islands and out into the pelagic areas (Carretta *et al*., 2014). Only the latter stock may be affected by 86 FWS's activities. This stock prefers waters deeper than 1,000 m (Baird 2016). This species forms large groups, with average group size of almost 250 individuals, with the largest group documented at close to 800 individuals (Baird 2016). Other research suggests a smaller average group size of 153 individuals (Bradford *et al.,* 2017).

The most recent abundance estimate for this stock in the SAR is 2,860 animals with PBR at 49 animals (Carretta *et al.,* 2014). More recently, the abundance estimate for this stock, based on a 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, is 8,666 individuals (Bradford *et al*., 2017). The main threat to this species is human induced, most likely through fisheries interactions (Carretta *et al.,* 2014) and mid-frequency sonar testing (Baird 2016). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.,* 2014).

Bottlenose dolphin

Bottlenose dolphins are found in tropical to warm-temperate waters (Carretta *et al*., 2014). They are common throughout the Hawaiian Islands, with coastal and offshore forms, and with limited range movements between islands and offshore waters (Carretta *et al.,* 2014). There are four resident populations: 1) Kauai/Niihau, 2) Oahu, 3) the 4-island region, and 4) Hawaii; as well as one pelagic stock, which is separated by the 1,000 m isobaths (Carretta *et al.,* 2014). Only the pelagic population is considered here. Average group size of bottlenose dolphins is 33.5 individuals (Bradford *et al.,* 2017).

The most recent abundance estimate for the pelagic stock in the SAR is 3,755 animals with PBR at 38 animals (Carretta *et al.*, 2014). More recently, the abundance estimate for all of the stocks in Hawaii, based on a 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, is 21,815 individuals (Bradford *et al*., 2017); however, this may be an overestimate since most of the sightings were in the Northwestern Hawaiian Islands (Baird 2016). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.,* 2014).

Pantropical spotted dolphin

Pantropical spotted dolphins are found in tropical and subtropical waters (Carretta *et al.,* 2014). There are four stocks in Hawaii: 1) the Oahu stock, 2) the 4-Island stock, 3) the Hawaii Island stock, and 4) the Hawaii pelagic stock. Only the pelagic stock is considered here. This species prefers deeper waters between 1,500 m and 3,000 m (Baird 2016). This species forms large groups with average group size of 60 individuals, with the largest group estimated at 400 individuals (Baird 2016). Other research suggests a smaller average group size of 43.2 individuals (Bradford *et al.,* 2017).

The most recent abundance estimate for the pelagic stock in the SAR is 15,917 animals with PBR at 115 animals (Carretta *et al.,* 2014). More recently, the abundance estimate for all of the stocks in Hawaii, based on a 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, is 55,795 individuals (Bradford *et al*., 2017). The main threat to this species is interactions with fisheries (Baird 2016). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.,* 2014).

Striped dolphin

Striped dolphins are found in tropical to warm-temperate waters (Carretta *et al.,* 2014). There is one stock of striped dolphins in Hawaii. This is a deep water species, preferring depths greater than 3,500 m (Baird 2016). This species forms large groups, with an average group size of 28 individuals, and a maximum group size of 100 individuals (Baird 2016). Other research suggests a larger average group size of 52.6 individuals (Bradford *et al.,* 2017).

The most recent abundance estimate for the pelagic stock in the SAR is 20,651 animals with PBR at 154 animals (Carretta *et al.,* 2014). More recently, the abundance estimate for all of the stocks in Hawaii, based on a 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, is 61,201 individuals (Bradford *et al*., 2017). The main threat to this species is disease (Carretta *et al.,* 2014). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.,* 2014).

Spinner dolphin

Spinner dolphins are found in tropical and warm-temperate waters (Carretta *et al.*, 2014). There are six stocks in the main Hawaiian islands: 1) Kauai/Niihau stock, 2) Oahu and the 4-Islands region, 3) Hawaii island stock, 4) Pearl & Hermes Reef, 5) Kure/Midway, and 6) pelagic stock. The boundary between the island-associated stocks and the pelagic stock is 10 nmi from shore (Carretta *et al.*, 2014). Only the pelagic stock is considered here. The offshore stock is rarely sighted (Baird 2016), and most of the deep water activity is at night when they feed. The average group size for this species is 30 individuals with larger groups of nearly 300 animals observed (Baird 2016).

The most recent abundance estimate for the pelagic stock in the SAR is 3,351 animals from a 2002 survey, which is outdated (Carretta *et al.*, 2014). The main threat to this species is the constant interactions with humans during the day-time when they are resting (Carretta *et al.*, 2014; Baird 2016). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.*, 2014).

Rough-toothed dolphin

Rough-toothed dolphins are found in tropical and warm-temperate waters (Carretta *et al.*, 2014). While there is evidence for two island-associated stocks and one pelagic stock in Hawaii, there is only one stock designated for Hawaii (Carretta *et al.*, 2014). Most sightings of this species off Kauai are in water depths of less than 1,000 m; however, it is the most often sighted species in depths greater than 3,000 m (Baird 2016). This species forms stable associations as part of larger groups, with average group sizes of 11 animals and maximum group sizes, observed off Kauai, of 140 individuals (Baird 2016). Other research suggests a larger average group size of 25.3 individuals (Bradford *et al.*, 2017).

The most recent abundance estimate for the pelagic stock in the SAR is 6,288 animals with PBR at 46 animals (Carretta *et al.*, 2014). More recently, the abundance estimate for all of the stocks in Hawaii, based on a 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, is 72,528 individuals (Bradford *et al*., 2017). The main threat to this species is interactions with fisheries (Carretta *et al.*, 2014). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.*, 2014).

Fraser's dolphin

Fraser's dolphin are found in tropical waters (Carretta *et al.*, 2011). This is a deep water species occurring offshore of the Hawaiian islands, with sightings occurring in water depths between 1,515 m and 4,600 m (Baird 2016). This species forms large groups with average group sizes between 75 and 110 individuals (Baird 2016). Other research suggests a larger average group size of 283.3 individuals (Bradford *et al.*, 2017).

The most recent abundance estimate for the pelagic stock in the SAR is 10,226 animals with PBR at 47 animals (Carretta *et al.*, 2011). More recently, the abundance estimate for all of the stocks in Hawaii, based on a 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, is 51,491 individuals (Bradford *et al*., 2017). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.*, 2011).

Risso's dolphin

Risso's dolphins are found in tropical to warm-temperate waters (Carretta *et al.*, 2014). This is a deep water species, often found in depths greater than 3,000 m, and with the highest sighting rate in depths greater than 4,500 m (Baird 2016). This species forms small groups, with an average group size of 4 individuals, and a maximum group size of 25 individuals off the coast of Hawaii (Baird 2016). Other research, which was conducted offshore, suggests a larger average group size of 26.6 individuals (Bradford *et al.,* 2017), which may be more representative of this species since they occur more often offshore in deeper waters.

The most recent abundance estimate for the pelagic stock in the SAR is 7,256 animals with PBR at 42 animals (Carretta *et al.,* 2014). More recently, the abundance estimate for all of the stocks in Hawaii, based on a 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, is 11,613 individuals (Bradford *et al*., 2017). The main threat to this species is interactions with fisheries (Carretta *et al.,* 2014). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.,* 2014).

Longman's beaked whale

Longman's beaked whales are found in tropical waters from the eastern Pacific westward through the Indian Ocean to the eastern coast of Africa (Carretta *et al*., 2014). There is one stock in Hawaii. Group sizes range from 18 to 110 individuals (Baird 2016), with an average group size of 59.8 individuals (Bradford *et al.,* 2017).

The most recent abundance estimate for the pelagic stock in the SAR is 4,571 animals with PBR at 28 animals (Carretta *et al.,* 2014). More recently, the abundance estimate for all of the stocks in Hawaii, based on a 2010 survey pooled with sightings collected during previous NMFS surveys of the eastern Pacific, is 7,619 individuals (Bradford *et al*., 2017). The main threats to this species are interactions with fisheries and increasing sounds in the ocean, including military sonar (Carretta *et al.,* 2014). This stock is not listed as endangered or threatened under the ESA and is not considered a depleted or strategic stock under the MMPA (Carretta *et al.*, 2014).

Potential Effects of the Specified Activity on Marine Mammals and Their Habitat

This section includes a summary and discussion of the ways that components (*e.g.*, munition strikes and detonation effects) of the specified activity, including mitigation, may impact marine mammals and their habitat. The *Estimated Take by Incidental Harassment* section later in this document will include a quantitative analysis of the number of individuals that we expect 86 FWS to take during this activity. The *Negligible Impact Analysis* section will include the analysis of how this specific activity would impact marine mammals, and will consider the content of this section, the *Estimated Take by Incidental Harassment* section, and the *Proposed Mitigation* section to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals, and from that on the affected marine mammal populations or stocks. In the following discussion, we provide general background information on sound and marine mammal hearing before considering potential effects on marine mammals from sound produced by surface detonations.

Description of Sound Sources and WSEP Sound Types

Sound travels in waves, the basic components of which are frequency, wavelength, velocity, and amplitude. Frequency is the number of pressure waves that pass by a reference point per unit of time and is measured in hertz (Hz) or cycles per second. Wavelength is the distance between two peaks of a sound wave. Amplitude is the height of the sound pressure wave or the “loudness” of a sound, and is typically measured using the decibel (dB) scale. A dB is the ratio between a measured pressure (with sound) and a reference pressure (sound at a constant pressure, established by scientific standards). It is a logarithmic unit that accounts for large variations in amplitude; therefore, relatively small changes in dB ratings correspond to large changes in sound pressure. When referring to sound pressure levels (SPLs; the sound force per unit area), sound is referenced in the context of underwater sound pressure to 1 microPascal (μPa). One pascal is the pressure resulting from a force of one newton exerted over an area of one square meter. The source level (SL) represents the sound level at a distance of 1 m from the source (referenced to 1 μPa). The received level is the sound level at the listener's position. Note that we reference all underwater sound levels in this document to a pressure of 1 μPa, and all airborne sound levels in this document are referenced to a pressure of 20 μPa.

Root mean square (rms) is the quadratic mean sound pressure over the duration of an impulse. Rms is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average (Urick 1983). Rms accounts for both positive and negative values; squaring the pressures makes all values positive so that one can account for the values in the summation of pressure levels (Hastings and Popper, 2005). This measurement is often used in the context of discussing behavioral effects, in part because behavioral effects, which often result from auditory cues, may be better expressed through averaged units than by peak pressures.

When underwater objects vibrate or activity occurs, sound-pressure waves are created. These waves alternately compress and decompress the water as the sound wave travels. Underwater sound waves radiate in all directions away from the source (similar to ripples on the surface of a pond), except in cases where the source is directional. The compressions and decompressions associated with sound waves are detected as changes in pressure by aquatic life and man-made sound receptors such as hydrophones.

Even in the absence of sound from the specified activity, the underwater environment is typically loud due to ambient sound. Ambient sound is defined as environmental background sound levels lacking a single source or point (Richardson *et al*., 1995), and the sound level of a region is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.*, waves, earthquakes, ice, and atmospheric sound), biological (*e.g.*, sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (*e.g.*, vessels, dredging, aircraft, and construction). A number of sources contribute to ambient sound, including the following (Richardson *et al*., 1995):

- Wind and waves: The complex interactions between wind and water surface, including processes such as breaking waves and wave-induced bubble oscillations and cavitation, are a main source of naturally occurring ambient noise for frequencies between 200 Hz and 50 kHz (Mitson 1995). In general, ambient sound levels tend to increase with increasing wind speed and wave height. Surf noise becomes important near shore, with measurements collected at a distance of 8.5 km from shore showing an increase of 10 dB in the 100 to 700 Hz band during heavy surf conditions.
- Precipitation: Sound from rain and hail impacting the water surface can become an important component of total noise at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times.
- Biological: Marine mammals can contribute significantly to ambient noise levels, as can some fish and shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz.

- Anthropogenic: Sources of ambient noise related to human activity include transportation (surface vessels and aircraft), dredging and construction, oil and gas drilling and production, seismic surveys, sonar, explosions, and ocean acoustic studies. Shipping noise typically dominates the total ambient noise for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic sounds are below 1 kHz; and, if higher frequency sound levels are created, they attenuate rapidly (Richardson *et al*., 1995). Sound from identifiable anthropogenic sources other than the activity of interest (*e.g.*, a passing vessel) is sometimes termed background sound as opposed to ambient sound.

