

FINAL

MITIGATION AND MONITORING PLAN

for the

LONG RANGE STRIKE WEAPON SYSTEMS EVALUATION
PROGRAM AT THE PACIFIC MISSILE RANGE FACILITY AT
KAUAI, HAWAII

2017-2021 MISSION ACTIVITIES

Submitted To:

86th Fighter Weapons Squadron



Prepared By:

Leidos, Inc.

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ACRONYMS AND ABBREVIATIONS

86 FWS	86th Fighter Weapons Squadron
BO	Biological Opinion
BSURE	Barking Sands Underwater Range Extension
DCL	Detection, Classification, and Localization
EA/OEA	Environmental Assessment/Overseas Environmental Assessment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
km	kilometer
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
PMRF	Pacific Missile Range Facility
SSC PAC	Space and Naval Warfare Systems Center, Pacific
WSEP	Weapon Systems Evaluation Program

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1.0 INTRODUCTION

This mitigation and monitoring plan consolidates the requirements contained in multiple environmental analysis documents and permits associated with Long Range Strike Weapon Systems Evaluation Program (WSEP) missions conducted in the Barking Sands Underwater Range Extension (BSURE) area of the Pacific Missile Range Facility (PMRF). Long Range Strike WSEP missions will occur annually during the summer and fall months from 2017 through 2021 and will consist of live (explosive) and inert (non-explosive) weapons employment. Live detonations may occur above, at, or just below the water surface. The weapon impact location is shown on Figure 1-1.

Several compliance documents have been prepared for Long Range Strike WSEP activities. The Environmental Assessment/Overseas Environmental Assessment (EA/OEA), Marine Mammal Protection Act (MMPA) Letter of Authorization (LOA), Endangered Species Act (ESA) Biological Opinion (BO), and Magnuson Stevens Fishery Conservation and Management Act (MSA) Essential Fish Habitat (EFH) Conservation Recommendations contain monitoring and mitigation measures that are legally required to be implemented before, during, and after missions. The 86th Fighter Weapons Squadron (86 FWS) is the test execution organization under the 53rd Wing for all Long Range Strike WSEP deployments and is the responsible organization for implementing these requirements to support 2017–2021 missions.

Laws and regulations relevant to Long Range Strike WSEP missions are discussed in Section 1.6 of the EA/OEA. Although Long Range Strike WSEP activities are evaluated in the context of several laws, this Mitigation and Monitoring Plan is only associated with the protection of federally-protected resources that may occur in the mission area. Management practices applicable to federally-protected biological resources consist of mitigation, monitoring, and reporting measures required by the National Marine Fisheries Service (NMFS) as a result of consultations and/or authorizations under the ESA, MMPA, and Magnuson-Stevens Act (MSA) that are designed to decrease or minimize the potential for or severity of impacts to marine mammals, sea turtles, fisheries and their habitats resulting from surface and subsurface detonations. These laws are summarized below. Other operational procedures, including those for human safety of military and civilian personnel, will also be implemented but are not part of this Mitigation and Monitoring Plan.

1.1 Endangered Species Act

The ESA provides for the conservation of species that are listed as endangered or threatened. An “endangered species” is any species in danger of extinction, while a “threatened species” is any species likely to become endangered in the future. ESA-listed species potentially present in the Long Range Strike WSEP mission area include several species of whales and sea turtles and the Hawaiian monk seal. The ESA prohibits the “take” of listed species without a permit, where “take” is defined as harassing, harming, wounding, or killing, among other actions. For Long Range Strike WSEP missions, NMFS issued the 86 FWS a Programmatic BO (Consultation No. FPR-2016-9160) on August 15, 2017, which includes an Incidental Take Statement with binding terms and conditions requiring the implementation of this Mitigation and Monitoring Plan.

1.2 Marine Mammal Protection Act

The MMPA provides for the conservation of marine mammals, which consist of whales, dolphins, and the Hawaiian monk seal in the Long Range Strike WSEP mission area. Similar to the ESA, the MMPA prohibits the “take” of all marine mammals in the U.S. without NMFS authorization. Authorizations may be of one-year or five-year duration based on the type of authorization. For WSEP missions in the PMRF, NMFS issued the 86 FWS a 5-year LOA setting forth prescribed mitigation and monitoring measures. This LOA is valid from August 21, 2017 through August 20, 2022.

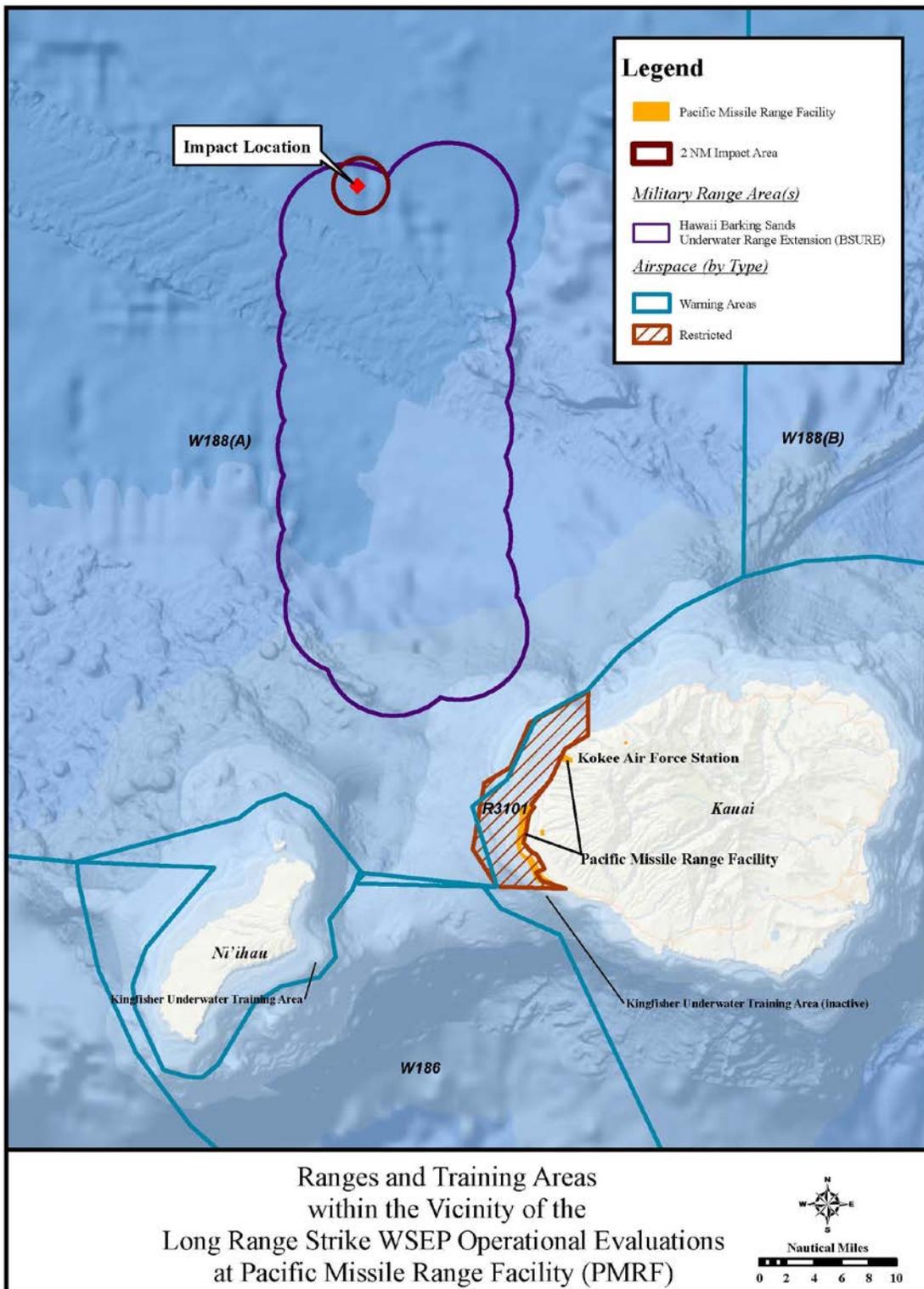
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1.3 Magnuson-Stevens Fishery Conservation and Management Act

