DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 218

[Docket No. 250708–0120]

RIN 0648–BN44

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Military Readiness Activities in the Hawaii-California Training and Testing Study Area

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

ACTION: Proposed rule; proposed letters of authorization; request for comments.

SUMMARY: NMFS has received a request from the U.S. Department of the Navy (including the U.S. Navy and the U.S. Marine Corps) (Navy) and on behalf of the U.S. Coast Guard (Coast Guard) and U.S. Army (Army) (hereafter, Navy, Coast Guard, and Army are collectively referred to as the Action Proponents) for Incidental Take Regulations (ITR) and multiple associated Letters of Authorization (LOAs) pursuant to the Marine Mammal Protection Act (MMPA). The requested regulations would govern the authorization of take of marine mammals incidental to training and testing activities, and modernization and sustainment of ranges conducted in the Hawaii-California Training and Testing (HCTT) Study Area over the course of seven years from December 2025 through December 2032. NMFS requests comments on this proposed rule. NMFS will consider public comments prior to making any final decision on the promulgation of the requested ITR and issuance of the LOAs; agency responses to public comments will be summarized in the final rule, if issued. The Action Proponents' activities are considered military readiness activities pursuant to the MMPA, as amended by the National Defense Authorization Act for Fiscal Year 2004 (2004 NDAA) and the NDAA for Fiscal Year 2019 (2019 NDAA).

DATES: Comments and information must be received no later than August 15, 2025.

ADDRESSES: A plain language summary of this proposed rule is available at: *https://www.regulations.gov/docket/NOAA-NMFS-2025-0028.* You may submit comments on this document, identified by NOAA–NMFS–2025–0028, by any of the following methods:

- *Electronic Submission:* Submit all electronic public comments via the Federal e-Rulemaking Portal. Visit *https://www.regulations.gov* and type NOAA–NMFS–2025–0028 in the Search box. Click on the ''Comment'' icon, complete the required fields, and enter or attach your comments.
- *Mail:* Submit written comments to Ben Laws, Incidental Take Program Supervisor, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910–3225.
- *Fax:* (301) 713–0376; Attn: Ben Laws.

Instructions: Comments sent by any other method, to any other address or individual, or received after the end of the comment period, may not be considered by NMFS. All comments received are a part of the public record and will generally be posted for public viewing at: *https://www.regulations.gov* without change. All personal identifying information (*e.g.,* name, address, *etc.*), confidential business information, or otherwise sensitive information submitted voluntarily by the sender will be publicly accessible. NMFS will accept anonymous comments (enter ''N/A'' in the required fields if you wish to remain anonymous). Attachments to electronic comments will be accepted in Microsoft Word, Excel, or Adobe PDF file formats only.

A copy of the Action Proponents' Incidental Take Authorization (ITA) application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities.* In case of problems accessing these documents, please call the contact listed below (see **FOR FURTHER INFORMATION CONTACT**).

FOR FURTHER INFORMATION CONTACT: Leah Davis, Office of Protected Resources, NMFS, (301) 427–8401.

SUPPLEMENTARY INFORMATION:

Purpose and Need for Regulatory Action

This proposed rule, if promulgated, would provide a framework under the authority of the MMPA (16 U.S.C. 1361 *et seq.*) to allow for the authorization of take of marine mammals incidental to the Action Proponents' training and testing activities and modernization and sustainment of ranges (which qualify as military readiness activities) involving the use of active sonar and other transducers, air guns, and explosives (also referred to *as* ''in-water detonations''); pile driving and vibratory extraction; land-based missile and target launches; and vessel movement in the HCTT Study Area. The HCTT Study Area includes areas in the north-central Pacific Ocean, from California west to Hawaii and the International Date Line, and including the Hawaii Range Complex (HRC) and Temporary Operating Area (TOA), Southern California (SOCAL) Range Complex, Point Mugu Sea Range (PMSR), Silver Strand Training Complex, areas along the Southern California coastline from approximately Dana Point to Port Hueneme, and the Northern California (NOCAL) Range Complex (see figure 1.1–1 of the rulemaking and LOA application (hereafter referred to as the application)). Please see the Legal Authority for the Proposed Action section for relevant definitions.

Legal Authority for the Proposed Action

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

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking; other ''means of effecting the least practicable adverse impact'' on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for certain subsistence uses (collectively referred to as ''mitigation''); and requirements pertaining to the monitoring and reporting of the takings. The MMPA defines ''take'' to mean to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal (16 U.S.C. 1362). The Preliminary Analysis and Negligible

Impact Determination section discusses the definition of ''negligible impact.''

The 2004 NDAA (Pub. L. 108–136) amended section 101(a)(5) of the MMPA to remove the ''small numbers'' and ''specified geographical region'' provisions, 16 U.S.C. 1371(a)(5)(F), and amended the definition of ''harassment'' in section 3(18)(B) of the MMPA as applied to a ''military readiness activity'' to read as follows: (1) 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 (2) 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). 16 U.S.C. 1362(18)(B). The 2004 NDAA also amended the MMPA to establish in section 101(a)(5)(A)(iii) that ''[f]or a military readiness activity . . . , a determination of 'least practicable adverse impact' . . . shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.'' 16 U.S.C. 1371(a)(5)(A)(iii). On August 13, 2018, the 2019 NDAA (Pub. L. 115–232) amended the MMPA to allow ITRs for military readiness activities to be issued for up to 7 years. 16 U.S.C. 1371(a)(5)(A)(ii).

Summary of Major Provisions Within the Proposed Rule

The major provisions of this proposed rule are as follows:

- The proposed authorization of take of marine mammals by Level A harassment and/or Level B harassment;
- The proposed authorization of take of marine mammals by mortality or serious injury (M/SI);
- The proposed use of defined powerdown and shutdown zones (based on activity);
- Proposed measures to reduce the likelihood of vessel strikes;
- Proposed activity limitations in certain areas and times that are biologically important (*i.e.,* for foraging, migration, reproduction) for marine mammals;
- The proposed implementation of a Notification and Reporting Plan (for dead, live stranded, or marine mammals struck by any vessel engaged in military readiness activities); and
- The proposed implementation of a robust monitoring plan to improve our understanding of the environmental effects resulting from the Action Proponents' training and testing activities and modernization and sustainment of ranges.

This proposed rule includes an adaptive management component that allows for timely modification of mitigation, monitoring, and/or reporting measures based on new information, when appropriate.

Summary of Request

On September 16, 2024, NMFS received an application from the Action Proponents requesting authorization to take marine mammals, by Level A and Level B harassment, incidental to training, testing, and modernization and sustainment of ranges (characterized as military readiness activities) including the use of sonar and other transducers, explosives, air guns, impact and vibratory pile driving and extraction, and land-based missile and target launches conducted within the HCTT Study Area. The Action Proponents also request authorization to take, by serious injury or mortality, a limited number of marine mammal species incidental to the use of explosives and vessel movement during military readiness activities conducted within the HCTT Study Area. The Action Proponents are requesting multiple 7-year LOAs for Navy training activities, Coast Guard training activities, Army training activities, and Navy testing activities. In response to our comments and following an information exchange, the Action Proponents submitted a revised application, deemed adequate and complete on December 13, 2024. On that same date, we published a notice of receipt of application in the **Federal Register** (89 FR 100982), requesting comments and information related to the Action Proponents' request for 30 days. During the 30-day public comment period on the NOR, we received one public comment from the Center for Biological Diversity. NMFS reviewed and considered all submitted material during the drafting of this proposed rule.

NMFS has previously promulgated ITRs pursuant to the MMPA relating to similar military readiness activities in areas located within the HCTT Study Area. NMFS published the first rule effective from January 5, 2009 through January 5, 2014, (74 FR 1456, January 12, 2009), the second rule effective from December 24, 2013 through December 24, 2018 (78 FR 78106, December 24, 2013), and the third rule effective from December 21, 2018 through December 20, 2023 (83 FR 66846, December 27, 2018), which was subsequently amended, extending the effective date until December 20, 2025 (85 FR 41780, July 10, 2020) pursuant to the 2019 NDAA and later further amended to increase the take of large whales by vessel strike and modify the mitigation, monitoring, and reporting measures to reduce vessel strikes (90 FR 4944, January 16, 2025). For this proposed rulemaking, the Action Proponents propose to conduct substantially similar training and testing activities within the HCTT Study Area that were conducted under previous rules (noting that the Study Area has been expanded, as described in the *Geographic Region* section).

The Action Proponents' application reflects the most up-to-date compilation of training and testing activities, and modernization and sustainment of ranges deemed necessary to accomplish military readiness requirements. The types and numbers of activities included in the proposed rule account for interannual variability in training and testing to meet evolving or emergent military readiness requirements. As explained herein, these proposed regulations also consolidate several actions conducted by the Navy that were previously authorized by NMFS and include some new military readiness activities carried out by the Action Proponents. In particular, these proposed regulations would cover incidental take during military readiness activities in the HCTT Study Area that would occur for a 7-year period following the expiration of the existing MMPA authorization which expires on December 20, 2025 (85 FR 41780, as amended by 90 FR 4944). In addition, this proposed rule includes PMSR activities for which incidental take has previously been authorized under separate authorizations, and, if finalized, this rule would supersede the most recent PMSR regulations (87 FR 40888, July 8, 2022). This proposed rule also includes areas along the Southern California coastline from approximately Dana Point to Port Hueneme and would supersede the incidental harassment authorization (IHA) allowing incidental take of marine mammals during pile driving training activities at Port Hueneme (90 FR 20283, May 13, 2025). In this proposed rule, we have undertaken a comprehensive assessment of the risks/impacts of all military training and testing activities on marine mammals likely to be present within the entire range of the Study Area.

Description of Proposed Activity

Overview

The Action Proponents request authorization to take marine mammals incidental to conducting military readiness activities. The Action Proponents have determined that acoustic and explosives stressors are likely to result in take of marine mammals in the form of Level A and B harassment, and that a limited number of takes by serious injury or mortality may result from vessel movement and use of explosives (including ship shock trials). Detailed descriptions of these activities are provided in chapter 2 and appendix A of the 2024 HCTT Draft Environmental Impact Statement/ Overseas Environmental Impact Statement (2024 HCTT Draft EIS/OEIS) (*https://www.nepa.navy.mil/hctteis/*) and in the Action Proponents' application (*https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities*), which are summarized here. Of note, the U.S. Air Force (USAF) is a joint lead agency for the 2024 HCTT Draft EIS/OEIS; USAF activities consist of air combat maneuvers and air-to-air gunnery (a gunnery exercise in which fixed-wing aircraft fire medium caliber guns at air targets). The Action Proponents determined that USAF activities would not result in the take of marine mammals, and therefore these activities are not included in the Action Proponents' application. NMFS concurs that these activities are not anticipated to result in incidental take of marine mammals.

The Navy's statutory mission is to organize, train, equip, and maintain combat-ready naval forces for the peacetime promotion of the national security interests and prosperity of the United States, and for prompt and sustained combat incident to operations essential to the prosecution of a naval campaign. This mission is mandated by Federal law (10 U.S.C. 8062 and 10 U.S.C. 8063), which requires the readiness of the naval forces of the United States. The Navy executes this responsibility by establishing and executing at-sea training and testing, often in designated operating areas (OPAREAs) and testing and training ranges. The Navy must be able to access and utilize these areas and associated sea and air space to develop and maintain skills for conducting naval operations. The Navy's testing activities ensure naval forces are equipped with well-maintained systems that take advantage of the latest technological advances. The Navy's research and acquisition community conducts military readiness activities that involve testing. The Navy tests vessels, aircraft, weapons, combat systems, sensors, and related equipment, and conducts scientific research activities to achieve and maintain military readiness.

The mission of the Coast Guard is to ensure the maritime safety, security, and stewardship of the United States. To advance this mission, the Coast Guard must ensure its personnel can qualify and train jointly with, and independently of, the Navy and other services in the effective and safe operational use of Coast Guard vessels, aircraft, and weapons under realistic conditions. These activities help ensure the Coast Guard can safely assist in the defense of the United States by protecting the United States' maritime safety, security, and natural resources in accordance with its national defense mission (14 U.S.C. 102). Coast Guard training, which accounts for a small portion of overall activities, is summarized below.

The Army is increasingly required to support the naval mission, frequently training in concert with the Navy. Some of this training includes the use of explosives in the marine environment.

Dates and Duration

The specified activities would occur at any time during the 7-year period of validity of the regulations. The proposed number of military readiness activities are described in the Detailed Description of the Specified Activity section (table 2 through table 9).

Geographic Region

The HCTT Study Area includes areas in the north-central Pacific Ocean, from California west to Hawaii and the International Date Line, and including the HRC and TOA, SOCAL Range Complex, PMSR, Silver Strand Training Complex, and the NOCAL Range Complex. The HRC encompasses ocean areas around the Hawaiian Islands, extending from 16 degrees north latitude to 43 degrees north latitude and from 150 degrees west longitude to the International Date Line (figure 1). It also includes pierside locations and port transit channels, bays, harbors, inshore waterways, amphibious approach lanes, and civilian ports where military readiness activities occur as well as transits between homeports and the Hawaii and California Study Areas. The geographic extent of the HRC remains the same and has not changed since the last rulemaking. The SOCAL Range Complex is located between Dana Point, California and San Antonio, Mexico, and extends southwest into the Pacific Ocean. The PMSR is located adjacent to Los Angeles, Ventura, Santa Barbara, and San Luis Obispo Counties along the Pacific Coast of Southern California. The Silver Strand Training Complex is an integrated set of training areas located on and adjacent to the Silver Strand, a narrow, sandy isthmus separating the San Diego Bay from the Pacific Ocean. The NOCAL Range Complex consists of two separate areas located offshore of central and northern California, one northwest of San Francisco and the other southwest of Monterey Bay.

The SOCAL Range Complex expansion, which is new, and incorporation of existing NOCAL Range Complex and the PMSR, are revisions for the HCTT Study Area (formerly HSTT (Hawaii-Southern California Training and Testing) Study Area) in this application (noting that take from activities at PMSR are currently authorized under a separate rule (87 FR 40888, July 8, 2022)).

This proposed rule also incorporates areas along the Southern California coastline from approximately Dana Point to Port Hueneme and includes the new IHA allowing incidental take of marine mammals during pile driving training activities at Port Hueneme (90 FR 20283, May 13, 2025).

Please refer to figure 1.1–1 of the application for a color map of the HCTT Study Area and figure 2–1 through figure 2–17 for additional maps of the range complexes, training and testing ranges, and other notable areas. A summary of the HCTT Study Area Training and Testing Ranges are provided in table 1.

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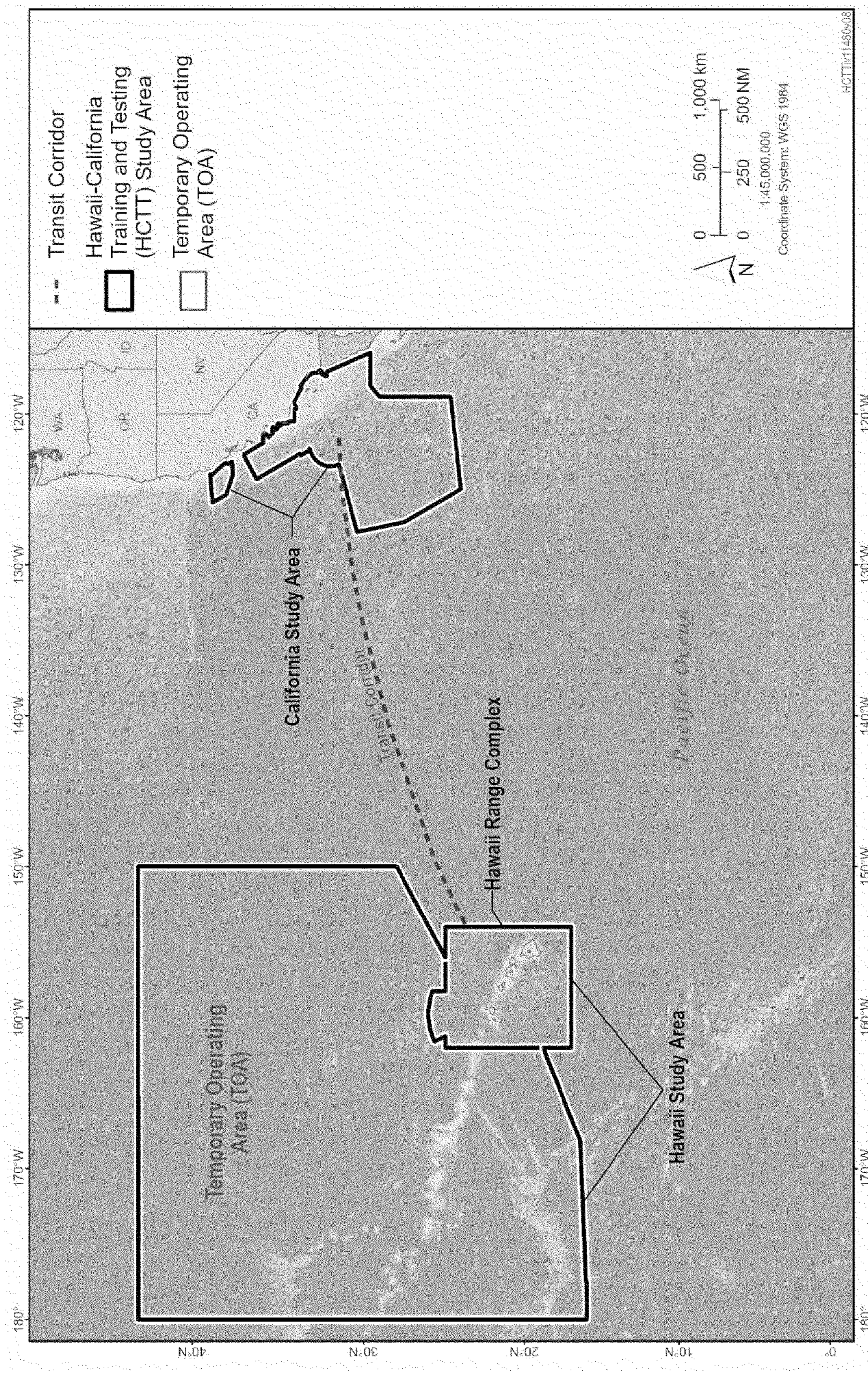

Figure 1 -- Map of the HCTT Study Area

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TABLE 1—HCTT STUDY AREA TRAINING AND TESTING RANGES

Name	Basic location	Spatial extent (air, sea, and undersea space)
Hawaii Range Complex (HRC)	Ocean areas around main Hawaiian islands from 16 degrees north latitude to 43 degrees north latitude and from 150 degrees west longitude to the International Date Line.	235,000 nmi² (80,602,744 ha).
Temporary Operating Area (TOA)	North and west from the island of Kaua'i	2,000,000 nmi² (585,980,800 ha).
Southern California Range Complex (SOCAL).	Off San Diego County out to approximately 550 nmi (1,109 km)	217,000 nmi² (74,428,916 ha).
Silver Strand Training Complex	Subset of areas within San Diego Bay and adjacent to ocean out to approximately 4 nmi.	16 nmi² (5,488 ha).
Point Mugu Sea Range (PMSR)	Off Los Angeles and Ventura Counties out to approximately 400 nmi	36,000 nmi² (12,347,654 ha).
Northern California Range Complex (NOCAL).	Two separate areas located offshore of central and northern California, one northwest of San Francisco and the other southwest of Monterey Bay.	16,000 nmi² (5,487,846 ha).

Note: nmi² = square nautical miles, ha = hectares, nmi = nautical miles, km = kilometer. Ports included in HCTT: San Diego Bay, California; Port Hueneme, California; and Pearl Harbor, Hawaii.

Detailed Description of the Specified Activity

The Action Proponents propose to conduct military readiness activities within the HCTT Study Area and have been conducting military readiness activities in the Study Area since the 1940s. The tempo and types of military readiness activities have varied interannually due to the introduction of new technologies, the evolving nature of international events, advances in warfighting doctrine and procedures, and changes in force structure (organization of vessels, weapons, and personnel). Such developments influence the frequency, duration, intensity, and location of required military readiness activities.

Primary Mission Areas

The Navy categorizes their activities into functional warfare areas called primary mission areas, while the Coast Guard categorizes their activities as operational mission programs. For the Navy, these activities generally fall six primary mission areas (Coast Guard mission areas are discussed below). The Navy mission areas with activities that may result in take of marine mammals (and stressors associated with training and testing activities within those mission areas) include the following:

- Amphibious warfare (in-water detonations);
- Anti-submarine warfare (sonar and other transducers, in-water detonations);
- Expeditionary warfare (in-water detonations, pile driving and extraction);
- Mine warfare (sonar and other transducers, in-water detonations);
- Surface warfare (in-water detonations and those occurring at or near the surface); and
- Other (sonar and other transducers, air guns, vessel movement, airborne noise from missile and target launches from San Nicolas Island (SNI) and from shore-to-surface gunnery and missile and aerial target launches from the Pacific Missile Range Facility (PMRF), unmanned systems training, and maintenance of ship and submarine sonar at piers and at-sea).

Most Navy activities conducted in HCTT are categorized under one of these primary mission areas; activities that do not fall within one of these areas are listed as ''other activities.'' In addition, ship shock (underwater detonations) trials, a specific Navy testing activity related to vessel evaluation, would be conducted. The testing community also categorizes most, but not all, of its testing activities under these primary mission areas. The testing community has three additional categories of activities: vessel evaluation (including ship shock trials), unmanned systems (*i.e.,* unmanned surface vehicles (USVs), unmanned underwater vehicles (UUVs)), and acoustic and oceanographic science and technology.

The Action Proponents describe and analyze the effects of their activities within the application (see the 2024 HCTT Draft EIS/OEIS for additional details). In their assessment, the Action Proponents concluded that sonar and other transducers, explosives (in-water detonations and those occurring at or near the surface), air guns, land-based missile and target launches, and pile driving/extraction were the stressors most likely to result in impacts on marine mammals that qualify as harassment (and serious injury or mortality by explosives or vessel strike) as defined under the MMPA. Therefore, the Action Proponents' application provides their assessment of potential effects from these stressors in terms of the primary warfare mission areas in which they would be conducted.

The Coast Guard has four major national defense missions:

- Maritime intercept operations;
- Deployed port operations/security and defense;
- Peacetime engagement; and
- Environmental defense operations (including oil and hazardous substance response).

The Coast Guard manages 6 major operational mission programs with 11 statutory missions, which includes defense readiness. As part of the Coast Guard's defense mission, 14 U.S.C. 1 states the Coast Guard is ''at all times an armed force of the United States.'' As part of the Joint Forces, the Coast Guard maintains its readiness to carry out military operations in support of the policies and objectives of the U.S. government. As an armed force, the Coast Guard trains and operates in the joint military arena at any time and functions as a specialized service under the Navy in time of war or when directed by the President. Coast Guard service members are trained to respond immediately to support military operations and national security. Federal law created the framework for the relationship between the Navy and the Coast Guard (10 U.S.C. 101; 14 U.S.C. 2 (7); 22 U.S.C. 2761; 50 U.S.C. 3004). To meet these statutory requirements and effectively carry out these missions, the Coast Guard's air and surface units train using realistic scenarios, including training with the Navy in their primary mission areas. Every Coast Guard unit is trained to support all statutory missions and, thus, trained to meet all mission requirements, which includes their defense mission requirements. Since all Coast Guard's missions generally entail the deployment of cutters or boats and either fixed-wing or rotary aircraft, the Coast Guard training requirements for one mission generally overlaps with the training requirements of other missions. Thus, when the Coast Guard is training for its defense mission, the same skill sets are utilized for its other statutory missions.

The Coast Guard's defense mission does not involve use of low- or mid-frequency active sonar (LFAS or MFAS), missiles, in-water detonations, pile driving and vibratory extraction, or air guns that would result in harassment of marine mammals.

The Army's mission is mandated by Federal law (10 U.S.C. 7062), which requires an Army capable of, in conjunction with the other armed forces:

- Preserving the peace and security, and providing for the defense, of the United States, the Commonwealths and possessions, and any areas occupied by the United States;
- Supporting the national policies;
- Implementing the national objectives; and
- Overcoming any nations responsible for aggressive acts that imperil the peace and security of the United States.

In general, the Army includes land combat and service forces, as well as aviation and water transport. It shall be organized, trained, and equipped primarily for prompt and sustained combat incident to operations on land. It is responsible for the preparation of land forces necessary for the effective prosecution of war except as otherwise assigned and, in accordance with integrated joint mobilization plans, for the expansion of the peacetime components of the Army to meet the needs of war.

The Army is increasingly required to operate in the marine environment and with the Navy and, therefore, have an increased requirement to train in the maritime environment. The Army's activities include only the use of explosives, and do not include the use of sonars or other transducers, pile driving and vibratory extraction, or air guns that would result in harassment of marine mammals.

Below, we provide additional detail for each of the applicable primary mission areas.

Amphibious Warfare—

The mission of amphibious warfare is to project military power from the sea to the shore (*i.e.,* attack a threat on land by a military force embarked on ships) through the use of naval firepower and expeditionary landing forces. Amphibious warfare operations include Army, Navy, and Marine Corps small unit reconnaissance or raid missions to large-scale amphibious exercises involving multiple ships and aircraft combined into a strike group.

Amphibious warfare training ranges from individual, crew, and small unit events to large task force exercises. Individual and crew training includes amphibious vehicles and naval gunfire support training. Such training includes shore assaults, boat raids, airfield or port seizures, reconnaissance, and disaster relief. Large-scale amphibious exercises involve ship-to-shore maneuvers, naval fire support such as shore bombardment, air strikes, shore-based missile and artillery firing, and attacks on targets that are near friendly forces. Some amphibious activities include firing at ships from shore in defense of the amphibious objective.

Testing of guns, munitions, aircraft, ships, and amphibious vessels and vehicles used in amphibious warfare are often integrated into training activities and, in most cases, the systems are used in the same manner in which they are used for training activities. Amphibious warfare tests, when integrated with training activities or conducted separately as full operational evaluations on existing amphibious vessels and vehicles following maintenance, repair, or modernization, may be conducted independently or in conjunction with other amphibious ship and aircraft activities. Testing is performed to ensure effective ship-to-shore coordination and transport of personnel, equipment, and supplies. Tests may also be conducted periodically on other systems, vessels, and aircraft intended for amphibious operations to assess operability and to investigate efficacy of new technologies.

Anti-Submarine Warfare—

The mission of anti-submarine warfare is to locate, neutralize, and defeat hostile submarine forces that threaten Navy forces. Anti-submarine warfare is based on the principle that surveillance and attack aircraft, ships, and submarines all search for hostile submarines. These forces operate together or independently to gain early warning and detection and to localize, track, target, and attack submarine threats.

Anti-submarine warfare training addresses basic skills such as detecting and classifying submarines, as well as evaluating sounds to distinguish between enemy submarines and friendly submarines, ships, and marine life. More advanced training integrates the full spectrum of anti-submarine warfare from detecting and tracking a submarine to attacking a target using either exercise torpedoes (*i.e.,* torpedoes that do not contain a warhead) or simulated weapons. These integrated anti-submarine warfare training exercises are conducted in coordinated, at-sea training events involving submarines, ships, and aircraft.

Testing of anti-submarine warfare systems is conducted to develop new technologies and assess weapon performance and operability with new systems and platforms, such as unmanned systems. Testing uses ships, submarines, and aircraft to demonstrate capabilities of torpedoes, missiles, countermeasure systems, and underwater surveillance and communications systems. Tests may be conducted as part of a large-scale fleet training event involving submarines, ships, fixed-wing aircraft, and helicopters. These integrated training events offer opportunities to conduct research and acquisition activities and to train aircrew in the use of new or newly enhanced systems during a large-scale, complex exercise.

Expeditionary Warfare—

The mission of expeditionary warfare is to provide security and surveillance in the littoral (*i.e.,* at the shoreline), riparian (*i.e.,* along a river), or coastal environments. Expeditionary warfare is wide ranging and includes defense of harbors, operation of remotely operated vehicles, clearing obstacles, small boat attack, and boarding/seizure operations.

Expeditionary warfare training activities conducted by the Action Proponents include underwater construction team training, diver propulsion device training and testing, parachute insertion, dive and salvage operations, and insertion/extraction via air, surface, and subsurface platforms, among others (see appendix A (Activity Descriptions) of the 2024 HCTT Draft EIS/OEIS for a full description of the expeditionary warfare activities).

Mine Warfare—

The mission of mine warfare is to detect, classify, and avoid or neutralize (*i.e.,* disable) mines to protect U.S. ships and submarines, and to maintain free access to ports and shipping lanes. Mine warfare training for the Navy falls into two primary categories: mine detection and classification, and mine countermeasure and neutralization. Mine warfare also includes offensive mine laying to gain control of or deny the enemy access to sea space. Naval mines can be laid by ships, submarines, UUVs, or aircraft.

Mine warfare neutralization training includes exercises in which aircraft, ships, submarines, underwater vehicles, unmanned vehicles, or marine mammal detection systems search for mine shapes. Personnel train to destroy or disable mines by attaching underwater explosives to or near the mine or using remotely operated vehicles to destroy the mine. Towed influence mine sweep systems mimic a particular ship's magnetic and acoustic signature, which would trigger a real mine causing it to explode.

Testing and development of mine warfare systems is conducted to improve sonar, laser, and magnetic detectors intended to hunt, locate, and record the positions of mines for avoidance or subsequent neutralization. Mine detection and classification testing involves the use of air, surface, and subsurface vessels and uses sonar, including towed and side-scan sonar, and unmanned vehicles to locate and identify objects underwater. Mine detection and classification systems are sometimes used in conjunction with a mine neutralization system. Mine countermeasure and neutralization testing includes the use of air, surface, and subsurface units and uses tracking devices, countermeasure and neutralization systems, and general purpose bombs to evaluate the effectiveness of neutralizing mine threats. Most neutralization tests use mine shapes, or non-explosive practice mines, to accomplish the requirements of the activity. For example, during a mine neutralization test, a previously located mine is destroyed or rendered nonfunctional using a helicopter or manned surface vehicle/USV-based system that may involve the deployment of a towed neutralization system.

A small percentage of mine warfare testing activities require the use of high-explosive mines to evaluate and confirm the ability of the system to neutralize a high-explosive mine under operational conditions. Only a subset of all mine warfare training areas are approved for underwater explosive use (see figures 2–5, 2–11, and 2–12 of the application). The majority of mine warfare systems are deployed by ships, helicopters, and unmanned vehicles. Tests may also be conducted in support of scientific research to support these new technologies (see appendix H (Description of Systems and Ranges) of the 2024 HCTT Draft EIS/OEIS for additional details).

Surface Warfare—

The mission of surface warfare is to obtain control of sea space from which naval forces may operate and entails offensive action against surface and subsurface targets while also defending against enemy forces. In surface warfare, aircraft use guns, air-launched cruise missiles, or other precision-guided munitions; ships employ naval guns and surface-to-surface missiles; and submarines attack surface ships using torpedoes or submarine-launched, anti-ship cruise missiles.

Surface warfare training includes Navy, Coast Guard, and Army surface-to-surface gunnery and missile exercises, air-to-surface gunnery, bombing, and missile exercises, submarine missile or torpedo launch events, other munitions against surface targets, and amphibious operations in a contested environment.

Testing of weapons used in surface warfare is conducted to develop new technologies and to assess weapon performance and operability with new systems and platforms, such as unmanned systems. Tests include various air-to-surface guns and missiles, surface-to-surface guns and missiles, and bombing tests. Testing events may be integrated into training activities to test aircraft or aircraft systems in the delivery of ordnance on a surface target. In most cases the tested systems are used in the same manner in which they are used for training activities.

Other Training Activities—

Other training activities are conducted in the HCTT Study Area that fall outside of the primary mission areas but support overall readiness. These activities include sonar and other transducers, vessel movement, missile and target launch noise from locations on SNI and PMRF, artillery firing noise from shore to surface gunnery at PMRF, unmanned systems training, and maintenance of ship and submarine sonar at piers and at-sea.

Overview of Training Activities Within the Study Area

The Action Proponents routinely train in the HCTT Study Area in preparation for national defense missions. Training activities and exercises covered in this proposed rule are briefly described below and in more detail within appendix A (Activity Descriptions) of the 2024 HCTT Draft EIS/OEIS. The description, annual number of activities, and location of each training activity are provided by stressor category in table 2 through table 5. Each training activity described meets a requirement that can be traced ultimately to requirements set forth by the National Command Authority.

Within the Navy, a major training exercise (MTE) is comprised of multiple ''unit-level'' range exercises conducted by several units operating together while commanded and controlled by a single commander. These units are collectively referred to as carrier and expeditionary strike groups. These exercises typically employ an exercise scenario developed to train and evaluate the strike group in tactical naval tasks. In a MTE, most of the operations and activities being directed and coordinated by the strike group commander are identical in nature to the operations conducted during individual, crew, and smaller unit-level training events. However, in MTEs, these disparate training tasks are conducted in concert rather than in isolation. Some integrated or coordinated anti-submarine warfare exercises are similar in that they are composed of several unit-level exercises but are generally on a smaller scale than a MTE, are shorter in duration, use fewer assets, and use fewer hours of hull-mounted sonar per exercise. Coordinated training exercises involve multiple units working together to meet unit-level training requirements, whereas integrated training exercises involve multiple units working together in preparation for deployment. Coordinated exercises involving the use of sonar are presented under the category of anti-submarine warfare. The anti-submarine warfare portions of these exercises are considered together in coordinated activities for the sake of acoustic modeling. When other training objectives are being met, those activities are described via unit-level training in each of the relevant primary mission areas.

With a smaller fleet of approximately 250 cutters, Coast Guard activities are not as extensive as Navy activities due to differing mission requirements. However, the Coast Guard does train with the Navy and conducts some of the same training as the Navy. The Coast Guard does not conduct any exercises similar in scale to Navy MTEs/integrated exercises, and the use of mid- or low-frequency sonar, missiles, and underwater detonations are examples of actions that are not a part of the Coast Guard's mission requirements. Coast Guard training generally occurs close to the vessel homeport or close to shore, on established Navy training and testing ranges, or in transit to a scheduled patrol/mission. There are approximately 1,600 Coast Guard vessels (cutters up to 418 feet (ft); 127.4 meters (m) and boats less than 65 ft (19.8 m)), and the largest cutters would be underway for 3–4 months, whereas the smaller cutters would be underway from a few days to 4 weeks. Within California, there are approximately 20 cutters homeported. Cutters are defined as vessels larger than 65 ft (19.8 m). The service has about 1,680 boats nation-wide altogether. These craft include heavy weather response boats, special purpose craft, aids-to-navigation (ATON) boats, and cutter-based boats. Sizes range from 64 ft (29.5 m) in length down to 12 ft (3.7 m). There are approximately 100 boats in California but the number of boats varies. Within Hawaii, the Coast Guard has eight cutters and an unspecified number of small boats homeported.

The MTEs and integrated/coordinated training activities analyzed for this request are Navy-led exercises in which the Coast Guard may participate and described in table 2. For additional information on these activities see table 1–8 of the application and appendix A (Activity Descriptions) of the 2024 HCTT Draft EIS/OEIS. Table 3 describes the proposed Navy training activities analyzed within the HCTT Study Area while table 4 describes the proposed Coast Guard training activities analyzed within the HCTT Study Area and table 5 describes the Army training activities analyzed within the HCTT Study Area. In addition to participating in Navy-led exercises, Coast Guard and Army training activities include unit-level activities conducted independently of, and not in coordination with, the Navy.

TABLE 2—MTES AND INTEGRATED/COORDINATED TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA

Training type	Exercise group	Description	Scale	Duration	Location (range complex)	Exercise examples	Typical hull-mounted sonar per event (hours)
Major Training Exercise.	Large Integrated ASW.	Larger-scale, longer duration integrated ASW exercises.	Greater than 6 surface ASW units (up to 30 with the largest exercises), 2 or more submarines, multiple ASW aircraft.	Generally greater than 10 days.	SOCAL, PMSR, HRC.	Strike Group COMPUTEX, RIMPAC.	>500
Major Training Exercise.	Medium Integrated ASW.	Medium-scale, medium duration integrated ASW exercises.	Approximately 3–8 surface ASW units, at least 1 submarine, multiple ASW aircraft.	Generally 4–10 days.	SOCAL, PMSR, HRC.	Task Force/Sustainment Exercise, Multi-Warfare Exercise.	100–500
Integrated/Coordinated Training.	Small Integrated ASW.	Small-scale, short duration integrated ASW exercises.	Approximately 3–6 surface ASW units, 2 dedicated submarines, 2–6 ASW aircraft.	Generally less than 5 days.	SOCAL, HRC	SWATT, NUWTAC ...	50–100
Integrated/Coordinated Training.	Medium Coordinated ASW.	Medium-scale, medium duration, coordinated ASW exercises.	Approximately 2–4 surface ASW units, possibly a submarine, 2–5 ASW aircraft.	Generally 3–10 days.	SOCAL, HRC	SCC, Fleet Battle Problem, TACDEVEX.	<100
Integrated/Coordinated Training.	Small Coordinated ASW.	Small-scale, short duration, coordinated ASW exercises.	Approximately 2–4 surface ASW units, possibly a submarine, 1–2 ASW aircraft.	Generally 2–4 days.	SOCAL, HRC	ID CERTEX	<50