The sum of the various natural and anthropogenic sound sources at any given location and time – which comprise “ambient” or “background” sound – depends not only on the source levels (as determined by current weather conditions and levels of biological and shipping activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor and is frequency-dependent. As a result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10-20 dB from day to day (Richardson *et al*., 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

The sounds produced by the proposed WSEP activities are considered impulsive, which is one of two general sound types, the other being non-pulsed. The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g.*, Ward, 1997 in Southall *et al*., 2007). Please see Southall *et al*. (2007) for an in-depth discussion of these concepts.

Impulsive sound sources (*e.g.*, explosions, gunshots, sonic booms, and impact pile driving) produce signals that are brief (typically considered to be less than one second), broadband, atonal transients (ANSI 1986; Harris, 1998; NIOSH 1998; ISO 2003), and occur either as isolated events or repeated in some succession. These sounds have a relatively rapid rise from ambient pressure to a maximal pressure value followed by a rapid decay period that may include a period of diminishing, oscillating maximal and minimal pressures, and generally have an increased capacity to induce physical injury as compared with sounds that lack these features.

Marine Mammal Hearing

When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Current data indicate that not all marine mammal species have equal hearing capabilities (Richardson *et al*., 1995; Southall *et al*., 1997; Wartzok and Ketten, 1999; Au and Hastings, 2008).

Animals are less sensitive to sounds at the outer edges of their functional hearing range and are more sensitive to a range of frequencies within the middle of their functional hearing range. For mid-frequency cetaceans, functional hearing estimates occur between approximately 150 Hz and 160 kHz, with best hearing estimated to occur between approximately 10 to less than 100 kHz (Finneran *et al*., 2005 and 2009, Natchtigall *et al*., 2005 and 2008; Yuen *et al*., 2005; Popov *et al*., 2010 and 2011; and Schlundt *et al*., 2011).

On August 4, 2016, NMFS released its Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (81 FR 51694). This new guidance established new thresholds for predicting onset of temporary (TTS) and permanent threshold shifts (PTS) for impulsive (*e.g.*, explosives and impact pile drivers) and non-impulsive (*e.g.*, vibratory pile drivers) sound sources. These acoustic thresholds are presented using dual metrics of cumulative sound exposure level (SELcum) and peak sound level (PK) for impulsive sounds and SELcum for non-impulsive sounds. The lower and/or upper frequencies for some of these functional hearing groups have been modified from those designated by Southall *et al*. (2007), and the revised generalized hearing ranges are presented in the new Guidance. The functional hearing groups and the associated frequencies are indicated in Table 3 below.

Table 3. Marine mammal hearing groups and their generalized hearing range.

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* and *L. australis*)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz

***** Represents the generalized hearing range for the entire group as a composite (*i.e.*, all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al*., 2007) and PW pinniped (approximation).

There are sixteen marine mammal species with expected potential to co-occur with 86 FWS LRS WSEP military readiness activities. These species fall into the following hearing groups: 1) low-frequency cetaceans (humpback whale (*Megaptera novanglieae*), sei whale

(*Balaenoptera borealis*), and minke whale (*Balaenoptera acutorostrata*)); 2) mid-frequency cetaceans (Pygmy killer whale (*Feresa attenuata*), short-finned pilot whale (*Globicephala macrorhynchus*), melon-headed whale (*Peponocephala electra*), bottlenose dolphin (*Tursiops truncatus*), Pantropical spotted dolphin (*Stenella attenuata*), striped dolphin (*Stenella coeruleoala*), spinner dolphin (*Stenella longirostris*), rough-toothed dolphin (*Steno bredanensis*), Fraser's dolphin (*Lagenodelphis hosei*), Risso's dolphin (*Grampus griseus*), and Longman's beaked whale (*Indopacetus pacificus*)); and 3) high-frequency cetaceans (Pygmy sperm whale (*Kogia breviceps*), and dwarf sperm whale (*Kogia sima*)). There are no phocid or otariid species that will be impacted by 86 FWS's activities. A species' functional hearing group is a consideration when we analyze the effects of exposure to sound on marine mammals.

Acoustic Impacts

Please refer to the information given previously (*Description of Sound Sources*) regarding sound, characteristics of sound types, and metrics used in this document. Anthropogenic sounds cover a broad range of frequencies and sound levels and can have a range of highly variable impacts on marine life, from none or minor to potentially severe responses, depending on received levels, duration of exposure, behavioral context, and various other factors. The potential effects of underwater sound from active acoustic sources can potentially result in one or more of the following: temporary or permanent hearing impairment; non-auditory physical or physiological effects; behavioral disturbance; stress; and masking (Richardson *et al*., 1995; Gordon *et al*., 2004; Nowacek *et al*., 2007; Southall *et al*., 2007; Götz *et al*., 2009). The degree of effect is intrinsically related to the signal characteristics, received level, distance from the source, and duration of the sound exposure. In general, sudden, high level sounds can cause hearing loss, as can longer exposures to lower level sounds. Temporary or permanent loss of hearing will occur almost exclusively as a result of exposure to noise within an animal's hearing range. We first describe specific manifestations of acoustic effects before providing discussion specific to 86 FWS's activities.

Richardson *et al*. (1995) described zones of increasing intensity of effect that might be expected to occur, in relation to distance from a source and assuming that the signal is within an animal's hearing range. First is the area within which the acoustic signal would be audible (potentially perceived) to the animal, but not strong enough to elicit any overt behavioral or physiological response. The next zone corresponds with the area where the signal is audible to the animal and of sufficient intensity to elicit behavioral or physiological responsiveness. Third is a zone within which, for signals of high intensity, the received level is sufficient to potentially cause discomfort or tissue damage to auditory or other systems. Overlaying these zones to a certain extent is the area within which masking (*i.e.*, when a sound interferes with or masks the ability of an animal to detect a signal of interest that is above the absolute hearing threshold) may occur; the masking zone may be highly variable in size.

We describe the more severe effects (*i.e.*, certain non-auditory physical or physiological effects and mortality) only briefly as we do not expect that there is a reasonable likelihood that 86 FWS's activities may result in such effects (see below for further discussion). Marine mammals exposed to high-intensity sound, or to lower-intensity sound for prolonged periods, can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Kastak *et al*., 1999; Schlundt *et al*., 2000; Finneran *et al*., 2002, 2005b). TS can be permanent (PTS), in which case the loss of hearing sensitivity is not fully recoverable, or temporary (TTS), in which case the animal's hearing threshold would recover over time (Southall *et al*., 2007). Repeated sound exposure that leads to TTS could cause PTS. In severe cases of PTS, there can be total or partial deafness, while in most cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter 1985).

When PTS occurs, there is physical damage to the sound receptors in the ear (*i.e.*, tissue damage); whereas, TTS represents primarily tissue fatigue and is reversible (Southall *et al*., 2007). In addition, other investigators have suggested that TTS is within the normal bounds of physiological variability and tolerance and does not represent physical injury (*e.g.*, Ward 1997). Therefore, NMFS does not consider TTS to constitute auditory injury.

Relationships between TTS and PTS thresholds have not been studied in marine mammals – PTS data exists only for a single harbor seal (Kastak *et al*., 2008) – but are assumed to be similar to those in humans and other terrestrial mammals. PTS typically occurs at exposure levels at least several decibels above (a 40-dB threshold shift approximates PTS onset; *e.g.*, Kryter *et al*., 1966; Miller, 1974) that inducing mild TTS (a 6-dB threshold shift approximates TTS onset; *e.g.*, Southall *et al*., 2007). Based on data from terrestrial mammals, a precautionary assumption is that the PTS thresholds for impulse sounds (such as bombs) are at least 6 dB higher than the TTS threshold on a peak-pressure basis and PTS cumulative sound exposure level thresholds are 15 to 20 dB higher than TTS cumulative sound exposure level thresholds (Southall *et al*., 2007). Given the higher level of sound or longer exposure duration necessary to cause PTS as compared with TTS, it is considerably less likely that PTS could occur.

Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to high level underwater sound or as a secondary effect of extreme behavioral reactions (*e.g.*, change in dive profile as a result of an avoidance reaction) caused by exposure to sound include neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al*., 2006; Southall *et al*., 2007; Zimmer and Tyack, 2007). 86 FWS's activities involve the use of devices such as explosives that are associated with these types of effects; however, severe injury to marine mammals is not anticipated from these activities.

When a live or dead marine mammal swims or floats onto shore and is incapable of returning to sea, the event is termed a “stranding” (16 U.S.C. 1421h(3)). Marine mammals are known to strand for a variety of reasons, such as infectious agents, biotoxicosis, starvation, fishery interaction, ship strike, unusual oceanographic or weather events, sound exposure, or combinations of these stressors sustained concurrently or in series (*e.g.*, Geraci *et al*., 1999). However, the cause or causes of most strandings are unknown (*e.g.*, Best 1982). Combinations of dissimilar stressors may combine to kill an animal or dramatically reduce its fitness, even though one exposure without the other would not be expected to produce the same outcome (*e.g.*, Sih *et al*., 2004). For further description of stranding events see, *e.g.*, Southall *et al*., 2006; Jepson *et al*., 2013; Wright *et al*., 2013.

1. *Temporary threshold shift* – TTS is the mildest form of hearing impairment that can occur during exposure to sound (Kryter 1985). While experiencing TTS, the hearing threshold rises, and a sound must be at a higher level in order to be heard. In terrestrial and marine mammals, TTS can last from minutes or hours to days (in cases of strong TTS). In many cases, hearing sensitivity recovers rapidly after exposure to the sound ends. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals, and none of the data published at the time of this writing concern TTS elicited by exposure to multiple pulses of sound.

Marine mammal hearing plays a critical role in communication with conspecifics, and in interpretation of environmental cues for purposes such as predator avoidance and prey capture. Depending on the degree (elevation of threshold in dB), duration (*i.e.*, recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious. For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that occurs during a time where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts.

Currently, TTS data exist only for four species of cetaceans ((bottlenose dolphin, beluga whale (*Delphinapterus leucas*), harbor porpoise (*Phocoena phocoena*), and Yangtze finless porpoise (*Neophocoena asiaeorientalis*)) and three species of pinnipeds (northern elephant seal (*Mirounga angustirostris)*, harbor seal (*Phoca vitulina*), and California sea lion (*Zalophus californianus*)) exposed to a limited number of sound sources (*i.e.*, mostly tones and octave-band noise) in laboratory settings (*e.g.,* Finneran *et al*., 2002; Nachtigall *et al*., 2004; Kastak *et al*., 2005; Lucke *et al*., 2009; Popov *et al*., 2011). In general, harbor seals (Kastak *et al*., 2005; Kastelein *et al*., 2012a) and harbor porpoises (Lucke *et al*., 2009; Kastelein *et al*., 2012b) have a lower TTS onset than other measured pinniped or cetacean species. Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. There are no data available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset thresholds, please see Southall *et al*. (2007) and Finneran and Jenkins (2012).

2. *Behavioral effects* – Behavioral disturbance may include a variety of effects, including subtle changes in behavior (*e.g.*, minor or brief avoidance of an area or changes in vocalizations), more conspicuous changes in similar behavioral activities, and more sustained

and/or potentially severe reactions, such as displacement from or abandonment of high-quality habitat. Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g.*, species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, and time of day), as well as the interplay between factors (*e.g.*, Richardson *et al*., 1995; Wartzok *et al*., 2003; Southall *et al*., 2007; Weilgart, 2007; Archer *et al*., 2010). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al*., 2012), and can vary depending on characteristics associated with the sound source (*e.g.*, whether it is moving or stationary, number of sources, and distance from the source). Please see Appendices B-C of Southall *et al*. (2007) for a review of studies involving marine mammal behavioral responses to sound.

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al*., 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. It is important to note that habituation is appropriately considered as a "progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial," rather than as, more generally, moderation in response to human disturbance (Bejder *et al*., 2009). The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. As noted, behavioral state may affect the type of response. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al*., 1995; NRC, 2003; Wartzok *et al*., 2003). Controlled experiments with captive marine mammals have shown pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al*., 1997; Finneran *et al*., 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic airguns or acoustic harassment devices) have been varied, but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds, 2002; see also Richardson *et al*., 1995; Nowacek *et al*., 2007).

Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically how any given sound in a particular instance might affect marine mammals perceiving the signal. If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone to the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g.*, Lusseau and Bejder, 2007; Weilgart, 2007; NRC, 2005). There are broad categories of potential response, which we describe in greater detail here, that include alteration of dive behavior, alteration of foraging behavior, effects to breathing, interference with or alteration of vocalization, avoidance, and flight.