The MSA regulates potential impacts to essential fish habitat (EFH) and federally-managed fisheries in U.S. waters. Federally-managed fisheries in the Long Range Strike WSEP mission area include numerous species of bottom fish, lobsters, shrimps, and corals. For each managed fishery, the MSA requires EFH to be identified. EFH is defined as waters and substrate necessary for spawning, breeding, feeding, and growth to maturity. Activities that could adversely affect federally managed fisheries and EFH, such as detonations and depositing munitions fragments on the seafloor, require consultation with NMFS.

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Figure 1. Long Range Strike WSEP Impact Location



2.0 MITIGATION MEASURES FOR PROTECTED MARINE SPECIES

2.1 Overview of Mitigation Measures

Mitigation measures designed to avoid or reduce the potential for impacts to protected marine species during Long Range Strike WSEP missions have been identified during consultations with NMFS, as required under the ESA, MMPA, and MSA. Similar measures have been implemented in the PMRF and BSURE areas for similar missions (see Incidental Harassment Authorization for 2016 Long Range Strike WSEP mission activities valid October 1, 2016 through November 30, 2016 and BO [Consultation number FPR-2016-9160]). Mitigation procedures will primarily consist of visual aerial surveys for the presence of marine mammals (whales, dolphins, and seals) and sea turtles before and after live weapons are deployed. During aerial surveys, mission personnel will survey a pre-determined monitoring area from mission aircraft. The total monitoring area extends from the weapon impact point out to 8 miles (13 km) or an approximate 200-square mile (mi²) (520-square kilometer [km²]) area, which will encompass the weapon impact location in the center, an exclusion zone, and a harassment zone. The exclusion zone extends from the weapon impact point out to 2.3 miles (3.7 km) and corresponds to an area where if any protected species are observed, weapon releases will be delayed. The harassment zone extends from the edge of the exclusion zone to the boundary of the monitoring area and corresponds to an area where if protected species are observed in which takes are not authorized in the LOA or the BO, weapons releases will also be delayed.

Most mission aircraft are equipped with sensors that will be used to supplement the visual surveys. As part of the Marine Mammal Acoustic Monitoring Plan described in Section 2.5, the effectiveness of using this type of instrumentation for detecting marine life on or near the water surface, will be evaluated. If a protected species is observed within the exclusion zone, weapon releases will be delayed until it is confirmed to be outside and on a path away from the exclusion zone (i.e., on a heading and swim speed suggesting it is outside the exclusion zone). If a protected species is observed in the monitoring area outside the exclusion zone, but inside a harassment zone (e.g., Level A) for which take is not authorized, weapon releases will also be delayed until after the animal is observed exiting the harassment zone. The Air Force and NMFS also agreed to implement an adaptive management approach where modifications to the mitigation and monitoring procedures can be made in instances where additional information on the effects of mission activities on protected species becomes available or improved technologies or survey techniques have been identified.

2.2 Summary of Visual Monitoring Tools

2.2.1 Mission Aircraft

Mission aircraft may consist of aircraft including, but not limited to, F-16, F-15, A-10, and bombers such as B-1 and B-52. Weapon employment will occur from at least one aircraft, while other chase aircraft are used to assist with ensuring the range is clear of non-participating vessels and tracking the weapon after it has been released. Each Long Range Strike WSEP mission will use varying types of mission aircraft and may also use additional surveillance aircraft, such as the C-26 or helicopters to help clear the human safety zone. Refer to Section 2.2.3. Typically the human safety zone is much larger than the monitoring area for protected species. Surveillance aircraft clearing the human safety zone for non-participating vessels will also opportunistically assist in visually monitoring for protected marine species on the water surface. Aircrew in surveillance aircraft will report any sighting information to mission personnel.

Mission aircraft are capable of flying at various altitudes and airspeeds. As part of operational procedures, aircrew must conduct aerial surveillance of a potential impact or target area prior to releasing any weapons to confirm the location of the target and ensure the human safety zone around the impact area is clear. In order to accomplish this, the aircraft must operate at an appropriate altitude and airspeed that is operationally safe while providing an optimal field of view for the aircrew and for the sensors. Generally

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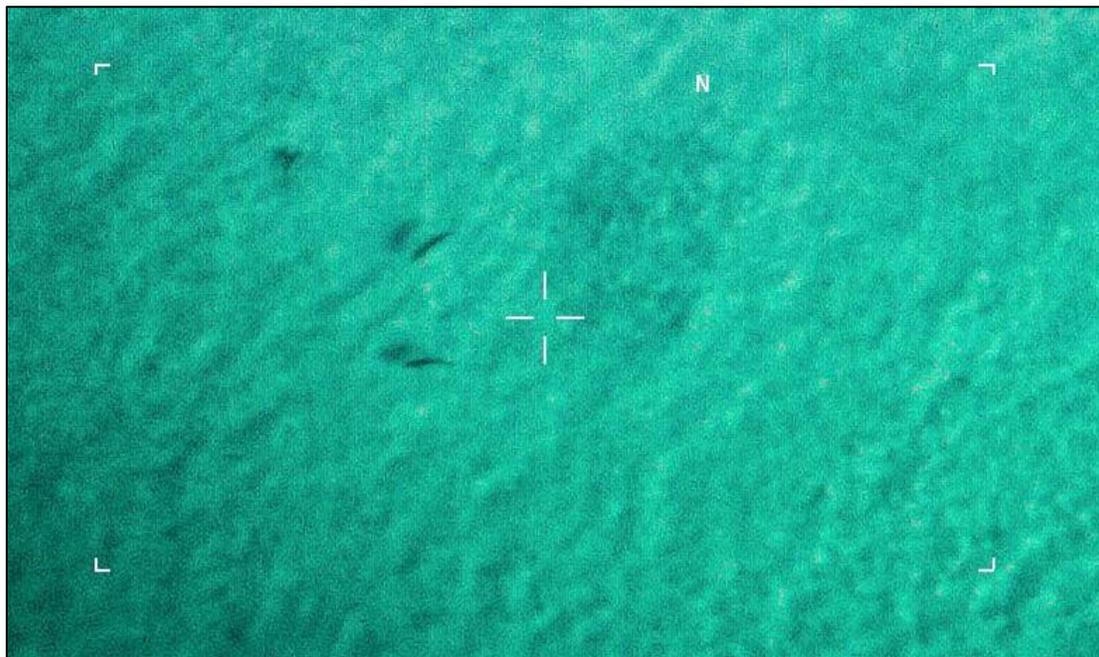
speaking, aircraft can operate anywhere from 1,000 to 40,000 feet altitude, which varies across all aerial platforms. Therefore a specific altitude and airspeed requirement cannot be determined because each Long Range Strike WSEP event will not have the same types of aircraft participating each year. While the aircrew are able to visually scan the area with the naked eye, they also use other sensors to assist with aerial surveillance, as described in Section 2.2.2 below.