Note: ASW = Anti-Submarine Warfare, HRC = Hawaii Range Complex, ID CERTEX = Independent Deployer Certification Exercise, NUWTAC = Naval Undersea Warfare Training Assessment Course, PMSR = Point Mugu Sea Range Overlap, RIMPAC = Rim of the Pacific, SCC = Submarine Commanders Course, SOCAL = Southern California Range Complex, SWATT = Surface Warfare Advanced Tactical Training, TACDEVEX = Tactical Development Exercise.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Major Training Exercise—Large Integrated ASW.	Composite Training Unit Exercise.	Aircraft carrier and carrier air wing integrates with surface and submarine units in a challenging multi-threat operational environment that certifies them ready to deploy. Duration: 21 days.	LFH, MF to HF, MF1, MFH, MFM.	1–2	11	Hawaii, SOCAL, PMSR, NOCAL.
Acoustic	Major Training Exercise—Large Integrated ASW.	Rim of the Pacific Exercise.	A biennial multinational training exercise in which navies from around the world assemble in Pearl Harbor, Hawaii, to conduct training throughout the Hawaiian Islands in a number of warfare areas. Marine mammal systems may be used during a Rim of the Pacific exercise. Components of a Rim of the Pacific exercise, such as certain mine warfare and amphibious training, may be conducted in the Southern California Range Complex. Duration: 30 days.	HFH, MF1, MFH, MFM.	0–1	4	Hawaii, SOCAL.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Major Training Exercise—Medium Integrated ASW.	Task Force/ Sustainment Exercise.	Aircraft carrier and carrier air wing integrates with surface and submarine units in a challenging multi-threat operational environment to maintain ability to deploy. Duration: 10 days.	LFH, MF to HF, MF1, MFH, MFM.	0–1	3	Hawaii.
Acoustic	Major Training Exercise—Medium Integrated ASW.	Task Force/ Sustainment Exercise.	Aircraft carrier and carrier air wing integrates with surface and submarine units in a challenging multi-threat operational environment to maintain ability to deploy. Duration: 10 days.	LFH, MF to HF, MF1, MFH, MFM.	0–1	3	SOCAL, PMSR, NOCAL.
Acoustic	Integrated/Coordinated ASW.	Composite Training Unit Exercise—Amphibious Ready Group/Marine Expeditionary Unit.	Navy and USMC forces conduct integration training at sea in preparation for deployment. Duration: 3 weeks.	LFH, MF to HF, MF1, MFH, MFM.	1–2	10	Hawaii, SOCAL, PMSR, NOCAL.
Acoustic	Integrated/Coordinated ASW.	Independent Deployer Certification Exercise/ Tailored Surface Warfare Training.	Multiple ships, aircraft, and submarines conduct integrated multi-warfare training with a surface warfare emphasis. Serves as a ready-to-deploy certification for individual surface ships tasked with surface warfare missions. Duration: 2–3 days.	MF to HF, MF1, MFH, MFM.	8–19	89	SOCAL, PMSR, NOCAL.
Acoustic	Integrated/Coordinated ASW.	Medium Coordinated ASW.	Multiple ships, aircraft, and submarines integrate the use of their sensors, including sonobuoys and unmanned systems, to search, detect, and track threat submarines; event may include inert torpedo firings. Duration: 3–10 days.	MF to HF, MF1, MFH, MFM.	12–17	99	Hawaii.
Acoustic	Integrated/Coordinated ASW.	Medium Coordinated ASW.	Multiple ships, aircraft, and submarines integrate the use of their sensors, including sonobuoys and unmanned systems, to search, detect, and track threat submarines; event may include inert torpedo firings. Duration: 3–10 days.	MF to HF, MF1, MFH, MFM.	5–13	59	SOCAL, PMSR, NOCAL.
Acoustic	Integrated/Coordinated ASW.	Small Joint Coordinated ASW.	Typically, a 5-day exercise with multiple ships, aircraft and submarines integrating the use of their sensors, including sonobuoys, to search, detect, and track threat submarines. Duration: 5 days.	LFH, MF to HF, MF1, MFH, MFM.	1	7	Hawaii.
Acoustic	Integrated/Coordinated ASW.	Small Joint Coordinated ASW.	Typically, a 5-day exercise with multiple ships, aircraft and submarines integrating the use of their sensors, including sonobuoys, to search, detect, and track threat submarines. Duration: 5 days.	LFH, MF to HF, MF1, MFH, MFM.	4–9	43	SOCAL, PMSR, NOCAL.
Explosive	Integrated/Coordinated Training—Other.	Large Amphibious Exercise.	The Large Amphibious Exercise utilizes all elements of the Marine Air Ground Task Force (Amphibious) to secure the battlespace (air, land, and sea), maneuver to and seize the objective, and conduct self-sustaining operations ashore with logistic support of the Expeditionary Strike Group. This exercise could include manned and unmanned activities in multiple warfare areas to secure the battlespace (air, land, and sea) and maneuver and secure operations ashore. Duration: 1 week.	E9	0–1	2	Hawaii.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Integrated/Coordinated Training—Other.	Large Amphibious Exercise.	The Large Amphibious Exercise utilizes all elements of the Marine Air Ground Task Force (Amphibious) to secure the battlespace (air, land, and sea), maneuver to and seize the objective, and conduct self-sustaining operations ashore with logistic support of the Expeditionary Strike Group. This exercise could include manned and unmanned activities in multiple warfare areas to secure the battlespace (air, land, and sea) and maneuver and secure operations ashore. Duration: 1 week.	E9	2–4	20	SOCAL, PMSR, NOCAL.
Acoustic and Explosive.	Integrated/Coordinated Training—Other.	Innovation and Demonstration Exercise.	These exercises are conducted to demonstrate or test new capabilities, tactics, techniques, and procedures; and generate standardized, actionable data for evaluation. Duration: 1 week.	E5, HFH, LF to HF, LFH, MF to HF, MF1, MFH, MFM.	0–1	4	Hawaii.
Acoustic and Explosive.	Integrated/Coordinated Training—Other.	Innovation and Demonstration Exercise.	These exercises are conducted to demonstrate or test new capabilities, tactics, techniques, and procedures; and generate standardized, actionable data for evaluation. Duration: 1 week.	E5, HFH, LF to HF, LFH, MF to HF, MF1, MFH, MFM.	3	16	SOCAL.
Acoustic and Explosive.	Integrated/Coordinated Training—Other.	Innovation and Demonstration Exercise.	These exercises are conducted to demonstrate or test new capabilities, tactics, techniques, and procedures; and generate standardized, actionable data for evaluation. Duration: 1 week.	E5, HFH, LF to HF, LFH, MF to HF, MF1, MFH, MFM.	1	7	Transit Corridor.
Acoustic and Explosive.	Integrated/Coordinated Training—Other.	Multi-Warfare Exercise.	Live training events which could involve U.S., Joint, and coalition forces operating across all warfare areas (*e.g.,* amphibious, electronic and cyber, air, surface, sub-surface, special warfare, and expeditionary) with manned and unmanned platforms. Events could be comprised of small units up to and including Carrier and Amphibious Strike Groups. Live-fire events could be ship-to-shore, shore-to-offshore target, and ship-to-ship utilizing live ordnance and laser systems. Duration: 1–5 days.	E5, HFH, LF to HF, LFH, MF to HF, MF1, MFH, MFM.	2	12	Hawaii.
Acoustic and Explosive.	Integrated/Coordinated Training—Other.	Multi-Warfare Exercise.	Live training events which could involve U.S., Joint, and coalition forces operating across all warfare areas (*e.g.,* amphibious, electronic and cyber, air, surface, sub-surface, special warfare, and expeditionary) with manned and unmanned platforms. Events could be comprised of small units up to and including Carrier and Amphibious Strike Groups. Live-fire events could be ship-to-shore, shore-to-offshore target, and ship-to-ship utilizing live ordnance and laser systems. Duration: 1–5 days.	E5, HFH, LF to HF, LFH, MF to HF, MF1, MFH, MFM.	6–7	43	SOCAL, PMSR.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Amphibious Warfare	Amphibious Operations in a Contested Environment.	Navy and Marine Corps forces conduct operations in coastal and offshore waterways against air, surface, and subsurface threats. Duration: 1–2 weeks.	E2	15	105	Hawaii.
Explosive	Amphibious Warfare	Amphibious Operations in a Contested Environment.	Navy and Marine Corps forces conduct operations in coastal and offshore waterways against air, surface, and subsurface threats. Duration: 1–2 weeks.	E2	10	70	SOCAL, SSTC.
Explosive	Amphibious Warfare	Naval Surface Fire Support Exercise-At Sea.	Surface ship crews fire large-caliber guns at a passive acoustic hydrophone scoring system. Duration: 1–2 hours of firing, 8 hours total.	E5	20–25	155	Hawaii.
Explosive	Amphibious Warfare	Shore-to-Surface Artillery Exercise.	Amphibious land-based forces fire artillery guns at surface targets. Duration: 1–2 hours of firing, 8 hours total.	E6	1	7	PMRF.
Explosive	Amphibious Warfare	Shore-to-Surface Artillery Exercise.	Amphibious land-based forces fire artillery guns at surface targets. Duration: 1–2 hours of firing, 8 hours total.	E6	12	84	SCI.
Explosive	Amphibious Warfare	Shore-to-Surface Missile Exercise.	Amphibious land-based forces fire anti-surface missiles, rockets, and loitering munitions at surface targets. Duration: 1–2 hours of firing, 8 hours total.	E9	4	28	PMRF.
Explosive	Amphibious Warfare	Shore-to-Surface Missile Exercise.	Amphibious land-based forces fire anti-surface missiles, rockets, and loitering munitions at surface targets. Duration: 1–2 hours of firing, 8 hours total.	E9	15	105	SCI.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Torpedo Exercise—Helicopter.	Helicopter crews search for, track, and detect submarines. Recoverable air launched torpedoes are employed against submarine targets. Duration: 2–5 hours.	HFH, MFH, MFM.	3–5	27	BARSTUR.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Torpedo Exercise—Helicopter.	Helicopter crews search for, track, and detect submarines. Recoverable air launched torpedoes are employed against submarine targets. Duration: 2–5 hours.	HFH, MFH, MFM.	3–5	27	SOAR.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Torpedo Exercise—Maritime Patrol Aircraft.	Maritime patrol aircraft aircrews search for, track, and detect submarines. Recoverable air launched torpedoes are employed against submarine targets. Duration: 2–8 hours.	HFH, MFM	20–80	320	BARSTUR.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Torpedo Exercise—Maritime Patrol Aircraft.	Maritime patrol aircraft aircrews search for, track, and detect submarines. Recoverable air launched torpedoes are employed against submarine targets. Duration: 2–8 hours.	HFH, MFM	60–80	480	SOAR.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Torpedo Exercise—Ship.	Surface ship crews search for, track, and detect submarines. Exercise torpedoes are used. Duration: 2–5 hours.	HFH, MF to HF, MF1.	34	238	BARSTUR, BSUR.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Torpedo Exercise—Ship.	Surface ship crews search for, track, and detect submarines. Exercise torpedoes are used. Duration: 2–5 hours.	HFH, MF to HF, MF1.	104	728	SOAR.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Torpedo Exercise—Submarine.	Submarine crews search for, track, and detect submarines. Exercise torpedoes are used. Duration: 8 hours.	HFH, LF to HF, MFH.	48	336	BARSTUR.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Torpedo Exercise—Submarine.	Submarine crews search for, track, and detect submarines. Exercise torpedoes are used. Duration: 8 hours.	HFH, LF to HF, MFH.	26	182	SOAR.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Helicopter.	Helicopter crews search for, track, and detect submarines. Duration: 2–4 hours.	MFH, MFM	125–130	890	Hawaii.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Helicopter.	Helicopter crews search for, track, and detect submarines. Duration: 2–4 hours.	MFH, MFM	125–130	890	SOCAL, PMSR.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Long-Range unmanned Surface Vessel.	Unmanned surface vessels search for, detect, and track a sub-surface target simulating a threat submarine with the goal of determining a firing solution that could be used to launch a torpedo. Duration: 1 day.	MFM	5	35	Hawaii.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Long-Range unmanned Surface Vessel.	Unmanned surface vessels search for, detect, and track a sub-surface target simulating a threat submarine with the goal of determining a firing solution that could be used to launch a torpedo. Duration: 1 day.	MFM	2	14	SOCAL.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Maritime Patrol Aircraft.	Maritime patrol aircraft aircrews search for, track, and detect submarines. Duration: 2–8 hours.	LFH, LFM, MFM.	150–200	1,200	Hawaii.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Maritime Patrol Aircraft.	Maritime patrol aircraft aircrews search for, track, and detect submarines. Duration: 2–8 hours.	LFH, LFM, MFM.	200	1,400	SOCAL, PMSR.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Ship.	Surface ship crews search for, track, and detect submarines. Duration: 2–4 hours.	MF to HF, MF1, MFH.	60–119	595	Hawaii.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Ship.	Surface ship crews search for, track, and detect submarines. Duration: 2–4 hours.	MF to HF, MF1, MFH.	240–480	2,400	SOCAL, PMSR.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Submarine.	Submarine crews search for, track, and detect submarines. Duration: 8 hours.	HFH, MFH	200	1,400	Hawaii.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Submarine.	Submarine crews search for, track, and detect submarines. Duration: 8 hours.	HFH, MFH	60	420	SOCAL, PMSR, NOCAL.
Acoustic	Anti-Submarine Warfare.	Anti-Submarine Warfare Tracking Exercise—Submarine.	Submarine crews search for, track, and detect submarines. Duration: 8 hours.	HFH, MFH	9	63	Transit Corridor.
Acoustic and Explosive.	Anti-Submarine Warfare.	Training and End-to-End Mission Capability Verification—Torpedo.	A submarine launches exercise and explosive torpedoes at a suspended target. Duration: 8 hours.	E11, HFH, HFM, MFH.	2	14	BARSTUR.
Acoustic and Explosive.	Anti-Submarine Warfare.	Training and End-to-End Mission Capability Verification—Torpedo.	A submarine launches exercise and explosive torpedoes at a suspended target. Duration: 8 hours.	E11, HFH, HFM, MFH.	1	7	SOAR.
Acoustic	Expeditionary Warfare.	Port Damage Repair	Navy Expeditionary forces train to repair critical port facilities. Duration: 8 hours per day for 5 days.	Pile Driving	12	84	Port Hueneme.
Explosive	Expeditionary Warfare.	Obstacle Clearance	Trains forces to create cleared lanes in simulated enemy obstacle systems to allow friendly forces safe transit from sea to shore. Duration: 8 hours.	E2	40	280	FORACS.
Explosive	Expeditionary Warfare.	Obstacle Clearance	Trains forces to create cleared lanes in simulated enemy obstacle systems to allow friendly forces safe transit from sea to shore. Duration: 8 hours.	E2	10	70	Lima Landing.
Explosive	Expeditionary Warfare.	Obstacle Clearance	Trains forces to create cleared lanes in simulated enemy obstacle systems to allow friendly forces safe transit from sea to shore. Duration: 8 hours.	E2	10	70	Pearl Peninsula.
Explosive	Expeditionary Warfare.	Obstacle Clearance	Trains forces to create cleared lanes in simulated enemy obstacle systems to allow friendly forces safe transit from sea to shore. Duration: 8 hours.	E6	10	70	Pu'uloa.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Expeditionary Warfare.	Obstacle Clearance	Trains forces to create cleared lanes in simulated enemy obstacle systems to allow friendly forces safe transit from sea to shore. Duration: 8 hours.	E2	100–150	850	SOCAL.
Explosive	Expeditionary Warfare.	Obstacle Clearance	Trains forces to create cleared lanes in simulated enemy obstacle systems to allow friendly forces safe transit from sea to shore. Duration: 8 hours.	E10	6	42	SCI.
Explosive	Expeditionary Warfare.	Personnel Insertion/Extraction—Air.	Personnel are inserted into a water objective via fixed-wing aircraft using parachutes or by helicopters via ropes or jumping into the water. Personnel are extracted by helicopters or small boats. Duration: 1 hour.	E1	8	56	FORACS.
Explosive	Expeditionary Warfare.	Personnel Insertion/Extraction—Air.	Personnel are inserted into a water objective via fixed-wing aircraft using parachutes or by helicopters via ropes or jumping into the water. Personnel are extracted by helicopters or small boats. Duration: 1 hour.	E1	26	182	Pearl Peninsula.
Explosive	Expeditionary Warfare.	Personnel Insertion/Extraction—Air.	Personnel are inserted into a water objective via fixed-wing aircraft using parachutes or by helicopters via ropes or jumping into the water. Personnel are extracted by helicopters or small boats. Duration: 1 hour.	E1	500	3,500	Hawaii.
Explosive	Expeditionary Warfare.	Personnel Insertion/Extraction—Air.	Personnel are inserted into a water objective via fixed-wing aircraft using parachutes or by helicopters via ropes or jumping into the water. Personnel are extracted by helicopters or small boats. Duration: 1 hour.	E1	854–954	6,278	SOCAL.
Explosive	Expeditionary Warfare.	Personnel Insertion/Extraction—Air.	Personnel are inserted into a water objective via fixed-wing aircraft using parachutes or by helicopters via ropes or jumping into the water. Personnel are extracted by helicopters or small boats. Duration: 1 hour.	E1	500–600	3,800	SSTC.
Explosive	Expeditionary Warfare.	Personnel Insertion/Extraction—Surface and subsurface.	Personnel are inserted into and extracted from an objective area by small boats or subsurface platforms. Duration: 2–4 hours.	E1	270–336	2,088	Hawaii.
Explosive	Expeditionary Warfare.	Personnel Insertion/Extraction—Surface and subsurface.	Personnel are inserted into and extracted from an objective area by small boats or subsurface platforms. Duration: 2–4 hours.	E1	1,049–1,149	7,643	SOCAL.
Explosive	Expeditionary Warfare.	Personnel Insertion/Extraction Training—Swimmer/Diver.	Divers and swimmers infiltrate harbors, beaches, or moored vessels and conduct a variety of tasks. Duration: up to 12 hours.	E1	495	3,465	Hawaii
Explosive	Expeditionary Warfare.	Personnel Insertion/Extraction Training—Swimmer/Diver.	Divers and swimmers infiltrate harbors, beaches, or moored vessels and conduct a variety of tasks. Duration: up to 12 hours.	E1	1,080–1,280	8,160	SOCAL.
Explosive	Mine Warfare	Amphibious Breaching Operations.	Amphibious forces use explosive clearing systems to clear simulated mines on beaches, shallow water, and surf zones for potential landing of personnel and vehicles. Duration: 8 hours.	E6	100	700	Hawaii.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Mine Warfare	Amphibious Breaching Operations.	Amphibious forces use explosive clearing systems to clear simulated mines on beaches, shallow water, and surf zones for potential landing of personnel and vehicles. Duration: 8 hours.	E6	275	1,925	SOCAL.
Explosive	Mine Warfare	Amphibious Breaching Operations.	Amphibious forces use explosive clearing systems to clear simulated mines on beaches, shallow water, and surf zones for potential landing of personnel and vehicles. Duration: 8 hours.	E6	315	2,205	SSTC.
Explosive	Mine Warfare	Amphibious Breaching Operations.	Amphibious forces use explosive clearing systems to clear simulated mines on beaches, shallow water, and surf zones for potential landing of personnel and vehicles. Duration: 8 hours.	E6	48–55	357	SWAT 2.
Acoustic and Explosive.	Mine Warfare	Civilian Port Defense–Homeland Security Anti-Terrorism/Force Protection Exercise.	Maritime security personnel train to protect civilian ports against enemy efforts to interfere with access to those ports. Duration: multiple days.	E4, HFH, HFM, MFH.	1–2	10	Hawaii.
Acoustic and Explosive.	Mine Warfare	Civilian Port Defense–Homeland Security Anti-Terrorism/Force Protection Exercise.	Maritime security personnel train to protect civilian ports against enemy efforts to interfere with access to those ports. Duration: multiple days.	E4, HFH, HFM, MFH.	1–2	11	SOCAL.
Acoustic and Explosive.	Mine Warfare	Civilian Port Defense–Homeland Security Anti-Terrorism/Force Protection Exercise.	Maritime security personnel train to protect civilian ports against enemy efforts to interfere with access to those ports. Duration: multiple days.	E4, HFH, HFM, MFH.	1–2	9	PMSR.
Explosive	Mine Warfare	Limpet Mine Neutralization System.	Navy Explosive Ordnance Disposal divers place a small charge on a simulated underwater mine. Duration: 2 hours.	E0, E3	6–8	48	Lima Landing.
Explosive	Mine Warfare	Limpet Mine Neutralization System.	Navy Explosive Ordnance Disposal divers place a small charge on a simulated underwater mine. Duration: 2 hours.	E0, E3	138–150	1,002	SOCAL.
Explosive	Mine Warfare	Limpet Mine Neutralization System.	Navy Explosive Ordnance Disposal divers place a small charge on a simulated underwater mine. Duration: 2 hours.	E0, E3	42–44	300	SSTC.
Acoustic	Mine Warfare	Mine Countermeasure Exercise—Ship Sonar.	Ship crews detect and avoid mines while navigating restricted areas or channels using active sonar. Duration: up to 15 hours.	HFH, MF1K	30	210	Hawaii.
Acoustic	Mine Warfare	Mine Countermeasure Exercise—Ship Sonar.	Ship crews detect and avoid mines while navigating restricted areas or channels using active sonar. Duration: up to 15 hours.	HFH, MF1K	42	294	Pearl Harbor.
Acoustic	Mine Warfare	Mine Countermeasure Exercise—Ship Sonar.	Ship crews detect and avoid mines while navigating restricted areas or channels using active sonar. Duration: up to 15 hours.	HFH, MF1K	92	644	SOCAL.
Acoustic	Mine Warfare	Mine Countermeasure Exercise—Ship Sonar.	Ship crews detect and avoid mines while navigating restricted areas or channels using active sonar. Duration: up to 15 hours.	HFH, MF1K	164	1,148	San Diego Bay.
Acoustic and Explosive.	Mine Warfare	Mine Countermeasures Mine Neutralization Remotely Operated Vehicle.	Ship, small boat, and helicopter crews locate and disable mines using remotely operated underwater vehicles. Duration: 1–4 hours.	E4, HFM	7–8	52	Hawaii MTRs.
Acoustic and Explosive.	Mine Warfare	Mine Countermeasures Mine Neutralization Remotely Operated Vehicle.	Ship, small boat, and helicopter crews locate and disable mines using remotely operated underwater vehicles. Duration: 1–4 hours.	E4, HFM	11	74	SOCAL.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic and Explosive.	Mine Warfare	Mine Countermeasures Mine Neutralization Remotely Operated Vehicle.	Ship, small boat, and helicopter crews locate and disable mines using remotely operated underwater vehicles. Duration: 1–4 hours.	E4, HFM	6	42	SSTC.
Acoustic and Explosive.	Mine Warfare	Mine Countermeasures Mine Neutralization Remotely Operated Vehicle.	Ship, small boat, and helicopter crews locate and disable mines using remotely operated underwater vehicles. Duration: 1–4 hours.	E4, HFM	3–6	30	TAR 2.
Acoustic and Explosive.	Mine Warfare	Mine Countermeasures Mine Neutralization Remotely Operated Vehicle.	Ship, small boat, and helicopter crews locate and disable mines using remotely operated underwater vehicles. Duration: 1–4 hours.	E4, HFM	11	74	SCORE.
Explosive	Mine Warfare	Mine Neutralization Explosive Ordnance Disposal.	Personnel disable threat mines using explosive charges. Duration: up to 4 hours.	E6	5–7	41	Hawaii.
Explosive	Mine Warfare	Mine Neutralization Explosive Ordnance Disposal.	Personnel disable threat mines using explosive charges. Duration: up to 4 hours.	E6	203–211	1,445	SOCAL.
Explosive	Mine Warfare	Mine Neutralization Explosive Ordnance Disposal.	Personnel disable threat mines using explosive charges. Duration: up to 4 hours.	E6	17–25	143	SSTC.
Explosive	Mine Warfare	Mine Neutralization Explosive Ordnance Disposal.	Personnel disable threat mines using explosive charges. Duration: up to 4 hours.	E6	0–1	5	SWAT 2.
Acoustic	Mine Warfare	Submarine Mine Counter Measure Exercise.	Submarine crews use active sonar or UUVs, and shore-based personnel operate UUVs to detect and avoid training mine shapes or other underwater hazardous objects. Duration: 6 hours.	HFH, MF to HF, VHFH.	80	560	Hawaii.
Acoustic	Mine Warfare	Submarine Mine Counter Measure Exercise.	Submarine crews use active sonar or UUVs, and shore-based personnel operate UUVs to detect and avoid training mine shapes or other underwater hazardous objects. Duration: 6 hours.	HFH, MF to HF, VHFH.	40	280	SOCAL.
Acoustic	Mine Warfare	Submarine Mobile Mine and Mine Laying Exercise.	Submarine crews and shore-based personnel operating a UUV deploy exercise (inert) mobile mines or mines. Duration: 6 hours.	HFL, HFM, MFM, VHFL.	20	140	Hawaii.
Acoustic	Mine Warfare	Submarine Mobile Mine and Mine Laying Exercise.	Submarine crews and shore-based personnel operating a UUV deploy exercise (inert) mobile mines or mines. Duration: 6 hours.	HFL, HFM, MFM, VHFL.	30	210	SOCAL, PMSR.
Acoustic	Mine Warfare	Surface Ship Object Detection.	Ship crews detect and avoid mines while navigating restricted areas or channels using active sonar. Duration: up to 15 hours.	MF1K	30	210	Hawaii.
Acoustic	Mine Warfare	Surface Ship Object Detection.	Ship crews detect and avoid mines while navigating restricted areas or channels using active sonar. Duration: up to 15 hours.	MF1K	42	294	Pearl Harbor.
Acoustic	Mine Warfare	Surface Ship Object Detection.	Ship crews detect and avoid mines while navigating restricted areas or channels using active sonar. Duration: up to 15 hours.	MF1K	92	644	SOCAL.
Acoustic	Mine Warfare	Surface Ship Object Detection.	Ship crews detect and avoid mines while navigating restricted areas or channels using active sonar. Duration: up to 15 hours.	MF1K	164	1,148	San Diego Bay.
Explosive	Mine Warfare	Underwater Demolition Qualification and Certification.	Navy divers conduct various levels of training and certification in placing underwater demolition charges. Duration: up to 8 hours.	E5, E6	5	35	Pu'uloa, Ewa Beach, Barbers Point.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Mine Warfare	Underwater Demolition Qualification and Certification.	Navy divers conduct various levels of training and certification in placing underwater demolition charges. Duration: up to 8 hours.	E5, E6	10–20	100	TAR 2.
Explosive	Mine Warfare	Underwater Demolition Qualification and Certification.	Navy divers conduct various levels of training and certification in placing underwater demolition charges. Duration: up to 8 hours.	E5, E6	24	168	SSTC.
Explosive	Mine Warfare	Underwater Demolitions Multiple Charge—Large Area Clearance.	Units deploy large explosive systems from vessels or vehicles to destroy barriers or obstacles over an area large enough to allow amphibious vehicles to access beach areas. Duration: 4 hours.	E13	6	42	TAR 2.
Explosive	Surface Warfare	Bombing Exercise Air-to-Surface.	Fixed-wing aircrews deliver bombs against surface targets. Duration: 1 hour.	E9, E10, E12	194	1,358	Hawaii.
Explosive	Surface Warfare	Bombing Exercise Air-to-Surface.	Fixed-wing aircrews deliver bombs against surface targets. Duration: 1 hour.	E9, E10, E12	653	4,571	SOCAL.
Explosive	Surface Warfare	Bombing Exercise Air-to-Surface.	Fixed-wing aircrews deliver bombs against surface targets. Duration: 1 hour.	E9, E10, E12	10	70	NOCAL.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Boat Medium-Caliber.	Small boat crews fire medium-caliber guns at surface targets. Duration: 1 hour.	E1	10	70	Hawaii.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Boat Medium-Caliber.	Small boat crews fire medium-caliber guns at surface targets. Duration: 1 hour.	E1	14	98	SOCAL.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Ship Large-Caliber.	Surface ship crews fire large-caliber guns at surface targets. Duration: up to 3 hours.	E3, E5	32	224	Hawaii.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Ship Large-Caliber.	Surface ship crews fire large-caliber guns at surface targets. Duration: up to 3 hours.	E3, E5	125	875	SOCAL.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Ship Large-Caliber.	Surface ship crews fire large-caliber guns at surface targets. Duration: up to 3 hours.	E3, E5	14	98	Transit Corridor.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Ship Medium-Caliber.	Surface ship crews fire medium-caliber guns at surface targets. Duration: 2–3 hours.	E1	5–50	170	Hawaii.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Ship Medium-Caliber.	Surface ship crews fire medium-caliber guns at surface targets. Duration: 2–3 hours.	E1	17–180	608	SOCAL.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Ship Medium-Caliber.	Surface ship crews fire medium-caliber guns at surface targets. Duration: 2–3 hours.	E1	6–40	144	Transit Corridor.
Explosive	Surface Warfare	Missile Exercise Air-to-Surface.	Fixed-wing and helicopter aircrews fire air-to-surface missiles at surface targets. Duration: 1 hour.	E6, E7, E8, E9	17–22	134	Hawaii.
Explosive	Surface Warfare	Missile Exercise Air-to-Surface.	Fixed-wing and helicopter aircrews fire air-to-surface missiles at surface targets. Duration: 1 hour.	E6, E7, E8, E9	4–9	43	SOCAL.
Explosive	Surface Warfare	Missile Exercise Air-to-Surface.	Fixed-wing and helicopter aircrews fire air-to-surface missiles at surface targets. Duration: 1 hour.	E6, E7, E8, E9	90	630	PMSR.
Explosive	Surface Warfare	Missile Exercise Air-to-Surface Rocket.	Helicopter aircrews fire both precision-guided and unguided rockets at surface targets. Duration: 1 hour.	E3	109–129	823	Hawaii.
Explosive	Surface Warfare	Missile Exercise Air-to-Surface Rocket.	Helicopter aircrews fire both precision-guided and unguided rockets at surface targets. Duration: 1 hour.	E3	251–271	1,817	SOCAL.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Surface Warfare	Missile Exercise Surface-to-Surface.	Surface ship crews defend against surface threats (ships or small boats) and engage them with missiles. Duration: 2–5 hours.	E9	28–32	208	Hawaii.
Explosive	Surface Warfare	Missile Exercise Surface-to-Surface.	Surface ship crews defend against surface threats (ships or small boats) and engage them with missiles. Duration: 2–5 hours.	E9	10	70	SOCAL.
Explosive	Surface Warfare	Sinking Exercise	Aircraft, ship, and submarine crews deliberately sink a seaborne target, usually a decommissioned ship made environmentally safe for sinking according to U.S. Environmental Protection Agency standards, with a variety of ordnance. Duration: 4–8 hours.	E5, E8, E9, E11, E12.	2–3	17	Hawaii.
Explosive	Surface Warfare	Sinking Exercise	Aircraft, ship, and submarine crews deliberately sink a seaborne target, usually a decommissioned ship made environmentally safe for sinking according to U.S. Environmental Protection Agency standards, with a variety of ordnance. Duration: 4–8 hours.	E5, E8, E9, E11, E12.	0–1	3	SOCAL.
Acoustic	Surface Warfare	Surface Warfare Torpedo Exercise—Submarine.	Submarine crews search for, detect, and track a surface ship simulating a threat surface ship with the goal of determining a firing solution that could be used to launch a torpedo with the intent to simulate destroying the targets. Duration: 8 hours.	HFH	30	210	Hawaii.
Acoustic	Surface Warfare	Surface Warfare Torpedo Exercise—Submarine.	Submarine crews search for, detect, and track a surface ship simulating a threat surface ship with the goal of determining a firing solution that could be used to launch a torpedo with the intent to simulate destroying the targets. Duration: 8 hours.	HFH	10	70	SOCAL.
Explosive	Surface Warfare	Training and End-to-End Mission Capability Verification—Submarine Missile Maritime.	Submarine crews launch missile(s) which may have an explosive warhead at a maritime target simulating an adversary surface ship with the goal of destroying or disabling adversary surface ship. Duration: 8 hours.	E9, E10	2	14	Hawaii.
Explosive	Surface Warfare	Training and End-to-End Mission Capability Verification—Submarine Missile Maritime.	Submarine crews launch missile(s) which may have an explosive warhead at a maritime target simulating an adversary surface ship with the goal of destroying or disabling adversary surface ship. Duration: 8 hours.	E9, E10	3	21	SOCAL.
Acoustic and Explosive.	Other Training Activities.	Multi-Domain Unmanned Autonomous Systems.	Multi-domain (surface, subsurface, and airborne) unmanned autonomous systems are launched from land, ships, and boats, in support of intelligence, surveillance, and reconnaissance operations; and deliver munitions or other non-munition systems to support mission and intelligence requirements. Duration: 4–8 hours.	E5, E7, MF to HF, VHFH.	50–100	500	Hawaii.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic and Explosive.	Other Training Activities.	Multi-Domain Unmanned Autonomous Systems.	Multi-domain (surface, subsurface, and airborne) unmanned autonomous systems are launched from land, ships, and boats, in support of intelligence, surveillance, and reconnaissance operations; and deliver munitions or other non-munition systems to support mission and intelligence requirements. Duration: 4–8 hours.	E5, E7, MF to HF, VHFH.	55–105	535	Pyramid Cove, SWATs.
Acoustic and Explosive.	Other Training Activities.	Multi-Domain Unmanned Autonomous Systems.	Multi-domain (surface, subsurface, and airborne) unmanned autonomous systems are launched from land, ships, and boats, in support of intelligence, surveillance, and reconnaissance operations; and deliver munitions or other non-munition systems to support mission and intelligence requirements. Duration: 4–8 hours.	E5, E7, MF to HF, VHFH.	50–100	500	SOCAL.
Acoustic	Other Training Activities.	Submarine Navigation Exercise.	Submarine crews operate sonar for navigation and object detection while transiting into and out of port during reduced visibility. Duration: 2 hours.	HFH, MFH	220	1,540	Pearl Harbor.
Acoustic	Other Training Activities.	Submarine Navigation Exercise.	Submarine crews operate sonar for navigation and object detection while transiting into and out of port during reduced visibility. Duration: 2 hours.	HFH, MFH	80	560	San Diego Bay.
Acoustic	Other Training Activities.	Submarine Sonar Maintenance and Systems Checks.	Maintenance of submarine sonar systems is conducted pierside or at sea. Duration: 1 hour.	MFH	260	1,820	Hawaii.
Acoustic	Other Training Activities.	Submarine Sonar Maintenance and Systems Checks.	Maintenance of submarine sonar systems is conducted pierside or at sea. Duration: 1 hour.	MFH	260	1,820	Pearl Harbor.
Acoustic	Other Training Activities.	Submarine Sonar Maintenance and Systems Checks.	Maintenance of submarine sonar systems is conducted pierside or at sea. Duration: 1 hour.	MFH	80	560	SOCAL.
Acoustic	Other Training Activities.	Submarine Sonar Maintenance and Systems Checks.	Maintenance of submarine sonar systems is conducted pierside or at sea. Duration: 1 hour.	MFH	13	91	PMSR.
Acoustic	Other Training Activities.	Submarine Sonar Maintenance and Systems Checks.	Maintenance of submarine sonar systems is conducted pierside or at sea. Duration: 1 hour.	MFH	92	644	San Diego Bay.
Acoustic	Other Training Activities.	Submarine Sonar Maintenance and Systems Checks.	Maintenance of submarine sonar systems is conducted pierside or at sea. Duration: 1 hour.	MFH	10	70	Transit Corridor.
Acoustic	Other Training Activities.	Submarine Under Ice Training and Certification.	Submarine crews train to operate under ice. Ice conditions are simulated during training and certification events. Duration: 5 days.	HFH	12	84	Hawaii.
Acoustic	Other Training Activities.	Submarine Under Ice Training and Certification.	Submarine crews train to operate under ice. Ice conditions are simulated during training and certification events. Duration: 5 days.	HFH	6	42	SOCAL.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic and Explosive.	Other Training Activities.	Submarine and UUV Subsea and Seabed Warfare Exercise.	Submarine crews and shore-based operators train to launch or recover and operate all classes of UUVs in the subsea and seabed environment in order to defend deep ocean and seabed infrastructure or take offensive action against a simulated adversary's subsea and seabed infrastructure. Duration: 1 day.	E3, VHFH	20	140	Hawaii.
Acoustic and Explosive.	Other Training Activities.	Submarine and UUV Subsea and Seabed Warfare Exercise.	Submarine crews and shore-based operators train to launch or recover and operate all classes of UUVs in the subsea and seabed environment in order to defend deep ocean and seabed infrastructure or take offensive action against a simulated adversary's subsea and seabed infrastructure. Duration: 1 day.	E3, VHFH	10	70	SOCAL.
Acoustic and Explosive.	Other Training Activities.	Submarine and UUV Subsea and Seabed Warfare Exercise.	Submarine crews and shore-based operators train to launch or recover and operate all classes of UUVs in the subsea and seabed environment in order to defend deep ocean and seabed infrastructure or take offensive action against a simulated adversary's subsea and seabed infrastructure. Duration: 1 day.	E3, VHFH	5	35	PMSR.
Acoustic and Explosive.	Other Training Activities.	Submarine and UUV Subsea and Seabed Warfare Exercise.	Submarine crews and shore-based operators train to launch or recover and operate all classes of UUVs in the subsea and seabed environment in order to defend deep ocean and seabed infrastructure or take offensive action against a simulated adversary's subsea and seabed infrastructure. Duration: 1 day.	E3, VHFH	5	35	NOCAL.
Acoustic	Other Training Activities.	Surface Ship Sonar Maintenance and Systems Checks.	Maintenance of surface ship sonar systems is conducted pierside or at sea. Duration: 4 hours.	HFH, MF1, MF1K, MFH.	75	525	Hawaii.
Acoustic	Other Training Activities.	Surface Ship Sonar Maintenance and Systems Checks.	Maintenance of surface ship sonar systems is conducted pierside or at sea. Duration: 4 hours.	HFH, MF1, MF1K, MFH.	80	560	Pearl Harbor.
Acoustic	Other Training Activities.	Surface Ship Sonar Maintenance and Systems Checks.	Maintenance of surface ship sonar systems is conducted pierside or at sea. Duration: 4 hours.	HFH, MF1, MF1K, MFH.	250	1,750	SOCAL.
Acoustic	Other Training Activities.	Surface Ship Sonar Maintenance and Systems Checks.	Maintenance of surface ship sonar systems is conducted pierside or at sea. Duration: 4 hours.	HFH, MF1, MF1K, MFH.	250	1,750	San Diego Bay.
Acoustic	Other Training Activities.	Surface Ship Sonar Maintenance and Systems Checks.	Maintenance of surface ship sonar systems is conducted pierside or at sea. Duration: 4 hours.	HFH, MF1, MF1K, MFH.	8–12	68	Transit Corridor.
Explosive	Other Training Activities.	Training and End-to-End Mission Capability Verification—Subsea and Seabed Warfare Kinetic Effectors.	Submarine crews or shore-based operators employ UUV with munitions or non-munition systems on the sea floor or in the water column. Duration: 8 hours.	E3	20	140	Hawaii.
Explosive	Other Training Activities.	Training and End-to-End Mission Capability Verification—Subsea and Seabed Warfare Kinetic Effectors.	Submarine crews or shore-based operators employ UUV with munitions or non-munition systems on the sea floor or in the water column. Duration: 8 hours.	E3	10	70	SOCAL.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Other Training Activities.	Training and End-to-End Mission Capability Verification—Subsea and Seabed Warfare Kinetic Effectors.	Submarine crews or shore-based operators employ UUV with munitions or non-munition systems on the sea floor or in the water column. Duration: 8 hours.	E3	5	35	PMSR.
Explosive	Other Training Activities.	Training and End-to-End Mission Capability Verification—Subsea and Seabed Warfare Kinetic Effectors.	Submarine crews or shore-based operators employ UUV with munitions or non-munition systems on the sea floor or in the water column. Duration: 8 hours.	E3	5	35	NOCAL.
Explosive	Other Training Activities.	Training and End-to-End Mission Capability Verification—Unmanned Aerial Vehicle (UAV).	Submarine crews or shore-based personnel controlling a UUV launch a capsule containing a UAV. The canister is deployed underwater and ascends to a programmed depth. The canister subsequently launches a UAV, and the canister sinks. Duration: 8 hours.	E3	10	70	Hawaii.
Explosive	Other Training Activities.	Training and End-to-End Mission Capability Verification—Unmanned Aerial Vehicle (UAV).	Submarine crews or shore-based personnel controlling a UUV launch a capsule containing a UAV. The canister is deployed underwater and ascends to a programmed depth. The canister subsequently launches a UAV, and the canister sinks. Duration: 8 hours.	E3	5	35	SOCAL.
Explosive	Other Training Activities.	Training and End-to-End Mission Capability Verification—Unmanned Aerial Vehicle (UAV).	Submarine crews or shore-based personnel controlling a UUV launch a capsule containing a UAV. The canister is deployed underwater and ascends to a programmed depth. The canister subsequently launches a UAV, and the canister sinks. Duration: 8 hours.	E3	3	21	PMSR.
Explosive	Other Training Activities.	Training and End-to-End Mission Capability Verification—Unmanned Aerial Vehicle (UAV).	Submarine crews or shore-based personnel controlling a UUV launch a capsule containing a UAV. The canister is deployed underwater and ascends to a programmed depth. The canister subsequently launches a UAV, and the canister sinks. Duration: 8 hours.	E3	2	14	NOCAL.
Acoustic	Other Training Activities.	Unmanned Underwater Vehicle Training—Certification and Development Exercises.	Unmanned underwater vehicle certification involves training with unmanned platforms to ensure submarine crew proficiency. Tactical development involves training with various payloads for multiple purposes to ensure that the systems can be employed effectively in an operational environment. Duration: up to 24 hours.	HFM, MF to HF, VHFH.	82–178	862	Hawaii.
Acoustic	Other Training Activities.	Unmanned Underwater Vehicle Training—Certification and Development Exercises.	Unmanned underwater vehicle certification involves training with unmanned platforms to ensure submarine crew proficiency. Tactical development involves training with various payloads for multiple purposes to ensure that the systems can be employed effectively in an operational environment. Duration: up to 24 hours.	HFM, MF to HF, VHFH.	284–492	2,612	SOCAL.

TABLE 3—PROPOSED NAVY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Other Training Activities.	Unmanned Underwater Vehicle Training—Certification and Development Exercises.	Unmanned underwater vehicle certification involves training with unmanned platforms to ensure submarine crew proficiency. Tactical development involves training with various payloads for multiple purposes to ensure that the systems can be employed effectively in an operational environment. Duration: up to 24 hours.	HFM, MF to HF, VHFH.	130–260	1,300	SSTC.
Acoustic	Other Training Activities.	Unmanned Underwater Vehicle Training—Certification and Development Exercises.	Unmanned underwater vehicle certification involves training with unmanned platforms to ensure submarine crew proficiency. Tactical development involves training with various payloads for multiple purposes to ensure that the systems can be employed effectively in an operational environment. Duration: up to 24 hours.	HFM, MF to HF, VHFH.	18–36	180	China Point.

Note: LF = low-frequency, MF = mid-frequency, HF = high-frequency, dB = decibels, L = low, M= medium, H = high (*e.g.,* MFL = mid-frequency low source level), H = hours, C = count. BARSTUR = Barking Sands Tactical Underwater Range, FORACS = Fleet Operational Readiness Accuracy Check Site, Hawaii = the Hawaii Study Area, MTR = Mine Training Range, NOCAL = Northern California Range Complex, PMRF = Pacific Missile Range Facility, PMSR = Point Mugu Sea Range, SCI = San Clemente Island, SOAR = Southern California Offshore Anti-Submarine Warfare Range, SOCAL = Southern California Range Complex, SSTC = Silver Strand Training Complex, SWAT = Special Warfare Training Area, TAR = Training Area and Range.

TABLE 4—PROPOSED COAST GUARD TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Ship Large-caliber.	Surface ship crews fire large-caliber guns at surface targets. Duration: up to 3 hours.	E3	5	35	Hawaii.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Ship Large-caliber.	Surface ship crews fire large-caliber guns at surface targets. Duration: up to 3 hours.	E3	20	140	SOCAL.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Ship Large-caliber.	Surface ship crews fire large-caliber guns at surface targets. Duration: up to 3 hours.	E3	2	14	PMSR.
Explosive	Surface Warfare	Gunnery Exercise Surface-to-Surface Ship Large-caliber.	Surface ship crews fire large-caliber guns at surface targets. Duration: up to 3 hours.	E3	2	14	NOCAL.
Acoustic	Other Training	Unmanned Underwater Vehicle Training—Certification and Development Exercises.	Unmanned underwater vehicle certification involves training with unmanned platforms to ensure submarine crew proficiency. Tactical development involves training with various payloads for multiple purposes to ensure that the systems can be employed effectively in an operational environment. Duration: up to 24 hours.	HFM, MF to HF, VHFH.	200	1,400	Hawaii.
Acoustic	Other Training	Unmanned Underwater Vehicle Training—Certification and Development Exercises.	Unmanned underwater vehicle certification involves training with unmanned platforms to ensure submarine crew proficiency. Tactical development involves training with various payloads for multiple purposes to ensure that the systems can be employed effectively in an operational environment. Duration: up to 24 hours.	HFM, MF to HF, VHFH.	200	1,400	SOCAL.
Acoustic	Other Training	Unmanned Underwater Vehicle Training—Certification and Development Exercises.	Unmanned underwater vehicle certification involves training with unmanned platforms to ensure submarine crew proficiency. Tactical development involves training with various payloads for multiple purposes to ensure that the systems can be employed effectively in an operational environment. Duration: up to 24 hours.	HFM, MF to HF, VHFH.	100	700	PMSR.

TABLE 4—PROPOSED COAST GUARD TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Other Training	Unmanned Underwater Vehicle Training—Certification and Development Exercises.	Unmanned underwater vehicle certification involves training with unmanned platforms to ensure submarine crew proficiency. Tactical development involves training with various payloads for multiple purposes to ensure that the systems can be employed effectively in an operational environment. Duration: up to 24 hours.	HFM, MF to HF, VHFH.	10	70	NOCAL.

Note: LF = low-frequency, MF = mid-frequency, HF = high-frequency, dB = decibels, L = low, M = medium, H = high (*e.g.,* MFL = mid-frequency low source level), H = hours, C = count. Hawaii = the Hawaii Study Area, NOCAL = Northern California Range Complex, PMSR = Point Mugu Sea Range, SOCAL = Southern California Range Complex.

TABLE 5—PROPOSED ARMY TRAINING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Amphibious Warfare.	Shore-to-Surface Artillery Exercise.	Amphibious land-based forces fire artillery guns at surface targets. Duration: 1–2 hours of firing, 8 hours total.	E6	2	14	PMRF.
Explosive	Amphibious Warfare.	Shore-to-Surface Missile Exercise.	Amphibious land-based forces fire anti-surface missiles, rockets, and loitering munitions at surface targets. Duration: 1–2 hours of firing, 8 hours total.	E9	18	126	PMRF.

Note: PMRF = Pacific Missile Range Facility.

Overview of Testing Activities Within the Study Area

While this proposed rule includes an evaluation of proposed training activities by the Navy, Coast Guard, and Army, all testing activities evaluated in this proposed rule would only be conducted by the Navy. The Navy's research and acquisition community engages in a broad spectrum of testing activities, some of which ultimately support all Action Proponents. These activities include, but are not limited to, basic and applied scientific research and technology development; testing, evaluation, and maintenance of systems (*e.g.,* missiles, radar, and sonar) and platforms (*e.g.,* surface ships, submarines, and aircraft); and acquisition of systems and platforms to support Navy missions and give a technological edge over adversaries. The individual commands within the research and acquisition community considered in the application are Naval Air Systems Command (NAVAIR), Naval Facilities Engineering and Expeditionary Warfare Center, Naval Sea Systems Command (NAVSEA), Office of Naval Research (ONR), and Naval Information Warfare Systems Command (NAVWAR). Although included in the testing community, proposed Expeditionary Warfare Center activities do not involve sonar and other transducers, underwater detonations, pile driving, airguns, or any other stressors that could result in harassment of marine mammals, and therefore, are not analyzed further in this proposed rule.

The Action Proponents operate in an ever-changing strategic, tactical, financially-constrained, and time-constrained environment. Testing activities occur in response to emerging science or fleet operational needs. For example, future Navy studies to develop a better understanding of ocean currents may be designed based on advancements made by non-government researchers not yet published in the scientific literature. Similarly, future but yet unknown Navy, Coast Guard, and Army operations within a specific geographic area may require development of modified Navy assets to address local conditions. Such modifications must be tested in the field to ensure they meet fleet needs and requirements. Accordingly, generic descriptions of some of these activities are the best that can be articulated in a long-term, comprehensive document.

Some testing activities are similar to training activities conducted by the fleet (*e.g.,* both the fleet and the research and acquisition community fire torpedoes). While the firing of a torpedo might look identical to an observer, the difference is in the purpose of the firing. The fleet might fire the torpedo to practice the procedures for such a firing, whereas the research and acquisition community might be assessing a new torpedo guidance technology or testing it to ensure the torpedo meets performance specifications and operational requirements (see appendix A (Activity Descriptions) of the 2024 HCTT Draft EIS/OEIS for more detailed descriptions of the activities).

NAVAIR testing activities generally fall in the primary mission areas used by the fleets and include the evaluation of new and in-service aircraft platforms and systems to deliver critical air warfare capabilities to the fleets. To accomplish its mission, NAVAIR conducts anti-submarine warfare tests using fixed-wing and rotary wing aircraft platforms, a suite of passive and active acoustic sonobuoys (to include Lot Acceptance Testing), and dipping sonar systems.

The majority of testing activities conducted by NAVAIR are similar to fleet training activities, and many platforms and systems currently being tested are already being used by the fleet or will ultimately be integrated into fleet training activities. However, some testing activities may be conducted in different locations and in a different manner than similar fleet training activities, and, therefore, the analysis for those events and the potential environmental effects may differ. Table 6 summarizes the proposed testing activities for NAVAIR analyzed within the HCTT Study Area.

TABLE 6—PROPOSED NAVAIR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Anti-Submarine Warfare.	ASW Torpedo Test—Aircraft.	This event is similar to the training event torpedo exercise. Test evaluates anti-submarine warfare systems onboard rotary-wing and fixed-wing aircraft and the ability to search for, detect, classify, localize, track, and attack a submarine or similar target. Duration: 2–6 hours.	HFH, MFH, MFM.	24–26	174	Hawaii.
Acoustic	Anti-Submarine Warfare.	ASW Torpedo Test—Aircraft.	This event is similar to the training event torpedo exercise. Test evaluates anti-submarine warfare systems onboard rotary-wing and fixed-wing aircraft and the ability to search for, detect, classify, localize, track, and attack a submarine or similar target. Duration: 2–6 hours.	HFH, MFH, MFM.	36–39	259	SOCAL.
Acoustic	Anti-Submarine Warfare.	ASW Torpedo Test—Aircraft.	This event is similar to the training event torpedo exercise. Test evaluates anti-submarine warfare systems onboard rotary-wing and fixed-wing aircraft and the ability to search for, detect, classify, localize, track, and attack a submarine or similar target. Duration: 2–6 hours.	HFH, MFH, MFM.	36–39	259	SCORE.
Acoustic	Anti-Submarine Warfare.	ASW Tracking Test—Fixed-Wing.	The test evaluates the sensors and systems used by maritime patrol aircraft to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements. Duration: 8 hours.	HFM, LFH, LFM, MFM.	61–67	445	Hawaii.
Acoustic	Anti-Submarine Warfare.	ASW Tracking Test—Fixed-Wing.	The test evaluates the sensors and systems used by maritime patrol aircraft to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements. Duration: 8 hours.	HFM, LFH, LFM, MFM.	68–75	497	SOCAL.
Acoustic	Anti-Submarine Warfare.	ASW Tracking Test—Rotary Wing.	The test evaluates the sensors and systems used by helicopters to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements. Duration: 2 hours.	MFH, MFM	66–73	483	Hawaii.
Acoustic	Anti-Submarine Warfare.	ASW Tracking Test—Rotary Wing.	The test evaluates the sensors and systems used by helicopters to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements. Duration: 2 hours.	MFH, MFM	66–73	482	SOCAL.
Acoustic	Anti-Submarine Warfare.	ASW Tracking Test—Rotary Wing.	The test evaluates the sensors and systems used by helicopters to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements. Duration: 2 hours.	MFH, MFM	66–73	482	SCORE.
Acoustic	Anti-Submarine Warfare.	Kilo Dip Test	Functional check of a helicopter-deployed dipping sonar system prior to conducting a testing or training event using the dipping sonar system. Duration: 1–2 hours.	MFH	6–7	45	Hawaii.

TABLE 6—PROPOSED NAVAIR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Anti-Submarine Warfare.	Kilo Dip Test	Functional check of a helicopter-deployed dipping sonar system prior to conducting a testing or training event using the dipping sonar system. Duration: 1–2 hours.	MFH	6–7	45	SOCAL.
Acoustic	Anti-Submarine Warfare.	Sonobuoy Lot Acceptance Test.	Sonobuoys are deployed from surface vessels and aircraft to verify the integrity and performance of a lot or group of sonobuoys in advance of delivery to the fleet for operational use. Duration: 6 hours.	HFM, LFH, LFM, MFM.	32–38	242	Hawaii.
Acoustic	Anti-Submarine Warfare.	Sonobuoy Lot Acceptance Test.	Sonobuoys are deployed from surface vessels and aircraft to verify the integrity and performance of a lot or group of sonobuoys in advance of delivery to the fleet for operational use. Duration: 6 hours.	HFM, LFH, LFM, MFM.	320–352	2,336	SOCAL.
Acoustic	Mine Warfare	Airborne Dipping Sonar Minehunting Test.	A mine-hunting dipping sonar system that is deployed from a helicopter and uses high-frequency sonar for the detection and classification of bottom and moored mines. Duration: 2 hours.	HFH	18–20	132	Hawaii.
Acoustic	Mine Warfare	Airborne Dipping Sonar Minehunting Test.	A mine-hunting dipping sonar system that is deployed from a helicopter and uses high-frequency sonar for the detection and classification of bottom and moored mines. Duration: 2 hours.	HFH	18–20	132	SOCAL.
Explosive	Mine Warfare	Airborne Mine Neutralization System Test.	A test of the airborne mine neutralization system evaluates the system's ability to detect and destroy mines from an airborne mine countermeasures capable helicopter. The Airborne Mine Neutralization System uses up to four unmanned underwater vehicles equipped with high frequency sonar, video cameras, and explosive and non-explosive neutralizers. Duration: 2–3 hours.	E4	36–39	261	Hawaii.
Explosive	Mine Warfare	Airborne Mine Neutralization System Test.	A test of the airborne mine neutralization system evaluates the system's ability to detect and destroy mines from an airborne mine countermeasures capable helicopter. The Airborne Mine Neutralization System uses up to four unmanned underwater vehicles equipped with high frequency sonar, video cameras, and explosive and non-explosive neutralizers. Duration: 2–3 hours.	E4	81–84	576	SOCAL.
Acoustic	Mine Warfare	Airborne Sonobuoy Minehunting Test.	A mine-hunting system made up of sonobuoys deployed from a helicopter. A field of sonobuoys, using high-frequency sonar, is used to detect and classify bottom and moored mines. Duration: 2 hours.	MFM	9–10	66	Hawaii.
Acoustic	Mine Warfare	Airborne Sonobuoy Minehunting Test.	A mine-hunting system made up of sonobuoys deployed from a helicopter. A field of sonobuoys, using high-frequency sonar, is used to detect and classify bottom and moored mines. Duration: 2 hours.	MFM	9–10	66	SOCAL.

TABLE 6—PROPOSED NAVAIR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Surface Warfare	Air-to-Surface Bombing Test.	This event is similar to the training event bombing exercise air-to-surface. Fixed-wing aircraft test the delivery of bombs against surface maritime targets with the goal of evaluating the bomb, the bomb carry and delivery system, and any associated systems that may have been newly developed or enhanced. Duration: 2 hours.	E7, E9	8–9	59	Hawaii.
Explosive	Surface Warfare	Air-to-Surface Bombing Test.	This event is similar to the training event bombing exercise air-to-surface. Fixed-wing aircraft test the delivery of bombs against surface maritime targets with the goal of evaluating the bomb, the bomb carry and delivery system, and any associated systems that may have been newly developed or enhanced. Duration: 2 hours.	E7, E9	14–15	101	SOCAL.
Explosive	Surface Warfare	Air-to-Surface Bombing Test.	This event is similar to the training event bombing exercise air-to-surface. Fixed-wing aircraft test the delivery of bombs against surface maritime targets with the goal of evaluating the bomb, the bomb carry and delivery system, and any associated systems that may have been newly developed or enhanced. Duration: 2 hours.	E7, E9	52	364	PMSR.
Explosive	Surface Warfare	Air-to-Surface Gunnery Test.	This event is similar to the training event gunnery exercise (air to surface). Fixed-wing and rotary-wing aircrews evaluate new or enhanced aircraft guns against surface maritime targets to test that the gun, gun ammunition, or associated systems meet required specifications or to train aircrew in the operation of a new or enhanced weapon system. Duration: 2–3 hours.	E1	6–7	45	Hawaii.
Explosive	Surface Warfare	Air-to-Surface Gunnery Test.	This event is similar to the training event gunnery exercise (air to surface). Fixed-wing and rotary-wing aircrews evaluate new or enhanced aircraft guns against surface maritime targets to test that the gun, gun ammunition, or associated systems meet required specifications or to train aircrew in the operation of a new or enhanced weapon system. Duration: 2–3 hours.	E1	60–66	438	SOCAL.
Explosive	Surface Warfare	Air-to-Surface Gunnery Test.	This event is similar to the training event gunnery exercise (air to surface). Fixed-wing and rotary-wing aircrews evaluate new or enhanced aircraft guns against surface maritime targets to test that the gun, gun ammunition, or associated systems meet required specifications or to train aircrew in the operation of a new or enhanced weapon system. Duration: 2–3 hours.	E1	10	70	PMSR.
Explosive	Surface Warfare	Air-to-Surface Missile Test.	This event is similar to the training event missile exercise air-to-surface. Test may involve both fixed-wing and rotary-wing aircraft launching missiles at surface maritime targets to evaluate the weapons system or as part of another system's integration test. Duration: 2–4 hours.	E6, E7, E8, E9	18–20	132	Hawaii.

TABLE 6—PROPOSED NAVAIR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Explosive	Surface Warfare	Air-to-Surface Missile Test.	This event is similar to the training event missile exercise air-to-surface. Test may involve both fixed-wing and rotary-wing aircraft launching missiles at surface maritime targets to evaluate the weapons system or as part of another system's integration test. Duration: 2–4 hours.	E6, E7, E8, E9	8	56	SOCAL.
Explosive	Surface Warfare	Air-to-Surface Missile Test.	This event is similar to the training event missile exercise air-to-surface. Test may involve both fixed-wing and rotary-wing aircraft launching missiles at surface maritime targets to evaluate the weapons system or as part of another system's integration test. Duration: 2–4 hours.	E6, E7, E8, E9	180–186	1,275	PMSR.
Explosive	Surface Warfare	Rocket Test	Rocket tests evaluate the integration, accuracy, performance, and safe separation of guided and unguided 2.75-inch (7 centimeter (cm)) rockets fired from a hovering or forward flying helicopter. Duration: 1–3 hours.	E3, E9	2	14	Hawaii.
Explosive	Surface Warfare	Rocket Test	Rocket tests evaluate the integration, accuracy, performance, and safe separation of guided and unguided 2.75-inch (7 cm) rockets fired from a hovering or forward flying helicopter. Duration: 1–3 hours.	E3, E9	22–24	160	SOCAL.
Explosive	Surface Warfare	Rocket Test	Rocket tests evaluate the integration, accuracy, performance, and safe separation of guided and unguided 2.75-inch (7 cm) rockets fired from a hovering or forward flying helicopter. Duration: 1–3 hours.	E3, E9	8	56	PMSR.
Explosive	Surface Warfare	Subsurface-to-Surface Missile Test.	Submarines launch missiles at surface maritime targets with the goal of destroying or disabling enemy ships or boats. Duration: 8 hours.	E10	4	28	PMSR.
Explosive	Surface Warfare	Surface-to-Surface Gunnery Test—Large-Caliber.	Evaluates the performance and effectiveness of software and hardware modifications or upgrades of ship-based large-caliber gunnery systems against surface targets. 3 hours.	E3, E5	10	70	PMSR.
Explosive	Surface Warfare	Surface-to-Surface Gunnery Test—Medium-Caliber.	Evaluates the performance and effectiveness of software and hardware modifications or upgrades of ship-based medium-caliber gunnery systems against surface targets. Duration: 3 hours.	E1, E3	26	182	PMSR.
Explosive	Surface Warfare	Surface-to-Surface Missile Test.	Surface ships launch missiles at surface maritime targets. Duration: 2–5 hours.	E9, E10	44	308	PMSR.
Acoustic	Other Testing	Undersea Range System Test.	Post installation node survey and test and periodic testing of range Node transmit functionality. Duration: varies.	MFM	30–33	207	BARSTUR.
Acoustic	Other Testing	Undersea Range System Test.	Post installation node survey and test and periodic testing of range Node transmit functionality. Duration: varies.	MFM	19–21	127	SOCAL.

Note: LF = low-frequency, MF = mid-frequency, HF = high-frequency, dB = decibels, L = low, M = medium, H = high (*e.g.,* MFL = mid-frequency low source level), H = hours, C = count. BARSTUR = Barking Sands Tactical Underwater Range, Hawaii = the Hawaii Study Area, PMSR = Point Mugu Sea Range, SCORE = Southern California Offshore Range, SOAR = Southern California Offshore Anti-Submarine Warfare Range, SOCAL = Southern California Range Complex.

NAVSEA activities are generally aligned with the primary mission areas used by the fleets and include, but are not limited to, new ship construction, life cycle support, and other weapon system development and testing. Testing activities are conducted throughout the life of a Navy ship, from construction through deactivation from the fleet to verification of performance and mission capabilities. Activities include pierside and at-sea testing of ship systems, including sonar, acoustic countermeasures, radars, torpedoes, weapons, unmanned systems, and radio equipment; tests to determine how the ship performs at sea (sea trials); development and operational test and evaluation programs for new technologies and systems, including ship shock trials to test the survivability of new ships; and testing on all ships and systems that have undergone overhaul or maintenance. Table 7 summarizes the proposed testing activities for NAVSEA analyzed within the HCTT Study Area.

TABLE 7—PROPOSED NAVSEA TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Anti-Submarine Warfare.	ASW Mission Package Testing.	Ships and their supporting platforms (*e.g.,* rotary-wing aircraft, unmanned aerial systems) detect, localize, and prosecute submarines. Duration: 1–2 weeks with 4–8 hours of active sonar use per day.	MF1, MFH	1	7	Hawaii.
Acoustic	Anti-Submarine Warfare.	ASW Mission Package Testing.	Ships and their supporting platforms (*e.g.,* rotary-wing aircraft, unmanned aerial systems) detect, localize, and prosecute submarines. Duration: 1–2 weeks with 4–8 hours of active sonar use per day.	MF1, MFH	1	7	SOCAL.
Acoustic	Anti-Submarine Warfare.	At-Sea Sonar Testing	At-sea testing to ensure systems are fully functional in an open ocean environment. Duration: 4 hours to 11 days.	HFH, HFL, HFM, LF to HF, LF to MF, LFH, LFM, MF to HF, MF1, MF1K, MFH, MFL, MFM.	9–11	70	Hawaii.
Acoustic	Anti-Submarine Warfare.	At-Sea Sonar Testing	At-sea testing to ensure systems are fully functional in an open ocean environment. Duration: 4 hours to 11 days.	HFH, HFL, HFM, LF to HF, LF to MF, LFH, LFM, MF to HF, MF1, MF1K, MFH, MFL, MFM.	16–22	128	SOCAL.
Acoustic	Anti-Submarine Warfare.	At-Sea Sonar Testing	At-sea testing to ensure systems are fully functional in an open ocean environment. Duration: 4 hours to 11 days.	HFH, HFL, HFM, LF to HF, LF to MF, LFH, LFM, MF to HF, MF1, MF1K, MFH, MFL, MFM.	10–20	70	SOAR.
Acoustic	Anti-Submarine Warfare.	At-Sea Sonar Testing	At-sea testing to ensure systems are fully functional in an open ocean environment. Duration: 4 hours to 11 days.	HFH, HFL, HFM, LF to HF, LF to MF, LFH, LFM, MF to HF, MF1, MF1K, MFH, MFL, MFM.	0–1	4	PMRF.
Acoustic	Anti-Submarine Warfare.	Countermeasure Testing.	Countermeasure testing involves the testing of systems that detect, localize, and engage incoming weapons, including marine vessel targets and airborne missiles. Testing includes surface ship torpedo defense systems, marine vessel stopping payloads, and airborne decoys against targets. Duration: 4 hours to 6 days.	HFH, LF to HF, MF to HF, MFH, MFM, VHFH.	3–6	20	Hawaii, Maui Basin, PMRF.
Acoustic	Anti-Submarine Warfare.	Countermeasure Testing.	Countermeasure testing involves the testing of systems that detect, localize, and engage incoming weapons, including marine vessel targets and airborne missiles. Testing includes surface ship torpedo defense systems, marine vessel stopping payloads, and airborne decoys against targets. Duration: 4 hours to 6 days.	HFH, LF to HF, MF to HF, MFH, MFM, VHFH.	7–12	25	SOCAL, SCORE.