Changes in dive behavior can vary widely and may consist of increased or decreased dive times and surface intervals as well as changes in the rates of ascent and descent during a dive (*e.g.*, Frankel and Clark, 2000; Costa *et al*., 2003; Ng and Leung, 2003; Nowacek *et al*.; 2004; Goldbogen *et al.*, 2013a,b). Variations in dive behavior may reflect interruptions in biologically significant activities (*e.g.*, foraging), or they may be of little biological significance. The impact of an alteration to dive behavior resulting from an acoustic exposure depends on what the animal is doing at the time of the exposure and the type and magnitude of the response.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g.*, bubble nets or sediment plumes), or changes in dive behavior. As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g.*, Croll *et al*., 2001; Nowacek *et al*.; 2004; Madsen *et al*., 2006; Yazvenko *et al*., 2007). A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the affected individuals and the relationship between prey availability, foraging effort and success, and the life history stage of the animal.

Variations in respiration naturally vary with different behaviors, and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may be representative of annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater noise when determining the potential for impacts resulting from anthropogenic sound exposure (*e.g.*, Kastelein *et al*., 2001, 2005b, 2006; Gailey *et al*., 2007).

Marine mammals vocalize for different purposes and across multiple modes, such as whistling, echolocation click production, calling, and singing. Changes in vocalization behavior in response to anthropogenic noise can occur for any of these modes and may result from a need to compete with an increase in background noise or may reflect increased vigilance or a startle response. For example, in the presence of potentially masking signals, humpback whales and killer whales have been observed to increase the length of their songs (Miller *et al*., 2000; Fristrup *et al*., 2003; Foote *et al*., 2004), while right whales have been observed to shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks *et al*., 2007b). In some cases, animals may cease sound production during production of aversive signals (Bowles *et al*., 1994).

Avoidance is the displacement of an individual from an area or migration path as a result of the presence of a sound or other stressors, and is one of the most obvious manifestations of disturbance in marine mammals (Richardson *et al*., 1995). For example, gray whales are known to change direction – deflecting from customary migratory paths – in order to avoid noise from seismic surveys (Malme *et al*., 1984). Avoidance may be short-term, with animals returning to the area once the noise has ceased (*e.g.*, Bowles *et al*., 1994; Goold 1996; Stone *et al*., 2000; Morton and Symonds 2002; Gailey *et al*., 2007). Longer-term displacement is possible, however, which may lead to changes in abundance or distribution patterns of the affected species in the affected region if habituation to the presence of the sound does not occur (*e.g.*, Blackwell *et al*., 2004; Bejder *et al*., 2006; Teilmann *et al*., 2006).

A flight response is a dramatic change in normal movement to a directed and rapid movement away from the perceived location of a sound source. The flight response differs from other avoidance responses in the intensity of the response (*e.g.*, directed movement, and rate of travel). Relatively little information on flight responses of marine mammals to anthropogenic signals exist, although observations of flight responses to the presence of predators have occurred (Connor and Heithaus 1996). The result of a flight response could range from brief, temporary exertion and displacement from the area where the signal provokes flight to, in extreme cases, marine mammal strandings (Evans and England 2001). However, it should be noted that response to a perceived predator does not necessarily invoke flight (Ford and Reeves 2008), and whether individuals are solitary or in groups may influence the response.

Behavioral disturbance can also impact marine mammals in subtler ways. Increased vigilance may result in costs related to diversion of focus and attention (*i.e.*, when a response consists of increased vigilance, it may come at the cost of decreased attention to other critical behaviors such as foraging or resting). These effects have generally not been demonstrated for marine mammals, but studies involving fish and terrestrial animals have shown that increased vigilance may substantially reduce feeding rates (*e.g.*, Beauchamp and Livoreil 1997; Fritz *et al*., 2002; Purser and Radford 2011). In addition, chronic disturbance can cause population declines through reduction of fitness (*e.g.*, decline in body condition) and subsequent reduction in reproductive success, survival, or both (*e.g.*, Harrington and Veitch, 1992; Daan *et al*., 1996; Bradshaw *et al*., 1998). However, Ridgway *et al*. (2006) reported that increased vigilance in bottlenose dolphins exposed to sound over a five-day period did not cause any sleep deprivation or stress effects.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (24-hour cycle). Disruptions of such functions resulting from reactions to stressors such as sound exposure are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al*., 2007). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall *et al*., 2007). Note that there is a difference between multi-day substantive behavioral reactions and multi-day anthropogenic activities. For example, just because an activity lasts for multiple days does not necessarily mean that individual animals are either exposed to activity-related stressors for multiple days or, further, exposed in a manner resulting in sustained multi-day substantive behavioral responses.

3. *Stress responses* – An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.*, Seyle 1950; Moberg 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

Neuroendocrine stress responses often involve the hypothalamus-pituitary-adrenal system. Virtually all neuroendocrine functions that are affected by stress – including immune competence, reproduction, metabolism, and behavior – are regulated by pituitary hormones. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction, altered metabolism, reduced immune competence, and behavioral disturbance (*e.g.*, Moberg, 1987; Blecha, 2000). Increases in the circulation of glucocorticoids are also equated with stress (Romano *et al*., 2004).

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and "distress" is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments and for both laboratory and free-ranging animals (*e.g.*, Holberton *et al*., 1996; Hood *et al*., 1998; Jessop *et al*., 2003; Krausman *et al*., 2004; Lankford *et al*., 2005). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker 2000; Romano *et al*., 2002b) and, more rarely, studied in wild populations (*e.g.*, Romano *et al*., 2002a). For example, Rolland *et al*. (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as "distress." In addition, any animal experiencing TTS would likely also experience stress responses (NRC, 2003).

4. *Auditory masking* – Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (*e.g.*, those used for intraspecific communication and social interactions, prey detection, predator avoidance, and navigation) (Richardson *et al*., 1995). Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher intensity, and may occur whether the sound is natural (*e.g.*, snapping shrimp, wind, waves, and precipitation) or anthropogenic (*e.g.*, shipping, sonar, and seismic exploration) in origin. The ability of a noise source to mask biologically important sounds depends on the

characteristics of both the noise source and the signal of interest (*e.g.*, signal-to-noise ratio, temporal variability, and direction), in relation to each other and to an animal's hearing abilities (*e.g.*, sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions.

Under certain circumstances, marine mammals experiencing significant masking could also be impaired from maximizing their performance fitness in survival and reproduction. Therefore, when the coincident (masking) sound is man-made, it may be considered harassment when disrupting or altering critical behaviors. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but it may result in a behavioral effect.

The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. For example, low-frequency signals may have less effect on high-frequency echolocation sounds produced by odontocetes, but are more likely to affect detection of mysticete communication calls and other potentially important natural sounds such as those produced by surf and some prey species. The masking of communication signals caused by anthropogenic noise may be considered as a reduction in the communication space of animals (*e.g.*, Clark *et al*., 2009), and may result in energetic or other costs as animals change their vocalization behavior (*e.g.*, Miller *et al*., 2000; Foote *et al*., 2004; Parks *et al*., 2007b; Di Iorio and Clark, 2009; Holt *et al*., 2009). Masking can be reduced in situations where the signal and noise come from different directions (Richardson *et al*., 1995), through amplitude modulation of the signal, or through other compensatory behaviors (Houser and Moore 2014). Masking can be tested directly in captive species (*e.g.*, Erbe 2008), but in wild populations it must be either modeled or inferred from evidence of masking compensation. There are few studies addressing real-world masking sounds likely to be experienced by marine mammals in the wild (*e.g.*, Branstetter *et al*., 2013).

Masking affects both senders and receivers of acoustic signals and can potentially have long-term chronic effects on marine mammals at the population level as well as at the individual level. Low-frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, with most of the increase from distant commercial shipping (Hildebrand 2009). All anthropogenic sound sources, but especially chronic and lower-frequency signals (*e.g.*, from vessel traffic), contribute to elevated ambient sound levels, thus intensifying masking.

The LRS WSEP training exercises proposed for the incidental take of marine mammals have the potential to take marine mammals by exposing them to impulsive noise and pressure waves generated by live ordnance detonation at the surface of the water. Exposure to energy, pressure, or direct strike by ordnance has the potential to result in non-lethal injury (Level A harassment), disturbance (Level B harassment), serious injury, and/or mortality. In addition, NMFS also considered the potential for harassment from vessel and aircraft operations.

Acoustic Effects, Underwater

Explosive detonations at the water surface send a shock wave and sound energy through the water and can release gaseous by-products, create an oscillating bubble, or cause a plume of water to shoot up from the water surface. The shock wave and accompanying noise are of most concern to marine animals. Depending on the intensity of the shock wave and size, location, and depth of the animal, an animal can be injured, killed, suffer non-lethal physical effects, experience hearing related effects with or without behavioral responses, or exhibit temporary behavioral responses (*e.g*. flight responses, temporary avoidance) from hearing the blast sound. Generally, exposures to higher levels of impulse and pressure levels would result in greater impacts to an individual animal.

The effects of underwater detonations on marine mammals are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the sound; the depth of the water column; the substrate of the habitat; the standoff distance between activities and the animal; and the sound propagation properties of the environment. Thus, we expect impacts to marine mammals from LRS WSEP activities to result primarily from acoustic pathways. As such, the degree of the effect relates to the received level and duration of the sound exposure, as influenced by the distance between the animal and the source. The further away from the source, the less intense the exposure should be.

The potential effects of underwater detonations from the proposed LRS WSEP training activities may include one or more of the following: temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, and masking (Richardson *et al*., 1995; Gordon *et al*., 2004; Nowacek *et al*., 2007; Southall *et al*., 2007). However, the effects of noise on marine mammals are highly variable, often depending on species and contextual factors (based on Richardson *et al*., 1995).

In the absence of mitigation, impacts to marine species could result from physiological and behavioral responses to both the type and strength of the acoustic signature (Viada *et al*., 2008). The type and severity of behavioral impacts are more difficult to define due to limited studies addressing the behavioral effects of impulsive sounds on marine mammals.

Hearing Impairment and Other Physical Effects—Marine mammals exposed to high intensity sound repeatedly or for prolonged periods can experience hearing threshold shift. Given the available data, the received level of a single pulse (with no frequency weighting) might need to be approximately 186 dB re 1 μPa2-s (*i.e.*, 186 dB sound exposure level (SEL) or approximately 221-226 dB p-p (peak)) in order to produce brief, mild TTS. Exposure to several strong pulses that each have received levels near 190 dB rms (175-180 dB SEL) might result in cumulative exposure of approximately 186 dB SEL and thus slight TTS in a small odontocete, assuming the TTS threshold is (to a first approximation) a function of the total received pulse energy.

Non-auditory Physiological Effects—Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress and other types of organ or tissue damage (Cox *et al*., 2006; Southall *et al*., 2007).

Serious Injury/Mortality: 86 FWS proposes to use munitions in its training exercises that may detonate above, at, or slightly below the water surface. The explosions from these weapons would send a shock wave and blast noise through the water, release gaseous by-products, create an oscillating bubble, and cause a plume of water to shoot up from the water surface. The shock wave and blast noise are of most concern to marine animals. In general, potential impacts from explosive detonations can range from brief effects (such as short term behavioral disturbance), tactile perception, physical discomfort, slight injury of the internal organs, and death of the animal (Yelverton *et al*., 1973; O'Keeffe and Young 1984; DoN 2001). Physical damage of tissues resulting from a shock wave (from an explosive detonation) constitutes an injury. Blast effects are greatest at the gas-liquid interface (Landsberg 2000) and gas-containing organs, particularly the lungs and gastrointestinal tract, are especially susceptible to damage (Goertner 1982; Yelverton *et al*., 1973). Nasal sacs, larynx, pharynx, trachea, and lungs may be damaged by compression/expansion caused by the oscillations of the blast gas bubble (Reidenberg and

Laitman 2003). Severe damage (from the shock wave) to the ears can include tympanic membrane rupture, fracture of the ossicles, cochlear damage, hemorrhage, and cerebrospinal fluid leakage into the middle ear.

Non-lethal injury includes slight injury to internal organs and the auditory system; however, delayed lethality can be a result of individual or cumulative sublethal injuries (DoN 2001). Immediate lethal injury would be a result of massive combined trauma to internal organs as a direct result of proximity to the point of detonation (DoN 2001).

Disturbance Reactions

Because the few available studies show wide variation in response to underwater sound, it is difficult to quantify exactly how sound from the LRS WSEP operational testing would affect marine mammals. It is likely that the onset of surface detonations could result in temporary, short term changes in an animal's typical behavior and/or avoidance of the affected area. These behavioral changes may include (Richardson *et al*., 1995): changing durations of surfacing and dives, number of blows per surfacing, moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); or avoidance of areas where sound sources are located.

The biological significance of any of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However generally, one could expect the consequences of behavioral modification to be biologically significant if the change affects growth, survival, or reproduction. Significant behavioral modifications that could potentially lead to effects on growth, survival, or reproduction include:

- Drastic changes in diving/surfacing patterns (such as those thought to cause beaked whale stranding due to exposure to military mid-frequency tactical sonar);
- Habitat abandonment due to loss of desirable acoustic environment; and
- Cessation of feeding or social interaction.