2.2.2 Aircraft Sensors

Advanced targeting pods such as SNIPER and LITENING are pods most frequently used by the U.S. Air Force and are currently installed on F-16, F-15C/E, A-10, B-1, and B-52 aircraft. Targeting pods have the ability to use high-definition forward looking infrared (FLIR) and high-definition television (TV) modes, both of which are displayed in real-time to the aircrew in the cockpit. Using thermal signatures, such as warm-blooded marine mammals in a comparatively cooler marine environment, it is expected that marine mammals at or near the water surface would be prominent and easy to identify in FLIR mode. In addition, the TV modes will allow the aircrew to see sea turtles at the water surface, although given their low densities in the mission area, the likelihood of observing a sea turtle is considered low.

Combat aircrews receive extensive training and have gained combat experience using advanced targeting pods to track and identify targets that are similar in size, and in some cases smaller than, marine mammals. For example, Figure 2-1 depicts an unclassified image of three sharks captured from an AC-130 aircraft conducting a 3-mile (5-km) orbit at 15,000 feet altitude using an electro-optical/infrared sensor in the Gulf of Mexico within the Eglin Gulf Test and Training Range. Even though the aircraft and survey location are different than what is proposed under Long Range Strike WSEP activities, the capabilities to detect marine life near the water surface are expected to be similar. Advancements in these technologies are rapidly improving and it is likely that future upgrades to aircraft instrumentation will lead to higher quality imagery of the marine environment and improve the capabilities for aircrew to detect marine mammals and sea turtles at or just below the water surface.

Figure 2. Image of Sharks Captured on AC-130 Gunship using Sensors at 15,000 feet altitude



As previously mentioned, the aircrew are required to conduct surveillance of a potential impact area or specific target prior to employing weapons. In combat operations, this is typically done at altitudes and airspeeds that make it difficult to detect the aircraft from the ground. Therefore, the aircrew utilizes area

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stabilization techniques, meaning they are able to stabilize the targeting pod onto an area or a specific target point, even though the host aircraft is traveling at high speeds across the ground. In addition, the targeting pods have a robust zoom capability, allowing the aircrew to identify small targets from miles away. As a result, the aircrew are able to conduct a detailed scan of the area from various altitudes and distances from the target, using the targeting pod. For example, the optimal altitude for an F-16 chase aircraft to operate using ground stabilization techniques with the targeting pod that would provide optimal visibility of the monitoring area during surveys would be approximately 20,000 feet. These flight parameters will provide an appropriate vantage point to observe the entire monitoring area while allowing the aircrew to use the targeting pod as a secondary monitoring tool with a wide enough field-of-view. If a marine protected species is identified from this higher altitude, the aircrew would be able to lower the aircraft's altitude to visually track the animal(s) and determine its location and heading within the monitoring area, relative to the exclusion zone and acoustic impact zones. However this would be dependent on other factors such as operational safety of the aircraft, cloud cover, angle of the sun, and other visibility parameters. The aircrew are highly-trained experts at determining the best operational parameters for the aircraft that would maximize their visibility of a specific point of interest (i.e., potential target) and those techniques would be utilized to visually track a marine mammal or sea turtle if observed.

2.2.3 Other Aerial Surveillance Platforms

The 86 FWS is required to clear a pre-determined safety footprint for human safety concerns anytime they release a weapon. For maritime activities, this includes conducting aerial surveillance using a C-26 aircraft, or other aircraft with similar capabilities, to identify non-participating vessels within the human safety zone and coordinating with other range personnel to contact their operators or captains and attempt to escort them outside of the area. This type of aerial surveillance would begin prior to the arrival of mission aircraft to ensure any vessels in the area are either outside the human safety zone, or in transit to the perimeter of the safety zone. The C-26 aircraft uses a combination of visual lookouts and radars to identify vessels, people, or other objects on the water surface. While the primary duty of the C-26 is to clear the range of vessels, the aircrew will be able to provide supplemental visual monitoring for protected species.

For 2016 Long Range Strike WSEP missions, a contracted helicopter was used for pre-mission surveys, which was required to evacuate the human safety zone after the surveys were complete but before the weapons were employed. This resulted in a time lapse between the end of the pre-mission survey and live weapon detonations, potentially reducing the likelihood that the area would remain clear of protected marine species. By having the mission aircraft complete the pre-mission surveys, this time lapse is eliminated because visual monitoring will be conducted right up to weapon employment, increasing the effectiveness of the pre-mission surveys in reducing impacts to marine mammals. However, if for any reason mission aircraft are unable to complete the aerial monitoring for pre-mission surveys due to technical issues with the targeting pods, operational constraints, or other unforeseeable reasons, the helicopter will be used to complete the pre-mission surveys in a similar manner as 2016 Long Range Strike WSEP missions as a back-up plan.

2.2.4 Range Cameras

Range cameras are installed on Makaha Ridge, at an elevation between 1,500 and 1,700 feet, and are able to see out to 50 NM from the shore. Since the weapon impact location is approximately 44 NM from shore, it would be within the line of sight of the cameras. The optical lenses of the cameras have the zoom capability to see marine life only if they are at or near the surface. The camera feed will be monitored by personnel within the mission control room at PMRF. Since these cameras will be used to track weapon impacts, they will be available to supplement aerial survey efforts by providing opportunistic sighting information. Therefore, during pre-mission surveys, the range cameras on Makaha Ridge will be zoomed in on the weapon impact area and will be monitored in real-time.