TABLE 7—PROPOSED NAVSEA TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Anti-Submarine Warfare.	Pierside Sonar Testing	Pierside testing to ensure systems are fully functional in a controlled pierside environment prior to at-sea test activities and complete any troubleshooting. Duration: up to 3 weeks, with intermittent sonar use.	HFH, HFM, MF to HF, MFH, MFM.	13–25	171	Pearl Harbor.
Acoustic	Anti-Submarine Warfare.	Pierside Sonar Testing	Pierside testing to ensure systems are fully functional in a controlled pierside environment prior to at-sea test activities and complete any troubleshooting. Duration: up to 3 weeks, with intermittent sonar use.	HFH, HFM, MF to HF, MFH, MFM.	44–55	383	San Diego Bay.
Acoustic	Anti-Submarine Warfare.	Pierside Sonar Testing	Pierside testing to ensure systems are fully functional in a controlled pierside environment prior to at-sea test activities and complete any troubleshooting. Duration: up to 3 weeks, with intermittent sonar use.	HFH, HFM, MF to HF, MFH, MFM.	15–20	140	Port Hueneme.
Acoustic	Anti-Submarine Warfare.	Surface Ship Sonar Testing/Maintenance.	Pierside and at-sea testing of ship systems occur periodically following major maintenance periods and for routine maintenance. Duration: up to 3 weeks, with intermittent sonar use.	LFL, MF to HF, MF1, MF1K, MFM.	3	7	Hawaii.
Acoustic	Anti-Submarine Warfare.	Surface Ship Sonar Testing/Maintenance.	Pierside and at-sea testing of ship systems occur periodically following major maintenance periods and for routine maintenance. Duration: up to 3 weeks, with intermittent sonar use.	LFL, MF to HF, MF1, MF1K, MFM.	3	21	Pearl Harbor.
Acoustic	Anti-Submarine Warfare.	Surface Ship Sonar Testing/Maintenance.	Pierside and at-sea testing of ship systems occur periodically following major maintenance periods and for routine maintenance. Duration: up to 3 weeks, with intermittent sonar use.	LFL, MF to HF, MF1, MF1K, MFM.	3	21	SOCAL.
Acoustic	Anti-Submarine Warfare.	Surface Ship Sonar Testing/Maintenance.	Pierside and at-sea testing of ship systems occur periodically following major maintenance periods and for routine maintenance. Duration: up to 3 weeks, with intermittent sonar use.	LFL, MF to HF, MF1, MF1K, MFM.	3	21	San Diego Bay.
Acoustic and Explosive.	Anti-Submarine Warfare.	Torpedo (Explosive) Testing.	Air, surface, or submarine crews employ explosive and non-explosive torpedoes against artificial targets. Duration: 1–2 days, 8–12 hours per day.	E8, E11, HFH, MF to HF, MF1, MFH, MFM.	1–5	17	Hawaii, SOCAL, PMSR.
Acoustic	Anti-Submarine Warfare.	Torpedo (Non-Explosive) Testing.	Air, surface, or submarine crews employ non-explosive torpedoes against submarines, surface vessels, or artificial targets. Duration: up to 2 weeks.	HFH, HFM, LF to HF, MF to HF, MF1, MFH, MFL, MFM, VHFH.	13–17	96	Hawaii, SOCAL, BARSTUR, PMSR.
Explosive	Mine Warfare	Mine Countermeasure and Neutralization Testing.	Air, surface, and subsurface vessels neutralize threat mines and mine-like objects. Duration: 1–10 days, with intermittent use of countermeasure systems.	E4	18–45	315	SOCAL.
Acoustic and Explosive.	Mine Warfare	Mine Countermeasure Mission Package Testing.	Vessels and associated aircraft conduct mine countermeasure operations. Duration: 1–2 weeks, with intermittent use of countermeasure systems.	E4, HFM, MFH	0–1	7	PMRF.
Acoustic and Explosive.	Mine Warfare	Mine Countermeasure Mission Package Testing.	Vessels and associated aircraft conduct mine countermeasure operations. Duration: 1–2 weeks, with intermittent use of countermeasure systems.	E4, HFM, MFH	16	109	Maui Basin.
Acoustic and Explosive.	Mine Warfare	Mine Countermeasure Mission Package Testing.	Vessels and associated aircraft conduct mine countermeasure operations. Duration: 1–2 weeks, with intermittent use of countermeasure systems.	E4, HFM, MFH	6	36	CPAAA.

TABLE 7—PROPOSED NAVSEA TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic and Explosive.	Mine Warfare ...	Mine Countermeasure Mission Package Testing.	Vessels and associated aircraft conduct mine countermeasure operations. Duration: 1–2 weeks, with intermittent use of countermeasure systems.	E4, HFM, MFH	6	36	SSTC.
Acoustic and Explosive.	Mine Warfare ...	Mine Countermeasure Mission Package Testing.	Vessels and associated aircraft conduct mine countermeasure operations. Duration: 1–2 weeks, with intermittent use of countermeasure systems.	E4, HFM, MFH	6	37	Tanner Bank.
Acoustic and Explosive.	Mine Warfare ...	Mine Countermeasure Mission Package Testing.	Vessels and associated aircraft conduct mine countermeasure operations. Duration: 1–2 weeks, with intermittent use of countermeasure systems.	E4, HFM, MFH	6	42	Imperial Beach Minefield.
Acoustic and Explosive.	Mine Warfare ...	Mine Countermeasure Mission Package Testing.	Vessels and associated aircraft conduct mine countermeasure operations. Duration: 1–2 weeks, with intermittent use of countermeasure systems.	E4, HFM, MFH	1	7	PMSR.
Acoustic	Mine Warfare ...	Mine Detection and Classification Testing.	Air, surface, and subsurface vessels and systems detect, classify, and avoid mines and mine-like objects. Vessels also assess their potential susceptibility to mines and mine-like objects. Duration: up to 24 days, 8–12 hours per day.	HFH	4–8	28	Hawaii.
Acoustic	Mine Warfare ...	Mine Detection and Classification Testing.	Air, surface, and subsurface vessels and systems detect, classify, and avoid mines and mine-like objects. Vessels also assess their potential susceptibility to mines and mine-like objects. Duration: up to 24 days, 8–12 hours per day.	HFH	0–1	4	Imperial Beach Minefield.
Acoustic	Mine Warfare ...	Mine Detection and Classification Testing.	Air, surface, and subsurface vessels and systems detect, classify, and avoid mines and mine-like objects. Vessels also assess their potential susceptibility to mines and mine-like objects. Duration: up to 24 days, 8–12 hours per day.	HFH	2	14	Maui Basin.
Acoustic	Mine Warfare ...	Mine Detection and Classification Testing.	Air, surface, and subsurface vessels and systems detect, classify, and avoid mines and mine-like objects. Vessels also assess their potential susceptibility to mines and mine-like objects. Duration: up to 24 days, 8–12 hours per day.	HFH	2	14	Tanner Bank.
Acoustic	Mine Warfare ...	Mine Detection and Classification Testing.	Air, surface, and subsurface vessels and systems detect, classify, and avoid mines and mine-like objects. Vessels also assess their potential susceptibility to mines and mine-like objects. Duration: up to 24 days, 8–12 hours per day.	HFH	4–8	28	PMSR.
Acoustic	Mine Warfare ...	Mine Detection and Classification Testing.	Air, surface, and subsurface vessels and systems detect, classify, and avoid mines and mine-like objects. Vessels also assess their potential susceptibility to mines and mine-like objects. Duration: up to 24 days, 8–12 hours per day.	HFH	4–9	30	SOCAL.
Acoustic	Unmanned Systems.	Unmanned Underwater Vehicle Testing.	Testing involves the production or upgrade of unmanned underwater vehicles. This may include testing mine detection capabilities, evaluating the basic functions of individual platforms, or conducting complex events with multiple vehicles. Duration: up to 35 days, gliders could operate for multiple months.	HFL, HFM, MF to HF, MFM, VHFH, VHFL.	2	14	Pearl Harbor.

TABLE 7—PROPOSED NAVSEA TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Unmanned Systems.	Unmanned Underwater Vehicle Testing.	Testing involves the production or upgrade of unmanned underwater vehicles. This may include testing mine detection capabilities, evaluating the basic functions of individual platforms, or conducting complex events with multiple vehicles. Duration: up to 35 days, gliders could operate for multiple months.	HFL, HFM, MF to HF, MFM, VHFH, VHFL.	230	1,610	Port Hueneme.
Acoustic	Unmanned Systems.	Unmanned Underwater Vehicle Testing.	Testing involves the production or upgrade of unmanned underwater vehicles. This may include testing mine detection capabilities, evaluating the basic functions of individual platforms, or conducting complex events with multiple vehicles. Duration: up to 35 days, gliders could operate for multiple months.	HFL, HFM, MF to HF, MFM, VHFH, VHFL.	10–15	85	SOCAL.
Acoustic	Unmanned Systems.	Unmanned Underwater Vehicle Testing.	Testing involves the production or upgrade of unmanned underwater vehicles. This may include testing mine detection capabilities, evaluating the basic functions of individual platforms, or conducting complex events with multiple vehicles. Duration: up to 35 days, gliders could operate for multiple months.	HFL, HFM, MF to HF, MFM, VHFH, VHFL.	440	3,080	SOCAL nearshore.
Acoustic	Vessel Evaluation.	In-Port Maintenance Testing.	Each combat system is tested to ensure they are functioning in a technically acceptable manner and are operationally ready to support at-sea testing. Duration: 3 weeks.	MF1	5	30	Pearl Harbor.
Acoustic	Vessel Evaluation.	In-Port Maintenance Testing.	Each combat system is tested to ensure they are functioning in a technically acceptable manner and are operationally ready to support at-sea testing. Duration: 3 weeks.	MF1	5	30	San Diego Bay.
Acoustic	Vessel Evaluation.	In-Port Maintenance Testing.	Each combat system is tested to ensure they are functioning in a technically acceptable manner and are operationally ready to support at-sea testing. Duration: 3 weeks.	MF1	10	70	Port Hueneme.
Acoustic	Vessel Evaluation.	Signature Analysis Operations.	Surface ship and submarine testing of electromagnetic, acoustic, optical, and radar signature measurements. Duration: 1–5 days.	HFM, MFM	2–4	14	Hawaii.
Acoustic	Vessel Evaluation.	Signature Analysis Operations.	Surface ship and submarine testing of electromagnetic, acoustic, optical, and radar signature measurements. Duration: 1–5 days.	HFM, MFM	0–1	1	San Diego Bay.
Explosive	Vessel Evaluation.	Small Ship Shock Trial	Underwater detonations are used to test new ships or major upgrades. Duration: up to 3 weeks.	E16	0–1	1	SOCAL.
Acoustic	Vessel Evaluation.	Submarine Sea Trials—Weapons System Testing.	Submarine weapons and sonar systems are tested at-sea to meet integrated combat system certification requirements. Duration: up to 7 days.	HFH, HFM, LF to HF, MFH, MFL.	2–4	12	Hawaii.
Acoustic	Vessel Evaluation.	Submarine Sea Trials—Weapons System Testing.	Submarine weapons and sonar systems are tested at-sea to meet integrated combat system certification requirements. Duration: up to 7 days.	HFH, HFM, LF to HF, MFH, MFL.	2–4	12	SOCAL.

TABLE 7—PROPOSED NAVSEA TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic and Explosive.	Vessel Evaluation.	Surface Warfare Testing.	Tests capability of shipboard sensors to detect, track, and engage surface targets. Testing may include ships defending against surface targets using explosive and non-explosive rounds, gun system structural test firing, and demonstration of the response to Call for Fire against land-based targets (simulated by sea-based locations). Duration: 7 days.	E3, E5, E6, E7, E8, E9, HFH, MFM.	0–12	48	Hawaii.
Acoustic and Explosive.	Vessel Evaluation.	Surface Warfare Testing.	Tests capability of shipboard sensors to detect, track, and engage surface targets. Testing may include ships defending against surface targets using explosive and non-explosive rounds, gun system structural test firing, and demonstration of the response to Call for Fire against land-based targets (simulated by sea-based locations). Duration: 7 days.	E3, E5, E6, E7, E8, E9, HFH, MFM.	4	35	PMRF.
Acoustic and Explosive.	Vessel Evaluation.	Surface Warfare Testing.	Tests capability of shipboard sensors to detect, track, and engage surface targets. Testing may include ships defending against surface targets using explosive and non-explosive rounds, gun system structural test firing, and demonstration of the response to Call for Fire against land-based targets (simulated by sea-based locations). Duration: 7 days.	E3, E5, E6, E7, E8, E9, HFH, MFM.	3–15	39	SOCAL.
Acoustic and Explosive.	Vessel Evaluation.	Surface Warfare Testing.	Tests capability of shipboard sensors to detect, track, and engage surface targets. Testing may include ships defending against surface targets using explosive and non-explosive rounds, gun system structural test firing, and demonstration of the response to Call for Fire against land-based targets (simulated by sea-based locations). Duration: 7 days.	E3, E5, E6, E7, E8, E9, HFH, MFM.	3–6	30	SOAR.
Acoustic and Explosive.	Vessel Evaluation.	Surface Warfare Testing.	Tests capability of shipboard sensors to detect, track, and engage surface targets. Testing may include ships defending against surface targets using explosive and non-explosive rounds, gun system structural test firing, and demonstration of the response to Call for Fire against land-based targets (simulated by sea-based locations). Duration: 7 days.	E3, E5, E6, E7, E8, E9, HFH, MFM.	4–12	36	SCORE.
Acoustic and Explosive.	Vessel Evaluation.	Surface Warfare Testing.	Tests capability of shipboard sensors to detect, track, and engage surface targets. Testing may include ships defending against surface targets using explosive and non-explosive rounds, gun system structural test firing, and demonstration of the response to Call for Fire against land-based targets (simulated by sea-based locations). Duration: 7 days.	E3, E5, E6, E7, E8, E9, HFH, MFM.	7–20	67	PMSR.

TABLE 7—PROPOSED NAVSEA TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Vessel Evaluation.	Undersea Warfare Testing.	Ships demonstrate capability of countermeasure systems and underwater surveillance, weapons engagement, and communications systems. This tests ships' ability to detect, track, and engage undersea targets. Duration: up to 10 days.	HFH, MF1, MFH, MFM.	1–7	26	Hawaii.
Acoustic	Vessel Evaluation.	Undersea Warfare Testing.	Ships demonstrate capability of countermeasure systems and underwater surveillance, weapons engagement, and communications systems. This tests ships' ability to detect, track, and engage undersea targets. Duration: up to 10 days.	HFH, MF1, MFH, MFM.	2–3	16	PMRF.
Acoustic	Vessel Evaluation.	Undersea Warfare Testing.	Ships demonstrate capability of countermeasure systems and underwater surveillance, weapons engagement, and communications systems. This tests ships' ability to detect, track, and engage undersea targets. Duration: up to 10 days.	HFH, MF1, MFH, MFM.	23–43	154	SOCAL.
Acoustic	Vessel Evaluation.	Undersea Warfare Testing.	Ships demonstrate capability of countermeasure systems and underwater surveillance, weapons engagement, and communications systems. This tests ships' ability to detect, track, and engage undersea targets. Duration: up to 10 days.	HFH, MF1, MFH, MFM.	2–14	56	SCORE.
Acoustic and Explosive.	Other Testing	Acoustic and Oceanographic Research.	Research using active transmissions from sources deployed from ships, aircraft, and unmanned underwater vehicles. Research sources can be used as proxies for current and future Navy systems. Duration: up to 14 days.	E7, LFM	1	7	Hawaii.
Acoustic and Explosive.	Other Testing	Acoustic and Oceanographic Research.	Research using active transmissions from sources deployed from ships, aircraft, and unmanned underwater vehicles. Research sources can be used as proxies for current and future Navy systems. Duration: up to 14 days.	E7, LFM	4–5	31	PMRF.
Acoustic and Explosive.	Other Testing	Acoustic and Oceanographic Research.	Research using active transmissions from sources deployed from ships, aircraft, and unmanned underwater vehicles. Research sources can be used as proxies for current and future Navy systems. Duration: up to 14 days.	E7, LFM	2	14	SOCAL.
Acoustic and Explosive.	Other Testing	Acoustic and Oceanographic Research.	Research using active transmissions from sources deployed from ships, aircraft, and unmanned underwater vehicles. Research sources can be used as proxies for current and future Navy systems. Duration: up to 14 days.	E7, LFM	0–1	3	PMSR.
Acoustic	Other Testing	Insertion/Extraction	Testing of submersibles capable of inserting and extracting personnel and payloads into denied areas from strategic distances. Duration: up to 30 days.	HFM, LF to MF, LFH.	2	14	Hawaii.
Acoustic	Other Testing	Insertion/Extraction	Testing of submersibles capable of inserting and extracting personnel and payloads into denied areas from strategic distances. Duration: up to 30 days.	HFM, LF to MF, LFH.	2	14	SOCAL.
Acoustic and Explosive.	Other Testing	Semi-Stationary Equipment Testing.	Semi-stationary equipment (*e.g.,* hydrophones) is deployed to determine functionality. Duration: up to 14 days.	E4, HFH	4–8	40	Pearl Harbor.

TABLE 7—PROPOSED NAVSEA TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic and Explosive.	Other Testing ...	Semi-Stationary Equipment Testing.	Semi-stationary equipment (*e.g.,* hydrophones) is deployed to determine functionality. Duration: up to 14 days.	E4, HFH	4–8	40	San Diego Bay.

Note: LF = low-frequency, MF = mid-frequency, HF = high-frequency, dB = decibels, L = low, M = medium, H = high (*e.g.,* MFL = mid-frequency low source level), H = hours, C = count. BARSTUR = Barking Sands Tactical Underwater Range, CPAAA = Camp Pendleton Amphibious Assault Area, Hawaii = the Hawaii Study Area, PMRF = Pacific Missile Range Facility, PMSR = Point Mugu Sea Range, SCORE = Southern California Offshore Range, SOAR = Southern California Offshore Anti-Submarine Range, SOCAL = Southern California Range Complex, SSTC = Silver Strand Training Complex.

NAVWAR is the information warfare systems command for the Navy. The mission of NAVWAR is to identify, develop, deliver, and sustain information warfare capabilities and services that enable naval, joint, coalition, and other national missions operating in warfighting domains from seabed to space; and to perform such other functions and tasks as directed. NAVWAR Systems Center Pacific is the research and development part of NAVWAR focused on developing and transitioning technologies in the area of command, control, communications, computers, intelligence, surveillance, and reconnaissance. Table 8 summarizes the proposed testing activities for NAVWAR analyzed within the HCTT Study Area.

TABLE 8—PROPOSED NAVWAR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Acoustic and Oceanographic Science and Technology.	Acoustic, Oceanographic, and Energy Research.	Testing includes activities utilizing the marine environment for research, and test and evaluation. Tests may involve radar, environmental sensors, magnetic sensors, passive and active acoustic sensors, optical sensors, and lasers. Surface operations utilize a variety of vessels and vehicles for deployment, operation, and testing. Energy research and harvesting would include the development and testing of energy harvesting and storage technologies, maritime charging stations, remote communications, and associated infrastructure. This testing would also include bioacoustics research in support of marine mammal science. Duration: up to 14 days.	HFM, LF to HF, LFM, MF to HF, MFH, MFM.	2	14	Pearl Harbor.
Acoustic	Acoustic and Oceanographic Science and Technology.	Acoustic, Oceanographic, and Energy Research.	Testing includes activities utilizing the marine environment for research, and test and evaluation. Tests may involve radar, environmental sensors, magnetic sensors, passive and active acoustic sensors, optical sensors, and lasers. Surface operations utilize a variety of vessels and vehicles for deployment, operation, and testing. Energy research and harvesting would include the development and testing of energy harvesting and storage technologies, maritime charging stations, remote communications, and associated infrastructure. This testing would also include bioacoustics research in support of marine mammal science. Duration: up to 14 days.	HFM, LF to HF, LFM, MF to HF, MFH, MFM.	10–16	88	SOCAL.

TABLE 8—PROPOSED NAVWAR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Acoustic and Oceanographic Science and Technology.	Acoustic, Oceanographic, and Energy Research.	Testing includes activities utilizing the marine environment for research, and test and evaluation. Tests may involve radar, environmental sensors, magnetic sensors, passive and active acoustic sensors, optical sensors, and lasers. Surface operations utilize a variety of vessels and vehicles for deployment, operation, and testing. Energy research and harvesting would include the development and testing of energy harvesting and storage technologies, maritime charging stations, remote communications, and associated infrastructure. This testing would also include bioacoustics research in support of marine mammal science. Duration: up to 14 days.	HFM, LF to HF, LFM, MF to HF, MFH, MFM.	133–160	1,012	San Diego Bay.
Acoustic	Acoustic and Oceanographic Science and Technology.	Acoustic, Oceanographic, and Energy Research.	Testing includes activities utilizing the marine environment for research, and test and evaluation. Tests may involve radar, environmental sensors, magnetic sensors, passive and active acoustic sensors, optical sensors, and lasers. Surface operations utilize a variety of vessels and vehicles for deployment, operation, and testing. Energy research and harvesting would include the development and testing of energy harvesting and storage technologies, maritime charging stations, remote communications, and associated infrastructure. This testing would also include bioacoustics research in support of marine mammal science. Duration: up to 14 days.	HFM, LF to HF, LFM, MF to HF, MFH, MFM.	2–4	20	PMSR.
Acoustic	Other Testing	Communications	Testing of maritime communications, underwater network systems with fiber optics cables, laser communications, acoustic modem networks and launching of communication payloads and objects. Durations: typically 5 days for 6–8 hours per day.	LF to MF	1	7	Hawaii.
Acoustic	Other Testing	Communications	Testing of maritime communications, underwater network systems with fiber optics cables, laser communications, acoustic modem networks and launching of communication payloads and objects. Durations: typically 5 days for 6–8 hours per day.	LF to MF	4	28	SOCAL.
Acoustic	Other Testing	Intelligence, Surveillance, Reconnaissance.	Testing deployable autonomous undersea technologies that may include mine detection and classification, detection and classification of targets of interest, sensors on the undersea systems testbed, expansion of the undersea systems testbed with fiber optic cables and nodes, sensor systems to detect mine shapes on ship hulls and pier structures, sensors for swimmer interdiction and other threats, and sensor systems that can detect explosive, radioactive, and other signatures of concern. Duration: up to 30 days.	Air gun, HFL, HFM, LF, LF to HF, LFH, MF to HF, MFH, MFL, MFM, VHFH.	15–17	108	Hawaii.

TABLE 8—PROPOSED NAVWAR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Other Testing	Intelligence, Surveillance, Reconnaissance.	Testing deployable autonomous undersea technologies that may include mine detection and classification, detection and classification of targets of interest, sensors on the undersea systems testbed, expansion of the undersea systems testbed with fiber optic cables and nodes, sensor systems to detect mine shapes on ship hulls and pier structures, sensors for swimmer interdiction and other threats, and sensor systems that can detect explosive, radioactive, and other signatures of concern. Duration: up to 30 days.	Air gun, HFL, HFM, LF, LF to HF, LFH, MF to HF, MFH, MFL, MFM, VHFH.	2	14	Pearl Harbor.
Acoustic	Other Testing	Intelligence, Surveillance, Reconnaissance.	Testing deployable autonomous undersea technologies that may include mine detection and classification, detection and classification of targets of interest, sensors on the undersea systems testbed, expansion of the undersea systems testbed with fiber optic cables and nodes, sensor systems to detect mine shapes on ship hulls and pier structures, sensors for swimmer interdiction and other threats, and sensor systems that can detect explosive, radioactive, and other signatures of concern. Duration: up to 30 days.	Air gun, HFL, HFM, LF, LF to HF, LFH, MF to HF, MFH, MFL, MFM, VHFH.	83–123	700	SOCAL.
Acoustic	Other Testing	Intelligence, Surveillance, Reconnaissance.	Testing deployable autonomous undersea technologies that may include mine detection and classification, detection and classification of targets of interest, sensors on the undersea systems testbed, expansion of the undersea systems testbed with fiber optic cables and nodes, sensor systems to detect mine shapes on ship hulls and pier structures, sensors for swimmer interdiction and other threats, and sensor systems that can detect explosive, radioactive, and other signatures of concern. Duration: up to 30 days.	Air gun, HFL, HFM, LF, LF to HF, LFH, MF to HF, MFH, MFL, MFM, VHFH.	5–10	50	CPAAA.
Acoustic	Other Testing	Intelligence, Surveillance, Reconnaissance.	Testing deployable autonomous undersea technologies that may include mine detection and classification, detection and classification of targets of interest, sensors on the undersea systems testbed, expansion of the undersea systems testbed with fiber optic cables and nodes, sensor systems to detect mine shapes on ship hulls and pier structures, sensors for swimmer interdiction and other threats, and sensor systems that can detect explosive, radioactive, and other signatures of concern. Duration: up to 30 days.	Air gun, HFL, HFM, LF, LF to HF, LFH, MF to HF, MFH, MFL, MFM, VHFH.	8–10	62	San Diego Bay.

TABLE 8—PROPOSED NAVWAR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Other Testing	Intelligence, Surveillance, Reconnaissance.	Testing deployable autonomous undersea technologies that may include mine detection and classification, detection and classification of targets of interest, sensors on the undersea systems testbed, expansion of the undersea systems testbed with fiber optic cables and nodes, sensor systems to detect mine shapes on ship hulls and pier structures, sensors for swimmer interdiction and other threats, and sensor systems that can detect explosive, radioactive, and other signatures of concern. Duration: up to 30 days.	Air gun, HFL, HFM, LF, LF to HF, LFH, MF to HF, MFH, MFL, MFM, VHFH.	11–19	101	SCIUR.
Acoustic	Other Testing	Intelligence, Surveillance, Reconnaissance.	Testing deployable autonomous undersea technologies that may include mine detection and classification, detection and classification of targets of interest, sensors on the undersea systems testbed, expansion of the undersea systems testbed with fiber optic cables and nodes, sensor systems to detect mine shapes on ship hulls and pier structures, sensors for swimmer interdiction and other threats, and sensor systems that can detect explosive, radioactive, and other signatures of concern. Duration: up to 30 days.	Air gun, HFL, HFM, LF, LF to HF, LFH, MF to HF, MFH, MFL, MFM, VHFH.	38–51	305	SCORE.
Acoustic	Other Testing	Intelligence, Surveillance, Reconnaissance.	Testing deployable autonomous undersea technologies that may include mine detection and classification, detection and classification of targets of interest, sensors on the undersea systems testbed, expansion of the undersea systems testbed with fiber optic cables and nodes, sensor systems to detect mine shapes on ship hulls and pier structures, sensors for swimmer interdiction and other threats, and sensor systems that can detect explosive, radioactive, and other signatures of concern. Duration: up to 30 days.	Air gun, HFL, HFM, LF, LF to HF, LFH, MF to HF, MFH, MFL, MFM, VHFH.	44–62	362	SSTC.
Acoustic	Other Testing	Vehicle Testing	Testing of surface, subsurface and airborne vehicles, sensor systems, payloads, communications, and navigation which may involve remotely operated vehicles, autonomous underwater vehicles, autonomous surface vehicles, and autonomous aerial vehicles. Testing may involve evaluating individual vehicles and payloads or conducting complex events with multiple vehicles. Durations: typically 5 days for 6–8 hours per day.	HFL, HFM, LFH, MFH, MFL, VHFH.	15–22	123	Hawaii.
Acoustic	Other Testing	Vehicle Testing	Testing of surface, subsurface and airborne vehicles, sensor systems, payloads, communications, and navigation which may involve remotely operated vehicles, autonomous underwater vehicles, autonomous surface vehicles, and autonomous aerial vehicles. Testing may involve evaluating individual vehicles and payloads or conducting complex events with multiple vehicles. Durations: typically 5 days for 6–8 hours per day.	HFL, HFM, LFH, MFH, MFL, VHFH.	32–39	245	SOCAL.

TABLE 8—PROPOSED NAVWAR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Other Testing	Vehicle Testing	Testing of surface, subsurface and airborne vehicles, sensor systems, payloads, communications, and navigation which may involve remotely operated vehicles, autonomous underwater vehicles, autonomous surface vehicles, and autonomous aerial vehicles. Testing may involve evaluating individual vehicles and payloads or conducting complex events with multiple vehicles. Durations: typically 5 days for 6–8 hours per day.	HFL, HFM, LFH, MFH, MFL, VHFH.	10–12	76	SCORE.
Acoustic	Other Testing	Vehicle Testing	Testing of surface, subsurface and airborne vehicles, sensor systems, payloads, communications, and navigation which may involve remotely operated vehicles, autonomous underwater vehicles, autonomous surface vehicles, and autonomous aerial vehicles. Testing may involve evaluating individual vehicles and payloads or conducting complex events with multiple vehicles. Durations: typically 5 days for 6–8 hours per day.	HFL, HFM, LFH, MFH, MFL, VHFH.	4–8	40	Transit Corridor.

Note: LF = low-frequency, MF = mid-frequency, HF = high-frequency, dB = decibels, L = low, M = medium, H = high (*e.g.,* MFL = mid-frequency low source level), H = hours, C = count. CPAAA = Camp Pendleton Amphibious Assault Area, Hawaii = the Hawaii Study Area, PMRF = Pacific Missile Range Facility, PMSR = Point Mugu Sea Range, SCIUR = San Clemente Island Underwater Range, SCORE = Southern California Offshore Range, SOCAL = Southern California Range Complex, SSTC = Silver Strand Training Complex.

ONR's mission is to plan, foster, and encourage scientific research in recognition of its paramount importance as related to the maintenance of future naval power, and the preservation of national security. ONR manages the Navy's basic, applied, and advanced research to foster transition from science and technology to higher levels of research, development, test, and evaluation. ONR is also a parent organization for the Naval Research Laboratory, which operates as the Navy's corporate research laboratory and conducts a broad multidisciplinary program of scientific research and advanced technological development. Table 9 summarizes the proposed testing activities for the ONR analyzed within the HCTT Study Area.

TABLE 9—PROPOSED ONR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Acoustic and Oceanographic Science and Technology.	Acoustic and Oceanographic Research.	Research using active transmissions from sources deployed from ships, aircraft, and unmanned underwater vehicles. Research sources can be used as proxies for current and future Navy systems. Duration: up to 14 days.	E1, E3, Air gun and non-explosive impulses, HFH, HFM, LFH, LFM, MFH, MFM, VHFM.	4–5	32	Hawaii.
Acoustic	Acoustic and Oceanographic Science and Technology.	Acoustic and Oceanographic Research.	Research using active transmissions from sources deployed from ships, aircraft, and unmanned underwater vehicles. Research sources can be used as proxies for current and future Navy systems. Duration: up to 14 days.	E1, E3, Air gun and non-explosive impulses, HFH, HFM, LFH, LFM, MFH, MFM, VHFM.	4–5	32	SOCAL.
Acoustic	Acoustic and Oceanographic Science and Technology.	Acoustic and Oceanographic Research.	Research using active transmissions from sources deployed from ships, aircraft, and unmanned underwater vehicles. Research sources can be used as proxies for current and future Navy systems. Duration: up to 14 days.	E1, E3, Air gun and non-explosive impulses, HFH, HFM, LFH, LFM, MFH, MFM, VHFM.	1–2	10	Acoustic Research Area.

TABLE 9—PROPOSED ONR TESTING ACTIVITIES ANALYZED WITHIN THE HCTT STUDY AREA—Continued

Stressor category	Activity type	Activity name	Description	Source bin	Number of activities 1-year	Number of activities 7-year	Location
Acoustic	Acoustic and Oceanographic Science and Technology.	Acoustic and Oceanographic Research.	Research using active transmissions from sources deployed from ships, aircraft, and unmanned underwater vehicles. Research sources can be used as proxies for current and future Navy systems. Duration: up to 14 days.	E1, E3, Air gun and non-explosive impulses, HFH, HFM, LFH, LFM, MFH, MFM, VHFM.	1–2	9	PMSR.
Acoustic	Acoustic and Oceanographic Science and Technology.	Acoustic and Oceanographic Research.	Research using active transmissions from sources deployed from ships, aircraft, and unmanned underwater vehicles. Research sources can be used as proxies for current and future Navy systems. Duration: up to 14 days.	E1, E3, Air gun and non-explosive impulses, HFH, HFM, LFH, LFM, MFH, MFM, VHFM.	1–2	14	NOCAL.
Acoustic	Acoustic and Oceanographic Science and Technology.	Long Range Acoustic Communications.	Low-frequency bottom-mounted acoustic source off of the Hawaiian Island of Kaua'i would transmit a variety of acoustic communications sequences. Duration: year-round; active transmissions 200 days a year.	LFM	1–2	11	Hawaii.
Acoustic	Acoustic and Oceanographic Science and Technology.	Mine Countermeasure Technology Research.	Test involves the use of broadband acoustic sources on unmanned underwater vehicles. Duration: up to 30 days.	MFH	1–2	11	Hawaii.
Acoustic	Acoustic and Oceanographic Science and Technology.	Mine Countermeasure Technology Research.	Test involves the use of broadband acoustic sources on unmanned underwater vehicles. Duration: up to 30 days.	MFH	6–8	50	SOCAL.

Note: LF = low-frequency, MF = mid-frequency, HF = high-frequency, dB = decibels, L = low, M = medium, H = high (*e.g.,* MFL = mid-frequency low source level), H = hours, C = count. Hawaii = the Hawaii Study Area, NOCAL = Northern California Range Complex, PMSR = Point Mugu Sea Range, SOCAL = Southern California Range Complex.

Vessel Movement

Vessels used as part of the proposed activities include both surface and subsurface operations of both manned and unmanned vessels (USVs, UUVs). Vessels used as part of the Action Proponents' activities include ships, submarines, unmanned vessels, and boats ranging in size from small, 22 ft (6.7 m) rigid hull inflatable boats to aircraft carriers with lengths up to 1,092 ft (332.8 m). Unmanned systems may include vehicles ranging from 4–16 ft (1.2–4.9 m) but typical size of USVs is 36–328 ft (11–100 m) while UUVs are 33–98 ft (10–30 m) in length. The Marine Corps operates small boats from 10–50 ft (3–15.2 m) in length and include small unit riverine craft, rigid hull inflatable boats and amphibious combat vehicles. Coast Guard vessels range in size from small boats between 13 and 65 ft (3.9 to 19.8 m) to large cutters with lengths up to 418 ft (127.4 m).

Large Navy ships greater than 350 ft (107 m) generally operate at speeds in the range of 10 to 15 knots (kn; 18.5 to 27.8 kilometers per hour (km/hr)) for fuel conservation. Submarines generally operate at lower speeds in transit and even lower speeds for certain tactical maneuvers. Small craft (considered in this proposed rule to be less than 60 ft (18 m) in length) have much more variable speeds (dependent on the mission). While these speeds for large Navy vessels are representative of most events, some of the Action Proponents' vessels may need to temporarily operate outside of these parameters. For example, to produce the required relative wind speed over the flight deck, an aircraft carrier vessel group engaged in flight operations must adjust its speed through the water accordingly. Additionally, there are specific events including high speed tests of newly constructed vessels. The Navy also anticipates testing large USVs, some of which would be at high speed. Conversely, there are other instances such as launch and recovery of a small rigid hull inflatable boat, vessel boarding, search and seizure training events, or retrieval of a target when vessels would be stopped or moving slowly ahead to maintain steerage. The Coast Guard currently operates approximately 250 cutters. Larger cutters (over 181 ft (55 m) in length) are controlled by Area Commands. The Pacific Area command is located in Alameda, CA. Smaller cutters come under control of district commands. There are four districts in the Pacific Area. Cutters usually carry a motor surf boat and/or a rigid-hulled inflatable boat.

The Coast Guard operates approximately 1,600 boats, defined as any vessel less than 65 ft (20 m) in length. These boats generally operate near shore and on inland waterways. The most common is 25 ft (7.6 m) long, of which the Coast Guard has more than 350; the shortest is 13 ft (4.0 m). Boat training includes small boat crews engaging surface targets with small- and medium-caliber weapons.

The number of vessels used in the HCTT Study Area varies based on military readiness requirements, deployment schedules, annual budgets, and other unpredictable factors. Most military readiness activities involve the use of vessels. These activities could be widely dispersed throughout the HCTT Study Area, but would typically be conducted near naval ports, piers, and range areas. Activities involving vessel movements occur intermittently and are variable in duration, ranging from a few hours to multiple weeks.

Action Proponent vessel traffic would especially be concentrated near San Diego, California and Pearl Harbor, Hawaii. There is no seasonal differentiation in vessel use. Large vessel movement primarily occurs with the majority of the traffic flowing between the installations and the OPAREAS. Support craft would be more concentrated in the coastal waters in the areas of naval installations, ports, and ranges.

The number of testing activities that include the use of vessels is around 18 percent lower than the number of training activities, but testing activities are more likely to include the use of larger unmanned vessels (although these are expected to transition to training use during the effective period of the rule, if finalized). In addition, testing often occurs jointly with a training event so it is likely that the testing activity would be conducted from a vessel that was also conducting a training activity. Vessel movement in conjunction with testing activities could occur throughout the Study Area, but would typically be conducted near naval ports, piers, and range complexes.

Additionally, a variety of smaller craft would be operated within the HCTT Study Area. Small craft types, sizes, and speeds vary. During military readiness activities, speeds generally range from 10 to 14 kn (18.5 to 25.9 km/hr); however, vessels can and will, on occasion, operate within the entire spectrum of their specific operational capabilities. During modernization and sustainment of ranges activities, vessels would operate more slowly, typically 3 kn (5.6 km/hr) or less. In all cases, the vessels/craft will be operated in a safe manner consistent with the local conditions.

Foreign Navies

In furtherance of national security objectives, foreign militaries may participate in multinational training and testing events in the Study Area. Foreign military activities that are planned by and under the substantial control and responsibility of the Action Proponents are included in the proposed action. These participants could be in various training or testing events described in appendix A of the 2024 HCTT Draft EIS/OEIS, and their effects are analyzed in this proposed rule. However, when foreign military vessels operate independently within the Study Area as sovereign vessels outside the planning, control, and responsibility of the Action Proponents, those activities are not considered part of the specified activity. There are many reasons why foreign military vessels may traverse U.S. waters or come into U.S. port, not all of which are at the behest of any of the Action Proponents. Foreign military vessels and aircraft operate pursuant to their own national authorities and have independent rights under customary international law, embodied in the principle of sovereign immunity, to engage in various activities on the world's oceans and seas. When foreign militaries are participating in a U.S. Navy planned and substantially controlled exercise or event, foreign military use of sonar and explosives, when combined with the U.S. Navy's use of sonar and explosives, would not result in exceedance of the analyzed levels (within each Navy Acoustic Effects Model (NAEMO) modeled sonar and explosive bin) used for estimating predicted impacts, which formed the basis of our acoustic impacts effects analysis that was used to estimate take in this proposed rule.

The most significant joint training event is the Rim of the Pacific (RIMPAC), a multi-national training exercise held every-other-year primarily in the HRC. The participation level of foreign military vessels in U.S. Navy-led training or testing events within the HRC and within SOCAL differs greatly between RIMPAC and non-RIMPAC years. For example, in 2019 (a non-RIMPAC year), there were 0.1 foreign navy surface vessel at-sea days (*i.e.,* 1 day = 24 hours) within HRC and 20 foreign navy at-sea days within SOCAL (Navy 2021). Out of 56 U.S.-led training events in 2019, 4 involved foreign navy vessels, with an average time per event of 8.7 hours. During RIMPAC 2022, foreign vessels operated and/or transited through the HRC for 576 hours (24 days). In 2023 (another non-RIMPAC year), there was no foreign vessel participation within SOCAL. Even in a RIMPAC year, the days at sea for foreign militaries engaged in a Navy-led training or testing activity accounts for a small, but variable, percentage compared to the U.S. Navy activities. For instance, the 2020 foreign military participation (a RIMPAC-year) was 1.5 percent of the U.S. Navy's average days at sea (32 days out of an estimated 2,056 days at sea). During RIMPAC 2024, twenty-five foreign surface vessels participated for a combined 5,000 hours in U.S.-led training events. Therefore, foreign surface vessel activity is estimated to conservatively account for up to 10 percent of the U.S. Navy's annual at sea time in HCTT (205 days out of an estimated 2,056 days at sea).

Please see the Proposed Mitigation Measures section and Proposed Reporting section of this proposed rule for information about mitigation and reporting related to foreign navy activities in the HCTT Study Area.

When foreign militaries are participating in a U.S. Navy-led exercise or event, foreign military use of sonar and explosives, when combined with the U.S. Navy's use of sonar and explosives, would not result in exceedance of the analyzed levels (within each NAEMO modeled sonar and explosive bin) used for estimating predicted impacts, which formed the basis of our acoustic impacts effects analysis that was used to estimate take in this proposed rule. Please see the Proposed Mitigation Measures section and Proposed Reporting section of this proposed rule for information about mitigation and reporting related to foreign navy activities in the HCTT Study Area.

Standard Operating Procedures

For training and testing to be effective, Action Proponent personnel must be able to safely use their sensors, platforms, weapons, and other devices to their optimum capabilities and as intended for use in missions and combat operations. The Action Proponents have developed standard operating procedures through decades of experience to provide for safety and mission success. Because they are essential to safety and mission success, standard operating procedures are part of the Proposed Action and are considered in the environmental analysis for applicable resources (see chapter 3 (Affected Environment and Environmental Consequences) of the 2024 HCTT Draft EIS/OEIS). While standard operating procedures are designed for the safety of personnel and equipment and to ensure the success of training and testing activities, their implementation often yields additional benefits on environmental, socioeconomic, public health and safety, and cultural resources.

Because standard operating procedures are essential to safety and mission success, the Action Proponents consider them to be part of the proposed activities and have included them in the environmental analysis. Standard operating procedures that are recognized as providing a potential secondary benefit on marine mammals during training and testing activities are noted below.

- Vessel safety;
- Weapons firing safety;
- Target deployment safety;
- Towed in-water device safety;
- Pile driving safety; and
- Coastal zones.

Standard operating procedures (which are implemented regardless of their secondary benefits) are different from mitigation measures (which are designed entirely for the purpose of avoiding or reducing impacts). Information on mitigation measures is provided in the Proposed Mitigation Measures section.

Description of Stressors

The Action Proponents use a variety of sensors, platforms, weapons, and other devices. Military readiness activities using these systems may introduce sound and energy into the environment. The proposed military readiness activities were evaluated to identify specific components that would act as stressors by having direct or indirect impacts on marine mammals and their habitat. This analysis included identification of the spatial variation of the identified stressors. The following subsections describe the acoustic and explosive stressors for marine mammals and their habitat within the HCTT Study Area. Each description contains a list of activities that may generate the stressor. Stressor/resource interactions that were determined to have impacts that do not qualify as take under the MMPA (*i.e.,* vessel, aircraft, or weapons noise) were not carried forward for analysis in the application. NMFS reviewed the Action Proponents' analysis and conclusions on de minimis sources (*i.e.,* those that are not likely to result in the take of marine mammals) and finds them complete and supportable (see section 3.7.4 of the technical report ''Quantifying Acoustic Impacts on Marine Mammals and Sea Turtles: Methods and Analytical Approach for Phase IV Training and Testing'' (U.S. Department of the Navy, 2024), hereafter referred to as the Acoustic Impacts Technical Report).

Acoustic Stressors

Acoustic stressors include acoustic signals emitted into the water for a specific purpose, such as sonar, other transducers (*i.e.,* devices that convert energy from one form to another—in this case, into sound waves), and air guns, as well as incidental sources of broadband sound produced as a byproduct of vessel movement, aircraft transits, use of weapons or other deployed objects, vibratory pile extraction, and vibratory and impact pile driving. Explosives also produce broadband sound but are characterized separately from other acoustic sources due to their unique hazardous characteristics. Characteristics of each of these sound sources are described in the following sections.

To better organize and facilitate the analysis of approximately 300 sources of underwater sound used for training and testing by the Action Proponents, including sonars and other transducers, air guns, and explosives, a series of source classifications, or source bins, were used. The acoustic source classification bins do not include the broadband noise produced incidental to pile driving, vessel and aircraft transits, weapons firing, and bow shocks. Noise produced from vessels and aircraft are not carried forward because those activities were found to have de minimis or no acoustic impacts, as stated above. Of note, the source bins used in this analysis have been revised from previous (Phase III) acoustic modeling to more efficiently group similar sources and use the parameters of the bin for propagation, making a comparison to previous bins impossible in most cases as some sources are modeled at different propagation parameters. For example, in previous analyses, non-impulsive narrowband sound sources were grouped into bins that were defined by their acoustic properties (*i.e.,* frequency, source level, beam pattern, and duty cycle) or, in some cases, their purpose or application. In the current analysis, these sources are binned based only on their acoustic properties and not on their purpose or application. As such, sources that previously fell into a single ''purpose-based'' bin now, in many cases, fall into multiple bins while sources with similar acoustic parameters that were previously sorted into separate bins due to different purposes now share a bin. Therefore, the acoustic source bins used in the current analysis do not represent a one-for-one replacement with previous bins, making direct comparison not possible in most cases.

The use of source classification bins provides the following benefits:

- Allows new sensors or munitions to be used under existing authorizations as long as those sources fall within the parameters of a ''bin'';
- Improves efficiency of source utilization data collection and reporting requirements anticipated under the MMPA authorizations;
- Ensures that impacts are not underestimated, as all sources within a given class are modeled as the most impactful source (highest source level, longest duty cycle, or largest net explosive weight (NEW)) within that bin;
- Allows analyses to be conducted in a more efficient manner, without any compromise of analytical results; and
- Provides a framework to support the reallocation of source usage (hours/explosives) between different source bins, as long as the total numbers of takes remain within the overall analyzed and authorized limits. This flexibility is required to support evolving training and testing requirements, which are linked to real world events.

Sonar and Other Transducers—

Active sonar and other transducers emit non-impulsive sound waves into the water to detect objects, navigate safely, and communicate. Passive sonars differ from active sound sources in that they do not emit acoustic signals; rather, they only receive acoustic information about the environment (*i.e.,* listen). In this proposed rule, the terms sonar and other transducers will be used to indicate active sound sources unless otherwise specified.

The Action Proponents employ a variety of sonars and other transducers to obtain and transmit information about the undersea environment. Some examples are mid-frequency hull-mounted sonars used to find and track enemy submarines; high-frequency small object detection sonars used to detect mines; high-frequency underwater modems used to transfer data over short ranges; and extremely high-frequency (greater than 200 kilohertz (kHz)) Doppler sonars used for navigation, like those used on commercial and private vessels. The characteristics of these sonars and other transducers, such as source level (SL), beam width, directivity, and frequency, depend on the purpose of the source. Higher frequencies can carry more information or provide more information about objects off which they reflect, but attenuate more rapidly. Lower frequencies attenuate less rapidly, so they may detect objects over a longer distance, but with less detail.

Propagation of sound produced underwater is highly dependent on environmental characteristics such as bathymetry, seafloor type, water depth, temperature, and salinity. The sound received at a particular location will be different than near the source due to the interaction of many factors, including propagation loss; how the sound is reflected, refracted, or scattered; the potential for reverberation; and interference due to multi-path propagation. In addition, absorption greatly affects the distance over which higher-frequency sounds propagate. The effects of these factors are explained in appendix D (Acoustic and Explosive Impacts Supporting Information) of the 2024 HCTT Draft EIS/OEIS. Because of the complexity of analyzing sound propagation in the ocean environment, the Action Proponents rely on acoustic models in their environmental analyses that consider sound source characteristics and varying ocean conditions across the HCTT Study Area. For additional information on how propagation is accounted for, see the Acoustic Impacts Technical Report.

The sound sources and platforms typically used in military readiness activities analyzed in the application are described in appendix A (Activity Descriptions) of the 2024 HCTT Draft EIS/OEIS. Sonars and other transducers used to obtain and transmit information underwater during military readiness activities generally fall into several categories of use described below.

Anti-Submarine Warfare—

Sonar used during anti-submarine warfare training and testing would impart the greatest amount of acoustic energy of any category of sonar and other transducers analyzed in this proposed rule. Types of sonars used to detect potential enemy vessels include hull-mounted, towed, line array, sonobuoy, helicopter dipping, and torpedo sonars. In addition, acoustic targets and decoys (countermeasures) may be deployed to emulate the sound signatures of vessels or repeat received signals.

Most anti-submarine warfare sonars are mid-frequency (1–10 kHz) because mid-frequency sound balances sufficient resolution to identify targets with distance over which threats can be identified. However, some sources may use higher or lower frequencies. Duty cycles can vary widely, from rarely used to continuously active. Anti-submarine warfare sonars can be wide-ranging in a search mode or highly directional in a track mode.

Most anti-submarine warfare activities involving submarines or submarine targets would occur in waters greater than 600 ft (182.9 m) deep due to safety concerns about running aground at shallower depths. Sonars used for anti-submarine warfare activities would typically be used beyond 12 nmi (22.2 km) from shore. Exceptions include use of dipping sonar by helicopters, pierside testing and maintenance of systems while in port, and system checks while transiting to or from port.

Mine Warfare, Small Object Detection, and Imaging—

Sonars used to locate mines and other small objects, as well as those used in imaging (*e.g.,* for hull inspections or imaging of the seafloor), are typically high-frequency or very high-frequency. Higher frequencies allow for greater resolution and, due to their greater attenuation, are most effective over shorter distances. Mine detection sonar can be deployed (towed or vessel hull-mounted) at variable depths on moving platforms (ships, helicopters, or unmanned vehicles) to sweep a suspected mined area. Hull-mounted anti-submarine sonars can also be used in an object detection mode known as ''Kingfisher'' mode (MF1K) (*e.g.,* used on vessels when transiting to and from port), where pulse length is shorter but pings are much closer together in both time and space, since the vessel goes slower when operating in this mode. Sonars used for imaging are usually used in close proximity to the area of interest, such as pointing downward near the seafloor.

Mine detection sonar use would be concentrated in areas where practice mines are deployed, typically in water depths less than 200 ft (60.9 m), and at established training or testing minefields or temporary minefields close to strategic ports and harbors. Kingfisher mode on vessels is most likely to be used when transiting to and from port. Sound sources used for imaging would be used throughout the HCTT Study Area.

Navigation and Safety—

Similar to commercial and private vessels, the Action Proponents' vessels employ navigational acoustic devices, including speed logs, Doppler sonars for ship positioning, and fathometers. These may be in use at any time for safe vessel operation. These sources are typically highly directional to obtain specific navigational data.

Communication—

Sound sources used to transmit data (*e.g.,* underwater modems), provide location (pingers), or send a single brief release signal to seafloor-mounted devices (acoustic release) may be used throughout the HCTT Study Area. These sources typically have low duty cycles and are usually only used when it is necessary to send a detectable acoustic message.

Classification of Sonar and Other Transducers—

Sonars and other transducers are grouped into bins based on their acoustic properties. Sonars and other transducers are now grouped into bins based on the frequency or bandwidth, source level, duty-cycle, and three-dimensional beam coverage. Unless stated otherwise, a reference distance of 1 microPascal (re 1 μPa) at 1 m (3.3 ft) is used for sonar and other transducers.

- Frequency of the non-impulsive acoustic source:
  - Low-frequency sources operate below 1 kHz;
  - Mid-frequency sources operate at or above 1 kHz, up to and including 10 kHz;
  - High-frequency sources operate above 10 kHz, up to and including 100 kHz; and
  - Very high-frequency sources operate above 100 kHz but below 200 kHz;
- Sound pressure level (SPL):
  - Greater than 160 decibels (dB) re 1 μPa, but less than 185 dB re 1 μPa;
  - Equal to 185 dB re 1 μPa and up to 205 dB re 1 μPa; and
  - Greater than 205 dB re 1 μPa.

Active sonar and other transducer use that was quantitatively analyzed in the Study Area are shown in table 10.