The onset of behavioral disturbance from anthropogenic sound depends on both external factors (characteristics of sound sources and their paths) and the specific characteristics of the receiving animals (hearing, motivation, experience, demography) and is difficult to predict (Southall *et al*., 2007).

Auditory Masking

While it may occur temporarily, we do not expect auditory masking to result in detrimental impacts to an individual's or population's survival, fitness, or reproductive success. Dolphin movement is not restricted within the BSURE area, allowing for movement out of the area to avoid masking impacts, and the sound resulting from the detonations is short in duration. Also, masking is typically of greater concern for those marine mammals that utilize low frequency communications, such as baleen whales and, as such, is not likely to occur for marine mammals in the BSURE area.

Vessel and Aircraft Presence

The marine mammals most vulnerable to vessel strikes are slow-moving and/or spend extended periods of time at the surface in order to restore oxygen levels within their tissues after deep dives (*e.g*., North Atlantic right whales (*Eubalaena glacialis*), fin whales, and sperm whales). Smaller marine mammals are agile and move more quickly through the water, making them less susceptible to ship strikes. NMFS and 86 FWS are not aware of any vessel strikes of marine mammals within in BSURE area during training operations, and both parties do not anticipate that potential 86 FWS vessels engaged in the specified activity would strike any marine mammals.

Aircraft produce noise at frequencies that are well within the frequency range of cetacean hearing and also produce visual signals such as the aircraft itself and its shadow (Richardson *et al*., 1995, Richardson and Wursig, 1997). A major difference between aircraft noise and noise caused by other anthropogenic sources is that the sound is generated in the air, transmitted through the water surface and then propagates underwater to the receiver, diminishing the received levels significantly below what is heard above the water's surface. Sound transmission from air to water is greatest in a sound cone 26 degrees directly under the aircraft.

There are fewer reports of reactions of odontocetes to aircraft than those of pinnipeds. Responses to aircraft by pinnipeds include diving, slapping the water with pectoral fins or tail fluke, or swimming away from the track of the aircraft (Richardson *et al.*, 1995). The nature and degree of the response, or the lack thereof, are dependent upon the nature of the flight (*e.g*., type of aircraft, altitude, straight vs. circular flight pattern). Wursig *et al*. (1998) assessed the responses of cetaceans to aerial surveys in the north central and western Gulf of Mexico using a DeHavilland Twin Otter fixed-wing airplane. The plane flew at an altitude of 229 m (751.3 ft) at 204 km/hr (126.7 mph) and maintained a minimum of 305 m (1,000 ft) straight line distance from the cetaceans. Water depth was 100 to 1,000 m (328 to 3,281 ft). Bottlenose dolphins most commonly responded by diving (48 percent), while 14 percent responded by moving away. Other species (*e.g*., beluga (*Delphinapterus leucas*) and sperm whales) show considerable variation in reactions to aircraft but diving or swimming away from the aircraft are the most common reactions to low flights (less than 500 m; 1,640 ft).

Direct Strike by Ordnance

Another potential risk to marine mammals is direct strike by ordnance, in which the ordnance physically hits an animal. Although strike from an item at the surface of the water while the animals are at the surface is possible, the potential risk of a direct hit to an animal within the target area would be low. Marine mammals spend the majority of their time below the surface of the water, and the potential for one bomb or missile to hit that animal at that specific time is highly unlikely.

Anticipated Effects on Habitat

Detonations of live ordnance would result in temporary changes to the water environment. An explosion on the surface of the water from these weapons could send a shock wave and blast noise through the water, release gaseous by-products, create an oscillating bubble, and cause a plume of water to shoot up from the water surface. However, these effects would be temporary and not expected to last more than a few seconds. Similarly, 86 FWS does not expect any long-term impacts with regard to hazardous constituents to occur. The 86 FWS considered the introduction of fuel, debris, ordnance, and chemical materials into the water column within its EA and determined the potential effects of each to be insignificant. We summarize 86 FWS's analyses in the following paragraphs. For a complete discussion of potential effects, please refer to section 3.0 in 86 FWS's EA.

Metals typically used to construct bombs and missiles include aluminum, steel, and lead, among others. Aluminum is also present in some explosive materials. These materials would settle to the seafloor after munitions detonate. Metal ions would slowly leach into the substrate and the water column, causing elevated concentrations in a small area around the munitions fragments. Some of the metals, such as aluminum, occur naturally in the ocean at varying concentrations and would not necessarily impact the substrate or water column. Other metals, such as lead, could cause toxicity in microbial communities in the substrate. However, such effects would be localized to a very small distance around munitions fragments and would not significantly affect the overall habitat quality of sediments in the BSURE area. In addition, metal fragments would corrode, degrade, and become encrusted over time.

Chemical materials include explosive byproducts and also fuel, oil, and other fluids associated with remotely controlled target boats. Explosive byproducts would be introduced into the water column through detonation of live munitions. Explosive materials would include TNT and research department explosive (RDX), among others. Various byproducts are produced during and immediately after detonation of TNT and RDX. During the very brief time that a detonation is in progress, intermediate products may include carbon ions, nitrogen ions, oxygen ions, water, hydrogen cyanide, carbon monoxide, nitrogen gas, nitrous oxide, cyanic acid, and carbon dioxide (Becker 1995). However, reactions quickly occur between the intermediates, and the final products consist mainly of water, carbon monoxide, carbon dioxide, and nitrogen gas, although small amounts of other compounds are typically produced as well.

Chemicals introduced into the water column would be quickly dispersed by waves, currents, and tidal action, and eventually become uniformly distributed. A portion of the carbon compounds such as carbon monoxide and carbon dioxide would likely become integrated into the carbonate system (alkalinity and pH buffering capacity of seawater). Some of the nitrogen and carbon compounds, including petroleum products, would be metabolized or assimilated by phytoplankton and bacteria. Most of the gas products that do not react with the water or become assimilated by organisms would be released into the atmosphere. Due to dilution, mixing, and transformation, none of these chemicals are expected to have significant impacts on the marine environment.

Explosive material that is not consumed in a detonation could sink to the substrate and bind to sediments. However, the quantity of such materials is expected to be inconsequential. Research has shown that if munitions function properly, nearly full combustion of the explosive materials will occur, and only extremely small amounts of raw material will remain. In addition, any remaining materials would be naturally degraded. TNT decomposes when exposed to sunlight (ultraviolet radiation) and is also degraded by microbial activity (Becker 1995). Several types of microorganisms have been shown to metabolize TNT. Similarly, RDX decomposes by hydrolysis, ultraviolet radiation exposure, and biodegradation.

While we anticipate that the specified activity may result in marine mammals avoiding certain areas due to temporary ensonification, this impact to habitat and prey resources would be temporary and reversible. The main impact associated with the proposed activity would be temporarily elevated noise levels and the associated direct effects on marine mammals, previously discussed in this notice. Marine mammals are anticipated to temporarily vacate the area of live detonations. However, these events are usually of short duration, and animals are anticipated to return to the activity area during periods of non-activity. Thus, based on the preceding discussion, we do not anticipate that the proposed activity would have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations.

Proposed Mitigation

In order to issue an incidental take authorization (ITA) under section 101(a)(5)(A) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of affecting the least adverse impact practicable on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses.

The NDAA of 2004 amended the MMPA as it relates to military-readiness activities and the incidental take authorization process such that “least practicable adverse impact” shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

NMFS and 86 FWS have worked to identify potential practicable and effective mitigation measures, which include a careful balancing of the likely benefit of any particular measure to the marine mammals with the likely effect of that measure on personnel safety, practicality of implementation, and impact on the military-readiness activity. We refer the reader to Section 11 of 86 FWS’s application for more detailed information on the proposed mitigation measures, which include the following:

Timing Restriction: The 86 FWS will be restricted to certain times of the day and certain months of the year. All missions will occur on weekdays during daylight hours only. Missions will not occur during the months of January to May when transmission loss is greater due to winter/spring seasonal conditions and when marine mammal densities are higher.

Visual Aerial Surveys: For the LRS WSEP activities, mitigation procedures consist of visual aerial surveys of the impact area for the presence of protected marine species (including marine mammals). During aerial observation, Navy test range personnel may survey the area from an S-61N helicopter or C-62 aircraft that is based at the PMRF land facility (typically, when missions are located relatively close to shore). Alternatively, when missions are located farther offshore, surveys may be conducted from mission aircraft (typically jet aircraft such as F-15E, F-16, or F-22) or a U.S. Coast Guard C-130 aircraft.

Protected species surveys typically begin within one hour of weapon release and as close to the impact time as feasible, given human safety requirements. Survey personnel must depart the human hazard zone before weapon release, in accordance with Navy safety standards. Personnel conduct aerial surveys within an area defined by a maximum 8-mi (13 km) radius around the impact point with surveys typically flown in a star pattern. This survey distance is much larger than requirements for similar actions at the PMRF and what was accomplished for October 2016 missions. This expanded area would encompass the entire behavioral threshold ranges (SEL) for all mid-frequency cetaceans, the entire PTS threshold ranges (SEL) for low-frequency cetaceans and phocids, approximately 23 percent of the TTS threshold ranges (SEL) for low-frequency cetaceans and phocids, and about 64 percent of the PTS threshold range (SEL) for high-frequency cetaceans (pygmy and dwarf sperm whales) (Table 5). The survey distance would not cover the entire behavioral harassment ranges for low- and high-frequency cetaceans and phocids. Given operational constraints, surveying these larger areas would not be feasible.

Observers would consist of aircrew operating the C-26, S-61N, and C-130 aircraft from the PMRF and the Coast Guard. These aircrew are trained and experienced at conducting aerial marine mammal surveys and have provided similar support for other missions at the PMRF. Aerial surveys are typically conducted at an altitude of about 200 ft, but altitude may vary somewhat depending on sea state and atmospheric conditions. If adverse weather conditions preclude the ability for aircraft to safely operate, missions would either be delayed until the weather clears or cancelled for the day. The C-26 and other aircraft would generally be operated at a slightly higher altitude than the helicopter. The observers will be provided with the GPS location of the impact area. Once the aircraft reaches the impact area, pre-mission surveys typically last for 30 minutes, depending on the survey pattern. The fixed-wing aircraft are faster than the helicopter, and, therefore, protected species may be more difficult to spot. However, to compensate for the difference in speed, the aircraft may fly the survey pattern multiple times.

Mission Delays: If a protected species is observed in the impact area, weapon release would be delayed until one of the following conditions is met: (1) the animal is observed exiting the impact area; or (2) the impact area has been clear of any additional sightings for a period of 30 minutes. All weapons will be tracked and their water entry points will be documented.

Post-mission surveys would begin immediately after the mission is complete and the Range Safety Officer declares the human safety area is reopened. Approximate transit time from the perimeter of the human safety area to the weapon impact area would depend on the size of the human safety area and vary between aircraft but is expected to be less than 30 minutes. Post-mission surveys would be conducted by the same aircraft and aircrew that conducted the pre-mission surveys and would follow the same patterns as pre-mission surveys but would focus on the area down current of the weapon impact area to determine if protected species were affected by the mission (observation of dead or injured animals). If a serious injury or mortality occurs to a protected species due to LRS WSEP missions, NMFS would be notified immediately.

A typical mission day would consist of pre-mission checks, safety review, crew briefings, weather checks, clearing airspace, range clearance, mitigations/monitoring efforts, and other military protocols prior to launch of weapons. Potential delays could be the result of multiple factors including, adverse weather conditions leading to unsafe take-off, landing, and aircraft operations, inability to clear the range of non-mission vessels or aircraft, mechanical issues with mission aircraft or munitions, or presence of protected species in the impact area. These standard operating procedures are usually done in the morning, and live range time may begin in late morning once all checks are complete and approval is granted from range control. The range would be closed to the public for a maximum of four hours per mission day.

Determination of the Zone of Influence: The zone of influence (ZOI) is defined as the area or volume of ocean in which marine mammals could be exposed to various pressure or acoustic energy levels caused by exploding ordnance. Refer to Appendix A of 86 FWS's application for a description of the method used to calculate impact areas for explosives. The pressure and energy levels considered to be of concern are defined in terms of metrics, criteria, and thresholds. A metric is a technical standard of measurement that describes the acoustic environment (*e.g.*, frequency duration, temporal pattern, and amplitude) and pressure at a given location. Criteria are the resulting types of possible impact and include mortality, injury, and harassment. A threshold is the level of pressure or noise above which the impact criteria are reached.