2.3 General Survey Procedures

For the purposes of this Mitigation and Monitoring Plan to support Long Range Strike WSEP missions, the following terms have been defined, as they relate to implementation of the BO and LOA requirements:

- **Weapon impact point:** Location where live weapons will strike the water surface and detonate either on impact, or just below the water surface.
- **Human safety zone:** An area calculated by the Range Safety Office that must be clear of humans before a weapon can be released. In many cases this area is very large, but is highly dependent on the type of weapon being released, along with aircraft release parameters. This area is typically larger than the monitoring area for protected species.
- **Monitoring area:** A pre-determined area identified during NMFS consultations that must be visually surveyed before live weapons can be released. This area is comprised of the weapon impact point in the center, an exclusion zone, and acoustic impact zones. For Long Range Strike WSEP missions, this area is a circle with an 8-mile (13-km) radius that extends from the weapon impact point.
- **Exclusion zone:** A pre-determined area designated by NMFS during consultations that must be visually clear of all protected species before live weapons can be released. For Long Range Strike WSEP missions, this area is a circle with a 2.3-mile (3.7-km) radius that extends from the weapon impact point. Generally, this corresponds to mortality and serious injury impact zones for all protected species, as well as Level A permanent threshold shift (PTS) zones for mid-frequency cetaceans, because no takes in this manner are authorized for these species.
- **Harassment zone:** A pre-determined area calculated based on acoustic modeling results. The acoustic model output provided the distances for the range to effects (in meters) for all acoustic thresholds and criteria for the functional hearing groups of marine mammals. Refer to Appendix A. The impact area for each manner of take is calculated as the area of a circle ($\pi \cdot \text{radius}^2$) with the radius equal to the range to effects distances calculated by the acoustic model. For the purposes of this Plan, the harassment zone describes the various acoustic impact areas that occur between the edge of the exclusion zone and the outer boundary of the monitoring area. Generally this accounts for the potential for acoustic impacts (Level A and Level B harassment) for species that may or may not have authorized takes.

Range cameras on Makaha Ridge are expected to be the first visual monitoring tool available to provide initial status on the conditions around the weapon impact area, such as visibility conditions and presence or absence of non-participating vessels. They will also be able to see whether there are any marine mammals swimming near the water surface, presumed to be visible when displaying surface behaviors such as porpoising, blowing, fluke or tail slapping, or breaching. The next asset to be deployed for visually clearing the range is the C-26, or other type of surveillance aircraft that uses onboard radars and visual lookouts. The aircraft's radar will primarily be used to check for the presence of vessels within the human safety zone, but visual lookouts will be able to determine whether any marine mammals or sea turtles are present on or near the water surface in the area.

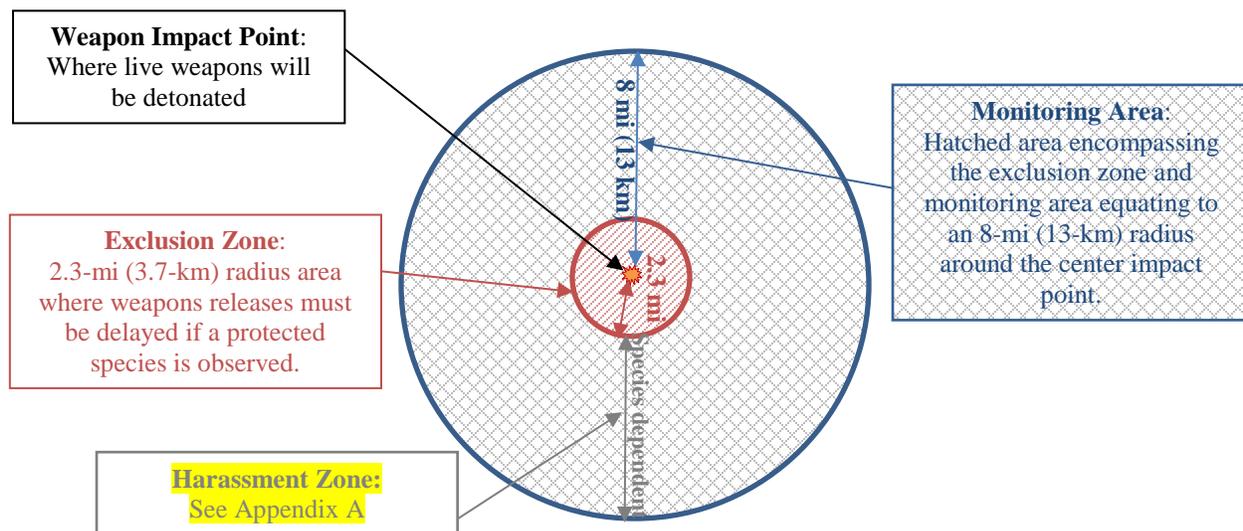
Prior to weapon release, chase aircraft will conduct a pre-mission survey. Chase aircraft are typically equipped with an advanced targeting pod, such as SNIPER and LITENING pods, or other comparable sensor. The chase aircraft will use visual lookouts and the aircraft's targeting pods, or other comparable sensor to survey the monitoring area. The visual lookout and targeting pod operator will each scan the monitoring area in closely-spaced line-transect patterns to look for marine mammals or sea turtles that may be present on the water surface. Both monitoring efforts will be conducted simultaneously and results of any protected species sightings from the visual lookout and from the sensors will be documented, collecting information similar to the example forms shown in Appendix B. If feasible, the

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aircrew may take photos or video footage from the targeting pods. Observation results will be used to evaluate the effectiveness of these procedures as part of the Marine Mammal Acoustic Monitoring Plan described in Section 2.5.

For 2017 Long Range Strike WSEP missions, an F-16 will be used as the chase aircraft and will operate at an altitude of approximately 20,000 feet during the pre-mission survey, which will provide an optimal field of view for the aircrew and for the sensors of the monitoring area. As shown in Figure 3, the monitoring area will consist of the weapon impact point in the center, the exclusion area that extends from the weapon impact point out to 2.3 miles (3.7 km), and a harassment zone that extends from the edge of the exclusion area out to the boundary of the monitoring area. The total monitoring area extends from the weapon impact point out to 8 miles (13 km) or an approximate 200-square mile (mi²) (520-square kilometer [km²]) area). Other chase aircraft may be used to conduct the aerial surveys in future missions, which could operate at different altitudes compared to the F-16 being used for 2017 missions. Operational altitudes will be based on optimal parameters that will provide the visual lookouts best visibility of the entire monitoring area and the appropriate field-of-view for the targeting pod or sensor.

Figure 3. Representation of Monitoring Area for Long Range Strike WSEP Missions



If a marine mammal or sea turtle is observed during the pre-mission survey, the chase aircraft will lower its altitude to visually track the animal(s) and determine its location and heading in relation to the exclusion zone. If a protected species is observed within the exclusion zone, the mission will be delayed. If a protected species is observed within the harassment zone and there is no authorized take for that species, the mission will also be delayed. In order for the mission to proceed, the animal(s) must be outside of the exclusion zone or, if applicable, the harassment zone, and on a heading away from the weapon impact point. If the animal dives to a depth where it is no longer visible from the surface, the mission will be delayed until the animal is re-sighted and confirmed to be outside the exclusion zone or, if applicable, the harassment zone heading away from the weapon impact point or until it has not been observed again for 30 minutes. Depending on fuel limitations of the aircraft and range time available to complete the mission, it is possible that the mission would need to be cancelled for the day, due to the presence of protected species in the area. To prevent this from occurring, if conditions suggest that protected marine animals will not be outside of the exclusion zone and mission timeline is at risk, the 86 FWS may shift the weapon impact point up to 2 miles in any direction to avoid impacting the animal(s).