TABLE 10—SONAR AND OTHER TRANSDUCERS QUANTITATIVELY ANALYZED IN THE HCTT STUDY AREA

Source type	Source category	Description	Unit	Training annual	Training 7-year total	Testing annual	Testing 7-year total
Broadband	LF	<205 dB	H			430–570	3,430
Broadband	LF to MF	<205 dB	H			2,801–2,833	19,737
Broadband	LF to HF	<205 dB	C	806–818	5,678	686–859	4,413
Broadband	LF to HF	<205 dB	H			1,662–2,077	11,371
Broadband	MF to HF	<205 dB	H	8,097–11,585	67,142	1,451–1,779	10,483
Low-frequency acoustic	LFL	160 dB to 185 dB	H			12	70
Low-frequency acoustic	LFM	185 dB to 205 dB	C			1,160–1,384	8,792
Low-frequency acoustic	LFM	185 dB to 205 dB	H	468–536	3,480	7,531–8,984	56,955
Low-frequency acoustic	LFH	>205 dB	C	1,498–2,120	12,372	6,046–6,704	44,296
Low-frequency acoustic	LFH	>205 dB	H	14	98	4,050–6,050	34,350
Mid-frequency acoustic	MFL	160 dB to 185 dB	H			12,632–14,982	92,794
Mid-frequency acoustic	MFM	185 dB to 205 dB	C	4,908–6,552	39,400	15,080–16,928	110,737
Mid-frequency acoustic	MFM	185 dB to 205 dB	H	30	210	14,381–16,081	101,064
Mid-frequency acoustic	MFH	>205 dB	H	1,951–3,003	17,010	8,115–10,424	63,221
High-frequency acoustic	HFL	160 dB to 185 dB	H	60	420	21,326–22,076	151,532
High-frequency acoustic	HFM	185 dB to 205 dB	C	9	63	1,800–2,346	14,238

TABLE 10—SONAR AND OTHER TRANSDUCERS QUANTITATIVELY ANALYZED IN THE HCTT STUDY AREA—Continued

Source type	Source category	Description	Unit	Training annual	Training 7-year total	Testing annual	Testing 7-year total
High-frequency acoustic	HFM	185 dB to 205 dB	H	3,907–5,290	31,498	12,409–13,259	89,322
High-frequency acoustic	HFH	>205 dB	C	802–899	5,907	835–1,137	6,351
High-frequency acoustic	HFH	>205 dB	H	2,419–2,498	17,170	1,367–1,920	10,735
Very high-frequency acoustic	VHFL	160 dB to 185 dB	H	30	210	9,160	64,120
Very high-frequency acoustic	VHFM	185 dB to 205 dB	H			96	672
Very high-frequency acoustic	VHFH	>205 dB	C			72–106	580
Very high-frequency acoustic	VHFH	>205 dB	H	5,458–7,862	45,418	12,544–16,824	100,648
Hull-mounted surface ship sonar.	MF1C	Hull-mounted surface ship sonar with duty cycle >80% (previously MF11).	H	796–1,406	7,404	45	314
Hull-mounted surface ship sonar.	MF1K	Hull-mounted surface ship sonar in Kingfisher mode.	H	455	3,183	14	91
Hull-mounted surface ship sonar.	MF1	Hull-mounted surface ship sonar.	H	5,096–8,758	46,828	413–917	4,275

Note: LF = low frequency, MF = mid frequency, HF = high frequency, dB = decibels, L = low, M = medium, H = high (*e.g.,* MFL = mid-frequency low source level), H = hours, C = count.

Air Guns—

Air guns are essentially stainless steel tubes charged with high-pressure air via a compressor. An impulsive sound is generated when the air is almost instantaneously released into the surrounding water. Small air guns with capacities up to 60 cubic inches (in^3; 983 cubic centimeters (cc)) would be used during testing activities in the offshore areas of the California Study Area and in the HRC.

Generated impulses would have short durations, typically a few hundred milliseconds, with dominant frequencies below 1 kHz. The root-mean-square (RMS) SPL and peak pressure (SPL peak) at a distance 1 m (3.3 ft) from the air gun would be approximately 215 dB re 1 μPa and 227 dB re 1 μPa, respectively, if operated at the full capacity of 60 in^3 (983 cc). The size of the air gun chamber can be adjusted, which would result in lower SPLs and sound exposure level (SEL) per shot. The air gun and non-explosive impulsive sources that were quantitatively analyzed in the HCTT Study Area are shown in table 11.

TABLE 11—TRAINING AND TESTING AIR GUN SOURCES QUANTITATIVELY ANALYZED IN THE STUDY AREA

Source class category	Description	Bin	Unit	Training annual	Training 7-year total	Testing annual	Testing 7-year total
Air Guns	Small underwater air guns	AG	C	0	0	30,432–36,780	232,068

Note: AG = air guns, C = count.

Pile Driving—

Impact and vibratory pile driving and extraction would occur during Port Damage Repair training in Port Hueneme, CA. Pile driving would not occur at other locations within the HCTT Study Area. The pile driving method, pile type and size, and assumptions for acoustic impact analysis are presented in table 12. This training activity would occur up to 12 times per year. Each training event consists of up to 7 separate modules, each which could occur up to 3 iterations during a single event (for a maximum of 21 modules). Training events would last a total of 30 days, of which pile driving is only anticipated to occur for a maximum of 14 days. The training would involve the installation and extraction 12- to 20-inch (30.5- to 50.8-cm) steel, timber, or composite round piles, and 27.5- or 18-inch (69.9- or 45.7-cm) steel or FRP Z-shape piles using a vibratory hammer; extraction of 12- to 20-inch (30.5- to 50.8-cm) timber round piles and 12- to 20-inch (30.5- to 50.8 cm) steel H-piles using a vibratory hammer; and installation of 12- to 20-inch (30.5- to 50.8-cm) timber round piles, 12- to 20-inch (30.5- to 50.8-cm) steel H-piles, and 12- to 20-inch (30.5- to 50.8-cm) steel, timber, or composite round piles using an impact hammer table 12.

TABLE 12—PORT DAMAGE REPAIR TRAINING PILES QUANTITATIVELY ANALYZED AND ASSOCIATED UNDERWATER SOUND LEVELS

Method	Pile size and type	Number of piles annual	Number of piles 7-year total	Peak SPL (single strike; dB re 1 μPa)	SEL (single strike; dB re 1 μPa2 ·s)	RMS SPL (single strike; dB re 1 μPa)	Unattenuated SPL (RMS; dB re 1 μPa)	Reference
Impact	12- to 20-inch (30 to 51 cm) timber round.	360	2,520	180	160	170		14-inch (36 cm) round timber piles (Caltrans, 2020).
Impact	12- to 20-inch (30 to 51 cm) steel H.	144	1,008	195	170	180		14-inch (36 cm) steel H-beam piles (Caltrans, 2020).
Impact	12- to 20-inch (30 to 51 cm) steel, timber, or composite round.	360	2,520	203	178	189		24-inch (61 cm) steel pipe piles (Illingworth and Rodkin Inc., 2007).

TABLE 12—PORT DAMAGE REPAIR TRAINING PILES QUANTITATIVELY ANALYZED AND ASSOCIATED UNDERWATER SOUND LEVELS—Continued

Method	Pile size and type	Number of piles annual	Number of piles 7-year total	Peak SPL (single strike; dB re 1 µPa)	SEL (single strike; dB re 1 µPa2 ·s)	RMS SPL (single strike; dB re 1 µPa)	Unattenuated SPL (RMS; dB re 1 µPa)	Reference
Vibratory	12- to 20-inch (30 to 51 cm) timber round.	360	2,520	....	....	....	166	24-inch (61 cm) steel piles (Washington State Department of Transportation, 2010).
Vibratory	12- to 20-inch (30 to 51 cm) steel H.	144	1,008	....	....	....	166	24-inch (61 cm) steel piles (Washington State Department of Transportation, 2010).
Vibratory	12- to 20-inch (30 to 51 cm) steel, timber, or composite round.	1,440	10,080	....	....	....	166	24-inch (61 cm) steel piles (Washington State Department of Transportation, 2010).
Vibratory	18- or 27.5-inch (46- or 70-cm) steel or FRP Z.	2,304	16,128	....	....	....	159	25-inch (64 cm) steel sheet piles (Naval Facilities Engineering Systems Command Southwest, 2020).

Note: Impact method is for installation only.

Only one hammer would be operated at any given point in time; there would not be any instances where multiple piles would be driven simultaneously. All piles and sheets would be extracted using the vibratory hammer.

Impact pile driving would involve the use of an impact hammer with both it and the pile held in place by a crane. When the pile driving starts, the hammer part of the mechanism is raised up and allowed to fall, transferring energy to the top of the pile. The pile is thereby driven into the sediment by a repeated series of these hammer blows. Each blow results in an impulsive sound emanating from the length of the pile into the water column as well as from the bottom of the pile through the sediment. Broadband impulsive signals are produced by impact pile driving methods, with most of the acoustic energy concentrated below 1,000 hertz (Hz) (Hildebrand, 2009). For the purposes of this analysis, the Action Proponents assume the impact pile driver would generally operate on average 60 strikes per pile.

Vibratory installation and extraction would involve the use of a vibratory hammer suspended from the crane and attached to the top of a pile. The pile is then vibrated by hydraulic motors rotating eccentric weights in the mechanism, causing a rapid up and down vibration in the pile, driving the pile into the sediment. During extraction, the vibration causes the sediment particles in contact with the pile to lose frictional grip on the pile. The crane slowly lifts the vibratory driver and pile until the pile is free of the sediment. In some cases, the crane may be able to lift the pile and vibratory driver without vibrations from the driver (*i.e.,* dead pull), in which case no noise would be introduced into the water. Vibratory driving and extraction create broadband, continuous, non-impulsive noise at low source levels, for a short duration with most of the energy dominated by lower frequencies. Port Damage Repair training would occur in shallow water, and sound would be transmitted on direct paths through the water, be reflected at the water surface or bottom, or travel through seafloor substrate. Soft substrates such as sand would absorb or attenuate the sound more readily than hard substrates (*e.g.,* rock), which may reflect the acoustic wave. The predicted sound levels produced by pile driving by method, pile size and type for Port Damage Repair training are presented in table 12.

In addition to underwater noise, the installation and extraction of piles also results in airborne noise in the environment, denoted dBA; dBA is an A-weighted decibel level that represents the relative loudness of sounds as perceived by the human ear. A-weighting gives more value to frequencies in the middle of human hearing and less value to frequencies at the edges as compared to a flat or unweighted decibel level. Impact pile driving creates in-air impulsive sound about 100 dBA re 20 µPa at a range of 15 m for 24-inch (0.61 m) steel piles (Illingworth and Rodkin, 2016). During vibratory extraction, the three aspects that generate airborne noise are the crane, the power plant, and the vibratory extractor. The average sound level recorded in air during vibratory extraction was about 85 dBA re 20 µPa (94 dB re 20 µPa) within a range of 32.8–49.2 ft (10–15 m) (Illingworth and Rodkin, 2015).

Explosive Stressors

This section describes the characteristics of explosions during military readiness activities. The activities analyzed in the application that use explosives are described in appendix A (Activity Descriptions) of the 2024 HCTT Draft EIS/OEIS, and terminology and metrics used when describing explosives in the application are in appendix D (Acoustic and Explosive Impacts Supporting Information) of the 2024 HCTT Draft EIS/OEIS.

The near-instantaneous rise from ambient to an extremely high peak pressure is what makes an explosive shock wave potentially damaging. Farther from an explosive, the peak pressures decay and the explosive waves propagate as an impulsive, broadband sound. Several parameters influence the effect of an explosive: the weight of the explosive warhead, the type of explosive material, the boundaries and characteristics of the propagation medium, and the detonation depth in water. The NEW, the explosive power of a charge expressed as the equivalent weight of trinitrotoluene (commonly referred to as TNT), accounts for the first two parameters.

Explosions in Water—

Explosive detonations during military readiness activities are associated with high-explosive munitions, including, but not limited to bombs, missiles, rockets, naval gun shells, torpedoes, mines, demolition charges, and explosive sonobuoys. Explosive detonations during military readiness activities involving the use of high-explosive munitions, including bombs, missiles, and naval gun shells, would occur in the air or near the water's surface. Explosive detonations associated with torpedoes and explosive sonobuoys would occur in the water column; mines and demolition charges would be detonated in the water column or on the ocean floor. The Coast Guard usage of explosives is limited to medium and large-caliber munitions used during gunnery exercises. Most detonations would occur in waters greater than 200 ft (60.9 m) in depth and greater than 3 nmi (5.6 km) from shore, although some mine warfare, demolition, and some testing detonations would occur in shallow water close to shore. The Army usage of explosives is limited to large-caliber projectiles used during shore-to-surface artillery and missile exercises, and all projectiles will impact beyond 3 nmi (5.6 km) from shore.

To better organize and facilitate the analysis of explosives used by the Action Proponents during military readiness activities that would detonate in water or at the water surface, explosive classification bins were developed. The use of explosive classification bins provides the same benefits as described for acoustic source classification bins in the Sonar and Other Transducers section. Explosives detonated in water are binned by NEW. Table 13 shows explosives use that was quantitatively analyzed in the Study Area. A range of annual use indicates that occurrence is anticipated to vary annually, consistent with the variation in the number of annual activities described in chapter 2 (Description of Proposed Action and Alternatives) of the 2024 HCTT Draft EIS/OEIS. The 7-year total takes that variability into account.

TABLE 13—EXPLOSIVE SOURCES QUANTITATIVELY ANALYZED PROPOSED FOR USE UNDERWATER OR AT THE WATER SURFACE

Bin	Net explosive weight (lb.)	Example explosive source	Navy training annual	Navy training 7-year	Coast Guard training annual	Coast Guard training 7-year	Army training annual	Army training 7-year	Navy testing annual	Navy testing 7-year
E1	0.1–0.25	Medium-caliber projectile	1,750–4,303	19,911					7,305–7,430	51,510
E2	>0.25–0.5	Medium-caliber projectile	2,950–3,000	20,800						
E3	>0.5–2.5	2.75-inch (7 cm) rockets	5,438–5,720	38,912	150	1,050			4,744–6,568	36,704
E4	>2.5–5	Mine neutralization charge.	179–190	1,286					1,324–2,624	18,352
E5	>5–10	5-inch (12.7 cm) projectile.	5,059–5,984	38,188					2,024–2,676	16,732
E6	>10–20	Hellfire missile	1,693–1,757	12,043			600	4,200	144–148	1,020
E7	>20–60	Demo block/shaped charge.	115–190	1,030					549–622	2,322
E8	>60–100	Lightweight torpedo	3–5	27					213–234	1,552
E9	>100–250	500 lb. (228 kg) bomb	278–300	2,015			108	756	111–115	789
E10	>250–500	Harpoon missile	89	620					13	91
E11	>500–675	Heavyweight Torpedo	7–11	61					1–2	8
E12	>675–1,000	2,000 lb. (907.2 kg) bomb	17–19	125						
E13	>1,000–1,740	Underwater demolitions—large area clearance.	6	42						
E16	10,000	Ship shock detonation							0–3	3

Note: > = greater than, in. = inch, lb. = pound, kg = kilogram.

Propagation of explosive pressure waves in water is highly dependent on environmental characteristics such as bathymetry, seafloor type, water depth, temperature, and salinity, which affect how the pressure waves are reflected, refracted, or scattered; the potential for reverberation; and interference due to multi-path propagation. In addition, absorption greatly affects the distance over which higher-frequency components of explosive broadband noise can propagate. Appendix D (Acoustic and Explosive Impacts Supporting Information) of the 2024 HCTT Draft EIS/OEIS explains the characteristics of explosive detonations and how the above factors affect the propagation of explosive energy in the water. Because of the complexity of analyzing sound propagation in the ocean environment, the Action Proponents rely on acoustic models in their environmental analyses that consider sound source characteristics and varying ocean conditions across the Study Area.

In-Air Acoustic Stressors

The proposed military readiness activities would generate missile and aerial target launch noise from locations on SNI (California), noise from missile and aerial target launches at the PMRF (Kauaʻi, Hawaii), and artillery firing noise from shore to surface gunnery at San Clemente Island and PMRF. Table 14 shows launch noise that was quantitatively analyzed in the HCTT Study Area.

Noise from target and missile launches from land at SNI and PMRF may disturb hauled-out pinnipeds. At SNI, this disturbance has been documented over nearly two decades of monitoring and reporting of those activities (U.S. Department of the Navy, 2020, 2022, 2023).

At PMRF, Hawaiian monk seals are known to haul out on a beach near the missile launch complex. If a seal is hauled out during a missile or aerial target launch, the seal may react to the noise and exhibit a behavioral response that may qualify as harassment (*e.g.,* flushing into the water). (Though, of note, behavioral disturbance of monk seals (*e.g.,* flushing or other disturbance) has not been observed due to these activities.) Currently, if a monk seal is hauled out on the beach (typically within approximately 1,000 ft (304.8 m) of the launch site) prior to a missile launch, the launch is halted or postponed until the seal has left the beach.

TABLE 14—PROPOSED LAUNCHES ANALYZED WITHIN THE HCTT STUDY AREA

Launch type	Location	Navy training annual	Navy training 7-year total	Navy testing annual	Navy testing 7-year total
Missiles and Aerial Targets	SNI (PMSR)	0	0	40	280
Missiles and Aerial Targets	PMRF	22	154	13	91
Artillery	PMRF	900	6,300	0	0

Note: SNI = San Nicolas Island, PMSR = Point Mugu Sea Range, PMRF = Pacific Missile Range Facility.

Vessel Strike

NMFS also considered the likelihood that vessel movement during military readiness activities could result in an incidental, but not intentional, strike of a marine mammal in the HCTT Study Area, which has the potential to result in serious injury or mortality. Vessel strikes are not specific to any specific military readiness activity but rather, a limited, sporadic, and incidental result of the Action Proponents' vessel movement during military readiness activities within the Study Area. Vessel strikes from commercial, recreational, and military vessels are known to seriously injure and occasionally kill cetaceans (Abramson *et al.,* 2011; Berman-Kowalewski *et al.,* 2010; Calambokidis, 2012; Crum *et al.,* 2019; Douglas *et al.,* 2008; Laggner 2009; Van der Hoop *et al.,* 2012; Van der Hoop *et al.,* 2013), although reviews of the literature on vessel strikes mainly involve collisions between commercial vessels and whales (Jensen and Silber, 2003, Laist *et al.,* 2001). Vessel speed, size, and mass are all important factors in determining both the potential likelihood and impacts of a vessel strike to marine mammals (Blondin *et al.* 2025; Conn and Silber, 2013; Garrison *et al.* 2025; Gende *et al.,* 2011; Redfern *et al.,* 2019; Silber *et al.,* 2010; Szesciorka *et al.,* 2019; Vanderlaan and Taggart, 2007; Wiley *et al.,* 2016). For large vessels, speed and angle of approach can influence the severity of a strike.

The Action Proponents' vessels transit at speeds that are optimal for fuel conservation or to meet training and testing requirements. From unpublished Navy data, average speed for large (greater than 350 ft (107 m) Navy ships in Southern California and Hawaii from 2016–2023 varied from 10 to 15 kn (18.5 to 27.8 km/hr) in offshore waters greater than 12 nmi from land and from 5 to 10 kn (9.3 to 18.5 km/hr) closer to the coast (less than 12 nmi; Navy 2021, unpublished data). Small craft (for purposes of this analysis, less than 59 ft (18 m) in length) have much more variable speeds (0 to 50 kn (0 to 92.6 km/hr), dependent on the activity). Submarines generally operate at speeds in the range of 8 to 13 kn (14.8 to 24.1 km per hour). Similar patterns are anticipated in the HCTT Study Area. A full description of the Action Proponents' vessels proposed for use during military readiness activities can be found in Chapter 2 (Description of Proposed Action and Alternatives) of the 2024 HCTT Draft EIS/OEIS.

While these speeds for large Navy vessels are representative of most events, some of the Action Proponents' vessels may need to temporarily operate outside of these parameters. For example, to produce the required relative wind speed over the flight deck, an aircraft carrier engaged in flight operations must adjust its speed through the water accordingly. There are specific events, including high speed tests of newly constructed vessels, where the Action Proponents' vessel would operate at higher speeds. By comparison, there are other instances when the Action Proponents vessel would be stopped or moving slowly ahead to maintain steerage, such as launch and recovery of a small rigid hull inflatable boat; vessel boarding, search, and seizure training events; or retrieval of a target.

Large Navy vessels (>400 ft (121.9 m)) and Coast Guard vessels within the offshore areas of range complexes and testing ranges operate differently from commercial vessels, which may reduce potential vessel strikes of large whales. Surface ships operated by or for the Navy have multiple personnel assigned to stand watch at all times, when a ship or surfaced submarine is moving through the water (underway). A primary duty of personnel standing watch on surface ships is to detect and report all objects and disturbances sighted in the water that may indicate a threat to the vessel and its crew, such as debris, a periscope, surfaced submarine, or surface disturbance. Per vessel safety requirements, personnel standing watch also report any marine mammals sighted in the path of the vessel as a standard collision avoidance procedure. All vessels proceed at a safe speed so they can take proper and effective action to avoid a collision with any sighted object or disturbance, and can stop within a distance appropriate to the prevailing circumstances and conditions. As described in the Standard Operating Procedures section, the Action Proponents utilize Lookouts to avoid collisions, and Lookouts are trained to spot marine mammals so that vessels may change course or take other appropriate action to avoid collisions. Despite the precautions, should a vessel strike occur, NMFS anticipates it would likely result in incidental take in the form of serious injury and/or mortality, though it is possible that it could result in a non-serious injury (Level A harassment). Accordingly, for the purposes of the analysis, NMFS assumes that any vessel strike would result in serious injury or mortality.

Proposed mitigation, monitoring, and reporting measures are described in detail later in this document (please see Proposed Mitigation Measures section, Proposed Monitoring section, and Proposed Reporting section).

Description of Marine Mammals and Their Habitat in the Area of Specified Activities

Marine mammal species and their associated stocks that have the potential to occur in the HCTT Study Area are presented in table 15 along with each stock's Endangered Species Act (ESA) and MMPA statuses, abundance estimate and associated coefficient of variation (CV) value, minimum abundance estimate, potential biological removal (PBR), annual M/SI, and potential occurrence in the HCTT Study Area. The Action Proponents request authorization to take individuals of 40 species (79 stocks) by Level A and Level B harassment incidental to military readiness activities from the use of sonar and other transducers, in-water detonations, air guns, missile and target launch noise, pile driving/extraction, and vessel movement in the HCTT Study Area. Currently, the humpback whale (Central America and Mexico Distinct Population Segments (DPSs)), killer whale (Eastern North Southern Resident DPS), false killer whale (Main Hawaiian Islands Insular DPS), and Hawaiian monk seal have critical habitat designated under the ESA in the HCTT Study Area (see *Critical Habitat* section below).

Sections 3 and 4 and appendix B (Marine Mammal Supplemental Information) of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history of the potentially affected species. NMFS fully considered all of this information, and we refer the reader to these descriptions, instead of reprinting the information. Additional information regarding population trends and threats may be found in NMFS' Stock Assessment Reports (SARs) (*https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*) and more general information about these species (*e.g.,* physical and behavioral descriptions) may be found on NMFS' website at: *https://www.fisheries.noaa.gov/find-species.* Additional information on the general biology and ecology of marine mammals is included in the 2024 HCTT Draft EIS/OEIS. Table 15 incorporates the best available science, including data from the 2023 Pacific and Alaska Marine Mammal Stock Assessment Reports (Carretta *et al.,* 2024; Young *et al.,* 2024) (see *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments),* and 2024 draft SARs, as well as monitoring data from the Navy's marine mammal research efforts.

TABLE 15—MARINE MAMMAL OCCURRENCE WITHIN THE HCTT STUDY AREA [1]

Common name	Scientific name	Stock	ESA/MMPA status; strategic (Y/N) [2]	Stock abundance (CV, N_{min}, most recent abundance survey) [3]	PBR	Annual M/SI [4]
Order Artiodactyla—Cetacea—Mysticeti (baleen whales)						
Family Eschrichtiidae:						
Gray whale	*Eschrichtius robustus*	Eastern North Pacific	-, -, N	25,960 (0.05, 25,849, 2016).	801	131
Gray whale	*Eschrichtius robustus*	Western North Pacific	E, D, Y	290 (N/A, 271, 2016)	0.12	UNK
Family Balaenopteridae (rorquals):						
Blue whale	*Balaenoptera musculus*	Central North Pacific	E, D, Y	133 (1.09, 63, 2010)	0.1	0
Blue whale	*Balaenoptera musculus*	Eastern North Pacific	E, D, Y	1,898 (0.085, 1,767, 2018)	4.1	≥18.6
Bryde's whale	*Balaenoptera edeni*	Eastern Tropical Pacific	-, -, N	UNK (UNK, UNK, N/A)	UND	UNK
Bryde's whale	*Balaenoptera edeni*	Hawaii	-, -, N	791 (0.29, 623, 2020)	6.2	0
Fin whale	*Balaenoptera physalus*	Hawaii	E, D, Y	203 (0.99, 101, 2017)	0.2	0
Fin whale	*Balaenoptera physalus velifera*	California/Oregon/Washington.	E, D, Y	11,065 (0.405, 7,970, 2018).	80	≥43.4
Humpback whale	*Megaptera novaeangliae*	Central America/Southern Mexico-California-Oregon-Washington [5].	E, D, Y	1,496 (0.171, 1,284, 2021)	3.5	14.9
Humpback whale	*Megaptera novaeangliae*	Mainland Mexico-California-Oregon-Washington [5].	T, D, Y	3,477 (0.101, 3,185, 2018)	43	22
Humpback whale	*Megaptera novaeangliae*	Hawaii	-, -, N	11,278 (0.56, 7,265, 2020)	127	27.09
Minke whale	*Balaenoptera acutorostrata*	Hawaii	-, -, N	438 (1.05, 212, 2017)	2.1	0
Minke whale	*Balaenoptera acutorostrata*	California/Oregon/Washington.	-, -, N	915 (0.792, 509, 2018)	4.1	≥0.19
Sei whale	*Balaenoptera borealis*	Hawaii	E, D, Y	391 (0.9, 204, 2010)	0.4	0.2
Sei whale	*Balaenoptera borealis*	Eastern North Pacific	E, D, Y	864 (0.40, 625, 2014)	1.25	UNK
Odontoceti (toothed whales, dolphins, and porpoises)						
Family Physeteridae:						
Sperm whale	*Physeter macrocephalus*	Hawaii	E, D, Y	5,707 (0.23, 4,486, 2017)	18	0
Sperm whale	*Physeter macrocephalus*	California/Oregon/Washington.	E, D, Y	2,606 (0.135, 2,011, 2018)	4	0.52
Family Kogiidae:						
Dwarf sperm whale	*Kogia sima*	Hawaii	-, -, N	UNK (UNK, UNK, 2017)	UND	0
Dwarf sperm whale	*Kogia sima*	California/Oregon/Washington.	-, -, N	UNK (UNK, UNK, 2014)	UND	0
Pygmy sperm whale	*Kogia breviceps*	Hawaii	-, -, N	42,083 (0.64, 25,695, 2017).	257	0
Pygmy sperm whale	*Kogia breviceps*	California/Oregon/Washington.	-, -, N	4,111 (1.12, 1,924, 2014)	19.2	0
Family Ziphiidae (beaked whales):						
Baird's beaked whale	*Berardius bairdii*	California/Oregon/Washington.	-, -, N	1,363 (0.53, 894, 2018)	8.9	≥0.2
Blainville's beaked whale.	*Mesoplodon densirostris*	Hawaii	-, -, N	1,132 (0.99, 564, 2017)	5.6	0
Goose-beaked whale	*Ziphius cavirostris*	Hawaii	-, -, N	4,431 (0.41, 3,180, 2017)	32	0
Goose-beaked whale	*Ziphius cavirostris*	California/Oregon/Washington.	-, -, N	5,454 (0.27, 4,214, 2016)	42	<0.1
Longman's beaked whale.	*Indopacetus pacificus*	Hawaii	-, -, N	2,550 (0.67, 1,527, 2017)	15	0
Mesoplodont beaked whale.	*Mesoplodon spp.* [6]	California/Oregon/Washington.	-, -, N	3,044 (0.54, 1,967, 2014)	20	0.1
Family Delphinidae:						
False killer whale	*Pseudorca crassidens*	Main Hawaiian Islands Insular.	E, D, Y	167 (0.14, 149, 2015)	0.3	0.1
False killer whale	*Pseudorca crassidens*	Northwest Hawaiian Islands.	-, -, N	477 (1.71, 178, 2017)	1.43	0.16
False killer whale	*Pseudorca crassidens*	Hawaii Pelagic	-, -, Y	5,528 (0.35, 4,152, 2017)	36	47
False killer whale	*Pseudorca crassidens*	Baja California Peninsula Mexico [7].	N/A	2.962 (0.71, N/A, N/A)	N/A	N/A

TABLE 15—MARINE MAMMAL OCCURRENCE WITHIN THE HCTT STUDY AREA [1]—Continued

Common name	Scientific name	Stock	ESA/MMPA status; strategic (Y/N) [2]	Stock abundance (CV, N_{min}, most recent abundance survey) [3]	PBR	Annual M/SI [4]
Killer whale	*Orcinus orca*	Hawaii	-, -, N	161 (1.06, 78, 2017)	0.8	0
Killer whale	*Orcinus orca*	Eastern North Pacific Offshore.	-, -, N	300 (0.1, 276, 2012)	2.8	0
Killer whale	*Orcinus orca*	Eastern North Pacific Southern Resident.	E, D, Y	75 (N/A, 75, 2023)	0.13	0
Killer whale	*Orcinus orca*	West Coast Transient	-, -, N	349 (N/A, 349, 2018)	3.5	0.4
Melon-headed whale	*Peponocephala electra*	Hawaiian Islands	-, -, N	40,647 (0.74, 23,301 [3] 2017).	233	0
Melon-headed whale	*Peponocephala electra*	Kohala Resident (Hawaii)	-, -, N	UNK (UNK, UNK, 2017)	UND	0
Pygmy killer whale	*Feresa attenuata*	Hawaii	-, -, N	10,328 (0.75, 5,885, 2017)	59	0
Pygmy killer whale	*Feresa attenuata*	California-Baja California Peninsula Mexico [7].	N/A	229 (1.11, N/A, N/A)	N/A	N/A
Short-finned pilot whale	*Globicephala macrorhynchus*	Hawaii	-, -, N	19,242 (0.23, 15,894, 2020).	159	0.2
Short-finned pilot whale	*Globicephala macrorhynchus*	California/Oregon/Washington.	-, -, N	836 (0.79, 466, 2014)	4.5	1.2
Bottlenose dolphin	*Tursiops truncatus*	Maui Nui	-, -, N	64 (0.15, 56, 2018)	0.6	UNK
Bottlenose dolphin	*Tursiops truncatus*	Hawaii Island	-, -, N	136 (0.43, 96, 2018)	1	>0.2
Bottlenose dolphin	*Tursiops truncatus*	Hawaii Pelagic	-, -, N	24,669 (0.57, 15,783, 2020).	158	0
Bottlenose dolphin	*Tursiops truncatus*	Kauaʻi/Niʻihau	-, -, N	112 (0.24, 92, 2018)	0.9	UNK
Bottlenose dolphin	*Tursiops truncatus*	Oʻahu	-, -, N	112 (0.17, 97, 2017)	1	UNK
Bottlenose dolphin	*Tursiops truncatus*	California Coastal	-, -, N	453 (0.06, 346, 2011)	2.7	≥2.0
Bottlenose dolphin	*Tursiops truncatus*	California/Oregon/Washington Offshore.	-, -, N	3,477 (0.696, 2,048, 2018)	19.7	≥0.82
Fraser's dolphin	*Lagenodelphis hosei*	Hawaii	-, -, N	40,960 (0.7, 24,068, 2017)	241	0
Long-beaked common dolphin.	*Delphinus delphis bairdii*	California	-, -, N	83,379 (0.216, 69,636, 2018).	668	≥29.7
Northern right whale dolphin.	*Lissodelphis borealis*	California/Oregon/Washington.	-, -, N	29,285 (0.72, 17,024, 2018).	163	≥6.6
Pacific white-sided dolphin.	*Lagenorhynchus obliquidens*	California/Oregon/Washington.	-, -, N	34,999 (0.222, 29,090, 2018).	279	7
Pantropical spotted dolphin.	*Stenella attenuata*	Maui Nui	-, -, N	UNK (UNK, UNK, N/A)	UND	UNK
Pantropical spotted dolphin.	*Stenella attenuata*	Hawaii Island	-, -, N	UNK (UNK, UNK, N/A)	UND	UNK
Pantropical spotted dolphin.	*Stenella attenuata*	Hawaii Pelagic	-, -, N	67,313 (0.27, 53,839, 2020).	538	0
Pantropical spotted dolphin.	*Stenella attenuata*	Oʻahu	-, -, N	UNK (UNK, UNK, N/A)	UND	UNK
Pantropical spotted dolphin.	*Stenella attenuata*	Baja California Peninsula Mexico [7].	N/A	105,416 (0.46, N/A, N/A)	N/A	N/A
Risso's dolphin	*Grampus griseus*	Hawaii	-, -, N	6,979 (0.29, 5,283, 2020)	53	0
Risso's dolphin	*Grampus griseus*	California/Oregon/Washington.	-, -, N	6,336 (0.32, 4,817, 2014)	46	≥3.7
Rough-toothed dolphin	*Steno bredanensis*	Hawaii	-, -, N	83,915 (0.49, 56,782, 2017).	511	3.2
Short-beaked common dolphin.	*Delphinus delphis*	California/Oregon/Washington.	-, -, N	1,056,308 (0.21, 888,971, 2018).	8,889	≥30.5
Spinner dolphin	*Stenella longirostris*	Hawaii Pelagic	-, -, N	UNK (UNK, UNK, 2010)	UND	0
Spinner dolphin	*Stenella longirostris*	Hawaii Island	-, -, N	665 (0.09, 617, 2012)	6.2	≥1.0
Spinner dolphin	*Stenella longirostris*	Kauaʻi/Niʻihau	-, -, N	N/A (N/A, N/A, 2005)	UND	UNK
Spinner dolphin	*Stenella longirostris*	Midway Atoll/Kure	-, -, N	UNK (UNK, UNK, 2010)	UND	UNK
Spinner dolphin	*Stenella longirostris*	Oʻahu/4 Islands Region	-, -, N	N/A (N/A, N/A, 2007)	UND	≥0.4
Spinner dolphin	*Stenella longirostris*	Pearl and Hermes	-, -, N	UNK (UNK, UNK, N/A)	UND	UNK
Spinner dolphin	*Stenella coeruleoalba*	Hawaii Pelagic	-, -, N	64,343 (0.28, 51,055, 2020).	511	0
Spinner dolphin	*Stenella coeruleoalba*	California/Oregon/Washington.	-, -, N	29,988 (0.3, 23,448, 2018)	225	≥4
Family Phocoenidae (porpoises):						
Dall's porpoise	*Phocoenoides dalli*	California/Oregon/Washington.	-, -, N	16,498 (0.61, 10,286, 2018).	99	≥0.66
Harbor porpoise	*Phocoena phocoena*	Monterey Bay	-, -, N	3,760 (0.561, 2,421, 2013)	35	≥0.2
Harbor porpoise	*Phocoena phocoena*	Morro Bay	-, -, N	4,191 (0.56, 2,698, 2012)	65	0
Harbor porpoise	*Phocoena phocoena*	Northern California/Southern Oregon.	-, -, N	15,303 (0.575, 9,759, 2022).	195	0
Harbor porpoise	*Phocoena phocoena*	San Francisco/Russian River.	-, -, N	7,777 (0.62, 4,811, 2017)	73	≥0.4
Order Carnivora—Pinnipedia						
Family Otariidae (eared seals and sea lions):						
California sea lion	*Zalophus californianus*	U.S.	-, -, N	257,606 (N/A, 233,515, 2014).	14,011	>321
Guadalupe fur seal	*Arctocephalus townsendi*	Mexico	T, D, Y	68,850 (N/A, 57,199, 2013)	1,959	≥10.0
Northern fur seal	*Callorhinus ursinus*	Eastern Pacific	-, D, Y	612,765 (0.2, 518,651, 2022).	11,151	296

TABLE 15—MARINE MAMMAL OCCURRENCE WITHIN THE HCTT STUDY AREA [1]—Continued

Common name	Scientific name	Stock	ESA/MMPA status; strategic (Y/N) [2]	Stock abundance (CV, N_{min}, most recent abundance survey) [3]	PBR	Annual M/SI [4]
Northern fur seal	*Callorhinus ursinus*	California	-, -, N	19,634 (N/A, 8,788, 2022)	527	≥1.2
Steller sea lion	*Eumetopias jubatus*	Eastern	-, -, N	36,308 (N/A, 36,308, 2022)	2,178	93
Family Phocidae (earless seals):						
Harbor seal	*Phoca vitulina*	California	-, -, N	30,968 (N/A, 27,348, 2012)	1,641	43
Hawaiian monk seal	*Neomonachus schauinslandi*	Hawaii	E, D, Y	1,605 (0.05, 1,508, 2022)	5	≥4.8
Northern elephant seal	*Mirounga angustirostris*	California Breeding	-, -, N	194,907 (N/A, 88,794, 2023).	5,328	11

Note: N/A = Not Applicable, UND = Undetermined, UNK = Unknown. Unless otherwise noted, abundance estimates are from the final 2022 Pacific stock assessment report (Carretta *et al.,* 2024; Carretta *et al.,* 2023b), the draft 2023 Pacific stock assessment report (Carretta *et al.,* 2024), or the Alaska stock assessment reports (Young, 2024).

[1] Information on the classification of marine mammal species can be found on the web page for The Society for Marine Mammalogy's Committee on Taxonomy (*https://marinemammalscience.org/science-and-publications/list-marine-mammal-species-subspecies/;* Committee on Taxonomy (2022)).

[2] 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 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.

[3] NMFS marine mammal stock assessment reports online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.* CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance.

[4] These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.,* commercial fisheries, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

[5] Humpback whales in the Central America/Southern Mexico-California-Oregon-Washington Stock make up the endangered Central America DPS, and humpback whales in the Mainland Mexico-California-Oregon-Washington Stock are part of the threatened Mexico DPS, along with whales from the Mexico-North Pacific Stock, which do not occur in the Study Area.

[6] Mesoplodont beaked whales are analyzed as a group due to insufficient data available to estimate species-specific densities.

[7] The Baja California Peninsula Mexico and California-Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

Species Not Included in the Analysis

The species carried forward for analysis (and described in table 15) are those likely to be found in the HCTT Study Area based on the most recent data available, and do not include species that may have once inhabited or transited the area but have not been sighted in recent years (*e.g.,* species which were extirpated from factors such as 19th and 20th century commercial exploitation). North Pacific right whale may be present in the northeast Pacific Ocean, but has an extremely low probability of presence in the HCTT Study Area. It is considered extralimital (*i.e.,* not anticipated to occur in the Study Area) and was not included in the analysis.

One species of marine mammal, the southern sea otter, occurs in the HCTT Study Area but is managed by the U.S. Fish and Wildlife Service (U.S. FWS) and thus are not considered further in this analysis.

Below, we consider additional information about the marine mammals in the area of the specified activities that informs our analysis, such as identifying known areas of important habitat or behaviors, or where unusual mortality events have been designated.

Critical Habitat

Currently, the humpback whale (Central America and Mexico DPSs), killer whale (Eastern North Pacific Southern Resident DPS), false killer whale (Main Hawaiian Islands Insular DPS), and Hawaiian monk seal have ESA-designated critical habitat in the HCTT Study Area.

Humpback Whale

On April 21, 2021, NMFS designated critical habitat for the endangered Western North Pacific DPS, the endangered Central America DPS, and the threatened Mexico DPS of humpback whales (86 FR 21082). Areas proposed as critical habitat include specific marine areas located off the coasts of California, Oregon, Washington, and Alaska. Designated critical habitat for the Central America DPS overlaps the NOCAL Range Complex (Units 15, 16, and 17), as well as PMSR and the northern portion of the SOCAL Range Complex (Units 17 and 18). These areas are essential for humpback whale foraging and migration. One of the proposed critical habitat areas, critical habitat Unit 19, would have also overlapped with the SOCAL range in the HSTT Study Area but was excluded after consideration of potential national security and economic impacts of designation.

NMFS, in the final rule designating critical habitat for humpback whales, identified prey species, primarily euphausiids and small pelagic schooling fishes of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth, as an essential habitat feature. NMFS, through a critical habitat review team (CHRT), also considered inclusion of migratory corridors and passage features, as well as sound and the soundscape, as essential habitat features. NMFS did not include either in the final critical habitat; however, as the CHRT concluded that the best available science did not allow for identification of any consistently used migratory corridors or definition of any physical, essential migratory or passage conditions for whales transiting between or within habitats of the three DPSs. Regardless of whether critical habitat is designated for a particular area, NMFS has considered all applicable information regarding marine mammals and their habitat in the analysis supporting these proposed regulations.

Killer Whale

NMFS designated critical habitat for the Southern Resident killer whale DPS on November 29, 2006 (71 FR 69054) in inland waters of Washington State, and on August 2, 2021, revised the designation by designating six additional coastal critical habitat areas along the U.S. West Coast (86 FR 41668). The HCTT Study Area overlaps two of the three continuous sections off the California coast: the North Central CA Coast Area and the Monterey Bay Area. Based on the natural history of the Southern Resident killer whales and their habitat needs, NMFS identified physical or biological features essential to the conservation of the Southern

Resident killer whale DPS: (1) water quality to support growth and development; (2) prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and (3) passage conditions to allow for migration, resting, and foraging.

False Killer Whale (Main Hawaiian Island Insular DPS)

Critical habitat for the ESA-listed Main Hawaiian Islands insular false killer whale DPS was finalized in July 2018 (83 FR 35062, July 24, 2018) designating waters from the 45 m depth contour to the 3,200 m depth contour around the main Hawaiian Islands from Niʻihau east to Hawaii. This designation does not include most bays, harbors, or coastal in-water structures. NMFS excluded 14 areas. The total area designated was approximately 45,504 square kilometers (km^2; 13,267 square nautical miles (nmi^2)) of marine habitat. Critical habitat for the main Hawaiian Islands insular DPS of false killer whale entirely overlaps the HRC.

Main Hawaiian Islands insular false killer whales are island-associated whales that rely entirely on the productive submerged habitat of the main Hawaiian Islands to support all of their life-history stages. Island-associated marine habitat for Main Hawaiian Islands insular false killer whale is the only essential feature of the critical habitat. The following characteristics of this habitat support insular false killer whales' ability to travel, forage, communicate, and move freely around and among the waters surrounding the main Hawaiian Islands: (1) adequate space for movement and use within shelf and slope habitat; (2) prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; (3) waters free of pollutants of a type and amount harmful to Main Hawaiian Islands insular false killer whales; and (4) sound levels that would not significantly impair false killer whales' use or occupancy.

Hawaiian Monk Seal

Critical habitat for Hawaiian monk seals was designated in 1986 (51 FR 16047, April 30, 1986) and later revised in 1988 (53 FR 18988, May 26, 1988) and in 2015 (80 FR 50925, August 21, 2015). In the Northwestern Hawaiian Islands Hawaiian monk seal critical habitat includes all beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland as well as the seafloor and marine habitat 10 m in height above the seafloor from the shoreline out to the 200 m depth contour around Kure Atoll (Hōlanikū), Midway Atoll (Kuaihelani), Pearl and Hermes Reef (Manawai), Lisianski Island (Kapou), Laysan Island (Kamole), Maro Reef (Kamokuokamohoaliʻi), Gardner Pinnacles (ʻŌnūnui), French Frigate Shoals (Lalo), Necker Island (Mokumanamana) and Nihoa Island. In the main Hawaiian Islands, Hawaiian monk seal critical habitat includes the seafloor and marine habitat to 10 m above the seafloor from the 200 m depth contour through the shoreline and extending into terrestrial habitat 5 m inland from the shoreline between identified boundary points around Kaula Island (includes marine habitat only), Niʻihau (includes marine habitat from 10 m-200 m in depth), Kauaʻi, Oʻahu, Maui Nui (including Kahoʻolawe, Lānaʻi, Maui, and Molokaʻi), and Hawaii Island. A portion of the critical habitat overlaps the HRC.

The essential features of Hawaiian monk seal critical habitat are: (1) terrestrial areas and adjacent shallow, sheltered aquatic areas with characteristics preferred by monk seals for pupping and nursing; (2) marine areas from 0 to 200 m in depth that support adequate prey quality and quantity for juvenile and adult monk seal foraging; and (3) significant areas used by monk seals for hauling out, resting or molting.

Biologically Important Areas

Ferguson *et al.* (2015) identified Biologically Important Areas (BIAs) within U.S. waters of the West Coast (Calambokidis *et al.* 2015) and in Hawaii (Baird *et al.* 2015), which represent areas and times in which cetaceans are known to concentrate in areas of known importance for activities related to reproduction, feeding, and migration, or areas where small and resident populations are known to occur. Unlike ESA critical habitat, these areas are not formally designated pursuant to any statute or law, but are a compilation of the best available science intended to inform impact and mitigation analyses. An interactive map of the BIAs is available at: *https://oceannoise.noaa.gov/biologically-important-areas.* In some cases, additional, or newer, information regarding known feeding, breeding, or migratory areas is available and has been used to update these BIAs (as cited below), and a summary of all of the BIAs is included below.

The West Coast and Hawaii BIAs were updated in 2024 (Calambokidis *et al.*) and 2023 (Kratofil *et al.*), respectively (referred to as BIA II herein). Calambokidis *et al.* (2024) and Kratofil *et al.* (2023) use a new scoring system described here and in Harrison *et al.* (2023). Experts identified an overall Importance Score for each BIA that considers: (1) ''Intensity''—the intensity and characteristics underlying an area's identification as a BIA; and (2) ''Data Support''—the quantity, quality, and type of information, and associated uncertainties, upon which the BIA delineation and scoring depends. Importance Scores range from 1 to 3, with a higher score representing an area of higher intensity and data support. Each BIA identified in BIA II is also scored for boundary uncertainty and spatiotemporal variability (dynamic, ephemeral, or static). Additionally, BIA II includes hierarchical BIAs for some species and stocks where a higher intensity score is appropriate for a smaller core area(s) (child BIA) within a larger BIA unit (parent BIA).

The Hawaii Study Area overlaps BIAs for small and resident populations of the following species: spinner dolphin, short-finned pilot whale, rough-toothed dolphin, pygmy killer whale, pantropical spotted dolphin, melon-headed whale, false killer whale, dwarf sperm whale, goose-beaked whale, common bottlenose dolphin, and Blainville's beaked whale. Further, the Hawaii Study Area overlaps updated BIAs for humpback whale reproduction (Kratofil *et al.* 2023). The California Study Area overlaps feeding BIAs for blue whale, fin whale, and humpback whale in SOCAL. Additionally, it overlaps a reproductive BIA as well as northbound and southbound migratory BIAs for gray whale (Calambokidis *et al.* 2024). Table 16 describes each BIA that overlaps the HCTT Study Area and the scores for the above criteria.

TABLE 16—BIAS OVERLAPPING THE HCTT STUDY AREA

Species	BIA type	Parent/child/ non-hierarchical	BIA name	Effective months	BIA area (km²)	Figure in action proponents' LOA application	Importance score	Intensity score	Data support score	Boundary certainty	Spatiotemporal variability	Transboundary across
Hawaii Study Area (Kratofil *et al.*, 2023)												
Humpback whale	Reproductive	Parent	Main Hawaiian Islands—Parent.	December through May.	23,041	B.1–11	2	2	2	2	Static	None.
Humpback whale	Reproductive	Child	Main Hawaiian Islands—Child.	December through May.	6,676	B.1–11	3	3	3	3	Static	None.
False killer whale	Small and Resident Population.	Parent	Main Hawaiian Islands Insular Stock—Parent.	Year-round	94,217	B.1–7	1	1	3	3	Static	None.
False killer whale	Small and Resident Population.	Child	Main Hawaiian Islands Insular Stock—Child.	Year-round	7,775	B.1–7	3	3	3	3	Static	None.
False killer whale	Small and Resident Population.	Non-hierarchical.	Northwestern Hawaiian Islands Insular Stock.	Year-round	138,001	B.1–7	1	1	2	2	Static	None.
Dwarf sperm whale.	Small and Resident Population.	Parent	Hawaii Island—Parent.	Year-round	1,341	B.1–14	3	3	2	2	Static	None.
Dwarf sperm whale.	Small and Resident Population.	Child	Hawaii Island—Child.	Year-round	457	B.1–14	3	3	2	2	Static	None.
Pygmy killer whale.	Small and Resident Population.	Non-hierarchical.	Oʻahu-Maui Nui	Year-round	7,416	B.1–15	3	3	2	2	Static	None.
Pygmy killer whale.	Small and Resident Population.	Non-hierarchical.	Hawaii Island	Year-round	5,201	B.1–15	2	2	2	2	Static	None.
Short-finned pilot whale.	Small and Resident Population.	Parent	Main Hawaiian Islands—Parent.	Year-round	51,280	B.1–16	1	1	3	3	Static	None.
Short-finned pilot whale.	Small and Resident Population.	Child	Main Hawaiian Islands—Child (Western Community Core Range).	Year-round	4,040	B.1–16	3	3	3	3	Static	None.
Short-finned pilot whale.	Small and Resident Population.	Child	Main Hawaiian Islands—Child (Central Community Core Range).	Year-round	2,427	B.1–16	3	3	3	3	Static	None.
Short-finned pilot whale.	Small and Resident Population.	Child	Main Hawaiian Islands—Child (Eastern Community Core Range).	Year-round	2,461	B.1–16	3	3	3	3	Static	None.
Common bottlenose dolphin.	Small and Resident Population.	Parent	Kauaʻi/Niʻihau-Oʻahu-Maui Nui.	Year-round	36,634	B.1–18	1	1	3	2	Static	None.
Common bottlenose dolphin.	Small and Resident Population.	Child	Kauaʻi/Niʻihau-Oʻahu-Maui Nui-Kauaʻi/Niʻihau).	Year-round	2,772	B.1–18	3	3	3	3	Static	None.
Common bottlenose dolphin.	Small and Resident Population.	Child	Kauaʻi/Niʻihau-Oʻahu-Maui Nui—Oʻahu.	Year-round	8,486	B.1–18	3	3	2	2	Static	None.
Common bottlenose dolphin.	Small and Resident Population.	Child	Kauaʻi/Niʻihau-Oʻahu-Maui Nui—Maui Nui.	Year-round	10,622	B.1–18	2	2	2	2	Static	None.
Common bottlenose dolphin.	Small and Resident Population.	Non-hierarchical.	Hawaii Island	Year-round	8,299	B.1–18	2	2	3	3	Static	None.