Standard impulsive and acoustic metrics were used for the analysis of underwater energy and pressure waves in this document. Several different metrics are important for understanding risk assessment analysis of impacts to marine mammals: SPL is the ratio of the absolute sound pressure to a reference level, SEL is the measure of sound intensity and duration, and positive impulse is the time integral of the pressure over the initial positive phase of an arrival.

The criteria and thresholds used to estimate potential pressure and acoustic impacts to marine mammals resulting from detonations were obtained from Finneran and Jenkins (2012) and include mortality, Level A harassment, and Level B harassment. In some cases, separate thresholds have been developed for different species groups or functional hearing groups.

Functional hearing groups included in the analysis are low-frequency cetaceans, mid-frequency cetaceans, and high-frequency cetaceans.

Based on the ranges presented in Table 5 and factoring operational limitations associated with the mission, 86 FWS estimates that during pre-mission surveys, the proposed monitoring area would be approximately 8 mi (13 km) from the target area radius around the impact point, with surveys typically flown in a star pattern, which is much larger than requirements already in place for similar actions at the PMRF and what was accomplished for October 2016 missions.

NMFS discussed with the 86 FWS and the U.S. Navy – whose hydrophones and PAM equipment in the PMRF would be used – the idea of using PAM for mitigation purposes to supplement visual surveys. Through these discussions, NMFS and 86 FWS attempted to determine if using PAM as a mitigation tool was feasible. The Navy described the constraints of using PAM as a real-time mitigation tool due to the limitations of the current technology. These include limitations on the ability to detect, classify, and estimate locations of marine mammals around the equipment; the fact that marine mammals present in the area may not be vocalizing; and the fact that vocalizations made by some species may be outside of the frequency capabilities of the hydrophones. These limitations are explained further, below.

In regards to the limitations to detect classify, and estimate locations of marine mammals around the equipment, and the fact that some of those animals may vocalize outside of the frequency capabilities of the hydrophones, the Navy states:

> Based on current capabilities, and given adequate time, vocalizing animals within an indeterminate radius around a particular phone are detected, but obtaining an estimated position for all individual animals passing through a predetermined area is not assured. Detecting vocalizations on a phone does not determine whether vocalizing individuals would be within the established mitigation zone in the timeframes required for mitigation. Since detection ranges are generally larger than current mitigation zones

for many activities, this would unnecessarily delay events due to uncertainty in the animals location.

To develop an estimated position for an individual, it must be vocalizing and its vocalizations must be detected on at least three hydrophones. The hydrophones must have the required bandwidth, and dynamic range to capture the signal. In addition, calls must be sufficiently loud so as to provide the required signal to noise ratio on the surrounding hydrophones. Typically, small odontocetes echolocate with a directed beam that makes detection of the call on multiple hydrophones difficult. Developing an estimated position of selected species requires the presence of whistles which may or may not be produced depending on the behavioral state.

Large baleen species vocalize at frequencies well below 1 kHz. There are few broadband phones with low frequency capabilities at PMRF and they are widely spaced, especially on the southern portion of the range. This makes estimating the positions of low frequency baleen whales difficult in that area. For minke whale boings, it takes 30 to 45 minutes of calling (*e.g*. observing 8 calls or more) to have good confidence in a whale's estimated position. Additionally, even minke whales that have been vocalizing for extended periods can, and have, gone silent for hours at a time. Extended gaps in calling have also been noted for fin, sei, and Bryde's whales. We are currently unable to estimate positions of humpbacks in real-time.

Beaked whales vocalize only during deep foraging dives which occur at a rate of approximately 10 per day. They produce highly directed echolocation clicks that are difficult to simultaneously detect on multiple hydrophones. Current real-time systems cannot follow individuals and at best produce sparse positions with multiple false locations.

The position estimation process must occur in an area with hydrophones spaced to allow the detection of the same echolocation click on at least three hydrophones. Typically, a spacing of less than 4 km in water depths of approximately 2 km is preferred. In the absence of localizations, the analyst can only determine with confidence if a group of beaked whales is somewhere within 6 km of a hydrophone. Beaked whales produce stereotypic click trains during deep (<700 m) foraging dives. The presence of a vocalizing group can be readily detected by an analyst by examining the click structure and repetition rate. However, estimating position is possible only if the same train of clicks is detected on multiple hydrophones which is often precluded by the animal's narrow beam pattern.

In regards to marine mammals not vocalizing in the area, the Navy states:

Animals must vocalize to be detected; the lack of detections on a hydrophone may give the false impression that the area is all clear. The lack of vocalization detections is not a direct measure of the absence of marine mammals. If an event were to be moved based upon low-confidence localizations, it may inadvertently be moved to an area where non-vocalizing animals of undetermined species/ESA status are present.

NMFS decided that these analytical and technical limitations preclude the use of PAM as a real-time mitigation tool. However, we will require the use of PAM for monitoring purposes (as described below).

We have carefully evaluated 86 FWS's proposed mitigation measures in the context of ensuring that we prescribe the means of effecting the least practicable adverse impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation.

NMFS prescribes mitigation measures that accomplish, have a reasonable likelihood of accomplishing (based on current science), or contribute to the accomplishment of one or more of the general goals listed here:

1. Avoidance or minimization of injury or death of marine mammals wherever possible (goals 2, 3, and 4 may contribute to this goal).

2. A reduction in the numbers of marine mammals (total number or number at biologically important time or location) exposed to stimuli expected to result in incidental take (this goal may contribute to 1, above, or to reducing takes by behavioral harassment only).

3. A reduction in the number of times (total number or number at biologically important time or location) individuals would be exposed to stimuli that we expect to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

4. A reduction in the intensity of exposures (either total number or number at biologically important time or location) to training exercises that we expect to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing the severity of harassment takes only).

5. Avoidance or minimization of adverse 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.

6. For monitoring directly related to mitigation—an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Based on our evaluation of 86 FWS's proposed measures, as well as other measures that may be relevant to the specified activity, we have preliminarily determined that the proposed mitigation measures, including visual aerial surveys and mission delays if protected species are observed in the impact area, provide the means of effecting the least practicable adverse impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance (while also considering personnel safety, practicality of implementation, and the impact of effectiveness of the military readiness activity).

Proposed Monitoring and Reporting

In order to issue an ITA for an activity, Section 101(a)(5)(A) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking."

The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for ITAs 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 in the proposed action area.

The 86 FWS submitted marine mammal monitoring and reporting measures in their LOA application. We may modify or supplement these measures based on comments or new information received during the public comment period. Any monitoring requirement we prescribe will improve our understanding of one or more of the following:

- Occurrence of marine mammal species in action area (*e.g.*, presence, abundance, distribution, density).
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) Action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) Affected species (*e.g.*, life history, dive patterns); (3) Co-occurrence of marine mammal species with the action; or (4) Biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas).
- Individual responses to acute stressors, or impacts of chronic exposures (behavioral or physiological).
- How anticipated responses to stressors impact either: (1) Long-term fitness and survival of an individual; or (2) Population, species, or stock.
- Effects on marine mammal habitat and resultant impacts to marine mammals.
- Mitigation and monitoring effectiveness.

NMFS proposes to include the following monitoring and reporting measures in the LRS WSEP Authorization (if issued):

(1) Using mission reporting forms, the 86 FWS will track the use of the PMRF for missions and protected species observations.

(2) The 86 FWS will submit a summary report of marine mammal observations and LRS WSEP activities to the NMFS PIRO and the Office of Protected Resources 90 days after completion of mission activities each year. This report must include the following information: (i) Date and time of each LRS WSEP exercise; (ii) a complete description of the pre-exercise and post-exercise activities related to mitigating and monitoring the effects of LRS WSEP exercises on marine mammal populations; and (iii) results of the LRS WSEP exercise monitoring, including number of marine mammals (by species) that may have been harassed due to presence within the activity zone.

(3) The 86 FWS will monitor for marine mammals in the proposed action area through pre-mission aerial visual surveys. If 86 FWS personnel observe or detect any dead or injured marine mammals prior to testing, or detect any injured or dead marine mammal during live fire exercises, 86 FWS must cease operations and submit a report to NMFS OPR and PIRO within 24 hours.

(4) The 86 FWS will monitor for marine mammals once the mission has ended or, if required, as soon as personnel declare the mission area safe. Post-mission aerial visual surveys will be identical to pre-mission surveys and will occur approximately 30 minutes after the munitions have been detonated, concentrating on the area down-current of the test site. Observers will document and report any marine mammal species, number, location, and behavior of any animals observed. Post-mission monitoring determines the effectiveness of pre-mission

mitigation by reporting sightings of any marine mammals within the ZOIs that may have been affected by mission activities.

(5) As noted previously, PAM will not be used as a real-time mitigation tool, but the 86 FWS will use PAM by using the Navy's hydrophones for monitoring within the PMRF, by collecting data before, during, and after LRS WSEP missions. This data will be stored at SPAWAR to be analyzed as funding allows.

(6) The 86 FWS must immediately report any unauthorized takes of marine mammals (*i.e*., serious injury or mortality) to NMFS OPR and to the respective Pacific Islands Region stranding coordinator. The 86 FWS must cease operations and submit a report to NMFS within 24 hours.

Adaptive Management

NMFS may modify (including augment) the existing mitigation, monitoring, or reporting measures (after consulting with the 86 FWS regarding the practicability of the modifications) if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring measures for these regulations.

Possible sources of data that could contribute to the decision to modify the mitigation, monitoring, or reporting measures in an LOA include: (1) results from 86 FWS's monitoring from the previous year(s); (2) results from other marine mammal and/or sound research or studies; and (3) any information that reveals marine mammals may have been taken in a manner, extent or number not authorized by these regulations or subsequent LOAs.

If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are substantial, NMFS will publish a notice of proposed LOA in the **Federal Register** and solicit public comment. If, however, NMFS determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals in Hawaii, an LOA may be modified without prior notice or opportunity for public comment. Notice would be published in the **Federal Register** within 30 days of the action.

Estimated Take by Incidental Harassment

The NDAA of 2004 amended the definition of harassment as it applies to a military readiness activity (Section 3(18)(B) of the MMPA) to read as follows: (i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild (Level A Harassment); or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered (Level B Harassment).

NMFS' analysis identified the physiological responses and behavioral responses that could potentially result from exposure to explosive detonations. In this section, we will relate the potential effects on marine mammals from detonation of explosives to the MMPA regulatory definitions of Level A and Level B harassment. This section will also quantify the effects that might occur from the proposed military readiness activities in the PMRF BSURE area. As described below, quantifying take includes a consideration of acoustic thresholds identified by NMFS above which received levels marine mammals are expected to be taken by either Level A or Level B harassment; predicted distances from the sound sources within which animals are expected to be exposed to sound levels above these thresholds; and the density of marine mammals within the areas ensonified above the thresholds.

Level B Harassment

Of the potential effects described earlier in this document, the following are the types of effects that would result from Level B harassment:

Behavioral Harassment—Exposure to non-impulsive or impulsive sound, which causes a behavioral disturbance that rises to the level described in the above definition, is Level B harassment. Some of the lower level physiological stress responses discussed earlier would also likely co-occur with the predicted harassments, although these responses are more difficult to detect, and fewer data exist relating these responses to specific received levels of sound. When predicting Level B harassment on estimated behavioral responses, those takes may have a stress-related physiological component.

Temporary Threshold Shift —As discussed previously, TTS can affect how an animal behaves in response to the environment, including conspecifics, predators, and prey. NMFS classifies exposure to explosives and other impulsive sources resulting in TTS as Level B harassment, not Level A harassment.

Level A Harassment

Of the potential effects that were described earlier, the following are the types of effects that result from Level A harassment and that may be expected from 86 FWS activities:

Permanent Threshold Shift —PTS (resulting from exposure to explosive detonations) is irreversible, and NMFS considers this to be an injury.

Table 4 outlines the explosive thresholds used by NMFS for this action when addressing noise impacts from explosives.

Table 4. Explosive thresholds for Marine Mammals used by 86 FWS in its current acoustics impacts modeling.