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Although the shifted weapon impact point would still occur within the monitoring area, the 86 FWS would still need to ensure the shifted 2.3-mile (3.7-km) radius exclusion zone around the new impact point is visually clear of marine mammals for 30 minutes before weapons can be released.

After the pre-mission survey is completed and the area is determined to be clear of protected species and non-participating vessels, the weapon-releasing aircraft will begin their approach to the release point and prepare to employ the weapons. On the inbound flight path prior to weapon release, the aircrew will conduct one last visual and targeting pod scan of the exclusion zone to ensure it is visually clear of protected species and humans. If a protected species is observed at this time, weapon releases will be delayed. Aircrew from mission aircraft will divert efforts to visually track the location and heading of the animal(s). Mission activities will not resume until the observed protected species is either visually confirmed to be outside the exclusion zone on a path away from the weapon impact point or until it is not re-sighted for 30 minutes. For reasons stated above, the 86 FWS may decide to relocate the weapon impact point by up to 2 miles and repeat pre-mission survey procedures at the new location. If a protected species is observed in the exclusion zone, or if applicable, within the harassment zone where takes have not been authorized after live weapon releases have already begun, all other live weapon releases will be ceased immediately. The sighting will be reported to PMRF personnel and the NMFS Pacific Island Regional Stranding Network Coordinator will be called. The aircrew will maintain visual contact with the animal(s), to the maximum extent practicable, and will capture videos or photographs if possible. All sighting information will be recorded, based on information shown in Appendix B. Further instructions will be provided to PMRF personnel by the NMFS Pacific Islands Regional Stranding Coordinator.

After weapons have been released and the mission has been concluded, mission aircraft will conduct the post-mission surveys. The aircrew will begin scanning the weapon impact point immediately after the last detonation has occurred using visual lookouts and the aircraft's targeting pod. Monitoring efforts will focus on the areas immediately surrounding the impact location and gradually move outwards to areas down-current of the area, following the same survey pattern used for the pre-mission surveys. If any protected species are observed, the sighting will be reported to PMRF personnel who will contact the NMFS Pacific Islands Regional Stranding Coordinator. The aircraft will maintain visual contact with the animal(s), to the maximum extent practicable given fuel limitations, and will capture videos or photographs if possible. All sighting information will be recorded, based on information shown in Appendix B. Further instructions will be provided to PMRF personnel by the NMFS Pacific Islands Regional Stranding Coordinator.

2.4 Detailed Mitigation Procedures

The following sections describe the mitigation procedures that will be implemented before, during, and after Long Range Strike WSEP missions. The 86 FWS will notify the NMFS Pacific Island Regional Office via email (greg.balogh@noaa.gov) regarding mission schedules at least 72 hours before Long Range Strike WSEP missions begin.

2.4.1 Pre-Mission Procedures

- Range cameras will be turned on and camera operators will begin visually monitoring the range, focusing on the weapon impact area. A dedicated protected species observation will begin no less than 30 minutes prior to the mission start.
- Chase aircraft will arrive at the mission location. Personnel will be provided with the Global Positioning System (GPS) coordinates of the weapon impact point ahead of time.
- Chase aircraft will begin protected species surveys of the monitoring area using the sensor pods.
 - Monitoring area will consist of an 8-mi (13-km) radius around the weapon impact point, encompassing the 2.3-mi (3.7-km) radius exclusion zone, and the harassment zone. (Figure 3).

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- Pre-mission surveys will be conducted for 30 minutes prior to weapon release
- Aerial surveys will be conducted by searching the water surface for the presence of whales, dolphins, and sea turtles. Aircrew should look for evidence of behaviors including porpoising, blowing, fluke or tail slapping, or breaching. Visual cues may include large splashes and blows. Also, marine mammal presence is often associated with diving birds or large flocks of birds foraging from the water surface.
- During pre-mission surveys, chase aircraft will operate at optimal altitudes and airspeeds that provides the best visibility of the monitoring area for visual lookouts and appropriate field-of-view for the sensors.
- Aircrew will visually scan the water surface of the monitoring area in a line-transect pattern
- Marine mammal or sea turtle sighting information will be documented. Example forms with the necessary information to be collected are provided in Appendix B.
- If mission aircraft equipped with a sensor pod cannot be used for marine mammal surveys, the 86 FWS may substitute a helicopter as the survey platform.
 - The helicopter will arrive at the mission site approximately one hour before weapon release to begin the pre-mission survey.
 - The helicopter will fly at an approximately 200 ft altitude and will cover the 8-mi (13-km) monitoring area, visually observing for protected species for 30 minutes.
 - Once the survey is completed, the helicopter will evacuate the human safety zone and the mission will begin.
- If a protected species is observed, the following steps will be taken:
 - Aircrew will confirm the location of the sighting and the aircraft's altitude will be lowered to optimize visual tracking of the animal(s)
 - Sighting will be documented, collecting information similar to that shown in the example reporting forms in Appendix B.
 - If possible, photos or videos of the animal(s) will be taken with the aircraft's targeting pod or sensor
 - Live weapon releases will be delayed if any protected species is observed in the exclusion zone, or if a protected species is observed within the harassment zone (outside of the exclusion zone) for which take is not authorized in the LOA.
 - Weapon releases will be delayed until one of the following conditions is met:
 - The animal(s) is observed exiting the exclusion zone or appropriate harassment zone and on a heading away from the weapon impact point.
 - The observed animal has not been re-sighted after 30 minutes and is thought to have exited the exclusion zone or appropriate harassment zone based on its speed and heading.
 - The exclusion zone or appropriate harassment zone has been clear of any additional sightings for a period of 30 minutes.
- If a protected species is observed within the monitoring area from the range cameras, the following steps will be taken:
 - Camera operators will communicate the sighting to the Project Engineer and the information will be relayed to mission aircraft conducting the aerial survey.

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- The pilot will be routed to the sighting location to visually track the animal.
- The mission will be delayed under the same parameters as described above.
- If protected species are observed during other surveillance efforts for non-participating vessels within the human safety zone, the sighting will be reported and mitigation measures will be implemented if warranted (e.g., sightings occurs within the exclusion zone or acoustic impact zone where take is not authorized).
- If conditions suggest that protected marine animals will not be outside of the exclusion zone or appropriate harassment zone and mission timeline is at risk, the 86 FWS may shift the weapon impact location up to 2 miles to avoid impacting the animals. Pre-mission survey and range clearance procedures would be repeated in the new area if this were to occur (i.e., the 86 FWS would still need to ensure the shifted 2.3-mile (3.7-km) radius exclusion zone around the new impact point is visually clear of marine mammals for 30 minutes before weapons can be released).
- If adverse weather conditions impair the ability of aircraft to operate safely, missions will either be delayed until the weather clears or is cancelled for the day.