TABLE 16—BIAS OVERLAPPING THE HCTT STUDY AREA—Continued

Species	BIA type	Parent/child/ non-hierarchical	BIA name	Effective months	BIA area (km²)	Figure in action proponents' LOA application	Importance score	Intensity score	Data support score	Boundary certainty	Spatiotemporal variability	Transboundary across
Pantropical spotted dolphin.	Small and Resident Population.	Parent	Oʻahu-Maui Nui-Hawaii Island—Parent.	Year-round	57,711	B.1–19	1	1	2	2	Static	None.
Pantropical spotted dolphin.	Small and Resident Population.	Child	Oʻahu-Maui Nui-Hawaii Island—Child (Oʻahu).	Year-round	12,952	B.1–19	1	1	2	2	Static	None.
Pantropical spotted dolphin.	Small and Resident Population.	Child	Oʻahu-Maui Nui-Hawaii Island—Child (Maui Nui).	Year-round	6,743	B.1–19	1	1	2	2	Static	None.
Pantropical spotted dolphin.	Small and Resident Population.	Child	Oʻahu-Maui Nui-Hawaii Island—Hawaii Island—Child (Hawaii Island).	Year-round	10,768	B.1–19	1	1	2	2	Static	None.
Rough-toothed dolphin.	Small and Resident Population.	Non-hierarchical.	Maui Nui-Hawaii Island.	Year-round	15,112	B.1–21	1	1	2	2	Static	None.
Rough-toothed dolphin.	Small and Resident Population.	Parent	Kauaʻi/Niʻihau-Oʻahu—Parent.	Year-round	24,233	B.1–21	1	1	2	2	Static	None.
Rough-toothed dolphin.	Small and Resident Population.	Child	Kauaʻi/Niʻihau-Oʻahu—Child (Kauaʻi/Niʻihau).	Year-round	1,149	B.1–21	2	2	2	2	Static	None.
Melon-headed whale.	Small and Resident Population.	Non-hierarchical.	Kohala Residents—Hawaii Island.	Year-round	3,816	B.1–21	2	2	3	3	Static	None.
Spinner dolphin	Small and Resident Population.	Non-hierarchical.	Manawai (Pearl and Hermes Reef).	Year-round	2,094	B.1–20	1	2	1	2	Static	None.
Spinner dolphin	Small and Resident Population.	Non-hierarchical.	Kuaihelani/Hōlanikū (Midway/Kure Atolls).	Year-round	4,841	B.1–20	1	2	1	2	Static	None.
Spinner dolphin	Small and Resident Population.	Non-hierarchical.	Kauaʻi and Niʻihau.	Year-round	7,233	B.1–20	1	1	2	3	Static	None.
Spinner dolphin	Small and Resident Population.	Non-hierarchical.	Oʻahu and Maui Nui.	Year-round	14,651	B.1–20	1	1	2	3	Static	None.
Spinner dolphin	Small and Resident Population.	Non-hierarchical.	Hawaii Island	Year-round	9,477	B.1–20	1	1	3	3	Static	None.
Goose-beaked whale.	Small and Resident Population.	Parent	Hawaii Island	Year-round	37,157	B.1–23	2	2	3	2	Static	None.
Goose-beaked whale.	Small and Resident Population.	Child	Hawaii Island	Year-round	5,400	B.1–23	3	3	3	3	Static	None.
Blainville's beaked whale.	Small and Resident Population.	Parent	Oʻahu-Maui Nui-Hawaii Island—Parent.	Year-round	78,714	B.1–24	1	1	3	2	Static	None.
Blainville's beaked whale.	Small and Resident Population.	Child	Oʻahu-Maui Nui-Hawaii Island—Child (Hawaii Island).	Year-round	4,214	B.1–24	3	3	3	3	Static	None.
California Study Area (Calambokidis *et al.*, 2024)												
Blue whale	Feeding	Parent	Blue whale West Coast—Parent.	June through November.	173,433	B.1–1	2	2	3	3	Static	None.
Blue whale	Feeding	Child	Blue whale West Coast—Core.	June through November.	54,349	B.1–1	3	3	3	3	Static	None.
Fin whale	Feeding	Parent	Fin whale West Coast—Parent.	June through November.	315,072	B.1–2	1	1	2	2	Static	None.

Fin whale	Feeding	Child	Fin whale West Coast—Core.	June through November.	155,508	B.1–2	2	2	2	2	Static	None.
Humpback whale	Feeding	Parent	Humpback whale West Coast—Parent.	March through November.	140,303	B.1–5	2	2	3	3	Static	None.
Humpback whale	Feeding	Child	Humpback whale West Coast—Core.	March through November.	38,052	B.1–5	3	3	3	3	Static	None.
Gray whale	Migratory	Parent	Gray Whale Migratory Route—Southbound and Northbound.	January through June, November through December.	167,066	B.1–13	1	1	2	2	Static	GOA.
Gray whale	Migratory	Child	Southbound	November–February.	70,110	B.1–13	2	2	3	3	Static	None.
Gray whale	Migratory	Child	Northbound Phase A.	January–May	65,047	B.1–13	2	2	3	3	Static	None.
Gray whale	Migratory	Child	Northbound Phase B.	March–May	51,947	B.1–13	3	3	3	3	Static	None.
Gray whale	Reproductive	Non-hierarchical.	Gray whale—Cow and Calf Migrants.	March–May	51,947	B.1–13	3	3	3	3	Static	None.
Harbor porpoise	Small and Resident Population.	Non-hierarchical.	Monterey Bay	Year-round	1,911	B.1–22	2	2	3	3	Static	None.
Harbor porpoise	Small and Resident Population.	Non-hierarchical.	Morro Bay	Year-round	3,030	B.1–22	1	1	3	3	Static	None.

National Marine Sanctuaries

Under Title III of the Marine Protection, Research, and Sanctuaries Act of 1972 (also known as the National Marine Sanctuaries Act (NMSA)), NOAA can establish as national marine sanctuaries (NMS) areas of the marine environment with special conservation, recreational, ecological, historical, cultural, archaeological, scientific, educational, or aesthetic qualities. Sanctuary regulations prohibit destroying, causing the loss of, or injuring any sanctuary resource managed under the law or regulations for that sanctuary (15 CFR part 922). NMS are managed on a site-specific basis, and each sanctuary has site-specific regulations. Most, but not all sanctuaries have site-specific regulatory exemptions from the prohibitions for certain military activities. Separately, section 304(d) of the NMSA requires Federal agencies to consult with the Office of National Marine Sanctuaries (ONMS) whenever their Proposed Activities are likely to destroy, cause the loss of, or injure a sanctuary resource. There are seven designated NMSs and one proposed NMS within the HCTT Study Area (see section 6 of the 2024 HCTT Draft EIS/OEIS):

- Channel Islands NMS
- Chumash Heritage NMS;
- Cordell Bank NMS;
- Greater Farallones NMS;
- Monterey Bay NMS;
- Hawaiian Islands Humpback Whale NMS
- Pacific Remote Islands NMS (in designation); and
- Papahānaumokuākea NMS.

Channel Islands NMS is an ecosystem-based managed sanctuary consisting of an area of 1,109 nmi^2 (3,803 km^2) around Anacapa Island, Santa Cruz Island, Santa Rosa Island, San Miguel Island, and Santa Barbara Island to the south. It encompasses sensitive habitats (*e.g.,* kelp forest habitat, deep benthic habitat) and includes various shipwrecks and maritime heritage artifacts. Channel Islands NMS waters and its remote, isolated position at the confluence of two major ocean currents support significant biodiversity of marine mammals, fish, and invertebrates. At least 33 species of cetaceans have been reported in the Channel Islands NMS region with common species, including: Long-beaked common dolphin, short-beaked common dolphin, Bottlenose dolphin, Pacific white-sided dolphin, Northern right whale dolphin, Risso's dolphin, California gray whale, Blue whale, and Humpback whale. The three species of pinnipeds that are commonly found throughout or in part of the Channel Islands NMS include: California sea lion, Northern elephant seal, and Pacific harbor seal.

Chumash Heritage NMS encompasses 3,430 nmi^2 (11,766 km^2) of coastal and ocean waters offshore Central California stretching nearly 52 nmi (96.6 km) from shore and down to a maximum depth of 11,580 ft (3,530 m). The sanctuary protects and collaboratively manages natural and cultural resources, maritime historical resources, and Indigenous cultural history along 100 nmi (186.9 km) of coastline. Chumash Heritage NMS contains marine biodiversity, productive ecosystems, and sensitive species and habitats, with special geologic features like Rodriguez Seamount and Santa Lucia Bank, along with an important biogeographic transition zone and upwelling along the California Current, which drives biological productivity and creates ecological conditions in the area that supports a high abundance of marine mammals. Different types of ecological habitats found within the sanctuary include kelp forests, rocky reefs, deep-sea coral gardens, and sandy beaches.

Cordell Bank NMS is an extremely productive marine area off the West Coast in northern California, just north of the Gulf of the Farallones. With its southern-most boundary located 36.5 nmi (67.6 km) north of San Francisco, the sanctuary is entirely offshore, with the eastern boundary 5.2 nmi (9.7 km) from shore and the western boundary 26.1 nmi (48.3 km) offshore. In total, the sanctuary protects an area of 971 nmi^2 (3,330 km^2). The centerpiece of the sanctuary is Cordell Bank, a 3.9 nmi by 8.3 nmi (7.2 km by 15.3 km) rocky undersea feature. The combination of ocean conditions and undersea topography creates a rich and diverse marine community in the sanctuary. The prevailing California Current flows southward along the coast, and the annual upwelling of nutrient-rich deep ocean water supports the sanctuary's rich biological community, including marine mammals.

Greater Farallon NMS encompasses 2,488 nmi^2 (8,534 km^2) just north and west of San Francisco Bay, CA, within the California Current ecosystem. Due to a high degree of wind-driven upwelling, there is a ready supply of nutrients to surface waters and the California Current ecosystem is one of the most biologically productive regions in the world. Greater Farallones NMS provides breeding and feeding grounds for at least 25 endangered or threatened species; 36 marine mammal species, including blue, gray, and humpback whales, harbor seals, elephant seals, Pacific white-sided dolphins, and one of the southernmost U.S. populations of threatened Steller sea lion.

Monterey Bay NMS is an ecosystem-based managed sanctuary consisting of an area of 4,601 nmi^2 (15,781 km^2) stretching from Marin to Cambria and extending an average of 26.1 nmi (48.3 km) from shore. Monterey Bay NMS contains extensive kelp forests and one of North America's largest underwater canyons and closest-to-shore deep ocean environments. Its diverse marine ecosystem also includes rugged rocky shores, wave-swept sandy beaches and tranquil estuaries. These habitats support a variety of marine life, including 36 species of marine mammals, more than 180 species of seabirds and shorebirds, at least 525 species of fishes, and an abundance of invertebrates and algae. Of the 36 species of marine mammals, six are pinnipeds with California sea lions being the most common, and the remainder are 26 species of cetaceans.

Hawaiian Islands Humpback Whale NMS is a single-species managed sanctuary, composed of 1,035 nmi^2 of the waters around Maui, Lānaʻi, and Molokaʻi; and smaller areas off the north shore of Kauaʻi, off Hawaii's west coast, and off the north and southeast coasts of Oʻahu. Hawaiian Islands Humpback Whale NMS is entirely within the HRC of the HCTT Study Area and constitutes one of the world's most important Hawaii humpback whale DPS habitats (81 FR 62259, September 8, 2016), and is a primary region for humpback reproduction in the U.S. (National Marine Sanctuaries Program, 2002). Scientists estimate that more than 50 percent of the entire North Pacific humpback whale population migrates to Hawaiian waters each winter to mate, calve, and nurse their young. The North Pacific humpback whale population has been split into two DPSs. The Hawaii humpback whale DPS migrates to Hawaiian waters each winter and is not listed under the ESA. In addition to protection under the MMPA, the Hawaii humpback whale DPS is protected in sanctuary waters by the Hawaiian Islands Humpback Whale NMS. The sanctuary was created to protect humpback whales and shallow, protected waters important for calving and nursing (Office of National Marine Sanctuaries, 2010).

Papahānaumokuākea NMS, the largest NMS, consists of approximately 439,910 nmi^2 (1,508,849 km^2) of marine habitat. The sanctuary comprises several interconnected ecosystems, such as coral islands surrounded by shallow reefs, low-light mesophotic reefs with extensive algal beds, open ocean waters connected to the greater North Pacific Ocean, deep-water habitats such as abyssal plains 16,400 ft (4,999 m) below sea level, and deep reef habitat characterized by seamounts, banks, and shoals. Hawaiian monk seals, one of the most endangered marine mammals in the world, live in Papahānaumokuākea NMS.

The Office of National Marine Sanctuaries is in the process of designating the Pacific Remote Islands NMS. The atolls, shoals, banks, reefs, seamounts, and open-ocean waters surrounding the Pacific Remote Islands are home to some of the most diverse tropical marine life on the planet. The region's diverse habitats and pristine reefs provide a haven for marine mammals and numerous threatened, endangered, and depleted species thrive in the area, including spinner dolphins and melon-headed whales. NMFS does not anticipate injury to Sanctuary resources in the proposed Pacific Remote Islands NMS, as the action proponents are not proposing to conduct activities within the vicinity of, or within, the proposed Pacific Islands Heritage NMS.

Unusual Mortality Events

An unusual mortality event (UME) is defined under Section 410(9) of the MMPA as a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response (16 U.S.C. 1421h(9)). From 1991 to the present, there have been 17 formally recognized UMEs affecting marine mammals in California and Hawaii and involving species under NMFS' jurisdiction; however, there are currently none that are active.

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Not all marine mammal species have equal hearing capabilities (*e.g.,* Richardson *et al.,* 1995, Wartzok and Ketten, 1999, Au and Hastings, 2008). To reflect this, Southall *et al.* (2007), Southall *et al.* (2019c) recommended that marine mammals be divided into hearing groups based on directly measured (behavioral or auditory evoked potential techniques) or estimated hearing ranges (*e.g.,* behavioral response data, anatomical modeling). NMFS (2024) generalized hearing ranges were chosen based on the approximately 65-dB threshold from the composite audiograms, previous analysis in NMFS (2018), and/or data from Southall *et al.* (2007) and Southall *et al.* (2019c). We note that the names of two hearing groups and the generalized hearing ranges of all marine mammal hearing groups have been recently updated (NMFS, 2024) as reflected below in table 16.

TABLE 17—MARINE MAMMAL HEARING GROUPS

[NMFS, 2024]

Hearing group	Generalized hearing range *
Low-frequency (LF) cetaceans (baleen whales).	7 Hz to 36** kHz
High-frequency (HF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz.
Very High-frequency (VHF) cetaceans (true porpoises, *Kogia,* river dolphins, Cephalorhynchid, *Lagenorhynchus cruciger* and *L. australis*).	200 Hz to 165 kHz.
Phocid pinnipeds (PW) (underwater) (true seals)	40 Hz to 90 kHz.
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 68 kHz.
Phocid pinnipeds (PA) (in-air) (true seals)	42 Hz to 52 kHz.
Otariid pinnipeds (OA) (in-air) (sea lions and fur seals)	90 Hz to 40 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 the ~65–dB threshold from composite audiogram, previous analysis in NMFS (2018), and/or data from Southall *et al.* (2007) and Southall *et al.* (2019). Additionally, animals are able to detect very loud sounds above and below that "generalized" hearing range.

** The Action Proponents split the LF functional hearing group into LF and VLF based on Houser *et al.,* (2024) while NMFS Updated Technical Guidance (NMFS, 2024) does not include these data. NMFS is aware these data and data collected during a final field season by Houser *et al.* (in prep) have implications for the generalized hearing range for low-frequency cetaceans and their weighting function, however, as described in the 2024 Updated Technical Guidance, it is premature for us to propose any changes to our current Updated Technical Guidance. Mysticete hearing data is identified as a special circumstance that could merit reevaluating the acoustic criteria for low-frequency cetaceans in the 2024 Updated Technical Guidance once the data from the final field season is published. Therefore, we anticipate that once the data are published, it will likely necessitate updating this document (*i.e.,* likely after the data gathered in the summer 2024 field season and associated analysis are published).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2024) for a review of available information.

The Navy adjusted these hearing groups using data from recent hearing measurements in minke whales (Houser *et al.,* 2024). These data support separating mysticetes (the LF cetacean marine mammal hearing group in table 17) into two hearing groups, which the Navy designates as "very low-frequency (VLF) cetaceans" and "low-frequency (LF) cetaceans," which follows the recommendations of Southall *et al.* (2019c). Within the Navy's adjusted hearing groups, the VLF cetacean group contains the larger mysticetes (*i.e.,* blue, fin, right, and bowhead whales) and the LF cetacean group contains the mysticete species not included in the VLF group (*e.g.,* minke, humpback, gray, pygmy right whales). Although there have been no direct measurements of hearing sensitivity in the larger mysticetes included in Navy's VLF hearing group, an audible frequency range of approximately 10 Hz to 30 kHz has been estimated from measured vocalization frequencies, observed responses to playback of sounds, and anatomical analyses of the auditory system. The upper frequency limit of hearing in Navy's LF hearing group has been estimated in a minke whale from direct measurements of auditory evoked potentials (Houser *et al.,* 2024).

Potential Effects of Specified Activities on Marine Mammals and Their Habitat

This section provides a discussion of the ways in which components of the specified activity may impact marine mammals and their habitat. The Estimated Take of Marine Mammals section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The Preliminary Analysis and Negligible Impact Determination section considers the content of this section, the Estimated Take of Marine Mammals section, and the Proposed Mitigation Measures section to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and whether those impacts on individuals are likely to adversely affect the species or stock through effects on annual rates of recruitment or survival.

The Action Proponents have requested authorization for the take of marine mammals that may occur incidental to training and testing activities in the HCTT Study Area. The Action Proponents analyzed potential impacts to marine mammals from acoustic and explosive sources and from vessel use in the application. NMFS carefully reviewed the information provided by the Action Proponents and concurs with their synthesis of science, along with independently reviewing applicable scientific research and literature and other information to evaluate the potential effects of the Action Proponents' activities on marine mammals, which are presented in this section (see appendix D in the 2024 HCTT Draft EIS/OEIS for additional information).

Other potential impacts to marine mammals from training and testing activities in the HCTT Study Area were analyzed in the 2024 HCTT Draft EIS/OEIS, in consultation with NMFS as a cooperating agency, and determined to be unlikely to result in marine mammal take. Therefore, the Action Proponents have not requested authorization for take of marine mammals incidental to other components of their proposed Specified Activities, and we agree that incidental take is unlikely to occur from those components. In this proposed rule, NMFS analyzes the potential effects on marine mammals from the activity components that may result in take of marine mammals: exposure to acoustic or explosive stressors including non-impulsive (*i.e.,* sonar and other transducers, and vibratory pile driving) and impulsive (*i.e.,* explosives, impact pile driving, launches, and air guns) stressors and vessel movement.

For the purpose of MMPA incidental take authorizations, NMFS' effects assessments serve four primary purposes: (1) to determine whether the specified activities would have a negligible impact on the affected species or stocks of marine mammals (based on whether it is likely that the activities would adversely affect the species or stocks through effects on annual rates of recruitment or survival); (2) to determine whether the specified activities would have an unmitigable adverse impact on the availability of the species or stocks for subsistence uses; (3) to prescribe the permissible methods of taking (*i.e.,* Level B harassment (behavioral harassment and temporary threshold shift (TTS)), Level A harassment (auditory injury (AUD INJ), non-auditory injury), serious injury, or mortality), including identification of the number and types of take that could occur by harassment, serious injury, or mortality, and to prescribe other means of effecting the least practicable adverse impact on the species or stocks and their habitat (*i.e.,* mitigation measures); and (4) to prescribe requirements pertaining to monitoring and reporting.

In this section, NMFS provides a description of the ways marine mammals may be generally affected by these activities in the form of mortality, physical injury, sensory impairment (permanent and temporary threshold shifts and acoustic masking), physiological responses (particular stress responses), behavioral disturbance, or habitat effects. Explosives and vessel strikes, which have the potential to result in incidental take by serious injury and/or mortality, will be discussed in more detail in the Estimated Take of Marine Mammals section. The Estimated Take of Marine Mammals section also discusses how the potential effects on marine mammals from non-impulsive and impulsive sources relate to the MMPA definitions of Level A Harassment and Level B Harassment, and quantifies those effects that do not qualify as a take under the MMPA. The Preliminary Analysis and Negligible Impact Determination section assesses whether the proposed authorized take would have a negligible impact on the affected species and stocks.

Potential Effects of Underwater Sound on Marine Mammals

The marine soundscape is composed of both ambient and anthropogenic sounds. Ambient sound is defined as the all-encompassing sound in a given place and is usually a composite of sound from many sources both near and far (American National Standards Institute, 1995). The sound level of an area is defined by the total acoustical energy being generated by known and unknown sources, which may include physical (*e.g.,* waves, wind, precipitation, earthquakes, ice, atmospheric sound), biological (*e.g.,* sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (*e.g.,* vessels, dredging, aircraft, construction).

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 activities may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

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 possibly result in one or more of the following: temporary or permanent hearing impairment, other auditory injury, non-auditory physical or physiological effects, behavioral disturbance, stress, and masking (Richardson *et al.,* 1995; Gordon *et al.,* 2003; Nowacek *et al.,* 2007; Southall *et al.,* 2007; Götz *et al.,* 2009, Southall *et al.,* 2019a). 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 auditory injury, as can longer exposures to lower level sounds. Temporary or permanent loss of hearing can occur after exposure to noise and occurs almost exclusively for noise within an animal's hearing range.

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 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 also describe more severe potential effects (*i.e.,* certain non-auditory physical or physiological effects). Potential effects from impulsive sound sources can range in severity from effects such as behavioral disturbance or tactile perception to physical discomfort, slight injury of the internal organs and the auditory system, or, in the case of explosives, more severe injuries or mortality (Yelverton *et al.,* 1973). Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to high levels of underwater sound or as a secondary effect of extreme behavioral responses (*e.g.,* change in dive profile as a result of an avoidance response) 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; Tal *et al.,* 2015).

Hearing

Marine mammals have adapted hearing based on their biology and habitat: amphibious marine mammals (*e.g.,* pinnipeds that spend time on land and underwater) have modified ears that allow them to hear both in-air and in-water, while fully aquatic marine mammals (*e.g.,* cetaceans that are always underwater) have specialized ear adaptations for in-water hearing (Wartzok and Ketten, 1999). These adaptations explain the variation in hearing ability and sensitivity among marine mammals and have led to the characterization of marine mammal functional hearing groups based on those sensitivities: very low-frequency cetaceans (VLF group: blue, fin, right, and bowhead whales), low-frequency cetaceans (LF group: minke, sei, Bryde's, Rice's, humpback, gray, and pygmy right whales), high-frequency (HF) cetaceans (HF group: sperm whales, beaked whales, killer whale, melon-headed whale, false/pygmy killer whale, pilot whales, and some dolphin species), very high-frequency (VHF) cetaceans (VHF group: some dolphin species, porpoises, Amazon River dolphin, *Kogia* species, Baiji, and La Plata dolphin), sirenians (SI) (SI group: manatees, dugongs), otariids (OCW) and other non-phocid marine carnivores (OCA) in water and in air (OCW and OCA groups: sea lion, fur seal, walrus, otter), and phocids in water (PCW) and in air (PCA) (PCW and PCA groups: true seals) (Southall *et al.,* 2019). In Phase III, VLF and LF cetaceans were part of one, combined LF cetacean hearing group. However, as described in the Navy's report ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase 4)'' (U.S. Department of the Navy, 2025), hereafter referred to as the Criteria and Thresholds Technical Report, Houser *et al.* (2024) recently reported obtaining hearing measurements for minke whales, the first direct measurements for a baleen whale species, using auditory evoked potential (AEP) methodology. The Action Proponents incorporated these measurements, as well as Southall *et al.* (2019), into their analysis. They determined that the data support dividing mysticetes into two separate hearing groups: VLF and LF cetaceans, and NMFS concurs, (as described further in the Estimated Take of Marine Mammals section), that this approach is appropriate for this action.

The hearing sensitivity of marine mammals is also directional, meaning the angle between an animal's position and the location of a sound source impacts the animal's hearing threshold, thereby impacting an animal's ability to perceive the sound emanating from that source. This directionality is likely useful for determining the general location of a sound, whether for detection of prey, predators, or members of the same species, and can be dependent upon the frequency of the sound (Accomando *et al.,* 2020; Au and Moore, 1984; Byl *et al.,* 2016; Byl *et al.* 2019; Kastelein *et al.,* 2005; Kastelein *et al.,* 2019; Popov and Supin, 2009).

Acoustic Signaling

An acoustic signal refers to the sound waves used to communicate underwater, and marine mammals use a variety of acoustic signals for socially important functions, such as communicating, as well as biologically important functions, such as echolocating (Richardson *et al.,* 1995; Wartzok and Ketten, 1999). Acoustic signals used for communication are lower frequency (*i.e.,* 20 Hz to 30 kHz) than those signals used for echolocation, which are high-frequency (approximately 10–200 kHz peak frequency) signals used by odontocetes to sense their underwater environment. Lower frequency vocalizations used for communication may have a specific, prominent fundamental frequency (Brady *et al.,* 2021) or have a wide frequency range, depending on the functional hearing group and whether the marine mammal is vocalizing in-water or in-air. Acoustic signals used for echolocation are high-frequency, high-energy sounds with patterns and peak frequencies that are often species-specific (Baumann-Pickering *et al.,* 2013).

Marine mammal species typically produce sounds at frequencies within their own hearing range, though auditory and vocal ranges do not perfectly align (*e.g.,* odontocetes may only hear a portion of the frequencies of an echolocation click). Because determining a species vocal range is easier than determining a species' hearing range, vocal ranges are often used to infer a species' hearing range when species-specific hearing data are not available (*e.g.,* large whale species).

Hearing Loss and Auditory Injury

Marine mammals, like all mammals, lose their ability to hear over time due to age-related degeneration of auditory pathways and sensory cells of the inner ear. This natural, age-related hearing loss is distinct from acute noise-induced hearing loss (Møller, 2013). Noise-induced hearing loss can be temporary (*i.e.,* TTS) or permanent (permanent threshold shift (PTS)), and higher-level sound exposures are more likely to cause PTS or other AUD INJ. For marine mammals, AUD INJ is considered to be possible when sound exposures are sufficient to produce 40 dB of TTS measured approximately 4 minutes after exposure (U.S. Department of the Navy, 2025). Numerous studies have directly examined noise-induced hearing loss in marine mammals by measuring an animal's hearing threshold before and after exposure to intense sounds. The difference between the post-exposure and pre-exposure hearing thresholds is then used to determine the amount of TTS (in dB) that was produced as a result of the sound exposure (see appendix D of the 2024 HCTT Draft EIS/OEIS for additional details). The Navy used these studies to generate exposure functions, which are predictions of the onset of TTS or PTS based on sound frequency, level, and type (continuous or impulsive), for each marine mammal functional hearing group (U.S. Department of the Navy, 2025).

TTS can last from minutes or hours to days (*i.e.,* there is recovery back to baseline/pre-exposure hearing threshold), can occur within a specific frequency range (*i.e.,* an animal might only have a temporary loss of hearing sensitivity within a limited frequency band of its auditory range), and can be of varying amounts (*e.g.,* an animal's hearing sensitivity might be reduced by only 6 dB or reduced by 30 dB). While there is no simple functional relationship between TTS and PTS or other AUD INJ (*e.g.,* neural degeneration), as TTS increases, the likelihood that additional exposure to increased SPL or duration will result in PTS or other injury also increases (see appendix D of the 2024 HCTT Draft EIS/OEIS for additional discussion). Exposure thresholds for the occurrence of AUD INJ, which include the potential for PTS, as well as situations when AUD INJ occurs without PTS, can therefore be defined based on a specific amount of TTS; that is, although an exposure has been shown to produce only TTS, we assume that any additional exposure may result in some AUD INJ. The specific upper limit of TTS is based on experimental data showing amounts of TTS that have not resulted in AUD INJ. In other words, we do not need to know the exact functional relationship between TTS and AUD INJ, we only need to know the upper limit for TTS before some AUD INJ is possible. In severe cases of AUD INJ, 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).

The following physiological mechanisms are thought to play a role in inducing auditory threshold shift: effects to sensory hair cells in the inner ear that reduce their sensitivity; modification of the chemical environment within the sensory cells; residual muscular activity in the middle ear; displacement of certain inner ear membranes; increased blood flow; and post-stimulatory reduction in both efferent and sensory neural output (Southall *et al.,* 2007). The amplitude, duration, frequency, temporal pattern, and energy distribution of sound exposure all can affect the amount of associated threshold shift and the frequency range in which it occurs. Generally, the amount of threshold shift, and the time needed to recover from the effect, increase as amplitude and duration of sound exposure increases. Human non-impulsive noise exposure guidelines are based on the assumption that exposures of equal energy (the same SEL) produce equal amounts of hearing impairment regardless of how the sound energy is distributed in time (NIOSH, 1998). Previous marine mammal TTS studies have also generally supported this equal energy relationship (Southall *et al.,* 2007). SEL is used to predict TTS in marine mammals and is considered a good predictor of TTS for shorter duration exposures than longer duration exposures. The amount of TTS increases with exposure SPL and duration, and is correlated with SEL, but duration of the exposure has a more significant effect on TTS than would be predicted based on SEL alone (*e.g.,* Finneran *et al.,* 2010b; Kastak *et al.,* 2007; Kastak *et al.,* 2005; Kastelein *et al.,* 2014a; Mooney *et al.,* 2009a; Popov *et al.,* 2014; Gransier and Kastelein, 2024). These studies highlight the inherent complexity of predicting TTS onset in marine mammals, as well as the importance of considering exposure duration when assessing potential impacts.

Generally, TTS increases with SEL in a non-linear fashion, where lower SEL exposures will elicit a steady rate of TTS increase while higher SEL exposures will either increase TTS more rapidly or plateau (Finneran, 2015; U.S. Department of the Navy, 2025). Additionally, with sound exposures of equal energy, those that had lower SPL with longer duration were found to induce TTS onset at lower levels than those of higher SPL and shorter duration. Less threshold shift will occur from intermittent sounds than from a continuous exposure with the same energy (some recovery can occur between intermittent exposures) (Kryter *et al.,* 1966; Ward, 1997; Mooney *et al.,* 2009a, 2009b; Finneran *et al.,* 2010; Kastelein *et al.,* 2014; Kastelein *et al.,* 2015). For example, one short, higher SPL sound exposure may induce the same impairment as one longer lower SPL sound, which in turn may cause more impairment than a series of several intermittent softer sounds with the same total energy (Ward, 1997). Additionally, though TTS is temporary, very prolonged or repeated exposure to sound strong enough to elicit TTS, or shorter-term exposure to sound levels well above the TTS threshold, can cause AUD INJ, at least in terrestrial mammals (Kryter, 1985; Lonsbury-Martin *et al.,* 1987).

Although TTS increases non-linearly in marine mammals, recovery from TTS typically occurs in a linear fashion with the logarithm of time (Finneran, 2015; Finneran *et al.,* 2010a; Finneran *et al.,* 2010b; Finneran and Schlundt, 2013; Kastelein *et al.,* 2012a; Kastelein *et al.,* 2012b; Kastelein *et al.,* 2013a; Kastelein *et al.,* 2014a; Kastelein *et al.,* 2014b; Kastelein *et al.,* 2014c; Popov *et al.,* 2014; Popov *et al.,* 2013; Popov *et al.,* 2011; Muslow *et al.,* 2023; Finneran *et al.,* 2023). Considerable variation has been measured in individuals of the same species in both the amount of TTS incurred from similar SELs (Kastelein *et al.,* 2012a; Popov *et al.,* 2013) and the time-to-recovery from TTS (Finneran, 2015; Kastelein *et al.,* 2019e). Many of these studies relied on continuous sound exposures, but intermittent, impulsive sound exposures have also been tested. The sound resulting from an explosive detonation is considered an impulsive sound, but no direct measurements of hearing loss from exposure to explosive sources have been made. Few studies (Finneran *et al.,* 2002; Lucke *et al.,* 2009; Sills *et al.,* 2020; Muslow *et al.,* 2023) using impulsive sounds have produced enough TTS to make predictions about hearing loss due to this source type (see U.S. Department of the Navy, 2025). In general, predictions of TTS based on SEL for this type of sound exposure are likely to overestimate TTS because some recovery from TTS may occur in the quiet periods between impulsive sounds—especially when the duty cycle is low. Peak SPL (unweighted) is also used to predict TTS due to impulsive sounds (Southall *et al.,* 2007; Southall *et al.,* 2019c; U.S. Department of the Navy, 2025).

Specific to land-based missile and target launches (characterized by sudden onset of sound, moderate to high peak sound levels (depending on the type of missile and distance), and short sound duration) although it is possible that some pinnipeds may incur TTS during launches from SNI (TTS is not anticipated during launches from PMRF), hearing impairment has not been measured for pinniped species exposed to launch sounds. Auditory brainstem response (*i.e.,* hearing assessment using measurements of electrical responses of the brain) was used to demonstrate that harbor seals did not exhibit loss in hearing sensitivity following launches of large rockets at Vandenberg Space Force Base (VSFB, formerly Vandenberg Air Force Base) (Thorson *et al.,* 1999; Thorson *et al.,* 1998). However, the hearing tests did not begin until at least 45 minutes after the launch; therefore, harbor seals may have incurred TTS which was undetectable by the time testing began. There was no sign of PTS in any of the harbor seals tested (Thorson *et al.,* 1999; Thorson *et al.,* 1998). Since 2001, no launch events at SNI have exposed pinnipeds to noise levels at or exceeding those where PTS could be incurred. Of note, the range to PTS and

TTS would not reach haulout locations for Hawaiian monk seals on beaches at PMRF (see section 6.3.2 of the application).

Based on measurements of received sound levels during previous launches at SNI (Burke 2017; Holst *et al.,* 2010; Holst *et al.,* 2005a; Holst *et al.,* 2008; Holst *et al.,* 2011; Ugoretz 2016; Ugoretz and Greene Jr. 2012), the Navy expects that there is a very limited potential of TTS for a few of the pinnipeds present, particularly for phocids. Available evidence from launch monitoring at SNI in 2001–2017 suggests that only a limited number of launch events produced sound levels that could elicit TTS for some pinnipeds (Burke 2017; Holst *et al.,* 2008; Holst *et al.,* 2011; Ugoretz 2016; Ugoretz and Greene Jr. 2012). In general, if any TTS were to occur to pinnipeds, it is expected to be mild and reversible. It is possible that some launch sounds as measured close to the launchers may exceed the auditory injury criteria, but it is not expected that any pinnipeds would be close enough to the launchers to be exposed to sounds strong enough to cause auditory injury. Due to the expected sound levels of the activities proposed and the distance of the activity from marine mammal habitat, the effects of sounds from the proposed activities are unlikely to result in auditory injury.

In some cases, intense noise exposures have caused AUD INJ (*e.g.,* loss of cochlear neuron synapses), despite thresholds eventually returning to normal (*i.e.,* it is possible to have AUD INJ without a resulting PTS (*e.g.,* Kujawa and Liberman, 2006, 2009; Fernandez *et al.,* 2015; Ryan *et al.,* 2016; Houser, 2021)). In these situations, however, threshold shifts were 30–50 dB measured 24 hours after the exposure (*i.e.,* there is no evidence that an exposure resulting in less than 40 dB TTS measured a few minutes after exposure can produce AUD INJ). Therefore, an exposure producing 40 dB of TTS, measured a few minutes after exposure, can also be used as an upper limit to prevent AUD INJ (*i.e.,* it is assumed that exposures beyond those capable of causing 40 dB of TTS have the potential to result in INJ (which may or may not result in PTS)).

Irreparable damage to the inner or outer cochlear hair cells may cause PTS; however, other mechanisms are also involved, such as exceeding the elastic limits of certain tissues and membranes in the middle and inner ears and resultant changes in the chemical composition of the inner ear fluids (Southall *et al.,* 2007). When AUD INJ occurs, there is physical damage to the sound receptors in the ear, whereas TTS represents primarily tissue fatigue and is reversible (Southall *et al.,* 2007). AUD INJ is permanent (*i.e.,* there is incomplete recovery back to baseline/pre-exposure levels) but also can occur in a specific frequency range and amount as mentioned above for TTS. 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 less than 40 dB of TTS to constitute AUD INJ. The NMFS Acoustic Updated Technical Guidance (NMFS, 2024), which was used in the assessment of effects for this proposed rule, compiled, interpreted, and synthesized the best available scientific information for noise-induced hearing effects for marine mammals to derive updated thresholds for assessing the impacts of noise on marine mammal hearing.

While many studies have examined noise-induced hearing loss in marine mammals (see Finneran (2015) and Southall *et al.* (2019a) for summaries), published data on the onset of TTS for cetaceans are limited to the captive bottlenose dolphin, beluga, harbor porpoise, and Yangtze finless porpoise, and for pinnipeds in water, measurements of TTS are limited to harbor seals, elephant seals, California sea lions, and bearded seals. These studies examine hearing thresholds measured in marine mammals before and after exposure to intense sounds, which can then be used to determine the amount of threshold shift at various post-exposure times. NMFS has reviewed the available studies, which are summarized below (see also the 2024 HCTT Draft EIS/OEIS which includes additional discussion on TTS studies related to sonar and other transducers).

- The method used to test hearing may affect the resulting amount of measured TTS, with neurophysiological measures producing larger amounts of TTS compared to psychophysical measures (Finneran *et al.,* 2007; Finneran, 2015).
- The amount of TTS varies with the hearing test frequency. As the exposure SPL increases, the frequency at which the maximum TTS occurs also increases (Kastelein *et al.,* 2014b). For high-level exposures, the maximum TTS typically occurs one-half to one octave above the exposure frequency (Finneran *et al.,* 2007; Mooney *et al.,* 2009a; Nachtigall *et al.,* 2004; Popov *et al.,* 2011; Popov *et al.,* 2013; Schlundt *et al.,* 2000). The overall spread of TTS from tonal exposures can therefore extend over a large frequency range (*i.e.,* narrowband exposures can produce broadband (greater than one octave) TTS).
- The amount of TTS increases with exposure SPL and duration and is correlated with SEL, especially if the range of exposure durations is relatively small (Kastak *et al.,* 2007; Kastelein *et al.,* 2014b; Popov *et al.,* 2014). As the exposure duration increases, however, the relationship between TTS and SEL begins to break down. Specifically, duration has a more significant effect on TTS than would be predicted on the basis of SEL alone (Finneran *et al.,* 2010a; Kastak *et al.,* 2005; Mooney *et al.,* 2009a). This means if two exposures have the same SEL but different durations, the exposure with the longer duration (thus lower SPL) will tend to produce more TTS than the exposure with the higher SPL and shorter duration. In most acoustic impact assessments, the scenarios of interest involve shorter duration exposures than the marine mammal experimental data from which impact thresholds are derived; therefore, use of SEL tends to over-estimate the amount of TTS. Despite this, SEL continues to be used in many situations because it is relatively simple, more accurate than SPL alone, and lends itself easily to scenarios involving multiple exposures with different SPL (Finneran, 2015).
- Gradual increases of TTS may not be directly observable with increasing exposure levels, before the onset of PTS (Reichmuth *et al.,* 2019). Similarly, PTS can occur without measurable behavioral modifications (Reichmuth *et al.,* 2019).
- The amount of TTS depends on the exposure frequency. Sounds at low frequencies, well below the region of best sensitivity, are less hazardous than those at higher frequencies, near the region of best sensitivity (Finneran and Schlundt, 2013). The onset of TTS—defined as the exposure level necessary to produce 6 dB of TTS (*i.e.,* clearly above the typical variation in threshold measurements)—also varies with exposure frequency. At the low frequency end of a species' hearing curve, onset-TTS exposure levels are higher compared to those in the region of best sensitivity.
- TTS can accumulate across multiple exposures, but the resulting TTS will be less than the TTS from a single, continuous exposure with the same SEL (Finneran *et al.,* 2010a; Kastelein *et al.,* 2014b; Kastelein *et al.,* 2015b; Mooney *et al.,* 2009b). This means that TTS predictions based on the total, cumulative SEL will overestimate the amount of TTS from

intermittent exposures such as sonars and impulsive sources.

• The amount of observed TTS tends to decrease with increasing time following the exposure; however, the relationship is not monotonic (*i.e.,* increasing exposure does not always increase TTS). The time required for complete recovery of hearing depends on the magnitude of the initial shift; for relatively small shifts recovery may be complete in a few minutes, while large shifts (*e.g.,* approximately 40 dB) may require several days for recovery. Under many circumstances TTS recovers linearly with the logarithm of time (Finneran *et al.,* 2010a, 2010b; Finneran and Schlundt, 2013; Kastelein *et al.,* 2012a; Kastelein *et al.,* 2012b; Kastelein *et al.,* 2013a; Kastelein *et al.,* 2014b; Kastelein *et al.,* 2014c; Popov *et al.,* 2011; Popov *et al.,* 2013; Popov *et al.,* 2014). This means that for each doubling of recovery time, the amount of TTS will decrease by the same amount (*e.g.,* 6 dB recovery per doubling of time).

Nachtigall *et al.* (2018) and Finneran (2018) describe the measurements of hearing sensitivity of multiple odontocete species (*i.e.,* bottlenose dolphin, harbor porpoise, beluga, and false killer whale) when a relatively loud sound was preceded by a warning sound. These captive animals were shown to reduce hearing sensitivity when warned of an impending intense sound. Based on these experimental observations of captive animals, the authors suggest that wild animals may dampen their hearing during prolonged exposures or if conditioned to anticipate intense sounds. Finneran (2018) recommends further investigation of the mechanisms of hearing sensitivity reduction in order to understand the implications for interpretation of existing TTS data obtained from captive animals, notably for considering TTS due to short duration, unpredictable exposures.

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 similar to those discussed in auditory masking, below. 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 takes place 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 a time when communication is critical for successful mother/calf interactions could have more serious impacts if it were in the same frequency band as the necessary vocalizations and of a severity that impeded communication. The fact that animals exposed to high levels of sound that would be expected to result in this physiological response would also be expected to have behavioral responses of a comparatively more severe or sustained nature is potentially more significant than the simple existence of a TTS. However, it is important to note that TTS could occur due to longer exposures to sound at lower levels so that a behavioral response may not be elicited.

Depending on the degree and frequency range, the effects of AUD INJ on an animal could also range in severity, although it is considered generally more serious than TTS because it is a permanent condition (Reichmuth *et al.,* 2019). Of note, reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al.,* 2007), so we can infer that strategies exist for coping with this condition to some degree, though likely not without some cost to the animal.

As the amount of research on hearing sensitivity has grown, so, too, has the understanding that marine mammals may be able to self-mitigate, or protect, against noise-induced hearing loss. An animal may learn to reduce or suppress their hearing sensitivity when warned of an impending intense sound exposure, or if the duty cycle of the sound source is predictable (Finneran, 2018; Finneran et al., 2024; Nachtigall and Supin, 2013, 2014, 2015; Nachtigall et al., 2016a, 2016b, 2016c, 2018). This has been shown with several species, including the false killer whale (Nachtigall and Supin, 2013), bottlenose dolphin (Finneran, 2018; Nachtigall and Supin, 2014, 2015; Nachtigall *et al.,* 2016c), beluga whale (Nachtigall *et al.,* 2016a), and harbor porpoise (Nachtigall *et al.,* 2016b). Additionally, Finneran *et al.* (2023) and Finneran *et al.* (2024) found that odontocetes that had participated in TTS experiments in the past could have learned from that experience and subsequently protected their hearing during new sound exposure experiments.

Behavioral Responses

Behavioral responses to sound are highly variable and context-specific (Nowacek *et al.,* 2007; Southall *et al.,* 2007; Southall *et al.,* 2019). Many different variables can influence an animal's perception of and response to (nature and magnitude) an acoustic event. An animal's prior experience with a sound or sound source affects whether it is less likely (habituation, self-mitigation) or more likely (sensitization) to respond to certain sounds in the future (animals can also be innately predisposed to respond to certain sounds in certain ways) (Southall *et al.,* 2007; Southall *et al.,* 2016; Finneran, 2018; Finneran *et al.,* 2024; Nachtigall and Supin, 2013, 2014, 2015; Nachtigall *et al.,* 2015; Nachtigall *et al.,* 2016a, 2018; Nachtigall *et al.,* 2016b). Related to the sound itself, the perceived proximity of the sound, bearing of the sound (approaching vs. retreating), the similarity of a sound to biologically relevant sounds in the animal's environment (*i.e.,* calls of predators, prey, or conspecifics), familiarity of the sound, and navigational constraints may affect the way an animal responds to the sound (Ellison *et al.,* 2012; Southall *et al.,* 2007, DeRuiter *et al.,* 2013a, Southall *et al.,* 2021; Wartzok *et al.,* 2003). Individuals (of different age, gender, reproductive status, *etc.*) among most populations will have variable hearing capabilities, and differing behavioral sensitivities to sounds that will be affected by prior conditioning, experience, and current activities of those individuals. Southall *et al.* (2007) and Southall *et al.* (2021) have developed and subsequently refined methods developed to categorize and assess the severity of acute behavioral responses, considering impacts to individuals that may consequently impact populations. Often, specific acoustic features of the sound and contextual variables (*i.e.,* proximity, duration, or recurrence of the sound or the current behavior that the marine mammal is engaged in or its prior experience), as well as entirely separate factors such as the physical presence of a nearby vessel, may be more relevant to the animal's response than the received level alone.

Studies by DeRuiter *et al.* (2013a) indicate that variability of responses to acoustic stimuli depends not only on the species receiving the sound and the sound source, but also on the social, behavioral, or environmental contexts of exposure. Another study by DeRuiter *et al.* (2013b) examined behavioral responses of goose-beaked whales to MF sonar and found that whales responded strongly at low received levels (89–127 dB re 1 μPa) by ceasing normal fluking and echolocation, swimming rapidly away, and extending both dive duration and subsequent non-foraging intervals when the sound source was 2.1–5.9 mi (3.4–9.5 km) away. Importantly, this study also showed that whales exposed to a similar range of received levels (78–106 dB re: 1 μPa) from distant sonar exercises 73.3 mi (118 km away) did not elicit such responses, suggesting that context may moderate responses.

Ellison *et al.* (2012) outlined an approach to assessing the effects of sound on marine mammals that incorporates contextual-based factors. The authors recommend considering not just the received level of sound, but also the activity the animal is engaged in at the time the sound is received, the nature and novelty of the sound (*i.e.,* whether this a new sound from the animal's perspective), and the distance between the sound source and the animal. They submit that this ''exposure context,'' as described, greatly influences the type of behavioral response exhibited by the animal. Forney *et al.* (2017) also point out that an apparent lack of response (*e.g.,* no displacement or avoidance of a sound source) may not necessarily mean there is no cost to the individual or population, as some resources or habitats may be of such high value that animals may choose to stay, even when experiencing stress or hearing loss. Forney *et al.* (2017) recommend considering both the costs of remaining in an area of noise exposure such as TTS, PTS, or masking, which could lead to an increased risk of predation or other threats or a decreased capability to forage, and the costs of displacement, including potential increased risk of vessel strike, increased risks of predation or competition for resources, or decreased habitat suitable for foraging, resting, or socializing. This sort of contextual information is challenging to predict with accuracy for ongoing activities that occur over large spatial and temporal expanses. However, distance is one contextual factor for which data exist to quantitatively inform a take estimate, and the method for predicting Level B harassment in this proposed rule does consider distance to the source. Other factors are often considered qualitatively in the analysis of the likely consequences of sound exposure, where supporting information is available.

Friedlaender *et al.* (2016) provided the first integration of direct measures of prey distribution and density variables incorporated into across-individual analyses of behavior responses of blue whales to sonar, and demonstrated a five-fold increase in the ability to quantify variability in blue whale diving behavior. These results illustrate that responses evaluated without such measurements for foraging animals may be misleading, which again illustrates the context-dependent nature of the probability of response.

Exposure of marine mammals to sound sources can result in, but is not limited to, no response or any of the following observable responses: increased alertness; orientation or attraction to a sound source; vocal modifications; cessation of feeding; cessation of social interaction; alteration of movement or diving behavior; habitat abandonment (temporary or permanent); and, in severe cases, panic, flight, stampede, or stranding, potentially resulting in death (Southall *et al.,* 2007). A review of marine mammal responses to anthropogenic sound was first conducted by Richardson (1995). More recent reviews (Nowacek *et al.,* 2007; DeRuiter *et al.,* 2013a and 2013b; Ellison *et al.,* 2012; Gomez *et al.,* 2016) address studies conducted since 1995 and focused on observations where the received sound level of the exposed marine mammal(s) was known or could be estimated. Gomez *et al.* (2016) conducted a review of the literature considering the contextual information of exposure in addition to received level and found that higher received levels were not always associated with more severe behavioral responses and vice versa. Southall *et al.* (2016) states that results demonstrate that some individuals of different species display clear yet varied responses, some of which have negative implications, while others appear to tolerate high levels, and that responses may not be fully predictable with simple acoustic exposure metrics (*e.g.,* received sound level). Rather, the authors state that differences among species and individuals along with contextual aspects of exposure (*e.g.,* behavioral state) appear to affect response probability (Southall *et al.,* 2019). The following parts provide examples of behavioral responses to stressors that provide an idea of the variability in responses that would be expected given the differential sensitivities of marine mammal species to sound and the wide range of potential acoustic sources to which a marine mammal may be exposed. Behavioral responses that could occur for a given sound exposure should be determined from the literature that is available for each species (see section D.4.5 (Behavioral Reactions) of the 2024 HCTT Draft EIS/OEIS for a comprehensive list of behavioral studies and species-specific findings) or extrapolated from closely related species when no information exists, along with contextual factors.

Responses Due to Sonar and Other Transducers—

Mysticetes responses to sonar and other duty-cycled tonal sounds are dependent upon the characteristics of the signal, behavioral state of the animal, sensitivity and previous experience of an individual, and other contextual factors including distance of the source, movement of the source, physical presence of vessels, time of year, and geographic location (Goldbogen *et al.,* 2013; Harris *et al.,* 2019a; Harris *et al.,* 2015; Martin *et al.,* 2015; Sivle *et al.,* 2015b). For example, a behavioral response study (BRS) in Southern California demonstrated that individual behavioral state was critically important in determining response of blue whales to Navy sonar. In this BRS, some blue whales engaged in deep (greater than 164 ft (50 m)) feeding behavior had greater dive responses than those in shallow feeding or non-feeding conditions, while some blue whales that were engaged in shallow feeding behavior demonstrated no clear changes in diving or movement even when received levels were high (approximately 160 dB re 1 μPa) from exposures to 3–4 kHz sonar signals, while others showed a clear response at exposures at lower received level of sonar and pseudorandom noise (Goldbogen *et al.,* 2013). Generally, behavioral responses were brief and of low to moderate severity, and the whales returned to baseline behavior shortly after the end of the acoustic exposure (DeRuiter *et al.,* 2017; Goldbogen *et al.,* 2013; Southall *et al.,* 2019c). To better understand the context of these behavioral responses, Friedlaender *et al.* (2016) mapped the prey field of the deep-diving blue whales and found that the response to sound was more apparent for individuals engaged in feeding than those that were not. The probability of a moderate behavioral response increased when the source was closer for these foraging blue whales, although there was a high degree of uncertainty in that relationship (Southall *et al.,* 2019b). In the same BRS, none of the tagged fin whales demonstrated more than a brief or minor response regardless of their behavioral state (Harris *et al.,* 2019a). The fin whales were exposed to both mid-frequency simulated sonar and pseudorandom noise of similar frequency, duration, and source level. They were less sensitive to disturbance than blue whales, with no significant differences in response between behavioral states or signal types. The authors rated responses as low-to-moderate severity with no negative impact to foraging success (Southall *et al.,* 2023).

Similarly, while the rates of foraging lunges decrease in humpback whales due to sonar exposure, there was variability in the response across individuals, with one animal ceasing to forage completely and another animal starting to forage during the exposure (Sivle *et al.,* 2016). In addition, almost half of the animals that exhibited avoidance behavior were foraging before the exposure, but the others were not; the animals that exhibited avoidance behavior while not feeding responded at a slightly lower received level and greater distance than those that were feeding (Wensveen *et al.,* 2017). These findings indicate that the behavioral state of the animal plays a role in the type and severity of a behavioral response. Henderson *et al.* (2019) examined tagged humpback whale dive and movement behavior, including individuals incidentally exposed to Navy sonar during training activities, at the PMRF off Kauaʻi, Hawaii. Tracking data showed that, regardless of exposure to sonar, individual humpbacks spent limited time, no more than a few days, in the vicinity of Kauaʻi. Potential behavioral responses due to sonar exposure were limited and may have been influenced by breeding and social behaviors. Martin *et al.* (2015) found that the density of calling minke whales was reduced during periods of Navy training involving sonar relative to the periods before training began and increased again in the days following the completion of training activities. The responses of individual whales could not be assessed, so in this case it is unknown whether the decrease in calling animals indicated that the animals left the range or simply ceased calling. Harris *et al.* (2019b) utilized acoustically generated minke whale tracks to statistically demonstrate changes in the spatial distribution of minke whale acoustic presence before, during, and after surface ship MFAS training. The spatial distribution of probability of acoustic presence was different in the ''during'' phase compared to the ''before'' phase, and the probability of presence at the center of ship activity during MFAS training was close to zero for both years. The ''after'' phases for both years retained lower probabilities of presence suggesting the return to baseline conditions may take more than five days. The results show a clear spatial redistribution of calling minke whales during surface ship MFAS training, however a limitation of passive acoustic monitoring is that one cannot conclude if the whales moved away, went silent, or a combination of the two.