Functional	Mortality*	Level A Harassment	Level B Harassment

Hearing Group		Slight Lung Injury*	GI Tract Injury	PTS	TTS	Behavioral
LF Cetaceans	$91.4M^{1/3}\left(1+\frac{D}{10.1}\right)^{1/2}$	$39.1M^{1/3}\left(1+\frac{D}{10.1}\right)^{1/2}$	Unweighted SPL: 237 dB re 1 μPa	Weighted SEL: 187 dB re 1 $\mu Pa^2 \cdot s$	Weighted SEL: 172 dB re 1 $\mu Pa^2 \cdot s$	Weighted SEL: 167 dB re 1 $\mu Pa^2 \cdot s$
				Unweighted SPL: 230 dB re 1 μPa	Unweighted SPL: 224 dB re 1 μPa (23 psi PP)	
MF Cetaceans			Unweighted SPL: 237 dB re 1 μPa	Weighted SEL: 187 dB re 1 $\mu Pa^2 \cdot s$	Weighted SEL: 172 dB re 1 $\mu Pa^2 \cdot s$	Weighted SEL: 167 dB re 1 $\mu Pa^2 \cdot s$
				Unweighted SPL: 230 dB re 1 μPa	Unweighted SPL: 224 dB re 1 μPa (23 psi PP)	
HF Cetaceans			Unweighted SPL: 237 dB re 1 μPa	Weighted SEL: 161 dB re 1 $\mu Pa^2 \cdot s$	Weighted SEL: 146 dB re 1 $\mu Pa^2 \cdot s$	Weighted SEL: 141 dB re 1 $\mu Pa^2 \cdot s$
				Unweighted SPL: 201 dB re 1 μPa	Unweighted SPL: 195 dB re 1 μPa (1 psi PP)	
Phocids (in water)			Unweighted SPL: 237 dB re 1 μPa	Weighted SEL: 192 dB re 1 $\mu Pa^2 \cdot s$	Weighted SEL: 177 dB re 1 $\mu Pa^2 \cdot s$	Weighted SEL: 172 dB re 1 $\mu Pa^2 \cdot s$
				Unweighted SPL: 218 dB re 1 μPa	Unweighted SPL: 212 dB re 1 μPa (6 psi PP)	

M = Animal mass based on species (kilograms); *D* = Water depth (meters); dB re 1 μPa = decibels referenced to 1 microPascal; dB re 1 $\mu Pa^2 \cdot s$ = decibels reference to 1 microPascal-squared–seconds; GI = gastrointestinal; PTS = permanent threshold shift; SEL = sound exposure level; TTS = temporary threshold shift; SPL = sound pressure level; PP = peak pressure
*Expressed in terms of acoustic impulse (Pascal – seconds [Pa·s])

The 86 FWS completed acoustic modeling to determine the distances from their explosive ordnance corresponding to NMFS' explosive thresholds; these distances were then used with each species' density to determine exposure estimates. Below is a summary of the methodology for those modeling efforts.

The maximum estimated range, or radius, from the detonation point to the point at which the various thresholds extend for all munitions proposed to be released in a 24-hour time period was calculated based on explosive acoustic characteristics, sound propagation, and sound transmission loss in the Study Area. These calculations incorporated water depth, sediment type, wind speed, bathymetry, and temperature/salinity profiles (Table 5). Transmission loss was calculated from the explosive source depth down to an array of water depth bins extending to the maximum depths where marine mammals may occur (see depth distributions in Appendix B of the 86 FWS's application). Then impact volumes were computed for each explosive source (based on the total number of munitions released on a representative mission day). Impact areas were calculated from scaling the impact volumes by each depth bin, dividing by their depth intervals, summing each value over the entire water column and converting to square kilometers. The total energy for all weapons released as part of a representative mission day was calculated to assess impacts from the accumulated energy resulting from multiple weapon releases within a 24-hour period. Given that there is a large degree of uncertainty in knowing this far in advance what types of explosives could be released on any particular mission day, in order to calculate the number of munitions to be released per mission day, the total number of each munition proposed to be released per year was divided by the annual number of mission days.

Explosives generally will be separated by some number of minutes, with the exception of up to four SDB-I/II munitions, which includes a burst during which each ordnance hits the water surface within a few seconds of each other. For the purposes of predicting the number of exposures above threshold, calculating the area for each independent explosive and then adding those areas together and multiplying by species density would result in an overestimate. This is because all explosions will occur within 4 hours and are generally targeting the same spot, and several explosions have very large zones, so it is likely that many of the exposures will be experienced by the same individual animals. Therefore, to calculate take, we instead summed the energy of the expected number of separate explosives per day to create one area of impact to overlay with species density for that area. Since there would be a total of five mission days per year during the time frame of 2017– 2021, the analysis assumed that in a representative mission day the following munitions and quantities would be released daily: one JASSM, six JDAMs, six SDB-Is, six SDB-IIs, and two HARMs.

The 86 FWS used the calculations for transmission loss from the summer season in their model, because the parameters for the summer were more conservative (*i.e.*, resulted in larger distances from the sound source) than for the fall, taking into account wind speed, sound speed, and transmission loss (see 86 FWS's seasonal parameters memo). Missions will most likely occur in the summer, but may also occur in the fall. Transmission loss was calculated from the explosive source depth down to an array of water depth bins extending to the maximum depths where marine mammals may occur (see depth distributions in Appendix B of the 86 FWS's application). Next, impact volumes were computed for each explosive source (*i.e*., total number of munitions released on a representative mission day). Impact areas were calculated by scaling the impact volumes for each depth bin, dividing by their depth intervals, summing each value over the entire water column and converting to square kilometers. The radii shown in Table 5 are based on these impact areas, and were used for mitigation considerations.

Table 5. Distances (m) to explosive thresholds used to calculate predicted take from 86 FWS's daily explosive ordnance use.

Species	Mortality[1]	Level A Harassment[2]				Level B Harassment		
		Slight Lung Injury	GI Tract Injury	PTS		TTS	Behavioral	
			237 dB SPL	Applicable SEL*	Applicable SPL*	Applicable SEL*	Applicable SPL*	Applicable SEL*
Humpback Whale	99	200	204	5,415	1,241	55,464	2,266	59,039
Blue Whale	74	149	204	5,415	1,241	55,464	2,266	59,039
Fin Whale	76	157	204	5,415	1,241	55,464	2,266	59,039
Sei Whale	101	204	204	5,415	1,241	55,464	2,266	59,039
Bryde's Whale	99	200	204	5,415	1,241	55,464	2,266	59,039
Minke Whale	138	268	204	5,415	1,241	55,464	2,266	59,039
Sperm Whale	91	177	204	1,575	413	8,019	763	11,948
Pygmy Sperm Whale	248	457	204	20,058	4,879	71,452	7,204	74,804

Dwarf Sperm Whale	273	509	204	20,058	4,879	71,452	7,204	74,804
Killer Whale	149	287	204	1,575	413	8,019	763	11,948
False Killer Whale (MHI Insular stock)	177	340	204	1,575	413	8,019	763	11,948
False Killer Whale (all other stocks)	177	340	204	1,575	413	8,019	763	11,948
Pygmy Killer Whale	324	604	204	1,575	413	8,019	763	11,948
Short-finned Pilot Whale	217	413	204	1,575	413	8,019	763	11,948
Melon-headed Whale	273	502	204	1,575	413	8,019	763	11,948
Bottlenose Dolphin	273	509	204	1,575	413	8,019	763	11,948
Pantropical Spotted Dolphin	324	604	204	1,575	413	8,019	763	11,948
Striped Dolphin	324	604	204	1,575	413	8,019	763	11,948
Spinner Dolphin	324	604	204	1,575	413	8,019	763	11,948
Rough-toothed Dolphin	273	509	204	1,575	413	8,019	763	11,948
Fraser's Dolphin	257	480	204	1,575	413	8,019	763	11,948
Risso's Dolphin	207	384	204	1,575	413	8,019	763	11,948
Cuvier's Beaked Whale	131	257	204	1,575	413	8,019	763	11,948
Blainville's Beaked Whale	195	368	204	1,575	413	8,019	763	11,948
Longman's Beaked Whale	133	261	204	1,575	413	8,019	763	11,948
Hawaiian Monk Seal	306	564	204	4,621	1,394	55,687	2,549	58,736

[1]Based on Goertner (1982)
[2]Based on Richmond *et al.* (1973)
*Based on the applicable Functional Hearing Group

Density Estimation

Density estimates for marine mammals were derived from the Navy's 2016 Marine Species Density Database (NMSDD). The 86 FWS used fall densities to estimate take. Fall densities are more conservative than summer densities because they include more species. Density estimates provided in Table 6 were extrapolated over the depth distributions by multiplying the density values by the percentage of time spent at each depth interval. These scaled densities were multiplied by the corresponding depth bin in the impact volume for each threshold and summed to create a three-dimensional exposure estimate. These estimates were then multiplied by the number of events, or total annual number of proposed mission days. NMFS refers the reader to Section 3 of 86 FWS's application for detailed information on all equations used to calculate densities presented in Table 6.

Table 6. Marine mammal density estimates within the impact location in the PMRF.

Species	Density Estimate (animals per square kilometer)			
	Fall	Spring	Summer	Winter
Humpback whale	0.02110	0.02110	0	0.02110
Blue whale	0.00005	0.00005	0	0.00005
Fin whale	0.00006	0.00006	0	0.00006
Sei whale	0.00016	0.00016	0	0.00016
Bryde's whale	0.00010	0.00010	0.00010	0.00010
Minke whale	0.00423	0.00423	0	0.00423
Sperm whale	0.00156	0.00156	0.00156	0.00156
Pygmy sperm whale	0.00291	0.00291	0.00291	0.00291
Dwarf sperm whale	0.00714	0.00714	0.00714	0.00714
Killer whale	0.00006	0.00006	0.00006	0.00006
False killer whale (Main Hawaiian Islands insular stock)	0.00080	0.00080	0.00080	0.00080
False killer whale (all other stocks)	0.00071	0.00071	0.00071	0.00071
Pygmy killer whale	0.00440	0.00440	0.00440	0.00440
Short-finned pilot whale	0.00919	0.00919	0.00919	0.00919
Melon-headed whale	0.00200	0.00200	0.00200	0.00200
Bottlenose dolphin	0.00316	0.00316	0.00316	0.00316
Pantropical spotted dolphin	0.00623	0.00623	0.00623	0.00623

Species	Density Estimate (animals per square kilometer)			
	Fall	Spring	Summer	Winter
Striped dolphin	0.00335	0.00335	0.00335	0.00335
Spinner dolphin	0.00204	0.00204	0.00204	0.00204
Rough-toothed dolphin	0.00470	0.00470	0.00470	0.00470
Fraser's dolphin	0.021	0.021	0.021	0.021
Risso's dolphin	0.00470	0.00470	0.00470	0.00470
Cuvier's beaked whale	0.00030	0.00030	0.00030	0.00030
Blainville's beaked whale	0.00086	0.00086	0.00086	0.00086
Longman's beaked whale	0.00310	0.00310	0.00310	0.00310
Hawaiian monk seal	0.00003	0.00003	0.00003	0.00003

Take Estimation

The resulting total number of marine mammals potentially exposed to the various levels of thresholds (mortality, injury, and non-injurious harassment, including behavioral harassment), in the absence of mitigation measures, is listed in Table 7. To eliminate double-counting of animals, exposure results from higher impact categories (*e.g.*, mortality) were subtracted from lower impact categories (*e.g.*, Level A harassment). For impact categories with dual criteria (*e.g.*, SEL and SPL metrics for PTS associated with Level A harassment), numbers in the table are based on the criterion resulting in the greatest number of exposures. Exposure levels include the possibility of injury to marine mammals and harassment (resulting in behavioral disruption (Level B harassment) in the absence of mitigation measures. The numbers represent total impacts for all detonations combined and do not take into account the required mitigation and monitoring measures (see Section 11 of the 86 FWS's application), which are expected to decrease the number of exposures shown in the Table 7.

The 86 FWS and NMFS estimated that 16 species could be exposed to noise levels constituting Level B harassment (TTS and behavioral disruption), and 4 of those marine mammal species could be exposed to injurious noise levels (Level A harassment)(187 dB SEL) in the absence of mitigation measures.

Table 7. Modeled number of marine mammals potentially affected annually by LRS WSEP operations.