2.4.2 Procedures During the Mission

- Weapon-releasing aircraft will conduct one final visual and targeting pod check of the exclusion zone as they are approaching the weapon release location before employing the weapon
- Chase aircraft will continue to visually scan the monitoring area for the duration of the mission
- All weapon releases will be tracked, and their water entry points will be documented.
- If, during the mission, a protected marine species is observed within the exclusion zone or harassment zone and no take is authorized, the following steps will be taken:
 - All weapon releases will cease immediately
 - Sighting will be reported to PMRF mission personnel and documented, collecting information similar to that shown in the example reporting forms in Appendix B.
 - Mission aircraft will maintain visual contact with the animal(s) to the maximum extent practicable; mission may resume after the marine mammal has exited the zone or, based on speed and direction, the marine mammals are thought to have left the zone and at least 30 minutes has passed since last sighting.
 - If possible, photos or videos of the animal(s) will be taken with the aircraft's targeting pod or sensor.
 - All details of the event will be logged (see Appendix B) and reported to the NMFS Office of Protected Resources (301-427-8401) in the Annual Report (see Section 2.6).

2.4.3 Post-Mission Procedures

- Using the weapon impact point as a reference, post-mission visual surveys will begin immediately after the mission is complete.
- Post-mission surveys will be conducted from the mission aircraft and will follow the same survey pattern as pre-mission surveys but will focus on the area down current of the impact point.
- If a helicopter is used for aerial surveys, after the mission is completed and the Range Safety Officer re-opens the range, the helicopter will transit to the impact location to conduct the post-mission survey.
- Aircrew lookouts will scan the water surface (visually and using the targeting pods, if available) for the presence of protected species and to determine if protected species were impacted by the

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mission (observation of dead or injured animals).

- If a dead or injured whale, dolphin, or turtle is observed in the survey area, one of the following actions will be carried out.
 1. If the death or injury is clearly caused by mission activities (i.e., observed immediately after detonations):
 - Immediately report the carcass or injured animal to the NMFS Pacific Islands Regional Stranding Coordinator (888-256-9840) followed by a report submitted to NMFS Office of Protected Resources.
 - The report must include the following information:
 - Time, date, and location of incident
 - Description of the incident
 - Environmental condition (wind speed and direction, Beaufort sea state, cloud cover, visibility)
 - Description of any marine mammal or sea turtle observations in the 24 hours preceding the incident
 - Species identification or description of the animal(s) involved
 - Fate of the animal(s)
 - Photographs or video footage of the animal(s)
 - Long Range Strike WSEP missions will not resume until NMFS reviews the circumstances and, in cooperation with 86 FWS, determines measures to minimize the likelihood of further incidents.
 2. If the cause of the death or injury is unknown but the death or injury appears to have occurred recently (for example, there is little or no decomposition):
 - Immediately report the incident to the NMFS Pacific Islands Regional Stranding Coordinator (888-256-9840), followed by a report to NMFS Office of Protected Resources and Pacific Island Regional Office within 24 hours of the discovery.
 - Submit a report to NMFS that includes the same information listed in #1 above.
 - Mission activities may continue while NMFS reviews the circumstances with 86 FWS to determine whether additional mitigation measures are necessary.
 3. If the death or injury is clearly not caused by mission activities (for example, if wounds are old, the carcass has moderate to advanced decomposition):
 - Within 24 hours of discovery, report the incident to the NMFS Office of Protected Resources (301-427-8400) and NMFS Pacific Islands Regional Stranding Coordinator (888-256-9840).
 - Provide photographs, video footage, or other documentation of the sighting to NMFS.
- Notify the NMFS Pacific Island Regional Office via email (greg.balaogh@noaa.gov) one business day after completion of missions to declare that Long Range Strike WSEP missions are complete.

2.5 Marine Mammal Acoustic Monitoring Plan

In accordance with Section 101(a)(5)(A)(i) of the MMPA, NMFS issued regulations (CFR 216.104[a][13]) containing requirements for monitoring marine mammal responses to Long Range Strike WSEP mission activities at PMRF. Given the unique assets within the Barking Sands Underwater Range Extension (BSURE) area, the 86 FWS proposed to use the underwater hydrophone array to collect acoustic data before, during, and after each Long Range Strike WSEP mission event annually. The objective in recording data from the hydrophones is to detect vocalizing marine mammals in the vicinity of the Long Range Strike WSEP mission location. The data can be used to determine marine mammal

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presence/absence in the area and whether a behavioral response from Long Range Strike WSEP missions can be documented through passive acoustic monitoring. In addition, the passive acoustic data can be used to assess the effectiveness of the aerial surveys in visually detecting marine mammals.

The 86 FWS has partnered with the Space and Naval Warfare Systems Center, Pacific (SSC PAC) Detection, Classification, and Localization (DCL) Lab to execute this marine mammal monitoring plan. SSC PAC DCL will obtain PMRF full bandwidth “raw” passive acoustic data recordings from 62 hydrophones during each Long Range Strike WSEP event annually. In addition, data recording will occur a few days before and after each event. Conceptually, passive acoustic data will be collected for approximately 44 hours before each mission event to record baseline marine mammal acoustic activities which will be considered Pre-Mission Monitoring. This time duration is based on the maximum amount of space available on the hard drives or discs that holds the data. Mission Day Monitoring would begin the morning of actual weapon releases (approximately 8:00 AM local time) and end after the mission is completed. Depending on range time availability and the time it takes to release all planned weapons, Mission Day Monitoring could last for a couple of hours, or up to 8 hours. Post-Mission Monitoring would begin immediately after mission activities are completed by starting with a new hard drive and collecting acoustic data until the disc is full (approximately 44 hours). See Table 1 for an example schedule based on August 2017 missions. Similar schedules will be developed for follow-on years during each mission planning cycle.

Table 1. Example Schedule for 2017 Data Recordings

PURPOSE	START	END	DISC*
Pre-Mission Monitoring	COB Friday** (18 August)	Sunday afternoon (20 August)	Disc 1 (44 hours)
Mission Day Monitoring***	Thursday morning (24 August)	Thursday afternoon (24 August)	Disc 2 (up to 8 hours)
Post-Mission Monitoring	Thursday afternoon (24 August)	Saturday afternoon (26 August)	Disc 3 (44 hours)

* Each disc holds approximately 44 hours of acoustic recordings

** Due to conflicts from other missions scheduled at PMRF, Pre Mission Monitoring will occur over the preceding weekend instead of the days immediately prior to Long Range Strike WSEP missions.

*** Mission Day Monitoring will begin immediately once personnel arrive in the mission control room and will end once the mission is completed.

The following data products will be collected for future incorporation into the analysis:

- Raw acoustic data
- Sound velocity profiles collected by PMRF (if available)
- Ship and aircraft tracks (this could be PMRF “Tsunami data” with radar tracks and potentially unclassified AIS data)
- Results of weapon scoring data analysis conducted by PMRF (e.g., list of weapons released, weapon impact location, timing, use of targets, etc...)