Building on this work, Durbach *et al.* (2021) used the same data and determined that individual minke whales tended to be in either a fast or slow movement behavior state while on the missile range, where whales tended to be in the slow state in baseline or before periods but transitioned into the fast state with more directed movement during sonar exposures. They also moved away from the area of sonar activity on the range, either to the north or east depending on where the activity was located; this explains the spatial redistribution found by Harris *et al.* (2019b). Minke whales were also more likely to stop calling when in the fast state, regardless of sonar activity, or when in the slow state during sonar activity (Durbach *et al.,* 2021). Similarly, minke whale detections were reduced or ceased altogether during periods of sonar use off Jacksonville, Florida, (Norris *et al.,* 2012; Simeone *et al.,* 2015; U.S. Department of the Navy, 2013), especially with an increased ping rate (Charif *et al.,* 2015).

Odontocetes have varied, context-dependent behavioral responses to sonar and other transducers. Much of the research on odontocetes has been focused on understanding the impacts of sonar and other transducers on beaked whales because they were hypothesized to be more susceptible to behavioral disturbance after several strandings of beaked whales in which military MFAS was identified as a contributing factor (see *Stranding and Mortality* section). Subsequent BRSs have shown that beaked whales are likely more sensitive to disturbance than most other cetaceans. Many species of odontocetes have been studied during BRSs, including Blainville's beaked whale, goose-beaked whale, Baird's beaked whale, northern bottlenose whale, harbor porpoise, pilot whale, killer whale, sperm whale, false killer whale, melon-headed whale, bottlenose dolphin, rough-toothed dolphin, Risso's dolphin, Pacific white-sided dolphin, and Commerson's dolphin. Observed responses by Blainville's beaked whales, goose-beaked whales, Baird's beaked whales, and northern bottlenose whales (the largest of the beaked whales), to mid-frequency sonar sounds include cessation of clicking, decline in group vocal periods, termination of foraging dives, changes in direction to avoid the sound source, slower ascent rates to the surface, longer deep and shallow dive durations, and other unusual dive behaviors (DeRuiter *et al.,* 2013b; Hewitt *et al.,* 2022; Jacobson *et al.,* 2022; McCarthy *et al.,* 2011; Miller *et al.,* 2015; Moretti *et al.,* 2014; Southall *et al.,* 2011; Stimpert *et al.,* 2014; Tyack *et al.,* 2011).

During a BRS in Southern California, a tagged Baird's beaked whale exposed to simulated MFA sonar within 3 km increased swim speed and modified its dive behavior (Stimpert *et al.,* 2014). One goose-beaked whale was also incidentally exposed to real Navy sonar located over 62.1 mi (100 km) away in addition to the source used in the controlled exposure study, and the authors did not detect similar responses at comparable received levels. Received levels from the MFA sonar signals from the controlled (2.1 to 5.9 mi (3.4 to 9.5 km)) exposures were calculated as 84–144 dB re 1 µPa, and incidental (73.3 mi (118 km)) exposures were calculated as 78–106 dB re 1 µPa, indicating that context of the exposures (*e.g.,* source proximity, controlled source ramp-up) may have been a significant factor in the responses to the simulated sonars (DeRuiter *et al.,* 2013b).

Long-term tagging work during the same BRS demonstrated that the longer duration dives considered a behavioral response by DeRuiter *et al.* (2013b) fell within the normal range of dive durations found for eight tagged goose-beaked whales on the Southern California Offshore Range (Schorr *et al.,* 2014). However, the longer inter-deep dive intervals found by DeRuiter *et al.* (2013b), which were among the longest found by Schorr *et al.* (2014) and Falcone *et al.* (2017), may indicate a response to sonar. Williams *et al.* (2017) note that during normal deep dives or during fast swim speeds, beaked whales and other marine mammals use strategies to reduce their stroke rates (*e.g.,* leaping, wave surfing when swimming, interspersing glides between bouts of stroking when diving). The authors determined that in the post-exposure dives by the tagged goose-beaked whales described in DeRuiter *et al.* (2013b), the whales ceased gliding and swam with almost continuous strokes. This change in swim behavior was calculated to increase metabolic costs by about 30.5 percent and increase the amount of energy expending on fast swim speeds from 27–59 percent of their overall energy budget. This repartitioning of energy was detected in the model up to 1.7 hours after the single sonar exposure. Therefore, while the overall post-exposure dive durations were similar, the metabolic energy calculated by Williams *et al.* (2017) was higher. However, Southall *et al.* (2019a) found that prey availability was higher in the western area of the Southern California Offshore Range where goose-beaked whales preferentially occurred, while prey resources were lower in the eastern area and moderate in the area just north of the Range. This high prey availability may indicate that goose-beaked whales need fewer foraging dives to meet energy requirements than would be needed in another area with fewer resources.

During a BRS in Norway, northern bottlenose whales avoided a sonar sound source over a wide range of distances (0.5 to 17.4 mi (0.8 to 28 km)) and estimated avoidance thresholds ranging from received SPLs of 117 to 126 dB re 1 μPa. The behavioral response characteristics and avoidance thresholds were comparable to those previously observed in beaked whale studies; however, researchers did not observe an effect of distance on behavioral response and found that onset and intensity of behavioral response were better predicted by received SPL. There was one instance where an individual northern bottlenose whale approached the vessel, circled the sound source (source level was only 122 dB re 1 μPa), and resumed foraging after the exposure. Conversely, one northern bottlenose whale exposed to a sonar source was documented performing the longest and deepest dive on record for the species, and continued swimming away from the source for more than 7 hours (Miller *et al.,* 2015; Siegal *et al.,* 2022; Wensveen *et al.,* 2019).

Research on Blainville's beaked whales at the Atlantic Undersea Test and Evaluation Center (AUTEC) range has shown that individuals move off-range during sonar use, only returning after the cessation of sonar transmission (Boyd *et al.,* 2009; Henderson *et al.,* 2015; Jones-Todd *et al.,* 2021; Manzano-Roth *et al.,* 2022; Manzano-Roth *et al.,* 2016; McCarthy *et al.,* 2011; Tyack *et al.,* 2011). Five Blainville's beaked whales estimated to be within 1.2 to 18 mi (2 to 29 km) of the AUTEC range at the onset of active sonar were displaced a maximum of 17.4 to 42.3 mi (28 to 68 km) after moving away from the range, although one individual did approach the range during active sonar use. Researchers found a decline in deep dives at the onset of the training and an increase in time spent on foraging dives as whales moved away from the range. Predicted received levels at which presumed responses were observed were comparable to those previously observed in beaked whale studies. Acoustic data indicated that vocal periods were detected on the range within 72 hours after training ended (Joyce *et al.,* 2019). However, Blainville's beaked whales have been documented to remain on-range to forage throughout the year (Henderson *et al.,* 2016), indicating the AUTEC range may be a preferred foraging habitat regardless of the effects of active sonar noise, or it could be that there are no long-term consequences of the sonar activity. In the SOCAL Range Complex, researchers conducting photo-identification studies have identified approximately 100 individual goose-beaked whales, with 40 percent having been seen in one or more prior years, with re-sightings up to 7 years apart, indicating a possible on-range resident population (Falcone and Schorr, 2014; Falcone *et al.,* 2009).

The probability of Blainville's beaked whale group vocal periods on the PMRF were modeled during periods of (1) no naval activity, (2) naval activity without hull-mounted MFA sonar, and (3) naval activity with hull-mounted MFA sonar (Jacobson *et al.,* 2022). At a received level of 150 dB re 1 μPa RMS, the probability of detecting a group vocal period during MFA sonar use decreased by 77 percent compared to periods when general training activity was ongoing, and by 87 percent compared to baseline (no naval activity) conditions. Jacobsen et al (2022) found a greater reduction in probability of a group vocal period with MFA sonar than observed in a prior study of the same species at the AUTEC range (Moretti *et al.,* 2014), which may be due to the baseline period in the AUTEC study including naval activity without MFA sonar, potentially lowering the baseline group vocal period activity in that study, or due to differences in the residency of the populations at each range.

Stanistreet *et al.* (2022) used passive acoustic recordings during a multinational navy activity to assess marine mammal acoustic presence and behavioral response to especially long bouts of sonar lasting up to 13 consecutive hours, occurring repeatedly over 8 days (median and maximum SPL = 120 dB and 164 dB). Goose-beaked whales and sperm whales substantially reduced how often they produced clicks during sonar, indicating a decrease or cessation in foraging behavior. Few previous studies have shown sustained changes in foraging or displacement of sperm whales, but there was an absence of sperm whale clicks for 6 consecutive days of sonar activity. Sperm whales returned to baseline levels of clicks within days after the activity, but beaked whale detection rates remained low even 7 days after the exercise. In addition, there were no detections from a Mesoplodon beaked whale species within the area during, and at least 7 days after, the sonar activity. Clicks from northern bottlenose whales and Sowerby's beaked whales were also detected but were not frequent enough at the recording site used to compare clicks between baseline and sonar conditions.

Goose-beaked whale behavioral responses (*i.e.,* deep and shallow dive durations, surface interval durations, inter-deep dive intervals) on the Southern California Anti-Submarine Warfare Range were modeled against predictor values that included helicopter dipping sonar, mid-power MFA sonar and hull-mounted, high-power MFA sonar along with other non-MFA sonar predictors (Falcone *et al.,* 2017). Falcone *et al.* (2017) found both shallow and deep dive durations increased as the proximity to both mid- and high-powered sources decreased and found that surface intervals and inter-deep dive intervals increased in the presence of both types of sonars (helicopter dipping and hull-mounted), although surface intervals shortened during periods without MFA sonar. Proximity of source and receiver were important considerations, as the responses to the mid-power MFA sonar at closer ranges were comparable to the responses to the higher source level vessel sonar, as was the context of the exposure. Helicopter dipping sonars are shorter duration and randomly located, therefore more difficult to predict or track by beaked whales and potentially more likely to elicit a response, especially at closer distances (3.7 to 15.5 mi (6 to 25 km)) (Falcone *et al.,* 2017).

Sea floor depths and quantity of light (*i.e.,* lunar cycle) are also important variables to consider in BRSs, as goose-beaked whale foraging dive depth increased with sea floor depth (maximum 6,561.7 ft (2,000 m)) and the amount of time spent at foraging depths (and likely foraging) was greater at night (likely avoiding predation by staying deeper during periods of bright lunar illumination), although they spent more time near the surface during the night, as well, particularly on dark nights with little moonlight, (Barlow *et al.,* 2020). Sonar occurred during 10 percent of the dives studied and had little effect on the resulting dive metrics. Watwood *et al.* (2017) found that the longer the duration of a sonar event, the greater reduction in detected goose-beaked whale group dives and, as helicopter dipping events occurred more frequently but with shorter durations than periods of hull-mounted sonar, when looking at the number of detected group dives there was a greater reduction during periods of hull-mounted sonar than during helicopter dipping sonar. DiMarzio *et al.* (2019) also found that group vocal periods (*i.e.,* clusters of foraging pulses), on average, decreased during sonar events on the Southern California Anti-Submarine Warfare Range, though the decline from before the event to during the event was significantly less for helicopter dipping events than hull-mounted events, and there was no difference in the magnitude of the decline between vessel-only events and events with both vessels and helicopters. Manzano-Roth *et al.* (2022) analyzed long-term passive acoustic monitoring data from the PMRF in Kauaʽi, Hawaii, and found beaked whales reduced group vocal periods during submarine command course events and remained low for a minimum of 3 days after the MFA sonar activity.

Harbor porpoise behavioral responses have been researched extensively using acoustic deterrent and acoustic harassment devices; however, BRSs using sonar are limited. Kastelein *et al.* (2018b) found harbor porpoises did not respond to low-duty cycle mid-frequency sonar tones (3.5–4.1 kHz at 2.7 percent duty cycle; *e.g.,* one tone per minute) at any received level, but one individual did respond (*i.e.,* increased jumping, increased respiration rates) to high-duty cycle sonar tones (3.5–4.1 kHz at 96 percent duty cycle; *e.g.,* continuous tone for almost a minute).

Behavioral responses by odontocetes (other than beaked whales and harbor porpoises) to sonar and other transducers include horizontal avoidance, reduced breathing rates, changes in behavioral state, changes in dive behavior (Antunes *et al.,* 2014; Isojunno *et al.,* 2018; Isojunno *et al.,* 2017; Isojunno *et al.,* 2020; Miller, 2012; Miller *et al.,* 2011; Miller *et al.,* 2014; Southall *et al.,* 2024), and, in one study, separation of a killer whale calf from its group (Miller *et al.,* 2011). Some species of dolphin (*e.g.,* bottlenose, spotted, spinner, Clymene, Pacific white-sided, rough-toothed) are frequently documented bowriding with vessels and the drive to engage in bowriding, whether for pleasure or energetic savings (Fiori *et al.,* 2024) may supersede the impact of associated sonar noise (Würsig *et al.,* 1998).

In controlled exposure experiments on captive odontocetes, Houser *et al.* (2013a) recorded behavioral responses from bottlenose dolphins with 3 kHz sonar-like tones between 115–185 dB re 1 μPa, and individuals across 10 trials demonstrated a 50 percent probability of response at 172 dB re 1 μPa. Multiple studies have been conducted on bottlenose dolphins and beluga whales to measure TTS (Finneran *et al.,* 2003a; Finneran *et al.,* 2001; Finneran *et al.,* 2005; Finneran and Schlundt, 2004; Schlundt *et al.,* 2000). During these studies, when individuals were presented with 1-second tones up to 203 dB re 1 μPa, responses included changes in respiration rate, fluke slaps, and a refusal to participate or return to the location of the sound stimulus, including what appeared to be deliberate attempts by animals to avoid a sound exposure or to avoid the location of the exposure site during subsequent tests (Finneran *et al.,* 2002; Schlundt *et al.,* 2000). Bottlenose dolphins exposed to more intense 1-second tones exhibited short-term changes in behavior above received levels of 178–193 dB re 1 μPa, and beluga whales did so at received levels of 180–196 dB re 1 μPa and above.

While several opportunistic observations of odontocete (other than beaked whales and harbor porpoises) responses have been recorded during previous Navy activities and BRSs that employed sonar and sonar-like sources, it is difficult to definitively attribute responses of non-focal species to sonar exposure. Responses range from no response to potential highlight-impactful responses, such as the separation of a killer whale calf from its group (Miller *et al.,* 2011). This may be due, in part, to the variety of species and sensitivities of the odontocete taxonomic group, as well as the breadth of study types conducted and field observations, leading to the assessment of both contextually driven and dose-based responses. The available data indicate exposures to sonar in close proximity and with multiple vessels approaching an animal likely lead to higher-level responses by most odontocete species, regardless of received level or behavioral state. However, when sources are further away and moving in variable directions, behavioral responses are likely driven by behavioral state, individual experience, or species-level sensitivities, as well as exposure duration and received level, with the likelihood of response increasing with increased received levels. As such, it is expected odontocete behavioral responses to sonar and other transducers will vary by species, populations, and individuals, and long-term consequences or population-level effects are likely dependent upon the frequency and duration of the exposure and resulting behavioral response.

Pinniped behavioral response to sonar and other transducers is context-dependent (*e.g.,* Hastie *et al.,* 2014; Southall *et al.,* 2019). All studies on pinniped response to sonar thus far have been limited to captive animals, though, based on exposures of wild pinnipeds to vessel noise and impulsive sounds (see Responses Due to Vessel Noise section and Responses Due to Impulsive Noise section below), pinnipeds may only respond strongly to military sonar that is in close proximity or approaching an animal. Kvadsheim *et al.* (2010b) found that captive hooded seals exhibited avoidance response to sonar signals between 1–7 kHz (160 to 170 dB re 1 μPa RMS) by reducing diving activity, rapid surface swimming away from the source, and eventually moving to areas of least SPL. However, the authors noted a rapid adaptation in behavior (passive surface floating) during the second and subsequent exposures, indicating a level of habituation within a short amount of time. Kastelein *et al.* (2015c) exposed captive harbor seals to three different sonar signals at 25 kHz with variable waveform characteristics and duty cycles and found individuals responded to a frequency modulated signal at received levels over 137 dB re 1 μPa by hauling out more, swimming faster, and raising their heads or jumping out of the water. However, seals did not respond to a continuous wave or combination signals at any received level (up to 156 dB re 1 μPa). Houser *et al.* (2013a) conducted a study to determine behavioral responses of captive California sea lions to MFA sonar at various received levels (125 to 185 dB re 1 μPa). They found younger animals (less than 2 years old) were more likely to respond than older animals and responses included increased respiration rate, increased time spent submerged, refusal to participate in a repetitive task, and hauling out. Most responses below 155 dB re 1 μPa were changes in respiration, while more severe responses (*i.e.,* refusing to participate, hauling out) began to occur over 170 dB re 1 μPa, and many of the most severe responses came from the young sea lions.

Responses Due to Impulsive Noise—

Impulsive signals have a rapid rise time and higher instantaneous peak pressure than other signal types, particularly at close range, which means they are more likely to cause startle or avoidance responses. At long distances, however, the rise time increases as the signal duration lengthens (similar to a ‘‘ringing’’ sound), making the impulsive signal more similar to a non-impulsive signal (Hastie *et al.,* 2019; Martin *et al.,* 2020). Behavioral responses from explosive sounds are likely to be similar to responses studied for other impulsive noise, such as those produced by air guns and impact pile driving. Data on behavioral responses to impulsive sound sources are limited across all marine mammal groups, with only a few studies available for mysticetes and odontocetes.

Mysticetes have varied responses to impulsive sound sources, including avoidance, aggressive directed movement towards the source, reduced surface intervals, altered swimming behavior, and changes in vocalization rates (Gordon *et al.,* 2003; McCauley *et al.,* 2000a; Richardson *et al.,* 1985; Southall *et al.,* 2007). Studies have been conducted on many baleen whale species, including gray, humpback, blue, fin, and bowhead whales; it is assumed that these responses are representative of all baleen whale species. The behavioral state of the whale seems to be an integral part of whether the animal responds and how they respond, as does the location and movement of the sound source, more than the received level of the sound.

If an individual is engaged in migratory behavior, it may be more likely to respond to impulsive noise, and some species may be more sensitive than others. Migrating gray whales showed avoidance responses to seismic vessels at received levels between 164 and 190 dB re 1 µPa (Malme *et al.,* 1986, Malme *et al.,* 1988). In one study, McCauley *et al.* (1998) found that migrating humpback whales in Australia showed avoidance behavior at ranges of 3.1–5 mi (5–8 km) from a seismic array during observational studies and controlled exposure experiments, and another study found humpback whales in Australia decreased their dive times and reduced their swimming speeds (Dunlop *et al.,* 2015). However, when comparing received levels and behavioral responses between air gun ramp-up versus constant noise level of air guns, humpback whales did not change their dive behavior but did deviate from their predicted heading and decreased their swim speeds, deviating more during the constant noise source trials but reducing swim speeds more during ramp-up trials (Dunlop *et al.,* 2016). In both cases, there was no dose-response relationship with the received level of the air gun noise, and similar responses were observed in control trials without air guns (vessel movement remained constant across trials), so some responses may have been due to vessel presence and not received level from the air guns. Social interactions between males and mother-calf pairs were reduced in the presence of vessels towing seismic air gun arrays, regardless of whether the air guns were active or not; which indicates that it was likely the presence of vessels (rather than the impulsive noise generated from active air guns) that affected humpback whale behavior (Dunlop *et al.,* 2020).

Proximity of the impulsive source is another important factor to consider when assessing the potential for behavioral responses in marine mammals. Dunlop *et al.* (2017) found that groups of humpback whales were more likely to avoid a smaller air gun array at closer proximity than a larger air gun array, despite the same received level, showing the difference in response between arrays has more to do with the combined effects of received level and source proximity. In this study, responses were varied and generally small, with short-term course deviations of about 1,640 ft (500 m). Studies on bowhead whales have shown they may be more sensitive than other species to impulsive noise, as individuals have shown clear changes in diving and breathing patterns up to 45.4 mi (73 km) from seismic vessels with received levels as low as 125 dB re 1 µPa (Malme *et al.* 1988). Richardson *et al.* (1995b) documented bowhead whales exhibiting avoidance behaviors at a distance of more than 12.4 mi (20 km) from seismic vessels when received levels were as low as 120 dB re 1 µPa, although most did not show active avoidance until 5 mi (8 km) from the source. Although bowhead whales may avoid the area around seismic surveys, from 3.7 to 5 mi (6 to 8 km) (Koski and Johnson 1987, as cited in Gordon *et al.,* 2003) out to 12.4 or 18.6 mi (20 or 30 km) (Richardson *et al.,* 1999), a study by Robertson *et al.* (2013) supports the idea that behavioral responses are contextually dependent, and that during seismic operations, bowhead whales may be less ''available'' for counting due to alterations in dive behavior but that they may not have completely vacated the area.

In contrast, noise from seismic surveys was not found to impact feeding behavior or exhalation rates in western gray whales while resting or diving off the coast of Russia (Gailey *et al.,* 2007; Yazvenko *et al.,* 2007); however, the increase in vessel traffic associated with surveys and the proximity of the vessels to the whales did affect the orientation of the whales relative to the vessels and shortened their dive-surface intervals (Gailey *et al.,* 2016). They also increased their speed and distance from the noise source and have been documented in one case study swimming towards shore to avoid an approaching seismic vessel (Gailey *et al.,* 2022). Todd *et al.* (1996) found no clear short-term behavioral responses by foraging humpbacks to explosions associated with construction operations in Newfoundland but did see a trend of increased rates of net entanglement closer to the noise source, possibly indicating a reduction in net detection associated with the noise through masking or TTS. Distributions of fin and minke whales were modeled with multiple environmental variables and with the occurrence or absence of seismic surveys, and no evidence of a decrease in sighting rates relative to seismic activity was found for either species (Vilela *et al.,* 2016). Their distributions were driven entirely by environmental variables, particularly those linked to prey, including warmer sea surface temperatures, higher chlorophyll-a values, and higher photosynthetically available radiation (a measure of primary productivity). Sighting rates based on over 8,000 hours of baleen and toothed whale survey data were compared on regular vessel surveys versus both active and passive periods of seismic surveys (Kavanagh *et al.,* 2019). Models of sighting numbers were developed, and it was determined that baleen whale sightings were reduced by 88 percent during active and 87 percent during inactive phases of seismic surveys compared to regular surveys. These results seemed to occur regardless of geographic location of the survey; however, when only comparing active versus inactive periods of seismic surveys the geographic location did seem to affect the change in sighting rates.

Mysticetes seem to be the most behaviorally sensitive taxonomic group of marine mammals to impulsive sound sources, with possible avoidance responses occurring out to 18.6 mi (30 km) and vocal changes occurring in response to sounds over 62.1 mi (100 km) away. However, they are also the most studied taxonomic group, yielding a larger sample size and greater chance of finding behavioral responses to impulsive noise. Also, their responses appear to be behavior-dependent, with most avoidance responses occurring during migration behavior and little observed response during feeding behavior. These response patterns are likely to hold true for impulsive sources used by the Action Proponents; however, their impulsive sources would largely be stationary (*e.g.,* explosives fired at a fixed target, small air guns), and short term (hours rather than days or weeks) versus in the aforementioned studies, so responses would likely occur in closer proximity to animals or not at all.

Odontocete responses to impulsive noise are not well studied and the majority of data have come from seismic (*i.e.,* air gun) surveys, pile driving, and construction activities, while only a few studies have been done to understand how explosive sounds impact odontocetes. What data are available show they may be less sensitive than mysticetes to impulsive sound and that responses occur at closer distances. This may be due to the predominance of low-frequency sound associated with impulsive sources that propagates across long distances and overlaps with the range of best hearing for mysticetes but is below that range for odontocetes. Even harbor porpoises—shown to be highly sensitive to most sound sources, avoiding both stationary (*e.g.,* pile driving) and moving (*e.g.,* seismic survey vessels) impulsive sound sources out to approximately 12.4 mi (20 km) (*e.g.,* Haelters *et al.,* 2014; Pirotta *et al.,* 2014)—have short-term responses, returning to an area within hours upon cessation of the impulsive noise.

Although odontocetes are generally considered less sensitive, impulsive noise does impact toothed whales in a variety of ways. In one study, dolphin detections were compared during 30 second periods before, during, and after underwater detonations near naval mine neutralization exercises in Virginia Capes Operating Area. Lammers *et al.* (2017) found that within 30 seconds after an explosion, the immediate response was an increase in whistles compared to the 30 seconds before an explosion, and that there was a reduction in dolphin acoustic activity during the day of and day after the exercise within 3.7 mi (6 km). This held true only during daytime, as nighttime activity did not appear different than before the exercise, and two days after the explosion there seemed to be an increase in daytime acoustic activity, indicating dolphins may have returned to the area or resumed vocalizations (Lammers *et al.,* 2017). Weaver (2015) documented potential sex-based differences in behavioral responses to impulsive noise during construction (including blasting) of a bridge over a waterway commonly used by bottlenose dolphins, where females decreased area use and males continued using the area, perhaps indicating differential habitat uses.

When exposed to multiple impulses from a seismic air gun, Finneran *et al.* (2015) noted some captive dolphins turned their heads away from the source just before the impulse, indicating they could anticipate the timing of the impulses and may be able to behaviorally mediate the exposure to reduce their received level. Kavanagh *et al.* (2019) found sightings of odontocete whales decreased by 53 percent during active phases of seismic air gun surveys and 29 percent during inactive phases compared to control surveys. Heide-Jorgensen *et al.* (2021) found that narwhals exposed to air gun noise in an Arctic fjord were sensitive to seismic vessels over 6.8 mi (11 km) away, even though the small air gun source reached ambient noise levels around 1.9 mi (3 km) (source level of 231 dB re 1 μPa at 1 m) and large air gun source reached ambient noise levels around 6.2 mi (10 km) (source level 241 dB re 1 μPa at 1 m). Behavioral responses included changes in swimming speed and swimming direction away from the impulsive sound source and towards the shoreline. Changes in narwhal swimming speed was context-dependent and usually increased in the presence of vessels but decreased (a ''freeze'' response) in response to closely approaching air gun pulses (Heide-Jorgensen *et al.,* 2021). A cessation of feeding was also documented, when the impulsive noise was less than 6.2 mi (10 km) away, although received SELs were less than 130 dB re 1 μPa^2s for either air gun at this distance. However, because of this study's research methods and criteria, the long-distance responses of narwhals may be conservatively estimating narwhals' range to behavioral response.

Similarly, harbor porpoises seem to have an avoidance response to seismic surveys by leaving the area and decreasing foraging activity within 3.1–6.2 mi (5–10 km) of the survey, as evidenced by both a decrease in vocalizations near the survey and an increase in vocalizations at a distance (Pirotta *et al.,* 2014; Thompson *et al.,* 2013a). The response was short-term, as the porpoises returned to the area within 1 day upon cessation of the air gun operation. Sarnocińska *et al.* (2020) placed autonomous recording devices near oil and gas platforms and control sites to measure harbor porpoise acoustic activity during seismic air gun surveys. They noted a dose-response effect, with the lowest amount of porpoise activity closest to the seismic vessel ($SEL_{single\ shot}$ = 155 dB re 1 μPa^2s) and increasing porpoise activity out to 5 to 7.5 mi (8 to 12 km), and that distance to the seismic vessel, rather than sound level, was a better model predictor of porpoise activity. Overall porpoise activity in the seismic survey area was similar to the control sites (approximately 9.3 mi (15 km) apart), which may indicate the harbor porpoises were moving around the area to avoid the seismic vessel without leaving the area entirely.

Pile driving, another activity that produces impulsive sound, elicited a similar response in harbor porpoises. Benhemma-Le Gall *et al.,* 2021 examined changes in porpoise presence and foraging at two offshore windfarms between control (102–104 dB) and construction periods (155–161 dB), and found decreased presence (8–17 percent) and decreased foraging activity (41–62 percent) during construction periods. Porpoises were displaced up to 7.5 mi (12 km) away from pile driving and 2.5 mi (4 km) from construction vessels. Multiple studies have documented strong avoidance responses by harbor porpoises out to 12.4 mi (20 km) during pile driving activity, however, animals returned to the area after the activity stopped (Brandt *et al.,* 2011; Dähne *et al.,* 2014; Haelters *et al.,* 2014; Thompson *et al.,* 2010; Tougaard *et al.,* 2005; Tougaard *et al.,* 2009). When bubble curtains were deployed around pile driving, the avoidance distance appeared to be reduced by half to 7.5 mi (12 km), and the animals returned to the area after approximately 5 hours rather than 1 day later (Dähne *et al.,* 2017). Further, Bergström *et al.* (2014) found that although there was a high likelihood of acoustic disturbance during wind farm construction (including pile driving), the impact was short-term, and Graham *et al.* (2019) found that the distance at which behavioral responses of harbor porpoises were likely decreased over the course of a construction project, suggesting habituation to impulsive pile-driving noise. Kastelein *et al.* (2013b) exposed captive harbor porpoises to impact pile driving noise, and found that respiration rates increased above 136 dB re 1 μPa (zero-to-peak), and at higher sound levels individuals jumped more frequently. When a single harbor porpoise was exposed to playbacks of impact pile driving noise with different bandwidths, Kastelein *et al.* (2022) found the animal's behavioral response (*i.e.,* swim speed, respiration rate, jumping) decreased with bandwidth.

Overall, odontocete behavioral responses to impulsive sound sources are likely species- and context-dependent. Responses might be expected close to a noise source, under specific behavioral conditions such as females with offspring, or for sensitive species such as harbor porpoises, while many other species demonstrate little to no behavioral response.

Pinnipeds seem to be the least sensitive marine mammal group to impulsive noise (Richardson *et al.,* 1995b; Southall *et al.,* 2007), and some may even experience hearing effects before exhibiting a behavioral response (Southall *et al.,* 2007). Some species may be more sensitive and are only likely to respond (*e.g.,* startling, entering the water, ceasing foraging) to loud impulsive noises in close proximity, but only for brief periods of time before returning to their previous behavior. Demarchi *et al.* (2012) exposed Steller sea lions to in-air explosive blasts, which resulted in increased activity levels and often caused re-entry into the water from a hauled out state. These responses were brief (lasting only minutes) and the animals returned to haul outs and there were no documented lasting behavioral impacts in the days following the explosions.

Ringed seals exhibited little or no response to pile driving noise with mean underwater levels of 157 dB re 1 µPa and in-air levels of 112 dB re 20 µPa (Blackwell *et al.,* 2004) while harbor seals vacated the area surrounding an active pile driving site at estimated received levels between 166–178 dB re 1 µPa SPL (peak to peak), returning within 2 hours of the completion of piling activities (Russell *et al.,* 2016). Wild-captured gray seals exposed to a startling treatment (sound with a rapid rise time and a 93 dB sensation level (the level above the animal's hearing threshold at that frequency)) avoided a known food source, whereas animals exposed to a non-startling treatment (sound with a slower rise time but peaking at the same level) did not react or habituated during the exposure period (Götz and Janik, 2011). These results underscore the importance of the characteristics of an acoustic signal in predicting an animal's response of habituation.

Hastie *et al.* (2021) studied how the number and severity of avoidance events may be an outcome of marine mammal cognition and risk assessment using captive grey seals. Five individuals were given the option to forage in a high- or low-density prey patch while continuously exposed to silence or an anthropogenic noise (pile driving or tidal turbine operation) playbacks (148 dB re 1 µPa at 1 m). For each trial, one prey patch was closer to the source, therefore having a higher received level in experimental exposures than the other prey patch. The authors found that foraging success was highest during silent periods and that the seals avoided both anthropogenic noises with higher received levels when the prey density was limited (low-density prey patch). The authors concluded that the seals made foraging decisions within the trials based on both the energetic value of the prey patch (low-density corresponding to low energetic value, high-density corresponding to high energetic value), and the nature and location of the acoustic signal relative to the prey patches of different value.

Pinniped responses to Navy missile launches are limited to observations at SNI on the PMSR, and there are extensive observations from this site over more than two decades (Burke, 2017; Holst *et al.,* 2011; Holst and Greene Jr., 2005; Holst and Greene Jr., 2008; Holst and Greene Jr., 2010; Navy, 2021a, 2021b, 2022; Ugoretz, 2014, 2015, 2016; Ugoretz and Greene Jr., 2012), including observations of northern elephant seals, California sea lions, and harbor seals) to every launch from SNI was required under these authorizations of launch activity. The results from these monitoring efforts (2001–2024) are summarized in this section. Over twenty years of observations of pinniped behavioral responses to land-based rocket and missile launches at VSFB are also available (Force, 2022).The observations at VSFB are consistent with those from SNI, but notable findings from VSFB are detailed below.

Since launches were relatively infrequent, and of such brief duration, it is unlikely that pinnipeds near the SNI launch sites were habituated to launch sounds. The most common type of response to airborne noise from missile and target launches at SNI was a momentary ''alert'' response. When the animals heard or otherwise detected the launch, they were likely to become alert and interrupt prior activities to pay attention to the launch. For both northern elephant seals and California sea lions, the proportion of animals that moved was significantly related to the closest point of approach of the vehicle or the weighted SEL of the event (based on pinniped in-air M-weighting function from Southall *et al.* (2007). These relationships were not evident for harbor seals, despite this species being the most susceptible to disturbance (Holst *et al.,* 2011). In cases where animals were displaced from normal activity, the displacement was typically short in duration (5–15 minutes, although some harbor seals left their haulout site until the following low tide when the haulout site was again accessible).

Observations indicated that elephant seals rarely showed more than a momentary alert, even when exposed to noise levels or types that caused nearby harbor seals and California sea lions to react more. This was also the case for northern fur seals at VSFB. Most elephant seals raised their heads briefly upon hearing the launch sounds and then quickly returned to their previous activity pattern (usually sleeping). During some launches, a small proportion of northern elephant seals moved a short distance on the beach or into the water, away from their resting site, but settled within minutes. Because of this, elephant seals were not specifically targeted for launch monitoring after 2010 (75 FR 71672, November 24, 2010), although in subsequent years they were often in the field of view when monitoring other species.

California sea lions (especially the young animals) exhibited more response than elephant seals, and responses varied by individual and age group. Some exhibited brief startle responses and increased vigilance for a short period after each launch. Others, particularly pups that were playing in groups along the margin of haulouts, appeared to react more vigorously. A greater proportion of hauled-out sea lions typically responded or entered the water when launch sounds were louder.

Harbor seals tended to be the most sensitive of the three target species, and during the majority of launches at SNI, most harbor seals left their haulout sites on rocky ledges to enter the water. In some cases, harbor seals returned to their haulout after a short period of time, while in other cases they did not return during the duration of the video-recording period (which sometimes extended up to several hours after a launch). During the day following a launch, harbor seals usually hauled out again at these sites (Holst and Lawson, 2002). The height of the tide following a launch event may have played a significant role in when harbor seals were able to return to a haulout site.

There were no observations of any sonic booms or stampedes at SNI and, specifically for the monitored launches at SNI from 2001 to 2024, there were no observed launch-related injuries or deaths (National Marine Fisheries Service, 2019b; Naval Air Warfare Center Weapons Division, 2018). On several occasions, harbor seals and California sea lion adults moved over pups (which can also happen without the presence of an anthropogenic noise) as the animals moved in response to the launches, but the pups did not appear to be injured. On one occasion, a stampede of California sea lions was observed in response to a sonic boom at VSFB. This was thought to have resulted from a particularly high amplitude sonic boom and is noted as an isolated incident.

Responses Due to Vessel Noise—

Mysticetes have varied responses to vessel noise and presence, from having no response to approaching vessels to exhibiting an avoidance response by both horizontal (swimming away) and vertical (increased diving) movement (Baker *et al.,* 1983; Fiori *et al.,* 2019; Gende *et al.,* 2011; Watkins, 1981). Avoidance responses include changing swim patterns, speed, or direction (Jahoda *et al.,* 2003), remaining submerged for longer periods of time (Au and Green, 2000), and performing shallower dives with more frequent surfacing. Behavioral responses to vessels range from smaller-scale changes, such as altered breathing patterns (*e.g.,* Baker *et al.,* 1983; Jahoda *et al.,* 2003), to larger-scale changes such as a decrease in apparent presence (Anderwald *et al.,* 2013). Other common behavioral responses include changes in vocalizations, surface time, feeding and social behaviors (Au and Green, 2000; Dunlop, 2019; Fournet *et al.,* 2018; Machernis *et al.,* 2018; Richter *et al.,* 2003; Williams *et al.,* 2002a). For example, North Atlantic right whales (NARWs) have been reported to increase the amplitude or frequency of their vocalizations or call at a lower rate in the presence of increased vessel noise (Parks *et al.,* 2007; Parks *et al.,* 2011) but generally demonstrate little to no response to vessels or sounds from approaching vessels and often continue to use habitats in high vessel traffic areas (Nowacek *et al.* 2004a). This lack of response may be due to habituation to the presence and associated noise of vessels in NARW habitat or may be due to propagation effects that may attenuate vessel noise near the surface (Nowacek *et al.,* 2004a; Terhune and Verboom, 1999).

Similarly, sei whales have been observed ignoring the presence of vessels entirely and even pass close to vessels (Reeves *et al.,* 1998). Historically, fin whales tend to ignore vessels at a distance (Watkins, 1981) or habituate to vessels over time (Watkins, 1986) but still demonstrate vocal modifications (*e.g.,* decreased frequency parameters of calls) during vessel traffic. Ramesh *et al.* (2021) found that fin whale calls in Ireland were less likely to be detected for every 1 dB re 1 μPa/minute increase in shipping noise levels. In the presence of tour boats in Chile, fin whales were changing their direction of movement more frequently, with less linear movement than occurred before the boats arrived; this behavior may represent evasion or avoidance of the boats (Santos-Carvallo *et al.,* 2021). The increase in travel swim speeds after the vessels departed may be related to the rapid speeds at which the vessels traveled, sometimes in front of fin whales, leading to additional avoidance behavior post-exposure.

Mysticete behavioral responses to vessels may also be affected by vessel behavior (Di Clemente *et al.,* 2018; Fiori *et al.,* 2019). Avoidance responses occurred most often after ''J'' type vessel approaches (*i.e.,* traveling parallel to the whales' direction of travel, then overtaking the whales by turning in front of the group) compared to parallel or direct approaches. Mother humpbacks were particularly sensitive to direct and J type approaches and spent significantly more time diving in response (Fiori *et al.,* 2019). The presence of a passing vessel did not change the behavior of resting humpback whale mother-calf pairs, but fast vessels with louder low-frequency weighted source levels (173 dB re 1 μPa, equating to weighted received levels of 133 dB re 1 μPa) at an average distance of 328 ft (100 m) resulted in a decreased resting behavior and increases in dives, swim speeds, and respiration rates (Sprogis *et al.,* 2020). Humpback whale responses to vessel disturbance were dependent on their behavioral state. Di Clemente *et al.* (2018) found that when vessels passed within 1,640 ft (500 m) of humpback whales, individuals would continue to feed if already engaged in feeding behavior but were more likely to start swimming if they were surface active when approached. In response to an approaching large commercial vessel in an area of high ambient noise levels (125–130 dB re 1 μPa), a tagged female blue whale turned around mid-ascent and descended perpendicular to the vessel's path (Szesciorka *et al.,* 2019). The whale did not respond until the vessel's closest point of approach (328 ft (100 m) distance, 135 dB re 1 μPa RMS), which was 10 dB above the ambient noise levels. After the vessel passed, the whale ascended to the surface again with a three-minute delay.

Overall, mysticete responses to vessel noise and traffic are varied, and habituation or changes to vocalization are predominant long-term responses. When baleen whales do avoid vessels, they seem to do so by altering their swim and dive patterns to move away from the vessel. Although a lack of response in the presence of a vessel may minimize potential disturbance from passing vessels, it does increase the whales' vulnerability to vessel strike, which may be of greater concern for mysticetes than vessel noise.

Odontocete responses due to vessel noise are varied and context-dependent, and it is difficult to separate the impacts of vessel noise from the impacts of vessel presence. Vessel presence has been shown to interrupt feeding behavior in delphinids in some studies (Meissner *et al.,* 2015; Pirotta *et al.,* 2015b) while a recent study by Mills *et al.* (2023) found that, in an important foraging area, bottlenose dolphins may continue to forage and socialize even while constantly exposed to high vessel traffic. Ng and Leung (2003) found that the type of vessel, approach, and speed of approach can all affect the probability of a negative behavioral response and, similarly, Guerra *et al.* (2014) documented varied responses in group structure and vocal behavior.

While most odontocetes have documented neutral responses to vessels, avoidance (Bejder *et al.,* 2006a; Würsig *et al.,* 1998) and attraction (Norris and Prescott, 1961; Ritter, 2002; Shane *et al.,* 1986; Westdal *et al.,* 2023; Würsig *et al.,* 1998) behaviors have also been observed (Hewitt, 1985). Archer *et al.* (2010) compared the responses of dolphin populations far offshore that were often targeted by tuna fisheries to populations closer (less than 100 nmi (185.2 km)) to shore and found the fisheries-associated populations (spotted, spinner, and common dolphins) showed evasive behavior when approached by vessels while those nearshore species not associated with offshore fisheries (coastal spotted and bottlenose dolphins) tended to be attracted to vessels.

Arranz *et al.* (2021) used different engine types to determine whether behavioral responses of short-finned pilot whales were attributable to vessel noise, vessel presence, or both. Mother-calf pairs were approached by the same vessel outfitted with either ''quiet'' electric engines or ''noisy'' traditional combustion engines, controlling for approach speed and distance. Arranz *et al.* (2021) found mother pilot whales rested less and calves nursed less in response to both types of engines compared to control conditions, but only the ''noisy'' engine caused significant impacts (29 percent and 81 percent, respectively).

Smaller vessels tend to generate more noise in higher frequency bands, are more likely to approach odontocetes directly, and spend more time near an animal. Carrera *et al.* (2008) found tour boat activity can cause short-term displacement of dolphins, and Haviland-Howell *et al.* (2007) documented longer term or repetitive displacement of dolphins due to chronic vessel noise. Delphinid behavioral states also change in the presence of small tour vessels that often approach animals: travel and resting increases, foraging and social behavior decreases, and animals move closer together (Cecchetti *et al.,* 2017; Clarkson *et al.,* 2020; Kassamali-Fox *et al.,* 2020; Meissner *et al.,* 2015). Most studies on behavioral responses of bottlenose dolphins to vessel traffic show at least short-term changes in behavior, activities, or vocalization patterns when vessels are nearby (Acevedo, 1991; Arcangeli and Crosti, 2009; Berrow and Holmes, 1999; Fumagalli *et al.,* 2018; Gregory and Rowden, 2001; Janik and Thompson, 1996; Lusseau, 2004; Marega *et al.,* 2018; Mattson *et al.,* 2005; Perez-Ortega *et al.,* 2021; Puszka *et al.,* 2021; Scarpaci *et al.,* 2000).

Information is limited on beaked whale responses to vessel noise, but Würsig *et al.* (1998) noted that most beaked whales seem to exhibit avoidance behaviors when exposed to vessels and beaked whales may respond to all anthropogenic noise (*i.e.,* sonar, vessel) at similar sound levels (Aguilar de Soto *et al.,* 2006; Tyack *et al.,* 2011; Tyack, 2009). The information available includes a disruption of foraging by a vocalizing goose-beaked whale in the presence of a passing vessel (Aguilar de Soto *et al.,* 2006) and restriction of group movement, or possibly reduction in the number of individuals clicking within the group, after exposure to broadband (received level of 135 dB re 1 μPa) vessel noise up to at least 3.2 mi (5.2 km) away from the source, though no change in duration of Blainville's beaked whale foraging dives was observed (Pirotta *et al.,* 2012).

Porpoises and small delphinids are known to be sensitive to vessel noise, as well. Frankish *et al.* (2023) found harbor porpoises more likely to avoid large commercial vessels via horizontal movement during the day and vertical movement at night, which supports previous research that the species routinely avoids large, motorized vessels (Polacheck and Thorpe, 1990). Harbor porpoises have also been documented responding to vessels with increased changes in behavioral state and significantly decreased feeding (Akkaya Bas *et al.,* 2017), fewer clicks (Sairanen, 2014), and fewer prey capture attempts and have disrupted foraging when vessels pass closely and noise levels are higher (Wisniewska *et al.,* 2018). Habituation to vessel noise and presence was observed for a resident population of harbor porpoises that was in regular proximity to vessel traffic (32.8 ft to 0.6 mi (10 m to 1 km) away); the population had no response in 74 percent of interactions and an avoidance response in 26 percent of interactions. It should be noted that fewer responses in populations of odontocetes regularly subjected to high levels of vessel traffic could be a sign of habituation, or it could be that the more sensitive individuals in the population have abandoned that area of higher human activity.

Most avoidance responses were the result of fast-moving or steady plane-hulling motorized vessels and the vessel type and speed were considered to be more relevant than vessel presence, as few responses were observed to non-motorized or stationary vessels (Oakley *et al.,* 2017). Similarly, Akkaya Bas *et al.* (2017) found that when fast moving vessels were within 164 ft (50 m) of harbor porpoises, there was an 80 percent probability of change in swimming direction but only a 40 percent probability of change when vessels were beyond 1,312.3 ft (400 m). Frankish *et al.* (2023) found that harbor porpoises were most likely to avoid vessels less than 984.3 ft (300 m) away but, 5–10 percent of the time, they would also respond to vessels more than 1.2 mi (2 km) away, signifying that they were not just attuning to vessel presence, but to vessel noise as well.

Although most vessel noise is constrained to frequencies below 1 kHz, at close ranges vessel noise can extend into mid- and high frequencies (into the tens of kHz) (Hermannsen *et al.,* 2014; Li *et al.,* 2015) and it is these frequencies that harbor porpoises are likely responding to; the mean M-weighted received SPL threshold for a response at these frequencies is 123 dB re 1 μPa (Dyndo *et al.,* 2015). M-weighting functions are generalized frequency weightings for various groups of marine mammals that were defined by Southall *et al.* (2007) based on known or estimated auditory sensitivity at different frequencies and are used to characterize auditory effects of strong sounds. Hermannsen *et al.* (2019) estimated that noise in the 16 kHz frequency band resulting from small recreational vessels could cause behavioral directions in harbor porpoises and could be elevated up to 124 dB re 1 μPa and raise ambient noise levels by a maximum of 51 dB. The higher noise levels were associated with vessel speed and range, which exceeded the threshold levels found by Dyndo *et al.* (2015) and Wisniewska *et al.* (2018) by 49–85 percent of events with high levels of vessel noise.

Lusseau and Bejder (2007) have reported some long-term consequences of vessel noise on odontocetes but, overall, there is little information on the long-term and cumulative impacts of vessel noise (National Academies of Sciences Engineering and Medicine, 2017; National Marine Fisheries Service, 2007). Many researchers speculate that long-term impacts may occur on odontocete populations that experience repeated interruption of foraging behaviors (Stockin *et al.,* 2008), and Southall *et al.* (2021) indicates that, in many contexts, the localized and coastal home ranges typical of many species make them less resilient to this chronic stressor than mysticetes.

Context and experience likely play a role in pinnipeds response to vessel noise, which vary from negative responses including increased vigilance and alerting to avoidance to reduced time spent doing biologically important activities (*e.g.,* resting, feeding, and nursing) (Martin *et al.,* 2023a; Martin *et al.,* 2022; Mikkelsen *et al.,* 2019; Richardson *et al.,* 1995b) to attraction or lack of observable response (Richardson *et al.,* 1995b). More severe responses, like flushing, could be more detrimental to individuals during biologically important activities and times, such as during pupping season. Blundell and Pendleton (2015) found that vessel presence reduces haul out time of Alaskan harbor seals during pupping season and larger vessels elicit stronger responses. Cates and Acevedo-Gutiérrez (2017) modeled harbor seal responses to passing vessels at haul out sites in less trafficked areas and found the model best predicting flushing behavior included number of boats, type of boats, and distance of seals to boats. The authors noted flushing occurred more in response to non-motorized vessels (*e.g.,* kayaks), likely because they tended to pass closer (82 to 603.7 ft (25 to 184 m)) to haul out sites than motorized vessels (180.4 to 1,939 ft (55 to 591 m)) and tended to occur in groups rather than as a single vessel.

Cape fur seals were also more responsive to vessel noise at sites with a large breeding colony than at sites with lower abundances of conspecifics (Martin *et al.,* 2023a). A field study of harbor and gray seals showed that seal responses to vessels included interruption of resting and foraging during times when vessel noise was increasing or at its peak (Mikkelsen *et al.,* 2019). And, although no behavioral differences were observed in hauled out wild cape fur seals exposed to low (60–64 dB re 20 μPa RMS SPL), medium (64–70 dB) and high-level (70–80 dB) vessel noise playbacks, mother-pup pairs spent less time nursing (15–31 percent) and more time awake (13–26 percent), vigilant (7–31 percent), and mobile (2–4 percent) during vessel noise conditions compared to control conditions (Martin *et al.,* 2022).

Masking

Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, interpret, or discriminate between acoustic signals of interest (*e.g.,* those used for intraspecific communication and social interactions, prey detection, predator avoidance, or navigation) (Clark *et al.,* 2009; Richardson *et al.,* 1995; Erbe and Farmer, 2000; Tyack, 2000; Erbe *et al.,* 2016; Branstetter and Sills, 2022). 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 coincident sound is natural (*e.g.,* snapping shrimp, wind, waves, precipitation) or anthropogenic (*e.g.,* shipping, sonar, seismic exploration) in origin.

As described in detail in appendix D, section D.4.4 (Masking), of the 2024 HCTT Draft EIS/OEIS, 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, 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. Masking these acoustic signals can disturb the behavior of individual animals, groups of animals, or entire populations. Masking can lead to behavioral changes including vocal changes (*e.g.,* Lombard effect, increasing amplitude, or changing frequency), cessation of foraging, and leaving an area, to both signalers and receivers, in an attempt to compensate for noise levels (Erbe *et al.,* 2016).

Most research on auditory masking is focused on energetic masking, or the ability of the receiver (*i.e.,* listener) to detect a signal in noise. However, from a fitness perspective, both signal detection and signal interpretation are necessary for success. This type of masking is called informational masking and occurs when a signal is detected by an animal but the meaning of that signal has been lost. Few data exist on informational masking in marine mammals but studies have shown that some recognition of predator cues might be missed by species that are preyed upon by killer whales if killer whale vocalizations are masked (Curé *et al.,* 2016; Curé *et al.,* 2015; Deecke *et al.,* 2002; Isojunno *et al.,* 2016; Visser *et al.,* 2016). Von Benda-Beckman *et al.* (2021) modeled the effect of pulsed and continuous active sonars (CAS) on sperm whale echolocation and found that sonar sounds could reduce the ability of sperm whales to find prey under certain 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 (*i.e.,* masking) sound is man-made, it may be considered harassment when disrupting natural behavioral patterns to the point where the behavior is abandoned or significantly altered. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which only occurs during the sound exposure. Because masking (without resulting in threshold shift) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

Richardson *et al.* (1995) argued that the maximum radius of influence of anthropogenic noise (including broadband low-frequency sound transmission) on a marine mammal is the distance from the source to the point at which the noise can barely be heard. This range is determined by either the hearing sensitivity (including critical ratios, or the lowest signal-to-noise ratio in which animals can detect a signal) of the animal (Finneran and Branstetter, 2013; Johnson *et al.,* 1989; Southall *et al.,* 2000) or the background noise level present. Masking is most likely to affect some species' ability to detect communication calls and natural sounds (*i.e.,* surf noise, prey noise, *etc.*) (Richardson *et al.,* 1995).

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 by anthropogenic noise may be considered as a reduction in the communication space of animals (*e.g.,* Clark *et al.,* 2009; Matthews *et al.,* 2016) 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.,* 2007; 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, 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.,* Cholewiak *et al.,* 2018; Branstetter and Sills, 2022; Branstetter *et al.,* 2024).