Species	Mortality	Level A Harassment (PTS only*)	Level B Harassment (TTS)	Level B Harassment (Behavioral)
Mysticetes (baleen whales)				
Humpback whale	0	4	54	38
Blue whale	0	0	0	0
Fin whale	0	0	0	0
Sei whale	0	0	0	1
Bryde's whale	0	0	0	0
Minke whale	0	1	11	19
Odontocetes (toothed whales and dolphins)				
Sperm whale	0	0	0	0
Pygmy sperm whale	0	9	83	36
Dwarf sperm whale	0	22	203	87
Killer whale	0	0	0	0
False killer whale (MHI Insular stock)	0	0	0	0
False killer whale (all other stocks)	0	0	0	0
Pygmy killer whale	0	0	1	2
Short-finned pilot whale	0	0	5	6
Melon-headed whale	0	0	1	1
Bottlenose dolphin	0	0	2	2
Pantropical spotted dolphin	0	0	3	4
Striped dolphin	0	0	2	2
Spinner dolphin	0	0	1	1
Rough-toothed dolphin	0	0	3	3
Fraser's dolphin	0	0	10	14
Risso's dolphin	0	0	2	2
Cuvier's beaked whale	0	0	0	0
Blainville's beaked whale	0	0	0	0
Longman's beaked whale	0	0	1	1
Pinnipeds				
Hawaiian monk seal	0	0	0	0
Total	**0**	**36**	**382**	**219**

These modeled take numbers show that the probability of some of these species being impacted by the 86 FWS's activities is low (*e.g.*, one modeled take for behavioral harassment of 4 of the 16 species). However, realistically, these species are seen in larger groups (rather than on an individual basis); therefore, we took into consideration average group sizes to determine our actual number of authorized takes. For example, melon-headed whales have a modeled take estimate of one individual, but their average group size is 153 individuals (Bradford *et al.*, 2017); therefore, we propose to authorize 153 takes by Level B harassment of melon headed whales, of which one may be from TTS. Similarly, for all species, if the modeled take was less than average group size, we used this same rationale and calculation to determine the proposed takes by Level B harassment (harassment resulting in TTS or behavioral disruption). We assumed that, of the total Level B harassment takes, the modeled take numbers would be used for TTS, and the difference between TTS and the average group size would be the behavioral take. We did not adjust takes for PTS, since, in all four instances of predicted PTS, the number of PTS takes was greater than average group size (*e.g.*, average group size for dwarf sperm whale is 2.7 (Baird 2016), and modeled PTS takes is 22). Proposed authorized take numbers are presented in Table 8.

Table 8. Estimated number of marine mammals for proposed authorized take by LRS WSEP operations.

Species	Mortality	Level A Harassment (PTS only*)	Level B Harassment (TTS)	Level B Harassment (Behavioral)
Humpback whale	0	4	54	38
Sei whale	0	0	0	3*
Minke whale	0	1	11	19
Pygmy sperm whale	0	9	83	36
Dwarf sperm whale	0	22	203	87
Pygmy killer whale	0	0	1	25*
Short-finned pilot whale	0	0	5	36*
Melon-headed whale	0	0	1	152*
Bottlenose dolphin	0	0	2	32*
Pantropical spotted dolphin	0	0	3	40*
Striped dolphin	0	0	2	51*
Spinner dolphin	0	0	1	29*[1]
Rough-toothed dolphin	0	0	3	22*
Fraser's dolphin	0	0	10	273*
Risso's dolphin	0	0	2	25*
Longman's beaked whale	0	0	1	59*
Total	**0**	**36**	**382**	**927**

*Denotes an adjusted take value from what is represented in the modeled take numbers in Table 7. All mean group sizes were taken from Bradford *et al.* (2017) except spinner dolphins, because this value was not available in this publication.

[1]Mean group size was taken from Baird (2016).

Based on the mortality exposure estimates calculated by the acoustic model (and further supported by the anticipated effectiveness of the mitigation), zero marine mammals are expected to be affected by pressure levels associated with mortality or serious injury. Zero marine mammals are expected to be exposed to pressure levels associated with slight lung injury or gastrointestinal tract injury.

NMFS considers PTS to fall under the injury category (Level A harassment). In this case, it would be highly unlikely for this scenario to unfold, given the nature of any anticipated acoustic exposures that could potentially result from a mobile marine mammal that NMFS generally expects to exhibit avoidance behavior to loud sounds within the BSURE area.

NMFS has relied on the best available scientific information to support the issuance of 86 FWS's authorization. In the case of authorizing Level A harassment, NMFS has estimated that, although unlikely, four marine mammal species (humpback whale, minke whale, dwarf sperm whale, and pygmy sperm whale) could experience minor PTS of hearing sensitivity. The available data and analyses include extrapolation of the results of many studies on marine mammal noise-induced TTS. An extensive review of TTS studies and experiments prompted NMFS to conclude that the possibility of minor PTS in the form of slight upward shift of hearing threshold at certain frequency bands by one individual marine mammal is extremely low.

Analyses and Preliminary Determinations

Negligible Impact Analysis

NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of Level B harassment takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through Level B harassment, we consider other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as the number and nature of estimated Level A harassment takes, the number of estimated mortalities, and effects on habitat. In making a negligible impact determination, NMFS considers the following:

(1) The number of anticipated injuries, serious injuries, or mortalities;

(2) The number, nature, intensity, and duration of Level B harassment takes;

(3) The context in which the takes occur (*i.e.*, impacts to areas of significance, impacts to local populations, and cumulative impacts when taking into account successive/contemporaneous actions when added to baseline data);

(4) The status of stock or species of marine mammals (*i.e.*, depleted, not depleted, decreasing, increasing, stable, impact relative to the size of the population);

(5) Impacts on habitat affecting rates of recruitment/survival; and

(6) The effectiveness of monitoring and mitigation measures to reduce the number or severity of incidental take.

For reasons stated previously in this document, the specified activities are not likely to cause long-term behavioral disturbance, serious injury, or death.

The takes from Level B harassment would be due to potential behavioral disturbance and TTS. The takes from Level A harassment would be due to potential PTS. Activities would occur only over a timeframe of five days each year in the summer months, over a maximum of four hours per day.

Behavioral disruption due to Level B harassment would be limited to reactions such as startle responses, movements away from the area, and short-term changes to behavioral state. These impacts are expected to be temporary and of short duration. We do not anticipate that the effects would be detrimental to rates of recruitment and survival because we do not expect serious or extended behavioral responses that would result in energetic effects at the level to impact fitness.

Noise-induced threshold shifts (TS, which includes TTS and PTS) are defined as increases in the threshold of audibility of the ear (*i.e.*, the sound has to be louder to be detected) at a certain frequency or range of frequencies (ANSI 1995; Yost 2007). Several important factors relate to the magnitude of TS, such as level, duration, spectral content (frequency range), and temporal pattern (continuous, intermittent) of exposure (Yost 2007; Henderson *et al*., 2008). TS occurs in terms of frequency range (Hz or kHz), hearing threshold level (dB), or both frequency and hearing threshold level.

TTS was modeled to occur in 15 species of marine mammals from mission activities. If TTS occurs, it is expected to be at low levels and of short duration. As explained above, TTS is temporary with no long term effects to species. The modeled take numbers are expected to be overestimates since NMFS expects that successful implementation of the required aerial-based mitigation measures could avoid TTS. Further, it is uncommon to sight marine mammals within the target area, especially for prolonged durations. Avoidance varies among individuals and depends on their activities or reasons for being in the area.

There are different degrees of PTS: ranging from slight/mild to moderate and from severe to profound. Profound PTS or the complete loss of the ability to hear in one or both ears is commonly referred to as deafness. High-frequency PTS, presumably as a normal process of aging that occurs in humans and other terrestrial mammals, has also been demonstrated in captive cetaceans (Ridgway and Carder, 1997; Yuen *et al*., 2005; Finneran *et al*., 2005; Houser and Finneran, 2006; Finneran *et al*., 2007; Schlundt *et al*., 2011) and in stranded individuals (Mann *et al.*, 2010).

In terms of what is analyzed for the potential PTS (Level A harassment) in marine mammals as a result of 86 FWS's LRS WSEP operations, if it occurs, NMFS has determined that the levels would be slight/mild because research shows that most cetaceans exhibit relatively high levels of avoidance. Further, it is uncommon to sight marine mammals within the target area, especially for prolonged durations. Avoidance varies among individuals and depends on their activities or reasons for being in the area.

Accordingly, NMFS' predicted estimates for Level A harassment take (Table 8) are likely overestimates of the likely injury that will occur. NMFS expects that successful implementation of the required aerial-based mitigation measures could avoid Level A harassment take. Also, NMFS expects that some individuals would avoid the source at levels expected to result in injury. Nonetheless, although NMFS expects that Level A harassment is unlikely to occur at the numbers proposed to be authorized, because it is difficult to quantify the degree to which the mitigation and avoidance will reduce the number of animals that might incur PTS, NMFS is proposing to authorize (and analyze) the modeled number of Level A harassment takes, which does not take the mitigation or avoidance into consideration. However, we anticipate that, because of the proposed mitigation measures, and the likely short duration of exposures, any PTS incurred would be in the form of only a small degree of PTS, rather than total deafness.

While animals may be impacted in the immediate vicinity of the activity, because of the short duration of the actual individual explosions themselves (versus continual sound source operation) combined with the short duration of the LRS WSEP operations (*i.e.*, maximum of four hours per day over a maximum of five days per year), NMFS has preliminarily determined that there will not be a substantial impact on marine mammals or on the normal functioning of the nearshore or offshore waters off Kauai and its ecosystems. We do not expect that the proposed activity would impact rates of recruitment or survival of marine mammals, since we do not expect mortality (which would remove individuals from the population) or serious injury to occur. In addition, the proposed activity would not occur in areas (and/or at times) of significance for the marine mammal populations potentially affected by the exercises (*e.g.*, feeding or resting areas, reproductive areas), and the activity would occur only in a small part of their overall range of those marine mammal populations, so the impact of any potential temporary displacement would be negligible and animals would be expected to return to the area after the cessation of activities. Although the proposed activity could result in Level A harassment (PTS only, as opposed to slight lung injury or gastrointestinal tract injury) and Level B harassment (behavioral disturbance and TTS), the level of harassment is not anticipated to impact rates of recruitment or survival of marine mammals, because the number of exposed animals is expected to be low due to the short-term and site-specific nature of the activity.

Moreover, the proposed mitigation and monitoring measures (described earlier in this preamble for the proposed rule) are expected to further minimize the potential for harassment. The protected species surveys would require 86 FWS to search the area for marine mammals, and if any are found in the impact zone, then the exercise would be suspended until the animals have left the area or relocated outside of the zone. Furthermore, LRS WSEP missions may be delayed or rescheduled for adverse weather conditions.

In past missions (October 2016), the 86 FWS completed pre- and post- aerial surveys. The 86 FWS did not observe any marine mammals in the ZOI before missions occurred, and did not observe any marine mammals after missions were completed. The 86 FWS was authorized for Level A and Level B harassment takes of five species, but monitoring showed that they had zero takes of any species from mission activities.

Based on NMFS' preliminary analysis of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS preliminarily finds that 86 FWS's LRS WSEP operations will result in the incidental take of marine mammals, by Level A and Level B harassment, and that the taking from the LRS WSEP activities will have a negligible impact on the affected species or stocks.

Impact on Availability of Affected Species for Taking for Subsistence Uses

There are no relevant subsistence uses of marine mammals implicated by this action. Therefore, NMFS has preliminarily determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act

There is one marine mammal species under NMFS' jurisdiction that is listed as endangered under the Endangered Species Act (ESA) with confirmed or possible occurrence in the action area: the sei whale. In March 2017, NMFS initiated formal consultation under Section 7 of the

ESA. The Biological Opinion will analyze the effects to the one ESA listed species by the 86 FWS' LRS WSEP activities.

National Environmental Policy Act

In 2016, 86 FWS provided NMFS with an Environmental Assessment (EA) titled, Environmental Assessment/Overseas Environmental Assessment for the Long Range Strike Weapon Systems Evaluation Program at the Pacific Missile Range Facility at Kauai, Hawaii. The EA analyzed the direct, indirect, and cumulative environmental impacts of the specified activities on marine mammals. NMFS will review and evaluate the 86 FWS EA for consistency with the regulations published by the Council of Environmental Quality (CEQ) and NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act, and determine whether or not to adopt the EA. Information in 86 FWS's application, the EA, and this notice collectively provide the environmental information related to proposed issuance of the regulations for public review and comment. We will review all comments submitted in response to this notice as we complete the NEPA process, including the decision of whether to sign a Finding of No Significant Impact (FONSI) prior to a final decision on the LOA request. The 2016 NEPA documents are available for review at *www.nmfs.noaa.gov/pr/permits/incidental/military.html.*

Classification

The Office of Management and Budget has determined that this proposed rule is not significant for purposes of Executive Order 12866.

Pursuant to the Regulatory Flexibility Act (RFA) (5 U.S.C. 601 *et seq.*), the Chief Counsel for Regulation of the Department of Commerce has certified to the Chief Counsel for Advocacy of the Small Business Administration that this proposed rule, if adopted, would not have a significant economic impact on a substantial number of small entities. The RFA requires a Federal agency to prepare an analysis of a rule's impact on small entities whenever the agency is required to publish a notice of proposed rulemaking. However, a Federal agency may certify, pursuant to 5 U.S.C. 605 (b), that the action will not have a significant economic impact on a substantial number of small entities. A description of this proposed rule and its purpose are found earlier in the preamble for this action and is not repeated here. 86 FWS is the sole entity that will be affected by this rulemaking and is not a small governmental jurisdiction, small organization, or small business, as defined by the RFA. Any requirements imposed by LOAs issued pursuant to these regulations, and any monitoring or reporting requirements imposed by these regulations, will be applicable only to 86 FWS.