Upon completion of each Long Range Strike WSEP event, all data will be shipped to the DCL lab in San Diego, backed up, and processed using existing SSC PAC DCL algorithms as a means of quality checking the data for timing errors, dropouts, or other issues. The data will then be stored onsite for future analysis. After completion of year 3 of Long Range Strike WSEP events for the 5-year LOA time (approximately summer/fall 2020), passive acoustic data will be analyzed and a report will be developed with the results. Example data analysis products will include dive locations (by hydrophone) for Blainville’s beaked whales and individual tracks for baleen whales, mostly likely limited to Bryde’s whales as these are the only baleen whale species believed present in Hawaiian waters in August. Detections and rate of odontocete vocalizations would be grouped together and analyzed as present/absent. Algorithms have not been developed for all odontocete species, therefore species-level

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classifications are not possible at this time. A basic presence/absence analysis of the area visually monitored during pre-mission surveys will be conducted to assess the effectiveness of aerial surveys by mission aircraft as well as the targeting pod sensors to visually detect marine mammals. The data products mentioned above would also be integrated into an analysis to include an assessment of what factors (e.g. weapon impact location relative to animals, weapon type/size, etc...) may lead to an observed response. Responses detectable by passive acoustic monitoring include the cessation of calling when mission activities begin or the initiation of calling when mission activities end, and changes in acoustic parameters of vocalizations (e.g. call rates or frequencies). In addition, if animals continue to call, basic tracks of the animals would be developed in post-processing to determine if they moved away from the mission area, as an example of an avoidance behavioral response.

2.6 Reporting Requirements

An annual report that summarizes mission activities, the results of pre- and post-mission surveys, and any impacts to protected species documented through post-mission surveys will be sent to NMFS within 90 days of conclusion of each year's mission activities. Reports may be sent by conventional mail or email. Specifically, the following information is required in each report:

- Date and time of each Long Range Strike WSEP mission.
- A description of the pre-mission and post-mission activities related to the effects of missions on marine mammals and sea turtles.
- Results of protected species monitoring, including:
 - Number (by species or stock if possible) of any marine mammals or sea turtles killed or injured as a result of the mission
 - Number (by species if possible) of any marine mammals or sea turtles that may have been harassed due to presence in the impact area.
 - Photos from sniper pods with details of how aircraft was operating (e.g., altitude/speed)
 - Note: An animal may have experienced Level A or Level B harassment if it is observed within the post-mission monitoring area but was not killed and does not appear to have been injured.

Because different divisions within NMFS are responsible for implementation of the various laws, reports must be submitted separately to each division. The due date for each division is also different in some cases. However, it is expected that the same report (with a different cover letter) may be sent to each division. The time frames, contact names, and addresses for each division is provided below. Currently, there are no specific mitigation measures for managed fishery species or EFH. However, NMFS requests that an annual report be sent to the division responsible for EFH protection. Table 2 summarizes annual reporting requirements for each division of NMFS.

Table 2. Annual Reporting Requirements

Report	Due Date	Mailing Address	Email Addresses
ESA Annual Report	Within 90 days of completion of the missions	Ms. Cathryn E. Tortorici Chief, ESA Interagency Cooperation Division Office of Protected Resources National Marine Fisheries Service 1315 East-West Highway Silver Spring, MD 20910	Primary: Jacki Pearson-Meyer (jacqueline.pearson-meyer@noaa.gov) Courtesy Copy: Cathryn Tortorici (cathy.tortorici@noaa.gov) Mike Ackerman (michael.ackerman.2@us.af.mil) Kevin Porteck (kevin.porteck@us.af.mil)

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Report	Due Date	Mailing Address	Email Addresses
MMPA Annual Report	90 days after missions are completed ¹	Ms. Jolie Harrison Chief, Permits and Conservation Division Office of Protected Resources National Marine Fisheries Service 1315 East-West Highway SSMC3, Room 13805 Silver Spring, MD 20910-3226	Primary: Jaclyn Daly (jaclyn.daly@noaa.gov) Courtesy Copy: Jolie Harrison (jolie.harrison@noaa.gov) Mike Ackerman (michael.ackerman.2@us.af.mil) Kevin Porteck (kevin.porteck@us.af.mil)
MMPA 5-year LOA Report	90 days after LOA expires or draft report with submission of subsequent LOA application	Ms. Jolie Harrison Chief, Permits and Conservation Division Office of Protected Resources National Marine Fisheries Service 1315 East-West Highway SSMC3, Room 13805 Silver Spring, MD 20910-3226	Primary: Jaclyn Daly (jaclyn.daly@noaa.gov) Courtesy Copy: Jolie Harrison (jolie.harrison@noaa.gov) Mike Ackerman (michael.ackerman.2@us.af.mil) Kevin Porteck (kevin.porteck@us.af.mil)
EFH Annual Report	Within 90 days of completion of the missions	Mr. Gerry Davis Assistant Regional Administrator, Habitat Conservation Division Pacific Islands Regional Office National Marine Fisheries Service 1601 Kapiolani Blvd, Suite 1110 Honolulu, HI 96814-4700	Primary: Samantha Brooke (samantha.brooke@noaa.gov) Courtesy copy: Gerry Davis (Gerry.davis@noaa.gov) Arlene Pangelinan (Arlene.pangelinan@noaa.gov) Mike Ackerman (michael.ackerman.2@us.af.mil) Kevin Porteck (kevin.porteck@us.af.mil)

MMPA = Marine Mammal Protection Act; ESA = Endangered Species Act; EFH = essential fish habitat

1. Draft report must be submitted within **90 days** of completion of the missions or **60 days** prior to being issued another permit, whichever comes first. A final report must be submitted within **30 days** following resolution of any NMFS comments on the draft report.

As previously indicated, the Marine Mammal Acoustic Monitoring Report containing the results of the analysis of passive acoustic data collected during years 1 through 3 (2017, 2018, and 2019 missions) of the 5-year LOA period will be developed and submitted to NMFS. In addition, the results from passive acoustic monitoring will be included in the LOA Application for future Long Range Strike WSEP operations (2022-2026). A final report with all data from 5-years of mission activities under the LOA will be due either no later than 90 days after the LOA expires or with the submission of a subsequent LOA application.

2.7 Adaptive Management

As part of the annual review of Long Range Strike WSEP mission activities, the 86 FWS and NMFS will coordinate on results of mission activities and plans for upcoming annual missions. An adaptive management approach will be taken as part of this dialog to consider multiple factors such as lessons learned from preceding year's mission activities, updated information on the effects of Long Range Strike WSEP missions to marine mammals and sea turtles, or improvements in the technology or techniques taken by the Air Force to visually monitor for protected species. The results of these discussions may allow for a modification of the mitigation and monitoring measures to be implemented in the following Long Range Strike WSEP mission event.

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Appendix A: HARASSMENT ZONES

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Appendix A: Harassment Zones

Table 3 shows the range to effects (in meters) for all acoustic thresholds and criteria for the functional hearing groups of marine mammals based on the acoustic model output and are included in the LOA. These ranges will be used to determine the harassment zones within the 8-mi (13-km) monitoring area. Table 4 shows the authorized levels of takes for marine mammals and sea turtles, annually during Long Range Strike WSEP 2017-2021 missions. No mortality, slight lung injury, and gastrointestinal (GI) tract injury takes are authorized in the LOA or the BO for any protected species, however these acoustic impact areas occur within the 2.3-mi (3.7-km) exclusion zone, which requires mitigation actions to be taken, as outlined in Section 2.4. Therefore implementation of mitigation requirements associated with the exclusion zone will prevent unauthorized takes in that manner. In addition, impact radii associated with Level A harassment by permanent threshold shift (PTS) for mid-frequency cetaceans also occur within the 2.3-mi (3.7-km) exclusion zone, similarly indicating mitigation actions would be implemented and unauthorized takes in this manner for mid-frequency cetaceans would be prevented.