High-frequency sounds may mask the echolocation calls of toothed whales. Human data indicate low-frequency sound can mask high-frequency sounds (*i.e.,* upward masking). Studies on captive odontocetes by Au *et al.* (1974; 1985; 1993) indicate that some species may use various processes to reduce masking effects (*e.g.,* adjustments in echolocation call intensity or frequency as a function of background noise conditions). Odontocete hearing is highly directional at high frequencies, facilitating echolocation in masked conditions (Au and Moore, 1984). A study by Nachtigall *et al.,* (2018) showed that false killer whales adjust their hearing to compensate for ambient sounds and the intensity of returning echolocation signals.

Impacts on signal detection, measured by masked detection thresholds, are not the only important factors to address when considering the potential effects of masking. As marine mammals use sound to recognize conspecifics, prey, predators, or other biologically significant sources (Branstetter *et al.,* 2016), it is also important to understand the impacts of masked recognition thresholds (*i.e.,* informational masking). Branstetter *et al.* (2016) measured masked recognition thresholds for whistle-like sounds of bottlenose dolphins and observed that they are approximately 4 dB above detection thresholds (energetic masking) for the same signals. Reduced ability to recognize a conspecific call or the acoustic signature of a predator could have severe negative impacts. Branstetter *et al.* (2016) observed that if "quality communication" is set at 90 percent recognition the output of communication space models (which are based on 50 percent detection) would likely result in a significant decrease in communication range.

As marine mammals use sound to recognize predators (Allen *et al.,* 2014; Cummings and Thompson, 1971; Cure *et al.,* 2015; Fish and Vania, 1971), the presence of masking noise may also prevent marine mammals from responding to acoustic cues produced by their predators, particularly if it occurs in the same frequency band. For example, harbor seals that reside in the coastal waters of British Columbia are frequently targeted by mammal-eating killer whales. The seals acoustically discriminate between the calls of mammal-eating and fish-eating killer whales (Deecke *et al.,* 2002), a capability that should increase survivorship while reducing the energy required to identify all killer whale calls. Similarly, sperm whales (Curé *et al.,* 2016; Isojunno *et al.,* 2016), long-finned pilot whales (Visser *et al.,* 2016), and humpback whales (Curé *et al.,* 2015) changed their behavior in response to killer whale vocalization playbacks. The potential effects of masked predator acoustic cues depends on the duration of the masking noise and the likelihood of a marine mammal encountering a predator during the time that detection and recognition of predator cues are impeded.

Redundancy and context can also facilitate detection of weak signals. These phenomena may help marine mammals detect weak sounds in the presence of natural or anthropogenic noise. Most masking studies in marine mammals present the test signal and the masking noise from the same direction. The dominant background noise may be highly directional if it comes from a particular anthropogenic source such as a vessel or industrial site. Directional hearing may significantly reduce the masking effects of these sounds by improving the effective signal-to-noise ratio.

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; Cholewiak *et al.,* 2018). All anthropogenic sound sources, but especially chronic and lower-frequency signals (*e.g.,* from commercial vessel traffic), contribute to elevated ambient sound levels, thus intensifying masking for marine mammals.

Masking Due to Sonar and Other Transducers—

The functional hearing ranges of mysticetes, odontocetes, and pinnipeds underwater overlap the frequencies of the sonar sources used in the Action Proponents' LFAS/MFAS/high-frequency active sonar (HFAS) training and the Navy's testing exercises. Additionally, almost all affected species' vocal repertoires span across the frequencies of these sonar sources used by the Action Proponents. Masking by LFAS or MFAS with relatively low-duty cycles is not anticipated (or would be of very short duration) for most cetaceans as sonar signals occur over a relatively short duration and narrow bandwidth (overlapping with only a small portion of the hearing range). LFAS could overlap in frequency with mysticete vocalizations, however LFAS does not overlap with vocalizations for most marine mammal species. For example, in the presence of LFAS, humpback whales were observed to increase the length of their songs (Fristrup *et al.,* 2003; Miller *et al.,* 2000), potentially due to the overlap in frequencies between the whale song and the LFAS. While dolphin whistles and MFAS are similar in frequency, masking is not anticipated (or would be of very short duration) due to the low-duty cycle and short durations of most sonars.

As described in additional detail in the 2024 HCTT Draft EIS/OEIS, high duty-cycle or CAS have more potential to mask vocalizations. These sonars transmit more frequently (greater than 80 percent duty cycle) than traditional sonars, but typically at lower source levels. HFAS, such as pingers that operate at higher repetition rates, also operate at lower source levels and have faster attenuation rates due to the higher frequencies used. These lower source levels limit the range of impacts, however, compared to traditional sonar systems, individuals close to the source are likely to experience masking at longer time scales. The frequency range at which high-duty cycle systems operate overlaps the vocalization frequency of many odontocetes. Continuous noise at the same frequency of communicative vocalizations may cause disruptions to communication, social interactions, and acoustically mediated cooperative behaviors (Sørensen *et al.,* 2023) such as foraging and mating. Similarly, because the high-duty cycle or CAS includes mid-frequency sources, there is also the potential for the mid-frequency sonar signals to mask important environmental cues (*e.g.,* predator or conspecific acoustic cues), possibly affecting survivorship for targeted animals. Spatial release from masking may occur with higher duty cycle or CAS.

While there are currently few studies of the impacts of high-duty cycle sonars on marine mammals, masking due to these systems is likely analogous to masking produced by other continuous sources (*e.g.,* vessel noise and low-frequency cetaceans), and would likely have similar short-term consequences, though longer in duration due to the duration of the masking noise. These may include changes to vocalization amplitude and frequency (Brumm and Slabbekoorn, 2005; Hotchkin and Parks, 2013) and behavioral impacts such as avoidance of the area and interruptions to foraging or other essential behaviors (Gordon *et al.,* 2003). Long-term consequences could include changes to vocal behavior and vocalization structure (Foote *et al.,* 2004; Parks *et al.,* 2007), abandonment of habitat if masking occurs frequently enough to significantly impair communication (Brumm and Slabbekoorn, 2005), a potential decrease in survivorship if predator vocalizations are masked (Brumm and Slabbekoorn, 2005), and a potential decrease in recruitment if masking interferes with reproductive activities or mother-calf communication (Gordon *et al.,* 2003).

Von Benda-Beckmann *et al.* (2021) modeled the effect of pulsed and continuous 1 to 2 kHz active sonar on sperm whale echolocation clicks and found that the presence of upper harmonics in the sonar signal increased masking of clicks produced in the search phase of foraging compared to buzz clicks produced during prey capture. Different levels of sonar caused intermittent to continuous masking (120 to 160 dB re 1 μPa^2, respectively), but varied based on click level, whale orientation, and prey target strength. CAS resulted in a greater percentage of time that echolocation clicks were masked compared to pulsed active sonar. This means that sonar sounds could reduce the ability of sperm whales to find prey under certain conditions. However, echoes from prey are most likely spatially separated from the sonar source, and so spatial release from masking would be expected.

Masking Due to Impulsive Noise—

Impulsive sound sources, including explosions, are intense and short in duration. Since impulsive noise is intermittent, the length of the gap between sounds (*i.e.,* duty-cycle) and received level are relevant when considering the potential for masking. Impulsive sounds with lower duty cycles or lower received levels are less likely to result in masking than higher duty cycles or received levels. There are no direct observations of masking in marine mammals due to exposure to explosive sources. Potential masking from explosive sounds or weapon noise is likely similar to masking studied for other impulsive sounds, such as air guns.

Masking of mysticete calls could occur due to the overlap between their low-frequency vocalizations and the dominant frequencies of impulsive sources (Castellote *et al.,* 2012; Nieukirk *et al.,* 2012). For example, blue whale feeding/social calls increased when seismic exploration was underway (Di Lorio and Clark, 2010), indicative of a possible compensatory response to masking effects of the increased noise level. However, mysticetes that call at higher rates are less likely to be masked by impulsive noise with lower duty cycles (Clark *et al.,* 2009) because of the decreased likelihood that the noise would overlap with the calls, and because of dip listening. Field observations of masking effects such as vocal modifications are difficult to interpret because when recordings indicate that call rates decline, this could be caused by (1) animals calling less frequently (*i.e.,* actual noise-induced vocal modifications), (2) the calls being masked from the recording hydrophone due to the noise (*e.g.,* animals are not calling less frequently but are being detected less frequently), or (3) the animals moving away from the noise, or any combination of these causes (Blackwell *et al.,* 2013; Cerchio *et al.,* 2014).

Masking of pinniped communication sounds at 100 Hz center frequency is possible when vocalizations occur at the same time as an air gun pulse (Sills *et al.,* 2017). This might result in some percentage of vocalizations being masked if an activity such as a seismic survey is being conducted in the vicinity, even when the sender and receiver are near one another. Release from masking due to ''dip listening'' is likely in this scenario.

While a masking effect of impulsive noise can depend on the received level (Blackwell *et al.,* 2015) and other characteristics of the noise, the vocal response of the affected animal to masking noise is an equally important consideration for inferring overall impacts to an animal. It is possible that the receiver would increase the rate and/or level of calls to compensate for masking; or, conversely, cease calling.

In general, impulsive noise has the potential to mask sounds that are biologically important for marine mammals, reducing communication space or resulting in noise-induced vocal modifications that might impact marine mammals. Masking by close-range impulsive sound sources is most likely to impact marine mammal communication.

Masking Due to Vessel Noise—

Masking is more likely to occur in the presence of broadband, relatively continuous noise sources such as vessels. Several studies have shown decreases in marine mammal communication space and changes in behavior as a result of the presence of vessel noise. For example, North Atlantic right whales were 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.,* 2007) as well as increasing the amplitude (intensity) of their calls (Parks, 2009; Parks *et al.,* 2011). Fournet *et al.* (2018) observed that humpback whales in Alaska responded to increasing ambient sound levels (natural and anthropogenic) by increasing the source levels of their calls (non-song vocalizations). Clark *et al.* (2009) also observed that right whales communication space decreased by up to 84 percent in the presence of vessels (Clark *et al.,* 2009). Cholewiak *et al.* (2018) also observed loss in communication space in Stellwagen National Marine Sanctuary for North Atlantic right whales, fin whales, and humpback whales with increased ambient noise and shipping noise. Gabriele *et al.* (2018) modeled the effects of vessel traffic sound on communication space in Glacier Bay National Park in Alaska and found that typical summer vessel traffic in Glacier Bay National Park causes losses of communication space to singing whales (reduced by 13–28 percent), calling whales (18–51 percent), and roaring seals (32–61 percent), particularly during daylight hours and even in the absence of cruise ships. Dunlop (2019) observed that an increase in vessel noise reduced modeled communication space and resulted in significant reduction in group social interactions in Australian humpback whales. However, communication signal masking did not fully explain this change in social behavior in the model, indicating there may also be an additional effect of the physical presence of the vessel on social behavior (Dunlop, 2019). Although humpback whales off Australia did not change the frequency or duration of their vocalizations in the presence of ship noise, their source levels were lower than expected based on source level changes to wind noise, potentially indicating some signal masking (Dunlop, 2016). Multiple delphinid species have also been shown to increase the minimum or maximum frequencies of their whistles in the presence of anthropogenic noise and reduced communication space (*e.g.,* Holt *et al.,* 2009; Holt *et al.,* 2011; Gervaise *et al.,* 2012; Williams *et al.,* 2014; Hermannsen *et al.,* 2014; Papale *et al.,* 2015; Liu *et al.,* 2017).

Other Physiological Response

Physiological stress is a natural and adaptive process that helps an animal survive changing conditions. When an animal perceives a potential threat, whether or not the stimulus actually poses a threat, a stress response is triggered (Selye, 1950; Moberg, 2000; Sapolsky, 2005). Once an animal's central nervous system perceives a threat, it mounts a biological response or defense that consists of a combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses.

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and distress is the biotic 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 biotic functions. For example, when a stress response diverts energy away from growth in young animals, those animals may experience stunted growth. When a stress response diverts energy from a fetus, an animal's reproductive success and its fitness will suffer. In these cases, the animals will have entered a pre-pathological or pathological state which is called ''distress'' (Selye, 1950) or ''allostatic loading'' (McEwen and Wingfield, 2003). This pathological state of distress will last until the animal replenishes its energetic reserves sufficiently to restore normal function.

According to Moberg (2000), in the case of many stressors, an animal's first and sometimes most economical (in terms of biotic costs) response is behavioral avoidance of the potential stressor or avoidance of continued exposure to a stressor. An animal's second line of defense to stressors involves the sympathetic part of the autonomic nervous system and the classical ''fight or flight'' response, which includes the cardiovascular system, the gastrointestinal system, the exocrine glands, and the adrenal medulla to produce changes in heart rate, blood pressure, and gastrointestinal activity that humans commonly associate with ''stress.'' These responses have a relatively short duration and may or may not have significant long-term effect on an animal's welfare.

An animal's third line of defense to stressors involves its neuroendocrine systems or sympathetic nervous systems; the system that has received the most study has been the hypothalamus-pituitary-adrenal (HPA) system (also known as the HPA axis in mammals or the hypothalamus-pituitary-interrenal axis in fish and some reptiles). Unlike stress responses associated with the autonomic nervous system, virtually all neuro-endocrine 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 (Moberg, 1987; Rivier and Rivest, 1991), altered metabolism (Elasser *et al.,* 2000), reduced immune competence (Blecha, 2000), and behavioral disturbance (Moberg, 1987; Blecha, 2000). Increases in the circulation of glucocorticosteroids (cortisol, corticosterone, and aldosterone in marine mammals; see Romano *et al.,* 2004) have been equated with stress for many years.

Marine mammals naturally experience stressors within their environment and as part of their life histories. Changing weather and ocean conditions, exposure to disease and naturally occurring toxins, lack of prey availability, and interactions with predators all contribute to the stress a marine mammal experiences (Atkinson *et al.,* 2015). Breeding cycles, periods of fasting, social interactions with members of the same species, and molting (for pinnipeds) are also stressors, although they are natural components of an animal's life history. Anthropogenic activities have the potential to provide additional stressors beyond those that occur naturally (*e.g.,* fishery interactions, pollution, tourism, ocean noise) (Fair *et al.,* 2014; Meissner *et al.,* 2015; Rolland *et al.,* 2012).

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments 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; Reneerkens *et al.,* 2002; Thompson and Hamer, 2000). However, it should be noted (and as is described in additional detail in the 2024 HCTT Draft EIS/OEIS) that our understanding of the functions of various stress hormones (*e.g.,* cortisol), is based largely upon observations of the stress response in terrestrial mammals. Atkinson *et al.,* (2015) note that the endocrine response of marine mammals to stress may not be the same as that of terrestrial mammals because of the selective pressures marine mammals faced during their evolution in an ocean environment. For example, due to the necessity of breath-holding while diving and foraging at depth, the physiological role of epinephrine and norepinephrine (the catecholamines) in marine mammals might be different than in other mammals. Relatively little information exists on the linkage between anthropogenic sound exposure and stress in marine mammals, and even less information exists on the ultimate consequences of sound-induced stress responses (either acute or chronic). Most studies to date have focused on acute responses to sound either by measuring catecholamines, a neurohormone, or heart rate as a proxy for an acute stress response.

The ability to make predictions from stress hormones about impacts on individuals and populations exposed to various forms of natural and anthropogenic stressors relies on understanding the linkages between changes in stress hormones and resulting physiological impacts. Currently, the sound characteristics that correlate with specific stress responses in marine mammals are poorly understood, as are the ultimate consequences of these changes. Several research efforts have improved the understanding of, and the ability to predict, how stressors ultimately affect marine mammal populations (*e.g.,* King *et al.,* 2015; New *et al.,* 2013a; Pirotta *et al.,* 2015a; Pirotta *et al.,* 2022b). This includes determining how and to what degree various types of anthropogenic sound cause stress in marine mammals and understanding what factors may mitigate those physiological stress responses. Factors potentially affecting an animal's response to a stressor include life history, sex, age, reproductive status, overall physiological and behavioral adaptability, and whether they are naïve or experienced with the sound (*e.g.,* prior experience with a stressor may result in a reduced response due to habituation) (Finneran and Branstetter, 2013; St. Aubin and Dierauf, 2001). Because there are many unknowns regarding the occurrence of acoustically induced stress responses in marine mammals, any physiological response (*e.g.,* hearing loss or injury) or significant behavioral response is assumed to be associated with a stress response.

Non-impulsive sources of sound can cause direct physiological effects including noise-induced loss of hearing sensitivity (or ''threshold shift'') or other auditory injury, nitrogen decompression, acoustically-induced bubble growth, and injury due to sound-induced acoustic resonance. Separately, an animal's behavioral response to an acoustic exposure might lead to physiological effects that might ultimately lead to injury or death, which is discussed later in the *Stranding and Mortality* section.

Heart Rate Response—

Several experimental studies have measured the heart rate response of a variety of marine mammals. For example, Miksis *et al.* (2001) observed increases in heart rates of captive bottlenose dolphins to which known calls of other dolphins were played, although no increase in heart rate was observed when background tank noise was played back. However, it cannot be determined whether the increase in heart rate was due to stress or social factors, such as expectation of an encounter with a known conspecific. Similarly, a young captive beluga's heart rate increased during exposure to noise, with increases dependent upon the frequency band of noise and duration of exposure, and with a sharp decrease to normal or below normal levels upon cessation of the exposure (Lyamin *et al.,* 2011). Spectral analysis of heart rate variability corroborated direct measures of heart rate (Bakhchina *et al.,* 2017). This response might have been in part due to the conditions during testing, the young age of the animal, and the novelty of the exposure; a year later the exposure was repeated at a slightly higher received level and there was no heart rate response, indicating the beluga whale had potentially habituated to the noise exposure.

Kvadsheim *et al.* (2010a) measured the heart rate of captive hooded seals during exposure to sonar signals and found an increase in the heart rate of the seals during exposure periods versus control periods when the animals were at the surface. When the animals dove, the normal dive-related heart rate decrease was not impacted by the sonar exposure. Similarly, Thompson *et al.* (1998) observed a rapid, short-lived decrease in heart rates in wild harbor and grey seals exposed to seismic air guns (cited in Gordon *et al.,* 2003).

Two captive harbor porpoises showed significant bradycardia (reduced heart rate), below that which occurs with diving, when they were exposed to pinger-like sounds with frequencies between 100–140 kHz (Teilmann *et al.,* 2006). The bradycardia was found only in the early noise exposures and the porpoises acclimated quickly across successive noise exposures. Elmegaard *et al.* (2021) also found that initial exposures to sonar sweeps produced bradycardia but did not elicit a startle response in captive harbor porpoises. As with Teilmann *et al.* (2006), the cardiac response disappeared over several repeat exposures suggesting rapid acclimation to the noise. In the same animals, 40-kHz noise pulses induced startle responses but without a change in heart rate. Bakkeren *et al.* (2023) found no change in the heart rate of a harbor porpoise during exposure to masking noise (⅓ octave band noise, centered frequency of 125 kHz, maximum received level of 125 dB re 1 μPa) during an echolocation task but showed significant bradycardia while blindfolded for the same task. The authors attributed the change in heart rate to sensory deprivation, although no strong conclusions about acoustic masking could be made since the animal was still able to perform the echolocation task in the presence of the masking noise. Williams *et al.* (2022) observed periods of increased heart rate variability in narwhals during seismic air gun impulse exposure, but profound bradycardia was not noted. Conversely, Williams *et al.* (2017) found that a profound bradycardia persisted in narwhals, even though exercise effort increased dramatically as part of their escape response following release from capture and handling.

Limited evidence across several different species suggests that increased heart rate might occur as part of the acute stress response of marine mammals that are at the surface. However, the decreased heart rate typical of diving marine mammals can be enhanced in response to an acute stressor, suggesting that the context of the exposure is critical to understanding the cardiac response. Furthermore, in instances where a cardiac response was noted, there appears to be rapid habituation when repeat exposures occur. Additional research is required to understand the interaction of dive bradycardia, noise-induced cardiac responses, and the role of habituation in marine mammals.

Stress Hormone and Immune Response—

What is known about the function of the various stress hormones is based largely upon observations of the stress response in terrestrial mammals. The endocrine response of marine mammals to stress may not be the same as that of terrestrial mammals because of the selective pressures marine mammals faced during their evolution in an ocean environment (Atkinson *et al.,* 2015). For example, due to the necessity of breath-holding while diving and foraging at depth, the physiological role of epinephrine and norepinephrine (the catecholamines) might be different in marine versus other mammals.

Catecholamines increase during breath-hold diving in seals, co-occurring with a reduction in heart rate, peripheral vasoconstriction (*i.e.,* constriction of blood vessels), and an increased reliance on anaerobic metabolism during extended dives (Hance *et al.,* 1982; Hochachka *et al.,* 1995; Hurford *et al.,* 1996); the catecholamine increase is not associated with increased heart rate, glycemic release, and increased oxygen consumption typical of terrestrial mammals. Captive belugas demonstrated no catecholamine response to the playback of oil drilling sounds (Thomas *et al.,* 1990b) but showed a small but statistically significant increase in catecholamines following exposure to impulsive sounds produced from a seismic water gun (Romano *et al.,* 2004). A captive bottlenose dolphin exposed to the same sounds did not demonstrate a catecholamine response but did demonstrate a statistically significant elevation in aldosterone (Romano *et al.,* 2004); however, the increase was within the normal daily variation observed in this species (St. Aubin *et al.,* 1996) and was likely of little biological significance. Aldosterone has been speculated to not only contribute to electrolyte balance, but possibly also the maintenance of blood pressure during periods of vasoconstriction (Houser *et al.,* 2011). In marine mammals, aldosterone is thought to play a role in mediating stress (St. Aubin and Dierauf, 2001; St. Aubin and Geraci, 1989).

Yang *et al.* (2021) measured cortisol concentrations in two captive bottlenose dolphins and found significantly higher concentrations after exposure to 140 dB re 1 μPa impulsive noise playbacks. Two out of six tested indicators of immune system function underwent acoustic dose-dependent changes, suggesting that repeated exposures or sustained stress response to impulsive sounds may increase an affected individual's susceptibility to pathogens. Unfortunately, absolute values of cortisol were not provided, and it is not possible from the study to tell if cortisol rose to problematic levels (*e.g.,* see normal variation and changes due to handling in Houser *et al.* (2021) and Champagne *et al.* (2018)). Exposing dolphins to a different acoustic stressor yielded contrasting results. Houser *et al.* (2020) measured cortisol and epinephrine obtained from 30 captive bottlenose dolphins exposed to simulated Navy MFAS and found no correlation between SPL and stress hormone levels, even though sound exposures were as high as 185 dB re 1 μPa. In the same experiment (Houser *et al.,* 2013b), behavioral responses were shown to increase in severity with increasing received SPLs. These results suggest that behavioral responses to sonar signals are not necessarily indicative of a hormonal stress response.

Whereas a limited amount of work has addressed the potential for acute sound exposures to produce a stress response, almost nothing is known about how chronic exposure to acoustic stressors affects stress hormones in marine mammals, particularly as it relates to survival or reproduction. In what is probably the only study of chronic noise exposure in marine mammals associating changes in a stress hormone with changes in anthropogenic noise, Rolland *et al.* (2012) compared the levels of cortisol metabolites in NARW feces collected before and after September 11, 2001. Following the events of September 11, 2001, shipping was significantly reduced in the region where fecal collections were made, and regional ocean background noise declined. Fecal cortisol metabolites significantly decreased during the period of reduced ship traffic and ocean noise (Rolland *et al.,* 2012). Rolland *et al.* (2017) also compared acute (death by vessel strike) to chronic (entanglement or live stranding) stressors in NARW and found that whales subject to chronic stressors had higher levels of glucocorticoid stress hormones (cortisol and corticosterone) than either healthy whales or those killed by ships. It was presumed that whales subjected to acute stress may have died too quickly for increases in fecal glucocorticoids to be detected.

Considerably more work has been conducted in an attempt to determine the potential effect of vessel disturbance on smaller cetaceans, particularly killer whales (Bain, 2002; Erbe, 2002; Lusseau, 2006; Noren *et al.,* 2009; Pirotta *et al.,* 2015b; Read *et al.,* 2014; Rolland *et al.,* 2012; Williams *et al.,* 2009; Williams *et al.,* 2014a; Williams *et al.,* 2014b; Williams *et al.,* 2006b). Most of these efforts focused primarily on estimates of metabolic costs associated with altered behavior or inferred consequences of boat presence and noise but did not directly measure stress hormones. However, Ayres *et al.* (2012) investigated Southern Resident killer whale fecal thyroid hormone and cortisol metabolites to assess two potential threats to the species' recovery: lack of prey (salmon) and impacts from exposure to the physical presence of vessel traffic (but without measuring vessel traffic noise). Ayres *et al.* (2012) concluded from these stress hormone measures that the lack of prey overshadowed any population-level physiological impacts on Southern Resident killer whales due to vessel traffic. Lemos *et al.* (2022) investigated the potential for vessel traffic to affect gray whales. By assessing gray whale fecal cortisol metabolites across years in which vessel traffic was variable, Lemos *et al.* (2022) found a direct relationship between the presence/density of vessel traffic and fecal cortisol metabolite levels. Unfortunately, no direct noise exposure measurements were made on any individual making it impossible to tell if other natural and anthropogenic factors could also be related to the results. Collectively, these studies indicate the difficulty in determining which factors are primarily influence the secretion of stress hormones, including the separate and additive effects of vessel presence and vessel noise. While vessel presence could contribute to the variation in fecal cortisol metabolites in North Atlantic right whales and gray whales, there are other potential influences on fecal hormone metabolites, so it is difficult to establish a direct link between ocean noise and fecal hormone metabolites.

Non-Auditory Injury

Non-auditory injury, or direct injury, is considered less likely to occur in the context of the Action Proponents' activities than auditory injury and the primary anticipated source of non-auditory injury for these activities is exposure to the pressure generated by explosive detonations, which is discussed in the *Potential Effects of Explosive Sources on Marine Mammals* section below. Here, we discuss less direct non-auditory injury impacts, including acoustically induced bubble formation, injury from sonar-induced acoustic resonance, and behaviorally mediated injury.

One theoretical cause of injury to marine mammals is rectified diffusion (Crum and Mao, 1996), the process of increasing the size of a bubble by exposing it to a sound field. This process could be facilitated if the environment in which the ensonified bubbles exist is supersaturated with gas. Repetitive diving by marine mammals can cause the blood and some tissues to accumulate gas to a greater degree than is supported by the surrounding environmental pressure (Ridgway and Howard, 1979). The deeper and longer dives of some marine mammals (for example, beaked whales) are theoretically predicted to induce greater supersaturation (Houser *et al.,* 2001b). If rectified diffusion were possible in marine mammals exposed to high-level sound, conditions of tissue supersaturation could theoretically speed the rate and increase the size of bubble growth. Subsequent effects due to tissue trauma and emboli would presumably mirror those observed in humans suffering from decompression sickness. Acoustically-induced (or mediated) bubble growth and other pressure-related physiological impacts are addressed below but are not expected to result from the Action Proponents' proposed activities.

It is unlikely that the short duration (in combination with the source levels) of sonar pings would be long enough to drive bubble growth to any substantial size, if such a phenomenon occurs. However, an alternative but related hypothesis has also been suggested: stable bubbles could be destabilized by high-level sound exposures such that bubble growth then occurs through static diffusion of gas out of the tissues. In such a scenario the marine mammal would need to be in a gas-supersaturated state for a long enough period of time for bubbles to become of a problematic size. Recent research with ex vivo supersaturated bovine tissues suggested that, for a 37 kHz signal, a sound exposure of approximately 215 dB re 1 μPa would be required before microbubbles became destabilized and grew (Crum *et al.,* 2005). Assuming spherical spreading loss and a nominal sonar source level of 235 dB re 1 μPa at 1 m, a whale would need to be within 33 ft (10 m) of the sonar dome to be exposed to such sound levels. Furthermore, tissues in the study were supersaturated by exposing them to pressures of 400–700 kilopascals for periods of hours and then releasing them to ambient pressures. Assuming the equilibration of gases with the tissues occurred when the tissues were exposed to the high pressures, levels of supersaturation in the tissues could have been as high as 400–700 percent. These levels of tissue supersaturation are substantially higher than model predictions for marine mammals (Fahlman *et al.,* 2009; Fahlman *et al.,* 2014; Houser *et al.,* 2001; Saunders *et al.,* 2008). It is improbable that this mechanism is responsible for stranding events or traumas associated with beaked whale strandings because both the degree of supersaturation and exposure levels observed to cause microbubble destabilization are unlikely to occur, either alone or in concert.

Yet another hypothesis has speculated that rapid ascent to the surface following exposure to a startling sound might produce tissue gas saturation sufficient for the evolution of nitrogen bubbles (*i.e.,* decompression sickness) (Jepson *et al.,* 2003; Fernandez *et al.,* 2005). In this scenario, the rate of ascent would need to be sufficiently rapid to compromise behavioral or physiological protections against nitrogen bubble formation. Alternatively, Tyack *et al.* (2006) studied the deep diving behavior of beaked whales and concluded that: ''Using current models of breath-hold diving, we infer that their natural diving behavior is inconsistent with known problems of acute nitrogen supersaturation and embolism.'' Collectively, these hypotheses can be referred to as ''hypotheses of acoustically mediated bubble growth.''

Although theoretical predictions suggest the possibility for acoustically mediated bubble growth, there is considerable disagreement among scientists as to its likelihood (Piantadosi and Thalmann, 2004; Evans and Miller, 2003; Cox *et al.,* 2006; Rommel *et al.,* 2006). Crum and Mao (1996) hypothesized that received levels would have to exceed 190 dB in order for there to be the possibility of significant bubble growth due to supersaturation of gases in the blood (*i.e.,* rectified diffusion). Work conducted by Crum *et al.* (2005) demonstrated the possibility of rectified diffusion for short duration signals, but at SELs and tissue saturation levels that are highly improbable to occur in diving marine mammals. To date, energy levels predicted to cause in vivo bubble formation within diving cetaceans have not been evaluated (NOAA, 2002b). Jepson *et al.* (2003, 2005) and Fernandez *et al.* (2004, 2005) concluded that in vivo bubble formation, which may be exacerbated by deep, long-duration, repetitive dives may explain why beaked whales appear to be relatively vulnerable to MFAS/HFAS exposures. It has also been argued that traumas from some beaked whale strandings are consistent with gas emboli and bubble-induced tissue separations (Jepson *et al.,* 2003); however, there is no conclusive evidence of this (Rommel *et al.,* 2006). Based on examination of sonar-associated strandings, Bernaldo de Quiros *et al.* (2019) list diagnostic features, the presence of all of which suggest gas and fat embolic syndrome for beaked whales stranded in association with sonar exposure.

As described in additional detail in the Behaviorally Mediated Injury section of appendix D the 2024 HCTT Draft EIS/OEIS, marine mammals generally are thought to deal with nitrogen loads in their blood and other tissues, caused by gas exchange from the lungs under conditions of high ambient pressure during diving, through anatomical, behavioral, and physiological adaptations (Hooker *et al.,* 2012). Although not a direct injury, variations in marine mammal diving behavior or avoidance responses have been hypothesized to result in nitrogen off-gassing in super-saturated tissues, possibly to the point of deleterious vascular and tissue bubble formation (Hooker *et al.,* 2012; Jepson *et al.,* 2003; Saunders *et al.,* 2008) with resulting symptoms similar to decompression sickness, however the process is still not well understood.

In 2009, Hooker *et al.* tested two mathematical models to predict blood and tissue tension N2 (P_{N2}) using field data from three beaked whale species: northern bottlenose whales, goose-beaked whales, and Blainville's beaked whales. The researchers aimed to determine if physiology (body mass, diving lung volume, and dive response) or dive behavior (dive depth and duration, changes in ascent rate, and diel behavior) would lead to differences in P_{N2} levels and thereby decompression sickness risk between species. In their study, they compared results for previously published time depth recorder data (Hooker and Baird, 1999; Baird *et al.,* 2006, 2008) from goose-beaked whale, Blainville's beaked whale, and northern bottlenose whale. They reported that diving lung volume and extent of the dive response had a large effect on end-dive P_{N2}. Also, results showed that dive profiles had a larger influence on end-dive P_{N2} than body mass differences between species. Despite diel changes (*i.e.,* variation that occurs regularly every day or most days) in dive behavior, P_{N2} levels showed no consistent trend. Model output suggested that all three species live with tissue P_{N2} levels that would cause a significant proportion of decompression sickness cases in terrestrial mammals. The authors concluded that the dive behavior of goose-beaked whale was different from both Blainville's beaked whale and northern bottlenose whale and resulted in higher predicted tissue and blood N2 levels (Hooker *et al.,* 2009). They also suggested that the prevalence of goose-beaked whales stranding after naval sonar exercises could be explained by either a higher abundance of this species in the affected areas or by possible species differences in behavior and/or physiology related to MF active sonar (Hooker *et al.,* 2009).

Bernaldo de Quiros *et al.* (2012) showed that, among stranded whales, deep diving species of whales had higher abundances of gas bubbles compared to shallow diving species. Kvadsheim *et al.* (2012) estimated blood and tissue P_{N2} levels in species representing shallow, intermediate, and deep diving cetaceans following behavioral responses to sonar and their comparisons found that deep diving species had higher end-dive blood and tissue N2 levels, indicating a higher risk of developing gas bubble emboli compared with shallow diving species. Fahlmann *et al.* (2014) evaluated dive data recorded from sperm, killer, long-finned pilot, Blainville's, and goose-beaked whales before and during exposure to low-frequency (1–2 kHz), as defined by the authors, and mid-frequency (2–7 kHz) active sonar in an attempt to determine if either differences in dive behavior or physiological responses to sonar are plausible risk factors for bubble formation. The authors suggested that CO_2 may initiate bubble formation and growth, while elevated levels of N2 may be important for continued bubble growth. The authors also suggest that if CO_2 plays an important role in bubble formation, a cetacean escaping a sound source may experience increased metabolic rate, CO_2 production, and alteration in cardiac output, which could increase risk of gas bubble emboli. However, as discussed in Kvadsheim *et al.* (2012), the actual observed behavioral responses to sonar from the species in their study (sperm, killer, long-finned pilot, Blainville's beaked, and goose-beaked whales) did not imply any significantly increased risk of decompression sickness due to high levels of N2. Therefore, further information is needed to understand the relationship between exposure to stimuli, behavioral response (discussed in more detail below), elevated N2 levels, and gas bubble emboli in marine mammals. The hypotheses for gas bubble formation related to beaked whale strandings is that beaked whales potentially have strong avoidance responses to MFAS because they sound similar to their main predator, the killer whale (Cox *et al.,* 2006; Southall *et al.,* 2007; Zimmer and Tyack, 2007; Baird *et al.,* 2008; Hooker *et al.,* 2009). Further investigation is needed to assess the potential validity of these hypotheses.

To summarize, while there are several hypotheses, there is little data directly connecting intense, anthropogenic underwater sounds with non-auditory physical effects in marine mammals. The available data do not support identification of a specific exposure level above which non-auditory effects can be expected (Southall *et al.,* 2007) or any meaningful quantitative predictions of the numbers (if any) of marine mammals that might be affected in these ways. In addition, such effects, if they occur at all, would be expected to be limited to situations where marine mammals were exposed to high powered sounds at very close range over a prolonged period of time, which is not expected to occur based on the speed of the vessels operating sonar in combination with the speed and behavior of marine mammals in the vicinity of sonar.

An object exposed to its resonant frequency will tend to amplify its vibration at that frequency, a phenomenon called acoustic resonance. Acoustic resonance has been proposed as a potential mechanism by which a sonar or sources with similar operating characteristics could damage tissues of marine mammals. In 2002, NMFS convened a panel of government and private scientists to investigate the potential for acoustic resonance to occur in marine mammals (NOAA, 2002). They modeled and evaluated the likelihood that Navy MFAS (2–10 kHz) caused resonance effects in beaked whales that eventually led to their stranding. The workshop participants concluded that resonance in air-filled structures was not likely to have played a primary role in the Bahamas stranding in 2000. They listed several reasons supporting this finding including (among others): tissue displacements at resonance are estimated to be too small to cause tissue damage; tissue-lined air spaces most susceptible to resonance are too large in marine mammals to have resonant frequencies in the ranges used by MFAS or LFAS; lung resonant frequencies increase with depth, and tissue displacements decrease with depth so if resonance is more likely to be caused at depth it is also less likely to have an affect there; and lung tissue damage has not been observed in any mass, multi-species stranding of beaked whales. The frequency at which resonance was predicted to occur in the animals' lungs was 50 Hz, well below the frequencies used by the MFAS systems associated with the Bahamas event. The workshop participants focused on the March 2000 stranding of beaked whales in the Bahamas as high-quality data were available, but the workshop report notes that the results apply to other sonar-related stranding events. For the reasons given by the 2002 workshop participants, we do not anticipate injury due to sonar-induced acoustic resonance from the Action Proponents' proposed activity.

Potential Effects of Explosive Sources on Marine Mammals

Explosive detonations that occur in water 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 and the potential effects of an explosive injury to marine mammals would consist of primary blast injury, which refers to injuries resulting from the compression of a body exposed to a blast wave. Blast effects are greatest at the gas-liquid interface (Landsberg, 2000) and are usually observed as barotrauma of gas-containing structures (*e.g.,* lung, gastrointestinal tract) and structural damage to the auditory system (Goertner, 1982; Greaves *et al.,* 1943; Hill, 1978; Office of the Surgeon General, 1991; Richmond *et al.,* 1973; Yelverton *et al.,* 1973). 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 or tolerance 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 near instantaneous high magnitude pressure change near an explosion can injure an animal where tissue material properties significantly differ from the surrounding environment, such as around air-filled cavities in the lungs or gastrointestinal tract. Large pressure changes at tissue-air interfaces in the lungs and gastrointestinal tract may cause tissue rupture, resulting in a range of injuries depending on degree of exposure. The lungs are typically the first site to show any damage, while the solid organs (*e.g.,* liver, spleen, and kidney) are more resistant to blast injury (Clark and Ward, 1943). Odontocetes can also incur hemorrhaging in the acoustic fats in the melon and jaw (Siebert *et al.,* 2022). Recoverable injuries would include slight lung injury, such as capillary interstitial bleeding, and contusions to the gastrointestinal tract. More severe injuries, such as tissue lacerations, major hemorrhage, organ rupture, or air in the chest cavity (pneumothorax), would significantly reduce fitness and likely cause death in the wild. Rupture of the lung may also introduce air into the vascular system, producing air emboli that can cause a stroke or heart attack by restricting oxygen delivery to critical organs.

Injuries resulting from a shock wave take place at boundaries between tissues of different densities. Different velocities are imparted to tissues of different densities, and this can lead to their physical disruption. Intestinal walls can bruise or rupture, with subsequent hemorrhage and escape of gut contents into the body cavity. Less severe gastrointestinal tract injuries include contusions, petechiae (*i.e.,* small red or purple spots caused by bleeding in the skin), and slight hemorrhaging (Yelverton *et al.,* 1973).

Relatively little is known about auditory system trauma in marine mammals resulting from explosive exposure, although it is assumed that auditory structures would be vulnerable to blast injuries because the ears are the most sensitive to pressure and, therefore, they are the organs most sensitive to injury (Ketten, 2000). Sound-related damage associated with sound energy from detonations can be theoretically distinct from injury from the shock wave, particularly farther from the explosion. If a noise is audible to an animal, it has the potential to damage the animal's hearing by causing decreased sensitivity (Ketten, 1995). Lethal impacts are those that result in immediate death or serious debilitation in or near an intense source and are not, technically, pure acoustic trauma (Ketten, 1995). Sublethal impacts include hearing loss, which is caused by exposures to perceptible sounds. Severe damage (from the shock wave) to the ears includes tympanic membrane rupture, fracture of the ossicles, damage to the cochlea, hemorrhage, and cerebrospinal fluid leakage into the middle ear. Moderate injury implies partial hearing loss due to tympanic membrane rupture and blood in the middle ear. Permanent hearing loss also can occur when the hair cells are damaged by one very loud event, as well as by prolonged exposure to a loud noise or chronic exposure to noise. The level of impact from blasts depends on both an animal's location and, at outer zones, on its sensitivity to the residual noise (Ketten, 1995). Auditory trauma was found in 2 humpback whales that died after the detonation of an 11,023 lb (5,000 kg) explosive used off Newfoundland during demolition of an offshore oil rig platform (Ketten *et al.,* 1993), but the proximity of the whales to the detonation was unknown. Eardrum rupture was examined in submerged terrestrial mammals exposed to underwater explosions (Richmond *et al.,* 1973; Yelverton *et al.,* 1973); however, results may not be applicable to the anatomical adaptations for underwater hearing in marine mammals given differences in impedance (Wartzok and Ketten 1999).

In general, models predict that an animal would be less susceptible to injury near the water surface because the pressure wave reflected from the water surface would interfere with the direct path pressure wave, reducing positive pressure exposure (Goertner, 1982; Yelverton and Richmond, 1981). This is shown in the records of humans exposed to blast while in the water, which show that the gastrointestinal tract was more likely to be injured than the lungs, likely due to the shallower exposure geometry of the lungs (*i.e.,* closer to the water surface) (Lance *et al.,* 2015). Susceptibility would increase with depth, until normal lung collapse (due to increasing hydrostatic pressure) and increasing ambient pressures again reduce susceptibility (Goertner, 1982). The only known occurrence of mortality or injury to a marine mammal due to a Navy training event involving explosives occurred in March 2011 in nearshore waters off San Diego, California, at the Silver Strand Training Complex (see Strandings Associated with Explosive Use section below).

Controlled tests with a variety of lab animals (*i.e.,* mice, rats, dogs, pigs, sheep, and other species) are the best data sources on actual injury to mammals due to underwater exposure to explosions. In the early 1970s, the Lovelace Foundation for Medical Education and Research conducted a series of tests in an artificial pond at Kirtland Air Force Base, New Mexico, to determine the effects of underwater explosions on mammals, with the goal of determining safe ranges for human divers. The resulting data were summarized in two reports (Richmond *et al.,* 1973; Yelverton *et al.,* 1973). Specific physiological observations for each test animal are documented in Richmond *et al.* (1973). Gas-containing internal organs, such as lungs and intestines, were the principle damage sites in submerged terrestrial mammals; this is consistent with earlier studies of mammal exposures to underwater explosions in which lungs were consistently the first areas to show damage, with less consistent damage observed in the gastrointestinal tract (Clark and Ward, 1943; Greaves *et al.,* 1943).

In the Lovelace studies, the first positive acoustic impulse was found to be the metric most related to degree of injury, and size of an animal's gas-containing cavities was thought to play a role in blast injury susceptibility. For these shallow exposures of small terrestrial mammals (masses ranging from 3.4 to 50 kg) to underwater detonations, Richmond *et al.* (1973) reported that no blast injuries were observed when exposures were less than 6 pounds per square inch per millisecond (psi-ms) (40 pascal seconds (Pa-s)), no instances of slight lung hemorrhage occurred below 20 psi-ms (140 Pa-s), and instances of no lung damage were observed in some exposures at higher levels up to 40 psi-ms (280 Pa-s). An impulse of 34 psi-ms (230 Pa-s) resulted in about 50 percent incidence of slight lung hemorrhage. About half of the animals had gastrointestinal tract contusions (with slight ulceration, *i.e.,* some perforation of the mucosal layer) at exposures of 25–27 psi-ms (170–190 Pa-s). Lung injuries were found to be slightly more prevalent than gastrointestinal tract injuries for the same exposure. The anatomical differences between the terrestrial animals used in the Lovelace tests and marine mammals are summarized in Fetherston *et al.* (2019). Goertner (1982) examined how lung cavity size would affect susceptibility to blast injury by considering both marine mammal size and depth in a bubble oscillation model of the lung; however, the Goertner (1982) model did not consider how tissues surrounding the respiratory air spaces would reflect shock wave energy or constrain oscillation (Fetherston *et al.,* 2019).

Goertner (1982) suggested a peak overpressure gastrointestinal tract injury criterion because the size of gas bubbles in the gastrointestinal tract are variable, and their oscillation period could be short relative to primary blast wave exposure duration. The potential for gastrointestinal tract injury, therefore, may not be adequately modeled by the single oscillation bubble methodology used to estimate lung injury due to impulse. Like impulse, however, high instantaneous pressures may damage many parts of the body, but damage to the gastrointestinal tract is used as an indicator of any peak pressure-induced injury due to its vulnerability.

Because gas-containing organs are more vulnerable to primary blast injury, adaptations for diving that allow for collapse of lung tissues with depth may make animals less vulnerable to lung injury with depth. Adaptations for diving include a flexible thoracic cavity, distensible veins that can fill space as air compresses, elastic lung tissue, and resilient tracheas with interlocking cartilaginous rings that provide strength and flexibility (Ridgway, 1972). Denk *et al.* (2020) found intra-species differences in the compliance of tracheobronchial structures of post-mortem cetaceans and pinnipeds under diving hydrostatic pressures, which would affect depth of alveolar collapse. Older literature suggested complete lung collapse depths at approximately 229.7 ft (70 m) for dolphins (Ridgway and Howard, 1979) and 65.6 to 164 ft (20 to 50 m) for phocid seals (Falke *et al.,* 1985; Kooyman *et al.,* 1972). Follow-on work by Kooyman and Sinnett (1982), in which pulmonary shunting was studied in harbor seals and sea lions, suggested that complete lung collapse for these species would be about 557.7 ft (170 m) and about 590.6 (180 m), respectively. Evidence in sea lions suggests that complete collapse might not occur until depths as great as 738.2 ft (225 m); although the depth of collapse and depth of the dive are related, sea lions can affect the depth of lung collapse by varying the amount of air inhaled on a dive (McDonald and Ponganis, 2012). This is an important consideration for all divers who can modulate lung volume and gas exchange prior to diving via the degree of inhalation and during diving via exhalation (Fahlman *et al.,* 2009); indeed, there are noted differences in pre-dive respiratory behavior, with some marine mammals exhibiting pre-dive exhalation to reduce the lung volume (*e.g.,* phocid seals) (Kooyman *et al.,* 1973).

Further Potential Effects of Behavioral Disturbance on Marine Mammal Fitness

The different ways in which marine mammals respond to sound are sometimes indicators of the ultimate effect that exposure to a given stimulus will have on the well-being (survival, reproduction, *etc.*) of an animal. The long-term consequences of disturbance, hearing loss, chronic masking, and acute or chronic physiological stress are difficult to predict because of the different factors experienced by individual animals, such as context of stressor exposure, underlying health conditions, and other environmental or anthropogenic stressors. Linking these non-lethal effects on individuals to changes in population growth rates requires long-term data, which is lacking for many populations. We summarize several studies below, but there are few quantitative marine mammal data relating the exposure of marine mammals to sound to effects on reproduction or survival, though data exists for terrestrial species to which we can draw comparisons for marine mammals. Several authors have reported that disturbance stimuli may cause animals to abandon nesting and foraging sites (Sutherland and Crockford, 1993); may cause animals to increase their activity levels and suffer premature deaths or reduced reproductive success when their energy expenditures exceed their energy budgets (Daan *et al.,* 1996; Feare, 1976; Mullner *et al.,* 2004); or may cause animals to experience higher predation rates when they adopt risk-prone foraging or migratory strategies (Frid and Dill, 2002). Each of these studies addressed the consequences of animals shifting from one behavioral state (*e.g.,* resting or foraging) to another behavioral state (*e.g.,* avoidance or escape behavior) because of human disturbance or disturbance stimuli.

Lusseau and Bejder (2007) present data from three long-term studies illustrating the connections between disturbance from whale-watching boats and population-level effects in cetaceans. In Shark Bay Australia, the abundance of bottlenose dolphins was compared within adjacent control and tourism sites over three consecutive 4.5-year periods of increasing tourism levels. Between the second and third time periods, in which tourism doubled, dolphin abundance decreased by 15 percent in the tourism area and did not change significantly in the control area. In Fiordland, New Zealand, two populations (Milford and Doubtful Sounds) of bottlenose dolphins with tourism levels that differed by a factor of seven were observed and significant increases in travelling time and decreases in resting time were documented for both. Consistent short-term avoidance strategies were observed in response to tour boats until a threshold of disturbance was reached (average 68 minutes between interactions), after which the response switched to a longer-term habitat displacement strategy. For one population, tourism only occurred in a part of the home range. However, tourism occurred throughout the home range of the Doubtful Sound population and once boat traffic increased beyond the 68-minute threshold (resulting in abandonment of their home range/preferred habitat), reproductive success drastically decreased (*i.e.,* increased stillbirths) and abundance decreased significantly (from 67 to 56 individuals in a short period). Last, in a study of Northern Resident killer whales off Vancouver Island, exposure to boat traffic was shown to reduce foraging opportunities and increase traveling time. A simple bioenergetics model was applied to show that the reduced foraging opportunities equated to a decreased energy intake of 18 percent, while the increased traveling incurred an increased energy output of 3–4 percent, which suggests that a management action based on avoiding interference with foraging might be particularly effective.

An important variable to consider is duration of disturbance. Severity scales used to assess behavioral responses of marine mammals to acute sound exposures are not appropriate to apply to sustained or chronic exposures, which requires considering the health of a population over time rather than a focus on immediate impacts to individuals (Southall *et al.,* 2021). For example, short-term costs experienced over the course of a week by an otherwise healthy individual may be recouped over time after exposure to the stressor ends. These short-term costs would be unlikely to result in long-term consequences to that individual or to that individual's population. Comparatively, long-term costs accumulated by otherwise healthy individuals over an entire season, year, or throughout a life stage (*e.g.,* pup, juvenile, adult) would be less easily recouped and more likely to result in long-term consequences to that individual or population.

Marine mammals exposed to frequent or intense anthropogenic activities may leave the area, habituate to the activity, or tolerate the disturbance and remain in the area (Wartzok *et al.,* 2003). Highly resident or localized populations may also stay in an area of disturbance because the cost of displacement is higher than the cost of remaining in the area (Forney *et al.,* 2017). As such, an apparent lack of response (*e.g.,* no displacement or avoidance of a sound source) does not necessarily indicate there is no cost to the individual or population, as some resources or habitats may be of such high value that animals may choose to stay, even when experiencing the consequences of stress, masking, or hearing loss (Forney *et al.,* 2017).

Longer term displacement can lead to changes in abundance or distribution patterns of the species in the affected region (Bejder *et al.,* 2006b; Blackwell *et al.,* 2004; Teilmann *et al.,* 2006). For example, gray whales in Baja California, Mexico, abandoned a historical breeding lagoon in the mid-1960s due to an increase in dredging and commercial shipping operations, and only repopulated the lagoon after shipping activities had ceased for several years (Bryant *et al.,* 1984). Mysticetes in the northeast tended to adjust to vessel traffic over several years, trending towards more neutral behavioral responses to passing vessels (Watkins, 1986), indicating that some animals may habituate to high levels of human activity. A study on bottlenose dolphin responses to vessel approaches found that lesser responses in populations of dolphins regularly subjected to high levels of vessel traffic could be a sign of habituation, or it could be that the more sensitive animals in this population previously abandoned the area of higher human activity (Bejder *et al.,* 2006a).

Population characteristics (*e.g.,* whether a population is open or closed to immigration and emigration) can influence sensitivity to disturbance as well; closed populations could not withstand a higher probability of disturbance compared to open populations with no limitation on food (New *et al.,* 2020). Predicting population trends or long-term displacement patterns due to anthropogenic disturbance is challenging due to limited information and survey data for many species over sufficient spatiotemporal scales, as well as a full understanding of how other factors, such as oceanographic oscillations, affect marine mammal presence (Moore and Barlow, 2013; Barlow, 2016; Moore and Barlow, 2017).

Population models are necessary to understand and link short-term effects to individuals from disturbance (anthropogenic impacts or environmental change) to long-term population consequences. Population models require inputs for the population size and changes in vital rates of the population (*e.g.,* the mean values for survival age, lifetime reproductive success, recruitment of new individuals into the population), to predict changes in population dynamics (*e.g.,* population growth rate). These efforts often rely on bioenergetic models, or energy budget models, which analyze energy intake from food and energy costs for life functions, such as maintenance, growth, and reproduction, either at the individual or population level (Pirotta, 2022), and model sensitivity analyses have identified the most consequential parameters, including prey characteristics, feeding processes, energy expenditure, body size, energy storage, and lactation capability (Pirotta, 2022). However, there is a high level of uncertainty around many parameters in these models (Hütt *et al.,* 2023).