NMFS does not expect the issuance of these regulations or the associated LOAs to result in any impacts to small entities pursuant to the RFA. Because this action, if adopted, would directly affect 86 FWS and not a small entity, NMFS concludes the action would not result in a significant economic impact on a substantial number of small entities. Accordingly, no regulatory flexibility analysis is necessary, and none has been prepared.

This action does not contain any collection of information requirements for purposes of the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 *et seq.*).

List of Subjects in 50 CFR Part 218

Regulations governing the taking and importing of marine mammals.

Dated: May 2, 2017.

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Alan D. Risenhoover,

Acting Deputy Assistant Administrator for Regulatory Programs,

National Marine Fisheries Service.

For reasons set forth in the preamble, 50 CFR part 218 is proposed to be amended as follows:

PART 218 – REGULATIONS GOVERNING THE TAKE OF MARINE MAMMALS INCIDENTAL TO SPECIFIED ACTIVITIES

1. The authority citation for part 218 continues to read as follows:

Authority: 16 U.S.C. 1361 *et seq*., unless otherwise noted.

2. Add subpart F to part 218 to read as follows:

Subpart F – Taking of Marine Mammals Incidental to the U.S. Air Force 86 Fighter Weapons Squadron Conducting Long Range Strike Weapons System Evaluation Program at the Pacific Missile Range Facility at Kauai, Hawaii.

Sec.

§ 218.50 Specified activity and specified geographical region.

(a) Regulations in this subpart apply only to the 86 Fighter Weapons Squadron (86 FWS) and those persons it authorizes to conduct activities on its behalf, for the taking of marine mammals as outlined in paragraph (b) of this section and incidental to Long Range Strike Weapons System Evaluation Program (LRS WSEP) missions.

(b) The taking of marine mammals by 86 FWS pursuant to a Letter of Authorization (LOA) is authorized only if it occurs at the Barking Sands Underwater Range Expansion (BSURE) area of the Pacific Missile Range Facility (PMRF) off Kauai, Hawaii.

§ 218.51 Effective dates.

Regulations in this subpart are effective August 23, 2017, through August 22, 2022.

§ 218.52 Permissible methods of taking.

Under a Letter of Authorization (LOA) issued pursuant to § 216.106 and § 218.56 of this chapter, the Holder of the LOA (herein after 86 FWS) may incidentally, but not intentionally, take marine mammals by Level A and Level B harassment associated with LRS WSEP activities within the area described in § 218.50 of this subpart, provided the activities are in compliance with all terms, conditions, and requirements of these regulations in this subpart and the appropriate LOA.

§ 218.53 Prohibitions.

Notwithstanding takings contemplated in § 218.50 and authorized by an LOA issued under § 216.106 and § 218.56 of this chapter, no person in connection with the activities described in § 218.50 of this chapter may:

(a) Violate, or fail to comply with, the terms, conditions, and requirements of this subpart or an LOA issued under § 216.106 and § 218.56 of this chapter.

(b) Take any marine mammal not specified in such LOAs;

(c) Take any marine mammal specified in such LOAs in any manner other than as specified;

(d) Take a marine mammal specified in such LOAs if NMFS determines such taking results in more than a negligible impact on the species or stocks of such marine mammal; or

(e) Take a marine mammal specified in such LOAs if NMFS determines such taking results in an unmitigable adverse impact on the species or stock of such marine mammal for taking for subsistence uses.

§ 218.54 Mitigation requirements.

When conducting activities identified in § 218.50 of this chapter, the mitigation measures contained in the LOA issued under § 216.106 and § 218.56 of this chapter must be implemented. These mitigation measures shall include but are not limited to the following general conditions:

(a) If daytime weather and/or sea conditions preclude adequate monitoring for detecting marine mammals and other marine life, LRS WSEP strike operations must be delayed until adequate sea conditions exist for monitoring to be undertaken.

(b) Restrictions on time of activities; missions will only occur during day-light hours, on weekdays, and only during the summer or fall months.

(c) Visual aerial surveys before and after mission activities each day.

(d) Required delay of mission activities if a protected species is observed in the impact zones. Mission activities cannot resume until one of the following conditions is met:

(1) The animal is observed exiting the impact area; or

(2) The impact area has been clear of any additional sightings for a period of 30 minutes.

(e) If post-mission surveys determine that an injury or lethal take of a marine mammal has occurred, the next mission will be suspended until the test procedure and the monitoring methods have been reviewed with NMFS and appropriate changes made.

(f) Additional mitigation measures as contained in an LOA.

§ 218.55 Requirements for monitoring and reporting.

(a) Holders of LOAs issued pursuant to § 218.56 for activities described in § 218.50(a) are required to cooperate with NMFS, and any other Federal, state, or local agency with authority to monitor the impacts of the activity on marine mammals. Unless specified otherwise in the LOA, the Holder of the LOA must notify the Pacific Islands Region Stranding Coordinator, NMFS, by email, at least 72 hours prior to LRS WSEP missions. If the authorized activity identified in § 218.50(a) is thought to have resulted in the mortality or injury of any marine mammals or take of marine mammals not identified in § 218.50(b), then the Holder of the LOA must notify the Director, Office of Protected Resources, NMFS, or designee, by telephone (301-427-8401), within 48 hours of the injury or death. The Holder of the LOA must also contact the Pacific Islands Region stranding coordinator, NMFS, by email, at least one business day after completion of missions to declare that missions are complete.

(b) The Holder of the LOA will use mission reporting forms to track their use of the PMRF BSURE area for the LRS WSEP missions and to track marine mammal observations.

(c) Aerial surveys – Pre-mission aerial surveys and post-mission aerial surveys will be conducted. Pre-mission surveys would begin approximately one hour prior to detonation. Post-detonation monitoring surveys will commence once the mission has ended or, if required, as soon as personnel declare the mission area safe. The proposed monitoring area would be approximately 8 miles (13 kilometers) from the target area radius around the impact point, with surveys typically flown in a star pattern. Aerial surveys would be conducted at an altitude of about 200 feet, but altitude may vary somewhat depending on sea state and atmospheric conditions. If adverse weather conditions preclude the ability for aircraft to safely operate, missions would either be delayed until the weather clears or cancelled for the day. The observers will be provided with the GPS location of the impact area. Once the aircraft reaches the impact area, pre-mission surveys typically last for 30 minutes, depending on the survey pattern. The aircraft may fly the survey pattern multiple times.

(d) The Holder of the LOA is required to:

(1) Submit a draft report to NMFS OPR on all monitoring conducted under the LOA within 90 days of the completion of marine mammal monitoring, or 60 days prior to the issuance of any subsequent LOA for projects at the PMRF, whichever comes first. A final report shall be prepared and submitted within 30 days following resolution of comments on the draft report from NMFS. This report must contain the informational elements described in the Monitoring Plan, at a minimum (see www.nmfs.noaa.gov/pr/permits/incidental/construction.htm), and shall also include:

(i) Date and time of each LRS WSEP mission;

(ii) A complete description of the pre-exercise and post-exercise activities related to mitigating and monitoring the effects of LRS WSEP missions on marine mammal populations; and

(iii) Results of the monitoring program, including numbers by species/stock of any marine mammals noted injured or killed as a result of the LRS WSEP mission and number of marine mammals (by species if possible) that may have been harassed due to presence within the zone of influence.

(2) The draft report will be subject to review and comment by NMFS. Any recommendations made by NMFS must be addressed in the final report prior to acceptance by NMFS. The draft report will be considered the final report for this activity under the LOA if NMFS has not provided comments and recommendations within 90 days of receipt of the draft report.

(e) Reporting injured or dead marine mammals:

(1) In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the LOA, such as an injury for species not authorized (Level A harassment), serious injury, or mortality, 86 FWS shall immediately cease the specified activities and report the incident to the Office of Protected Resources, NMFS, and the Pacific Islands Regional Stranding Coordinator, NMFS. The report must include the following information:

(i) Time and date of the incident;

(ii) Description of the incident;

(iii) Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and visibility);

(iv) Description of all marine mammal observations in the 24 hours preceding the incident;

(v) Species identification or description of the animal(s) involved;

(vi) Fate of the animal(s); and

(vii) Photographs or video footage of the animal(s).

(2) Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with 86 FWS to determine what measures are necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. The 86 FWS may not resume their activities until notified by NMFS.

(3) In the event that 86 FWS discovers an injured or dead marine mammal, and the lead observer determines that the cause of the injury or death is unknown and the death is relatively recent (*e.g.*, in less than a moderate state of decomposition), 86 FWS shall immediately report the incident to the Office of Protected Resources, NMFS, and the Pacific Islands Regional Stranding Coordinator, NMFS.

(4) The report must include the same information identified in paragraph (e)(i) of this section. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with 86 FWS to determine whether additional mitigation measures or modifications to the activities are appropriate.

(5) In the event that 86 FWS discovers an injured or dead marine mammal, and the lead observer determines that the injury or death is not associated with or related to the activities authorized in the LOA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, scavenger damage), 86 FWS shall report the incident to the Office of Protected Resources, NMFS, and the Pacific Islands Regional Stranding Coordinator, NMFS, within 24 hours of the discovery. The 86 FWS shall provide photographs or video footage or other documentation of the stranded animal sighting to NMFS.

(f) *Additional Conditions.* (1) The Holder of the LOA must inform the Director, Office of Protected Resources, NMFS, (301-427-8400) or designee (301-427-8401) prior to the initiation of any changes to the monitoring plan for a specified mission activity.

(2) A copy of the LOA must be in the possession of the safety officer on duty each day that long range strike missions are conducted.

(3) The LOA may be modified, suspended or withdrawn if the holder fails to abide by the conditions prescribed herein, or if NMFS determines the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals.

§ 218.56 Letters of Authorization.

(a) To incidentally take marine mammals pursuant to these regulations, 86 FWS must apply for and obtain an LOA.

(b) An LOA, unless suspended or revoked, may be effective for a period of time not to exceed the expiration date of these regulations.

(c) If an LOA expires prior to the expiration date of these regulations, 86 FWS must apply for and obtain a renewal of the LOA.

(d) In the event of projected changes to the activity or to mitigation and monitoring measures required by an LOA, 86 FWS must apply for and obtain a modification of the LOA as described in § 218.57.

(e) The LOA will set forth:

(1) Permissible methods of incidental taking;

(2) The number of marine mammals, by species and age class, authorized to be taken;

(3) Means of effecting the least practicable adverse impact (*i.e.*, mitigation) on the species of marine mammals authorized for taking, on its habitat, and on the availability of the species for subsistence uses; and

(4) Requirements for monitoring and reporting.

(f) Issuance of an LOA shall be based on a determination that the level of taking will be consistent with the findings made for the total taking allowable under these regulations.

(g) Notice of issuance or denial of an LOA will be published in the **Federal Register** within 30 days of a determination.

§ 218.57 Renewals and Modifications of Letters of Authorization.

(a) An LOA issued under § 216.106 and § 218.56 of this chapter for the activity identified in § 218.50(a) will be renewed or modified upon request by the applicant, provided that:

(1) The proposed specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for these regulations (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section), and

(2) NMFS determines that the mitigation, monitoring, and reporting measures required by the previous LOA under these regulations were implemented.

(b) For an LOA modification or renewal request by the applicant that include changes to the activity or the mitigation, monitoring, or reporting (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section) that do not change the findings made for the regulations or result in no more than a minor change in the total estimated number of takes (or distribution by species or years), NMFS may publish a notice of proposed LOA in the **Federal Register**, including the associated analysis illustrating the change, and solicit public comment before issuing the LOA.

(c) An LOA issued under § 216.106 and § 218.56 of this chapter for the activity identified in § 218.50(a) may be modified by NMFS under the following circumstances:

(1) Adaptive Management – NMFS may modify (including augment) the existing mitigation, monitoring, or reporting measures (after consulting with 86 FWS regarding the practicability of the modifications) if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring set forth in the preamble for these regulations.

(i) Possible sources of data that could contribute to the decision to modify the mitigation, monitoring, or reporting measures in an LOA are:

(A) Results from 86 FWS's monitoring from previous years;

(B) Results from other marine mammal and sound research or studies; and

(C) Any information that reveals marine mammals may have been taken in a manner, extent or number not authorized by these regulations or subsequent LOAs.

(ii) If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are substantial, NMFS will publish a notice of proposed LOA in the **Federal Register** and solicit public comment.

(2) Emergencies - If NMFS determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified LOAs issued pursuant to § 216.106 and 218.50 of this chapter, an LOA may be modified without prior notice or opportunity for public comment. Notice would be published in the **Federal Register** within 30 days of the action.

218.58 [Reserved]

218.59 [Reserved]

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