Table 3. Acoustic Impacts Radii (in meters) for Long Range Strike WSEP Missions

Species	Mortality	Level A Harassment			Level B Harassment	
		Slight Lung Injury	GI Tract Injury	PTS	TTS	Behavioral
Low frequency cetaceans						
Humpback Whale	99*	200*	204*	5,415	55,464	59,039
Blue Whale	74*	149*				
Fin Whale	76*	157*				
Sei Whale	101*	204*				
Bryde's Whale	99*	200*				
Minke Whale	138*	268*				
Mid-frequency cetaceans						
Sperm Whale	91*	177*	204*	1,575*	8,019	11,948
Killer Whale	149*	287*				
False Killer Whale (MHI Insular stock)	177*	340*				
False Killer Whale (all other stocks)	177*	340*				
Pygmy Killer Whale	324*	604*				
Short-finned Pilot Whale	217*	413*				
Melon-headed Whale	273*	502*				
Bottlenose Dolphin	273*	509*				
Pantropical Spotted Dolphin	324*	604*				
Striped Dolphin	324*	604*				
Spinner Dolphin	324*	604*				
Rough-toothed Dolphin	273*	509*				
Fraser's Dolphin	257*	480*				
Risso's Dolphin	207*	384*				
Cuvier's Beaked Whale	131*	257*				
Blainville's Beaked Whale	195*	368*				
Longman's Beaked Whale	133*	261*				
High frequency cetaceans						
Pygmy Sperm Whale	248*	457*	204*	20,058	71,452	74,804
Dwarf Sperm Whale	273*	509*				
Sea turtles						
Leatherback sea turtle	340*	631*	204*	4,336	15,340	12,010
Loggerhead sea turtle						
Olive ridley sea turtle						

* Impact radii fall within the 2.3-mi (3.7-km) exclusion zone, therefore mitigation actions outlined in Section 2.4 would be taken if any protected species is observed.

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Table 4. Annual Numbers and Manner of Take Authorized for Protected Species

Species	Mortality/Tissue Damage	Level A Harassment (PTS only)	Level B Harassment (TTS)	Level B Harassment (Behavioral)
Marine Mammals				
Humpback whale	0	4	44	30
Sei whale	0	0	0	3
Minke whale	0	1	9	15
Pygmy sperm whale	0	7	66	29
Dwarf sperm whale	0	18	162	70
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	26
Pantropical spotted dolphin	0	0	3	40
Striped dolphin	0	0	2	51
Spinner dolphin	0	0	1	29
Rough-toothed dolphin	0	0	3	22
Fraser's dolphin	0	0	8	273
Risso's dolphin	0	0	2	25
Longman's beaked whale	0	0	1	59
Total marine mammals	0	30	310	885
Sea Turtles				
Leatherback sea turtle	0	0	4	4
Loggerhead sea turtle	0	0	3	3
Olive ridley sea turtle	0	0	2	2
Total sea turtles	0	0	9	9

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Appendix B: EXAMPLE MISSION REPORTING FORMS

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Appendix B: Example Mission Reporting Forms

The forms below may be used to assist with collecting sighting information during pre- and post-mission surveys and other relevant information needed to complete annual reporting requirements associated with the Letter of Authorization and Biological Opinion issued by the National Marine Fisheries Service. One form would be used to provide summary information on the mission itself, including start and stop times of surveys and munition detonations. The other form would be used to collect sighting information in the event that a marine mammal or sea turtle is observed. These exact forms are not required to be used during missions but should be referenced to ensure proper information is being recorded and included in the annual reports.

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PROTECTED SPECIES SIGHTING FORM

Complete this form for each sighting

Sighting # <u> </u>		
Time: _____	Sea state: _____	Survey Platform: Aircraft or Range Camera (circle one)
Mission status at time of observation (check one): <input type="checkbox"/> Pre-mission survey <input type="checkbox"/> On approach/During mission <input type="checkbox"/> Post-mission survey		
Location of sighting: Latitude: _____ Longitude: _____ Compass Heading: _____ Location of sighting relative to weapon impact site (check one): <input type="checkbox"/> within 2.3-mi (3.7-km) exclusion zone <input type="checkbox"/> within acoustic impact zone <input type="checkbox"/> outside 8-mi (13-km) monitoring area <input type="checkbox"/> Other (state distance and heading relative to weapon impact site): _____		
What was observed? Protected species indicator: <input type="checkbox"/> Large school(s) of fish <input type="checkbox"/> Large flock(s) of feeding birds <input type="checkbox"/> <i>Sargassum</i> mat(s) <input type="checkbox"/> Large jellyfish aggregation(s) <input type="checkbox"/> Other (describe): _____ Protected species class: Marine Mammal: _____ Sea Turtle _____ <input type="checkbox"/> Large/baleen whale <input type="checkbox"/> Dolphin <input type="checkbox"/> Small whale <input type="checkbox"/> Unknown Species name (if known): _____ If unknown, provide description: _____ Estimated # of animals: Adults: _____ Calves: _____ Length of time observers maintained visual contact with animal(s): _____ Photos or videos taken of the animal(s)? Y or N _____		
Resolution of the sighting: <input type="checkbox"/> Animal was observed outside the 8-mi (13-km) monitoring area (no mission delays). <input type="checkbox"/> Animal was observed within the 2.3-mi (3.7-km) exclusion zone Mission delayed? Y or N _____ If no delay, please state why: _____ If yes, mission was delayed until (check one): <input type="checkbox"/> Animal was observed exiting the area <input type="checkbox"/> Animal was not resighted for 30 minutes Length of delay: _____ or Time that mission resumed: _____ Mission relocated? Y or N (if yes, fill out a new Mission Summary Report Form) Mission cancelled? Y or N _____ <input type="checkbox"/> Animal was observed within an acoustic impact zone Is impact zone associated with a species and manner of take that is authorized? Y or N _____ If yes, mitigation actions were not needed. Mission proceeded. If no or unknown, mission was delayed until (check one): <input type="checkbox"/> Animal was observed exiting the area <input type="checkbox"/> Animal was not resighted for 30 minutes. Length of delay: _____ or Time that mission resumed: _____ Mission relocated? Y or N (if yes, fill out a new Mission Summary Report Form) Mission cancelled? Y or N _____		
Post-mission survey observations: If animal(s) was observed during a post-mission survey, describe behavior/physical condition: <input type="checkbox"/> Fast/Erratic swimming <input type="checkbox"/> Breaching <input type="checkbox"/> Injured (blood/wounds observed) <input type="checkbox"/> Dead <input type="checkbox"/> Other: _____		

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Use this section to provide additional narrative or description of the animal(s) behavior/condition and other relevant information on the sighting and mission-related actions: _____