The U.S. National Research Council (NRC) committee on Characterizing Biologically Significant Marine Mammal Behavior developed an initial conceptual model to link acoustic disturbance to population effects and inform data and research needs (NRC, 2005). This Population Consequences of Acoustic Disturbance, or PCAD, conceptual model linked the parameters of sound exposure, behavior change, life function immediately affected, vital rates, and population effects. In its report, the committee found that the relationships between vital rates and population effects were relatively well understood, but that the relationships between the other components of the model were not well-known or easily observed.

Following the PCAD framework (NRC, 2005), an ONR working group developed the Potential Consequences of Disturbance (PCoD), outlining an updated conceptual model of the relationships linking disturbance to changes in behavior and physiology, health, vital rates, and population dynamics. The PCoD model considers all types of disturbance, not solely anthropogenic or acoustic, and incorporates physiological changes, such as stress or injury, along with behavioral changes as a direct result of disturbance (National Academies of Sciences Engineering and Medicine, 2017). In this framework, behavioral and physiological changes can have direct (acute) effects on vital rates, such as when changes in habitat use or increased stress levels raise the probability of mother-calf separation or predation; they can have indirect and long-term (chronic) effects on vital rates, such as when changes in time/energy budgets or increased disease susceptibility affect health, which then affects vital rates; or they can have no effect to vital rates (New *et al.,* 2014; Pirotta *et al.,* 2018a). In addition to outlining this general framework and compiling the relevant literature that supports it, the authors chose four example species for which extensive long-term monitoring data exist (southern elephant seals, North Atlantic right whale, *Ziphiidae* beaked whales, and bottlenose dolphins) and developed state-space energetic models that can be used to forecast longer-term, population-level impacts from behavioral changes. While these models cannot yet be applied broadly to project-specific risk assessments for the majority of species, as well as requiring significant resources and time to conduct (more than is typically available to support regulatory compliance for one project), they are a critical first step towards being able to quantify the likelihood of a population level effect. Since New *et al.* (2014), several publications have described models developed to examine the long-term effects of environmental or anthropogenic disturbance of foraging on various life stages of selected species (sperm whale, Farmer *et al.* (2018); California sea lion, McHuron *et al.* (2018); and blue whale, Pirotta, *et al.* (2018a)).

The PCoD model identifies the types of data that would be needed to assess population-level impacts. These data are lacking for many marine mammal species (Booth *et al.,* 2020). Southall *et al.* (2021) states that future modeling and population simulation studies can help determine population-wide long-term consequences and impact analysis. However, the method to do so is still developing, as there are gaps in the literature, possible sampling biases, and results are rarely ground-truthed, with a few exceptions (Booth *et al.,* 2022; Schwarz *et al.,* 2022). Nowacek *et al.* (2016) reviewed technologies such as passive acoustic monitoring, tagging, and the use of unmanned aerial vehicles which can improve scientists' abilities to study these model inputs and link behavioral changes to individual life functions and ultimately population-level effects. Relevant data needed for improving analyses of population-level consequences resulting from disturbances will continue to be collected during the 7-year period of the LOAs through projects funded by the Navy's Marine Species Monitoring Program. Multiple case studies across marine mammal taxonomic groups have been conducted following the PCoD framework. From these studies, Keen *et al.* (2021) identified themes and contextual factors relevant to assessing impacts to populations due to disturbance, which have been considered in the context of the impacts of the Action Proponents' activities.

A population's movement ecology determines the potential for spatiotemporal overlap with a disturbance. Resident populations or populations that rely on spatially limited habitats for critical life functions (*i.e.,* foraging, breeding) would be at greater risk of repeated or chronic exposure to disturbances than populations that are wide-ranging relative to the footprint of a disturbance (Keen *et al.,* 2021). Even for the same species, differences in habitat use between populations can result in different potential for repeated exposure to individuals for a similar stressor (Costa *et al.,* 2016a). The location and radius of disturbance can impact how many animals are exposed and for how long (Costa *et al.,* 2016b). While some models have shown the advantages of populations with larger ranges, namely the decreased chance of being exposed (Costa *et al.,* 2016b), it's important to consider that for some species, the energetic cost of a longer migration could make a population more sensitive to energy lost through disturbance (Villegas-Amtmann *et al.,* 2017). In addition to ranging patterns, a species' activity budgets and lunging rates can cause variability in their predicted cost of disturbance as well (Pirotta *et al.,* 2021).

Bioenergetics frameworks that examine the impact of foraging disruption on body reserves of individual whales found that rates of daily foraging disruption can predict the number of days to terminal starvation for various life stages (Farmer *et al.,* 2018b). Similarly, when a population is displaced by a stressor, and only has access to areas of poor habitat quality (*i.e.,* low prey abundance) for relocation, bioenergetic models may be more likely to predict starvation, longer recovery times, or extinction (Hin *et al.,* 2023). There is some debate over the use of blubber thickness as a metric of cetacean energy stores and health, as marine mammals may not use their fat stores in a similar manner to terrestrial mammals (Derous *et al.,* 2020).

Resource limitation can impact marine mammal population growth rate regardless of additional anthropogenic disturbance. Stochastic Dynamic Programming models have been used to explore the impact declining prey species has on focal marine mammal predators (McHuron *et al.,* 2023a; McHuron *et al.,* 2023b). A Stochastic Dynamic Programming model determined that a decrease in walleye pollock (*Gadus chalcogrammus*) availability increased the time and distance northern fur seal mothers had to travel offshore, which negatively impacted pup growth rate and wean mass, despite attempts to compensate with longer recovery time on land (McHuron *et al.,* 2023b). Prey is an important factor in long-term consequence models for many species of marine mammals. In disturbance models that predict habitat displacement or otherwise reduced foraging opportunities, populations are being deprived of energy dense prey or ''high quality'' areas which can lead to long-term impacts on fecundity and survival (Czapanskiy *et al.,* 2021; Hin *et al.,* 2019; McHuron *et al.,* 2023a; New *et al.,* 2013b). Prey density limits the energy available for growth, reproduction, and survival. Some disturbance models indicate that the immediate decrease in a portion of the population (*e.g.,* young lactating mothers) is not necessarily detrimental to a population, since as a result, prey availability increases and the population's overall improved body condition reduces the age at first calf (Hin *et al.,* 2021). The timing of a disturbance with seasonally available resources is also important; if a disturbance occurs during periods of low resource availability, the population-level consequences are greater and occur faster than if the disturbance occurs during periods when resource levels are high (Hin *et al.,* 2019). Further, when resources are not evenly distributed, populations with cautious strategies and knowledge of resource variation have an advantage (Pirotta *et al.,* 2020).

Even when modeled alongside several anthropogenic sources of disturbance (*e.g.,* vessel strike, vessel noise, chemical contaminants, sonar), several species of marine mammals are most influenced by lack of prey (Czapanskiy *et al.,* 2021; Murray *et al.,* 2021). Some species like killer whales are especially sensitive to prey abundance due to their limited diet (Murray *et al.,* 2021). The short-term energetic cost of eleven species of cetaceans and mysticetes exposed to mid-frequency active sonar was influenced more by lost foraging opportunities than increased locomotor effort during avoidance (Czapanskiy *et al.,* 2021). Additionally, the model found that mysticetes incurred more energetic cost than odontocetes, even during mild behavioral responses to sonar. These results may be useful in the development of future Population Consequences of Multiple Stressors and PCoD models since they should seek to qualify cetacean health in a more ecologically relevant manner.

PCoD models have been used to assess the impacts of multiple and recurring stressors. A marine mammal population that is already subject to chronic stressors will likely be more vulnerable to acute disturbances. Models that have looked at populations of cetaceans who are exposed to multiple stressors over several years have found that even one major chronic stressor (*e.g.,* epizootic disease, oil spill) has severe impacts on population size. A layer of one or more stressor (*e.g.,* seismic surveys) in addition to a chronic stressor (*e.g.,* an oil spill) can yield devastating impacts on a population. These results may vary based on species and location, as one population may be more impacted by chronic shipping noise, while another population may not. However, just because a population doesn't appear to be impacted by one chronic stressor (*e.g.,* shipping noise), does not mean they aren't affected by others (*e.g.,* disease) (Reed *et al.,* 2020). Recurring or chronic stressors can impact population abundance even when instances of disturbance are short and have minimal behavioral impact on an individual (Farmer *et al.,* 2018a; McHuron *et al.,* 2018b; Pirotta *et al.,* 2019). Some changes to response variables like pup recruitment (survival to age one) are not noticeable for several years, as the impacts on pup survival does not affect the population until those pups are mature but impacts to young animals will ultimately lead to population-wide declines. The severity of the repeated disturbance can also impact a population's long-term reproductive success. Scenarios with severe repeated disturbance (*e.g.,* 95 percent probability of exposure, with 95 percent reduction in feeding efficiency) can severely reduce fecundity and calf survival, while a weaker disturbance (25 percent probability of exposure, with 25 percent reduction in feeding efficiency) had no population-wide effect on vital rates (Pirotta *et al.,* 2019).

Farmer *et al.* (2018a) modeled how an oil spill led to chronic declines in a sperm whale population over 10 years, and if models included even one more stressor (*i.e.,* behavioral responses to air guns), the population declined even further. However, the amount of additional population decline due to acoustic disturbance depended on the way the dose-response of the noise levels were modeled. A single step-function led to higher impacts than a function with multiple steps and frequency weighting. In addition, the amount of impact from both disturbances was mediated when the metric in the model that described animal resilience was changed to increase resilience to disturbance (*e.g.,* able to make up reserves through increased foraging).

Not all stressors have the same impact for all species and all locations. Another model analyzed the effect of a number of chronic disturbances on two bottlenose dolphin populations in Australia over 5 years (Reed *et al.,* 2020). Results indicated that disturbance from fisheries interactions and shipping noise had little overall impact on population abundances in either location, even in the most extreme impact scenarios modeled. At least in this area, other factors (*e.g.,* epizootic scenarios) had the largest impact on population size and fecundity.

Recurring stressors can impact population abundance even when individual instances of disturbance are short and have minimal behavioral impact on an individual. A model on California sea lions introduced a generalized disturbance at different times throughout the breeding cycle, with their behavior response being an increase in the duration of a foraging trip by the female (McHuron *et al.,* 2018b). Very short duration disturbances or responses led to little change, particularly if the disturbance was a single event, and changes in the timing of the event in the year had little effect. However, with even relatively short disturbances or mild responses, when a disturbance was modeled as recurring there were resulting reductions in population size and pup recruitment (survival to age one). Often, the effects weren't noticeable for several years, as the impacts on pup survival did not affect the population until those pups were mature.

Stranding and Mortality

The definition for a stranding under title IV of the MMPA is an event in the wild in which (A) a marine mammal is dead and is (i) on a beach or shore of the United States; or (ii) in waters under the jurisdiction of the United States (including any navigable waters); or (B) a marine mammal is alive and is (i) on a beach or shore of the United States and is unable to return to the water; (ii) on a beach or shore of the United States and, although able to return to the water, is in need of apparent medical attention; or (iii) in the waters under the jurisdiction of the United States (including any navigable waters), but is unable to return to its natural habitat under its own power or without assistance (see 16 U.S.C. 1421h(6)). This definition is useful for considering stranding events even when they occur beyond lands and waters under the jurisdiction of the United States.

Marine mammal strandings have been linked to a variety of causes, such as illness from exposure to infectious agents, biotoxins, or parasites; starvation; unusual oceanographic or weather events; or anthropogenic causes including fishery interaction, vessel strike, entrainment, entrapment, sound exposure, or combinations of these stressors sustained concurrently or in series. Historically, the cause or causes of most strandings have remained unknown (*e.g.,* Odell *et al.,* 1980), but the development of trained, professional stranding response networks and improved analyses have led to a greater understanding of marine mammal stranding causes (Simeone and Moore 2018).

Numerous studies suggest that the physiology, behavior, habitat, social relationships, age, or condition of cetaceans may cause them to strand or might predispose them to strand when exposed to another phenomenon. These suggestions are consistent with the conclusions of numerous other studies that have demonstrated that combinations of dissimilar stressors commonly combine to kill an animal or dramatically reduce its fitness, even though one exposure without the other does not produce the same result (Bernaldo de Quiros *et al.,* 2019; Chroussos, 2000; Creel, 2005 Fair and Becker, 2000; Foley *et al.,* 2001; Moberg, 2000; Relyea, 2005a; 2005b, Romero, 2004; Sih *et al.,* 2004).

Historically, stranding reporting and response efforts have been inconsistent, although significant improvements have occurred over the last 25 years. Reporting forms for basic (''Level A'') information, rehabilitation disposition, and human interaction have been standardized nationally are available at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/level-data-collection-marine-mammal-stranding-events.* However, data collected beyond basic information varies by region (and may vary from case to case) and are not standardized across the United States. Logistical conditions such as weather, time, location, and decomposition state may also affect the ability of the stranding network to thoroughly examine a specimen (Carretta *et al.,* 2023; Moore *et al.,* 2013). While the investigation of stranded animals provides insight into the types of threats marine mammal populations face, full investigations are only possible and conducted on a small fraction of the total number of strandings that occur, limiting our understanding of the causes of strandings (Carretta *et al.,* 2016a). Additionally, and due to the variability in effort and data collected, the ability to interpret long-term trends in stranded marine mammals is complicated.

In the United States from 2006–2022, there were 27,781 cetacean strandings and 79,572 pinniped strandings (107,353 total) (P. Onens, NMFS, *pers comm.,* 2024). Several mass strandings (strandings that involve two or more individuals of the same species, excluding a single mother-calf pair) that have occurred over the past two decades have been associated with anthropogenic activities that introduced sound into the marine environment such as naval operations and seismic surveys. An in-depth discussion of strandings can be found in appendix D of the 2024 HCTT Draft EIS/OEIS and in the Navy's Technical Report on Marine Mammal Strandings Associated with U.S. Navy Sonar Activities (U.S. Navy Marine Mammal Program and Space and Naval Warfare Systems Command Center Pacific, 2017b).

Worldwide, there have been several efforts to identify relationships between cetacean mass stranding events and military active sonar (Cox *et al.,* 2006, Hildebrand, 2004; Taylor *et al.,* 2004). D'Amico *et al.* (2009) reviewed beaked whale stranding data compiled primarily from the published literature, which provides an incomplete record of stranding events, as many are not written up for publication, along with unpublished information from some regions of the world.

Most of the stranding events reviewed by the IWC involved beaked whales. A mass stranding of goose-beaked whales in the eastern Mediterranean Sea occurred in 1996 (Frantzis, 1998), and mass stranding events involving Gervais' beaked whales, Blainville's beaked whales, and goose-beaked whales occurred off the coast of the Canary Islands in the late 1980s (Simmonds and Lopez-Jurado, 1991). The stranding events that occurred in the Canary Islands and Kyparissiakos Gulf in the late 1990s and the Bahamas in 2000 have been the most intensively-studied mass stranding events and have been associated with naval maneuvers involving the use of tactical sonar. Other cetacean species with naval sonar implicated in stranding events include harbor porpoise (Norman *et al.,* 2004, Wright *et al.,* 2013) and common dolphin (Jepson *et al.,* 2013).

Strandings Associated With Active Sonar

Over the past 21 years, there have been 5 stranding events coincident with naval MFAS use in which exposure to sonar is believed to have been a contributing factor: Greece (1996); the Bahamas (2000); Madeira (2000); Canary Islands (2002); and Spain (2006) (Cox *et al.,* 2006; Fernandez, 2006; U.S. Navy Marine Mammal Program and Space and Naval Warfare Systems Command Center Pacific, 2017). These five mass strandings have resulted in about 40 known cetacean deaths consisting mostly of beaked whales and with close linkages to MFAS activity. In these circumstances, exposure to non-impulsive acoustic energy was considered a potential indirect cause of death of the marine mammals (Cox *et al.,* 2006). Only one of these stranding events, the Bahamas (2000), was associated with exercises conducted by the U.S. Navy. Additionally, in 2004, during the RIMPAC exercises, between 150 and 200 usually pelagic melon-headed whales occupied the shallow waters of Hanalei Bay, Kauaʻi, Hawaii for over 28 hours. NMFS determined that MFAS was a plausible, if not likely, contributing factor in what may have been a confluence of events that led to the Hanalei Bay stranding. A number of other stranding events coincident with the operation of MFAS, including the death of beaked whales or other species (*i.e.,* minke whales, dwarf sperm whales, pilot whales), have been reported; however, the majority have not been investigated to the degree necessary to determine the cause of the stranding. Most recently, the Independent Scientific Review Panel investigating potential contributing factors to a 2008 mass stranding of melon-headed whales in Antsohihy, Madagascar released its final report suggesting that the stranding was likely initially triggered by an industry seismic survey (Southall *et al.,* 2013). This report suggests that the operation of a commercial high-powered 12 kHz multibeam echosounder during an industry seismic survey was a plausible and likely initial trigger that caused a large group of melon-headed whales to leave their typical habitat and then ultimately strand as a result of secondary factors such as malnourishment and dehydration. The report indicates that the risk of this particular convergence of factors and ultimate outcome is likely very low but recommends that the potential be considered in environmental planning. Because of the association between tactical MFAS use and a limited number of marine mammal strandings, the Navy and NMFS have been considering and addressing the potential for strandings in association with Navy activities for years. In addition to the proposed mitigation measures intended to more broadly minimize impacts to marine mammals, the Navy will abide by the Notification and Reporting Plan, which sets out notification, reporting, and other requirements when dead, injured, or stranded marine mammals are detected in certain circumstances.

Greece (1996)—

Twelve goose-beaked whales stranded atypically (in both time and space) along a 23.7 mi (38.2 km) strand of the Kyparissiakos Gulf coast on May 12 and 13, 1996 (Frantzis, 1998). From May 11 through May 15, the North Atlantic Treaty Organization (NATO) research vessel Alliance was conducting sonar tests with signals of 600 Hz and 3 kHz and source levels of 228 and 226 dB re 1 µPa, respectively (D'Amico and Verboom, 1998; D'Spain *et al.,* 2006). The timing and location of the testing encompassed the time and location of the strandings (Frantzis, 1998).

Necropsies of eight of the animals were performed but were limited to basic external examination and sampling of stomach contents, blood, and skin. No ears or organs were collected, and no histological samples were preserved. No significant apparent abnormalities or wounds were found, however examination of photos of the animals, taken soon after their death, revealed that the eyes of at least four of the individuals were bleeding (Frantzis, 2004). Stomach contents contained the flesh of cephalopods, indicating that feeding had recently taken place (Frantzis, 1998).

All available information regarding the conditions associated with this stranding event was compiled, and many potential causes were examined including major pollution events, prominent tectonic activity, unusual physical or meteorological events, magnetic anomalies, epizootics, and conventional military activities (International Council for the Exploration of the Sea, 2005). However, none of these potential causes coincided in time or space with the mass stranding or could explain its characteristics (International Council for the Exploration of the Sea, 2005). The robust condition of the animals, plus the recent stomach contents, is inconsistent with pathogenic causes. In addition, environmental causes can be ruled out as there were no unusual environmental circumstances or events before or during this time period and within the general proximity (Frantzis, 2004).

Because of the rarity of this mass stranding of goose-beaked whales in the Kyparissiakos Gulf (first one in historical records), the probability for the two events (the military exercises and the strandings) to coincide in time and location, while being independent of each other, was thought to be extremely low (Frantzis, 1998). However, because full necropsies had not been conducted, and no abnormalities were noted, the cause of the strandings could not be precisely determined (Cox *et al.,* 2006). A Bioacoustics Panel convened by NATO concluded that the evidence available did not allow them to accept or reject sonar exposures as a causal agent in these stranding events. The analysis of this stranding event provided support for, but no clear evidence for, the cause-and-effect relationship of tactical sonar training activities and beaked whale strandings (Cox *et al.,* 2006).

Bahamas (2000)—

NMFS and the Navy prepared a joint report addressing the multi-species stranding in the Bahamas in 2000, which took place within 24 hours of U.S. Navy ships using MFAS as they passed through the Northeast and Northwest Providence Channels on March 15–16, 2000. The ships, which operated both AN/SQS–53C and AN/

SQS–56 sonar, moved through the channel while emitting pings approximately every 24 seconds. Of the 17 cetaceans that stranded over a 36-hour period (goose-beaked whales, Blainville's beaked whales, minke whales, and a spotted dolphin), 7 animals died on the beach (5 goose-beaked whales, 1 Blainville's beaked whale, and 1 spotted dolphin), while the other 10 were returned to the water alive (though their ultimate fate is unknown). As discussed in the Bahamas report (DOC/DON, 2001), there is no likely association between the minke whale and spotted dolphin strandings and the operation of MFAS.

Necropsies were performed on five of the stranded beaked whales. All five necropsied beaked whales were in good body condition, showing no signs of infection, disease, vessel strike, blunt trauma, or fishery related injuries, and three still had food remains in their stomachs. Auditory structural damage was discovered in four of the whales, specifically bloody effusions or hemorrhaging around the ears. Bilateral intracochlear and unilateral temporal region subarachnoid hemorrhage, with blood clots in the lateral ventricles, were found in two of the whales. Three of the whales had small hemorrhages in their acoustic fats (located along the jaw and in the melon).

A comprehensive investigation was conducted and all possible causes of the stranding event were considered, whether they seemed likely at the outset or not. Based on the way in which the strandings coincided with ongoing naval activity involving tactical MFAS use, in terms of both time and geography, the nature of the physiological effects experienced by the dead animals, and the absence of any other acoustic sources, the investigation team concluded that MFAS aboard U.S. Navy ships that were in use during the active sonar exercise in question were the most plausible source of this acoustic or impulse trauma to beaked whales. This sound source was active in a complex environment that included the presence of a surface duct, unusual and steep bathymetry, a constricted channel with limited egress, intensive use of multiple, active sonar units over an extended period of time, and the presence of beaked whales that appear to be sensitive to the frequencies produced by these active sonars. The investigation team concluded that the cause of this stranding event was the confluence of the Navy MFAS and these contributory factors working together and further recommended that the Navy avoid operating MFAS in situations where these five factors would be likely to occur. This report does not conclude that all five of these factors must be present for a stranding to occur, nor that beaked whales are the only species that could potentially be affected by the confluence of the other factors. Based on this, NMFS believes that the operation of MFAS in situations where surface ducts exist, or in marine environments defined by steep bathymetry and/or constricted channels may increase the likelihood of producing a sound field with the potential to cause cetaceans (especially beaked whales) to strand, and therefore, suggests the need for increased vigilance while operating MFAS in these areas, especially when beaked whales (or potentially other deep divers) are likely present.

Madeira, Portugal (2000)—

From May 10–14, 2000, three goose-beaked whales were found stranded on two islands in the Madeira Archipelago, Portugal (Cox *et al.,* 2006). A fourth animal was reported floating in the Madeiran waters by fisherman but did not come ashore (Ketten, 2005). Joint NATO amphibious training peacekeeping exercises involving participants from 17 countries and 80 warships, took place in Portugal during May 2–15, 2000.

The bodies of the three stranded whales were examined postmortem (Ketten, 2005), though only one of the stranded whales was fresh enough (24 hours after stranding) to be necropsied (Cox *et al.,* 2006). Results from the necropsy revealed evidence of hemorrhage and congestion in the right lung and both kidneys (Cox *et al.,* 2006). There was also evidence of intracochlear and intracranial hemorrhage similar to that which was observed in the whales that stranded in the Bahamas event (Cox *et al.,* 2006). There were no signs of blunt trauma, and no major fractures, and the cranial sinuses and airways were found to be clear with little or no fluid deposition, which may indicate good preservation of tissues (Woods Hole Oceanographic Institution, 2005).

Several observations on the Madeira stranded beaked whales, such as the pattern of injury to the auditory system, are the same as those observed in the Bahamas strandings. Blood in and around the eyes, kidney lesions, pleural hemorrhages, and congestion in the lungs are particularly consistent with the pathologies from the whales stranded in the Bahamas and are consistent with stress and pressure related trauma. The similarities in pathology and stranding patterns between these two events suggest that a similar pressure event may have precipitated or contributed to the strandings at both sites (Woods Hole Oceanographic Institution, 2005).

Even though no definitive causal link can be made between the stranding event and naval exercises, certain conditions may have existed in the exercise area that, in their aggregate, may have contributed to the marine mammal strandings (Freitas, 2004): Exercises were conducted in areas of at least 547 fathoms (1,000 m) depth near a shoreline where there is a rapid change in bathymetry on the order of 547 to 3,281 fathoms (1,000 to 6,000 m) occurring across a relatively short horizontal distance (Freitas, 2004); multiple ships were operating around Madeira, though it is not known if MFAS was used, and the specifics of the sound sources used are unknown (Cox *et al.,* 2006; Freitas, 2004); and exercises took place in an area surrounded by landmasses separated by less than 35 nmi (65 km) and at least 10 nmi (19 km) in length, or in an embayment. Exercises involving multiple ships employing MFAS near land may produce sound directed towards a channel or embayment that may cut off the lines of egress for marine mammals (Freitas, 2004).

Canary Islands, Spain (2002)—

The southeastern area within the Canary Islands is well known for aggregations of beaked whales due to its ocean depths of greater than 547 fathoms (1,000 m) within a few hundred meters of the coastline (Fernandez *et al.,* 2005). On September 24, 2002, 14 beaked whales were found stranded on Fuerteventura and Lanzarote Islands in the Canary Islands (International Council for Exploration of the Sea, 2005a). Seven whales died, while the remaining seven live whales were returned to deeper waters (Fernandez *et al.,* 2005). Four beaked whales were found stranded dead over the next three days either on the coast or floating offshore. These strandings occurred within close proximity of an international naval exercise that utilized MFAS and involved numerous surface warships and several submarines. Strandings began about four hours after the onset of MFAS activity (International Council for Exploration of the Sea, 2005a; Fernandez *et al.,* 2005).

Eight goose-beaked whales, one Blainville's beaked whale, and one Gervais' beaked whale were necropsied, six of them within 12 hours of stranding (Fernandez *et al.,* 2005). No pathogenic bacteria were isolated from the carcasses (Jepson *et al.,* 2003). The animals displayed severe vascular congestion and hemorrhage especially around the tissues in the jaw, ears, brain, and kidneys, displaying marked disseminated microvascular hemorrhages associated with widespread fat emboli (Jepson *et al.,* 2003; International Council for Exploration of the Sea, 2005a). Several organs contained intravascular bubbles, although definitive evidence of gas embolism in vivo is difficult to determine after death (Jepson *et al.,* 2003). The livers of the necropsied animals were the most consistently affected organ, which contained macroscopic gas-filled cavities and had variable degrees of fibrotic encapsulation. In some animals, cavitary lesions had extensively replaced the normal tissue (Jepson *et al.,* 2003). Stomachs contained a large amount of fresh and undigested contents, suggesting a rapid onset of disease and death (Fernandez *et al.,* 2005). Head and neck lymph nodes were enlarged and congested, and parasites were found in the kidneys of all animals (Fernandez *et al.,* 2005).

The association of NATO MFAS use close in space and time to the beaked whale strandings, and the similarity between this stranding event and previous beaked whale mass strandings coincident with sonar use, suggests that a similar scenario and causative mechanism of stranding may be shared between the events. Beaked whales stranded in this event demonstrated brain and auditory system injuries, hemorrhages, and congestion in multiple organs, similar to the pathological findings of the Bahamas and Madeira stranding events. In addition, the necropsy results of the Canary Islands stranding event lead to the hypothesis that the presence of disseminated and widespread gas bubbles and fat emboli were indicative of nitrogen bubble formation, similar to what might be expected in decompression sickness (Jepson *et al.,* 2003; Fernández *et al.,* 2005).

Hanalei Bay (2004)—

On July 3 and 4, 2004, approximately 150 to 200 melon-headed whales occupied the shallow waters of Hanalei Bay, Kauaʻi, Hawaii for over 28 hours. Attendees of a canoe blessing observed the animals entering Hanalei Bay in a single wave formation at 7 a.m. on July 3, 2004. The animals were observed moving back into the shore from the mouth of the Bay at 9 a.m. The usually pelagic animals milled in the shallow bay and were returned to deeper water with human assistance beginning at 9:30 a.m. on July 4, 2004, and were out of sight by 10:30 a.m.

Only one animal, a calf, was known to have died following this event. The animal was noted alive and alone in Hanalei Bay on the afternoon of July 4, 2004, and was found dead in Hanalei Bay the morning of July 5, 2004. A full necropsy, magnetic resonance imaging, and computerized tomography examination were performed on the calf to determine the manner and cause of death. The combination of imaging, necropsy and histological analyses found no evidence of infectious, internal traumatic, congenital, or toxic factors. Cause of death could not be definitively determined, but it is likely that maternal separation, poor nutritional condition, and dehydration contributed to the final demise of the animal. Although it is not known when the calf was separated from its mother, the animals' movement into Hanalei Bay and subsequent milling and re-grouping may have contributed to the separation or lack of nursing, especially if the maternal bond was weak or this was an inexperienced mother with her first calf.

Environmental factors, abiotic and biotic, were analyzed for any anomalous occurrences that would have contributed to the animals entering and remaining in Hanalei Bay. The Bay's bathymetry is similar to many other sites within the Hawaiian Island chain and dissimilar to sites that have been associated with mass strandings in other parts of the United States. The weather conditions appeared to be normal for that time of year with no fronts or other significant features noted. There was no evidence of unusual distribution, occurrence of predator or prey species, or unusual harmful algal blooms, although Mobley (2007) suggested that the full moon cycle that occurred at that time may have influenced a run of squid into the Bay. Weather patterns and bathymetry that have been associated with mass strandings elsewhere were not found to occur in this instance.

The Hanalei Bay event was spatially and temporally correlated with RIMPAC. Official sonar training and tracking exercises in the PMRF warning area did not commence until approximately 8 a.m. on July 3 and were thus ruled out as a possible trigger for the initial movement into the bay. However, six naval surface vessels transiting to the operational area on July 2 intermittently transmitted active sonar (for approximately 9 hours total from 1:15 p.m. to 12:30 a.m.) as they approached from the south. The potential for these transmissions to have triggered the whales' movement into Hanalei Bay was investigated. Analyses with the information available indicated that animals to the south and east of Kauaʻi could have detected active sonar transmissions on July 2 and reached Hanalei Bay on or before 7 a.m. on July 3. However, data limitations regarding the position of the whales prior to their arrival in Hanalei Bay, the magnitude of sonar exposure, behavioral responses of melon-headed whales to acoustic stimuli, and other possible relevant factors preclude a conclusive finding regarding the role of sonar in triggering this event. Propagation modeling suggests that transmissions from sonar use during the July 3 exercise in the PMRF warning area may have been detectable at the mouth of the Hanalei Bay. If the animals responded negatively to these signals, it may have contributed to their continued presence in Hanalei Bay. The U.S. Navy ceased all active sonar transmissions during exercises in this range on the afternoon of July 3. Subsequent to the cessation of sonar use, the animals were herded out of Hanalei Bay.

While causation of this stranding event may never be unequivocally determined, NMFS considers the active sonar transmissions of July 2–3, 2004 a plausible, if not likely, contributing factor in what may have been a confluence of events. This conclusion is based on the following: (1) the evidently anomalous nature of the stranding; (2) its close spatiotemporal correlation with wide-scale, sustained use of sonar systems previously associated with stranding of deep-diving marine mammals; (3) the directed movement of two groups of transmitting vessels toward the southeast and southwest coast of Kauaʻi; (4) the results of acoustic propagation modeling and an analysis of possible animal transit times to the bay; and (5) the absence of any other compelling causative explanation. The initiation and persistence of this event may have resulted from an interaction of biological and physical factors. The biological factors may have included the presence of an apparently uncommon, deep-diving cetacean species (and possibly an offshore, non-resident group), social interactions among the animals before or after they entered the Bay, and/or unknown predator or prey conditions. The physical factors may have included the presence of nearby deep water, multiple vessels transiting in a directed manner while transmitting active sonar over a sustained period, the presence of surface sound ducting conditions, and/or intermittent and random human interactions while the animals were in Hanalei Bay.

A separate event involving melon-headed whales and rough-toothed dolphins took place over the same period of time in the Northern Mariana

Islands (Jefferson *et al.,* 2006), which is several thousand miles from Hawaii. Some 500 to 700 melon-headed whales came into Sasanhaya Bay on July 4, 2004, near the island of Rota and then left of their own accord after 5.5 hours; no known active sonar transmissions occurred in the vicinity of that event. The Rota incident led to scientific debate regarding what, if any, relationship the event had to the simultaneous events in Hawaii and whether they might be related by some common factor (*e.g.,* there was a full moon on July 2, 2004, as well as during other melon-headed whale strandings and nearshore aggregations (Brownell *et al.,* 2009; Lignon *et al.,* 2007; Mobley, 2007). Brownell *et al.* (2009) compared the two incidents, along with one other stranding incident at Nuka Hiva in French Polynesia and normal resting behaviors observed at Palmyra Island, in regard to physical features in the areas, melon-headed whale behavior, and lunar cycles. Brownell *et al.,* (2009) concluded that the rapid entry of the whales into Hanalei Bay, their movement into very shallow water far from the 328-ft (100-m) contour, their milling behavior (typical pre-stranding behavior), and their reluctance to leave the bay constituted an unusual event that was not similar to the events that occurred at Rota, which appear to be similar to observations of melon-headed whales resting normally at Palmyra Island. Additionally, there was no correlation between lunar cycle and the types of behaviors observed in the Brownell *et al.* (2009) examples.

Spain (2006)—

The Spanish Cetacean Society reported an atypical mass stranding of four beaked whales that occurred January 26, 2006, on the southeast coast of Spain, near Mojácar (Gulf of Vera) in the Western Mediterranean Sea. According to the report, two of the whales were discovered the evening of January 26 and were found to be still alive. Two other whales were discovered during the day on January 27 but had already died. The first three animals were located near the town of Mojácar and the fourth animal was found dead, a few kilometers north of the first three animals. From January 25–26, 2006, Standing NATO Response Force Maritime Group Two (five of seven ships including one U.S. ship under NATO Operational Control) had conducted active sonar training against a Spanish submarine within 50 nmi (93 km) of the stranding site.

Veterinary pathologists necropsied the two male and two female goose-beaked whales. According to the pathologists, the most likely primary cause of this type of beaked whale mass stranding event was anthropogenic acoustic activities, most probably anti-submarine MFAS used during the military naval exercises. However, no positive acoustic link was established as a direct cause of the stranding. Even though no causal link can be made between the stranding event and naval exercises, certain conditions may have existed in the exercise area that, in their aggregate, may have contributed to the marine mammal strandings (Freitas, 2004). Exercises were conducted in areas of at least 547 fathoms (1,000 m) depth near a shoreline where there is a rapid change in bathymetry on the order of 547 to 3,281 fathoms (1,000 to 6,000 m) occurring across a relatively short horizontal distance (Freitas, 2004). Multiple ships (in this instance, five) were operating MFAS in the same area over extended periods of time (in this case, 20 hours) in close proximity; and exercises took place in an area surrounded by landmasses, or in an embayment. Exercises involving multiple ships employing MFAS near land may have produced sound directed towards a channel or embayment that may have cut off the lines of egress for the affected marine mammals (Freitas, 2004).

Honaunau Bay (2022)—

On March 25, 2022, a beaked whale (species unknown) stranded in Honaunau Bay, Hawaii. The animal was observed swimming into shore and over rocks. Bystanders intervened to turn the animal off of the rocks, and it swam back out of Honaunau Bay on its own. Locals reported hearing a siren or alarm type of sound underwater on the same day, and a Navy vessel was observed from shore on the following day. The Navy confirmed it used CAS within 27 nmi (50 km) and 48 hours of the time of stranding, though the stranding has not been definitively linked to the Navy's CAS use, and there is no evidence to determine whether the animal had any further short- or long-term effects.

Behaviorally Mediated Responses to MFAS That May Lead to Stranding

Although the confluence of Navy MFAS with the other contributory factors noted in the 2001 NMFS/Navy joint report was identified as the cause of the 2000 Bahamas stranding event, the specific mechanisms that led to that stranding (or the others) are not well understood, and there is uncertainty regarding the ordering of effects that led to the stranding. It is unclear whether beaked whales were directly injured by sound (*e.g.,* acoustically mediated bubble growth, as addressed above) prior to stranding or whether a behavioral response to sound occurred that ultimately caused the beaked whales to be injured and strand.

Although causal relationships between beaked whale stranding events and active sonar remain unknown, several authors have hypothesized that stranding events involving these species in the Bahamas and Canary Islands may have been triggered when the whales changed their dive behavior in a startled response to exposure to active sonar or to further avoid exposure (Cox *et al.,* 2006; Rommel *et al.,* 2006). These authors proposed three mechanisms by which the behavioral responses of beaked whales upon being exposed to active sonar might result in a stranding event. These include the following: gas bubble formation caused by excessively fast surfacing; remaining at the surface too long when tissues are supersaturated with nitrogen; or diving prematurely when extended time at the surface is necessary to eliminate excess nitrogen. More specifically, beaked whales that occur in deep waters that are in close proximity to shallow waters (for example, the ''canyon areas'' that are cited in the Bahamas stranding event; see D'Spain and D'Amico, 2006), may respond to active sonar by swimming into shallow waters to avoid further exposures and strand if they were not able to swim back to deeper waters. Second, beaked whales exposed to active sonar might alter their dive behavior. Changes in their dive behavior might cause them to remain at the surface or at depth for extended periods of time which could lead to hypoxia directly by increasing their oxygen demands or indirectly by increasing their energy expenditures (to remain at depth) and increase their oxygen demands as a result. If beaked whales are at depth when they detect a ping from an active sonar transmission and change their dive profile, this could lead to the formation of significant gas bubbles, which could damage multiple organs or interfere with normal physiological function (Cox *et al.,* 2006; Rommel *et al.,* 2006; Zimmer and Tyack, 2007). Baird *et al.* (2006) found that slow ascent rates from deep dives and long periods of time spent within 164 ft (50 m) of the surface were typical for both goose-beaked and Blainville's beaked whales, the two species involved in mass strandings related to naval sonar. These two behavioral mechanisms may be necessary to purge excessive dissolved nitrogen concentrated in their tissues during their frequent long dives (Baird *et al.,* 2005). Baird *et al.* (2005) further suggests that abnormally rapid ascents or premature dives in response to high-intensity sonar could indirectly result in physical harm to the beaked whales, through the mechanisms described above (gas bubble formation or non-elimination of excess nitrogen). In a review of the previously published data on the potential impacts of sonar on beaked whales, Bernaldo de Quirós *et al.* (2019) suggested that the effect of MFAS on beaked whales varies among individuals or populations, and that predisposing conditions such as previous exposure to sonar and individual health risk factors may contribute to individual outcomes (*e.g.,* decompression sickness).

Because many species of marine mammals make repetitive and prolonged dives to great depths, it has long been assumed that marine mammals have evolved physiological mechanisms to protect against the effects of rapid and repeated decompressions. Although several investigators have identified physiological adaptations that may protect marine mammals against nitrogen gas supersaturation (*i.e.,* alveolar collapse and elective circulation; Kooyman *et al.,* 1972; Ridgway and Howard, 1979), Ridgway and Howard (1979) reported that bottlenose dolphins that were trained to dive repeatedly had muscle tissues that were substantially supersaturated with nitrogen gas. Houser *et al.* (2001b) used these data to model the accumulation of nitrogen gas within the muscle tissue of other marine mammal species and concluded that cetaceans that dive deep and have slow ascent or descent speeds would have tissues that are more supersaturated with nitrogen gas than other marine mammals. Based on these data, Cox *et al.* (2006) hypothesized that a critical dive sequence might make beaked whales more prone to stranding in response to acoustic exposures. The sequence began with (1) very deep (to depths as deep as 1.2 mi (2 km)) and long (as long as 90 minutes) foraging dives; (2) relatively slow, controlled ascents; and (3) a series of ''bounce'' dives between 328 and 1,312 ft (100 and 400 m) in depth (see Zimmer and Tyack, 2007). They concluded that acoustic exposures that disrupted any part of this dive sequence (for example, causing beaked whales to spend more time at surface without the bounce dives that are necessary to recover from the deep dive) could produce excessive levels of nitrogen supersaturation in their tissues, leading to gas bubble and emboli formation that produces pathologies similar to decompression sickness.

Zimmer and Tyack (2007) modeled nitrogen tension and bubble growth in several tissue compartments for several hypothetical dive profiles and concluded that repetitive shallow dives (defined as a dive where depth does not exceed the depth of alveolar collapse, approximately 236 ft (72 m) for goose-beaked whale), perhaps as a consequence of an extended avoidance response to sonar sound, could pose a risk for decompression sickness and that this risk should increase with the duration of the response. Their models also suggested that unrealistically rapid rates of ascent from normal dive behaviors are unlikely to result in supersaturation to the extent that bubble formation would be expected. Tyack *et al.* (2006) suggested that emboli observed in animals exposed to mid-frequency range sonar (Jepson *et al.,* 2003; Fernandez *et al.,* 2005) could stem from a behavioral response that involves repeated dives shallower than the depth of lung collapse. Given that nitrogen gas accumulation is a passive process (*i.e.,* nitrogen is metabolically inert), a bottlenose dolphin was trained to repetitively dive a profile predicted to elevate nitrogen saturation to the point that nitrogen bubble formation was predicted to occur. However, inspection of the vascular system of the dolphin via ultrasound did not demonstrate the formation of asymptomatic nitrogen gas bubbles (Houser *et al.,* 2010). Baird *et al.* (2008), in a beaked whale tagging study off Hawaii, showed that deep dives are equally common during day or night, but ''bounce dives'' are typically a daytime behavior, possibly associated with visual predator avoidance. This may indicate that ''bounce dives'' are associated with something other than behavioral regulation of dissolved nitrogen levels, which would be necessary day and night.

Additional predictive modeling conducted to date has been performed with many unknowns about the respiratory physiology of deep-diving breath-hold animals. For example, Denk *et al.* (2020) found intra-species differences in the compliance of tracheobronchial structures of post-mortem cetaceans and pinnipeds under diving hydrostatic pressures, which would affect depth of alveolar collapse. Although, as hypothesized by Garcia Parraga *et al.* (2018) and reviewed in Fahlman *et al.,* (2021), mechanisms may exist that allow marine mammals to create a pulmonary shunt without the need for hydrostatic pressure-induced lung collapse (*i.e.,* by varying perfusion to the lung independent of lung collapse and degree of ventilation). If such a mechanism exists, then assumptions in prior gas models require reconsideration, the degree of nitrogen gas accumulation associated with dive profiles needs to be re-evaluated, and behavioral responses potentially leading to a destabilization of the relationship between pulmonary ventilation and perfusion should be considered. Costidis and Rommel (2016) suggested that gas exchange may continue to occur across the tissues of air-filled sinuses in deep diving odontocetes below the depth of lung collapse if hydrostatic pressures are high enough to drive gas exchange across into non-capillary veins.

If marine mammals respond to an Action Proponent vessel that is transmitting active sonar in the same way that they might respond to a predator, their probability of flight responses could increase when they perceive that Action Proponent vessels are approaching them directly, because a direct approach may convey detection and intent to capture (Burger and Gochfeld, 1981, 1990; Cooper, 1997; Cooper, 1998). The probability of flight responses could also increase as received levels of active sonar increase (and the ship is, therefore, closer) and as ship speeds increase (that is, as approach speeds increase). For example, the probability of flight responses in ringed seals (Born *et al.,* 1999), Pacific brant (*Branta bernicla nigricans*) and Canada geese (*B. canadensis*) increased as a helicopter or fixed-wing aircraft approached groups of these animals more directly (Ward *et al.,* 1999). Bald eagles (*Haliaeetus leucocephalus*) perched on trees alongside a river were also more likely to flee from a paddle raft when their perches were closer to the river or were closer to the ground (Steidl and Anthony, 1996).

Despite the many theories involving bubble formation (both as a direct cause of injury (see Non-Auditory Injury section) and an indirect cause of stranding), Southall *et al.* (2007) summarizes that there is either scientific disagreement or a lack of information regarding each of the following important points: (1) received acoustical exposure conditions for animals involved in stranding events; (2) pathological interpretation of observed lesions in stranded marine mammals; (3) acoustic exposure conditions required to induce such physical trauma directly; (4) whether noise exposure may cause behavioral responses (*e.g.,* atypical diving behavior) that secondarily cause bubble formation and tissue damage; and (5) the extent the post mortem artifacts introduced by decomposition before sampling, handling, freezing, or necropsy procedures affect interpretation of observed lesions.

Strandings Associated With Explosive Use

Silver Strand (2011)—

During a Navy training event on March 4, 2011, at the Silver Strand Training Complex in San Diego, California, three or possibly four dolphins were killed in an explosion. During an underwater detonation training event, a pod of 100 to 150 long-beaked common dolphins were observed moving towards the 700-yard (yd) (640.1-m) exclusion zone around the explosive charge, monitored by personnel in a safety boat and participants in a dive boat. Approximately 5 minutes remained on a time-delay fuse connected to a single 8.76 lb (3.97 kg) explosive charge (C–4 and detonation cord). Although the dive boat was placed between the pod and the explosive in an effort to guide the dolphins away from the area, that effort was unsuccessful and three long-beaked common dolphins near the explosion died. The Navy recovered those animals and transferred them to the local stranding network for necropsy. In addition to the three dolphins found dead on March 4, the remains of a fourth dolphin were discovered on March 7, 2011, near Oceanside, California (3 days later and approximately 42 mi (68 km) north of the detonation), which might also have been related to this event. Upon necropsy, all four animals were found to have sustained typical mammalian primary blast injuries (Danil and St. Leger, 2011). Association of the fourth stranding with the training event is uncertain because dolphins strand on a regular basis in the San Diego area. Details such as the dolphins' depth and distance from the explosive at the time of the detonation could not be estimated from the 250 yd (228.6 m) standoff point of the observers in the dive boat or the safety boat.

These dolphin mortalities are the only known occurrence of a Navy training or testing event involving impulsive energy (underwater detonation) that caused mortality or injury to a marine mammal. Despite this being a rare occurrence, the Navy reviewed training requirements, safety procedures, and possible mitigation measures and implemented changes to reduce the potential for this to occur in the future. Discussions of procedures associated with underwater explosives training and other training events are presented in the Proposed Mitigation Measures section.

Kyle of Durness, Scotland (2011)—

On July 22, 2011, a mass stranding event involving long-finned pilot whales occurred at Kyle of Durness, Scotland. An investigation by Brownlow *et al.* (2015) considered unexploded ordnance detonation activities at a Ministry of Defense bombing range, conducted by the Royal Navy prior to and during the strandings, as a plausible contributing factor in the mass stranding event. While Brownlow *et al.* (2015) concluded that the serial detonations of underwater ordnance were an influential factor in the mass stranding event (along with the presence of a potentially compromised animal and navigational error in a topographically complex region), they also suggest that mitigation measures—which included observations from a zodiac only and by personnel not experienced in marine mammal observation, among other deficiencies—were likely insufficient to assess if cetaceans were in the vicinity of the detonations. The authors also cite information from the Ministry of Defense indicating ''an extraordinarily high level of activity'' (*i.e.,* frequency and intensity of underwater explosions) on the range in the days leading up to the stranding.

Strandings on the Hawaii and California Coasts

Stranded marine mammals are reported along the Hawaii and California coasts each year. Marine mammals strand due to natural or anthropogenic causes, and the majority of reported type of occurrences in marine mammal strandings in this region include fishery interactions, illness, predation, and vessel strikes (Carretta *et al.,* 2024).

Potential Effects of Vessel Strike

Vessel strikes of marine mammals can result in death or serious injury of the animal. Wounds resulting from vessel strike may include massive trauma, hemorrhaging, broken bones, or propeller lacerations (Knowlton and Kraus, 2001). An animal at the surface could be struck directly by a vessel, a surfacing animal could hit the bottom of a vessel, or an animal just below the surface could be cut by a vessel's propeller. Superficial strikes may not kill or result in the death of the animal. Lethal interactions are typically associated with large whales, which are occasionally found draped across the bulbous bow of large commercial ships upon arrival in port. Although smaller cetaceans are more maneuverable in relation to large vessels than are large whales, they may also be susceptible to strike. The severity of injuries typically depends on the size and speed of the vessel (Knowlton and Kraus, 2001; Laist *et al.,* 2001; Vanderlaan and Taggart, 2007; Conn and Silber, 2013). Impact forces increase with speed, as does the probability of a strike at a given distance (Silber *et al.,* 2010; Gende *et al.,* 2011).

The most vulnerable marine mammals are those that spend extended periods of time at the surface in order to restore oxygen levels within their tissues after deep dives (*e.g.,* the sperm whale; Jaquet and Whitehead, 1996; Watkins *et al.,* 1999). In addition, some baleen whales seem generally unresponsive to vessel sound, making them more susceptible to vessel strikes (Nowacek *et al.,* 2004). These species are primarily large, slow moving whales. Marine mammal responses to vessels may include avoidance and changes in dive pattern (NRC, 2003).

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Jensen and Silber (2003) detailed 292 records of known or probable vessel strikes of all large whale species from 1975 to 2002. Of these, vessel speed at the time of collision was reported for 58 cases. Of these 58 cases, 39 (or 67 percent) resulted in serious injury or death (19 of those resulted in serious injury as determined by blood in the water, propeller gashes, or severed tailstock, and fractured skull, jaw, vertebrae, hemorrhaging, massive bruising or other injuries noted during necropsy, and 20 resulted in death).

Operating speeds of vessels that struck various species of large whales ranged from 2 to 51 kn (3.7 to 94.5 km/hr). The majority (79 percent) of these strikes occurred at speeds of 13 kn (24 km/hr) or greater. The average speed that resulted in serious injury or death was 18.6 kn (34.4 km/hr). Pace and Silber (2005) found that the probability of death or serious injury increased rapidly with increasing vessel speed. Specifically, the predicted probability of serious injury or death increased from 45 to 75 percent as vessel speed increased from 10 to 14 kn (18.5 to 25.9 km/hr) and exceeded 90 percent at 17 kn (31.5 km/hr). Higher speeds during strikes result in greater force of impact and also appear to increase the chance of severe injuries or death. While modeling studies have suggested that hydrodynamic forces pulling whales toward the vessel hull increase with increasing speed (Clyne, 1999; Knowlton *et al.,* 1995), this is inconsistent with Silber *et al.* (2010), which demonstrated that there is no such relationship (*i.e.,* hydrodynamic forces are independent of speed).

In a separate study, Vanderlaan and Taggart (2007) analyzed the probability of lethal mortality of large whales at a given speed, showing that the greatest rate of change in the probability of a lethal injury to a large whale as a function of vessel speed occurs between 8.6 and 15 kn (15.9 and 27.8 km/hr). The chances of a lethal injury decline from approximately 80 percent at 15 kn to approximately 20 percent at 8.6 kn (15.9 km/hr). At speeds below 11.8 kn (21.9 km/hr), the chances of lethal injury drop below 50 percent, while the probability asymptotically increases toward 100 percent above 15 kn (27.8 km/hr). Garrison *et al.* (2025) reviewed and updated available data on whale-vessel interactions in U.S. waters to determine the effects of vessel speed and size on lethality of strikes of large whales and found vessel size class had a significant effect on the probability of lethality. Decreasing vessel speeds reduced the likelihood of a lethal outcome for all vessel size classes modeled, with the strongest effect for vessels less than 354 ft (108 m) long. Notably, the probability that a strike by a very large (*i.e.,* in length) vessel will be lethal exceeded 0.80 at all speeds greater than 5 kn (9.26 km/hr) (Garrison *et al.,* 2025).

The Jensen and Silber (2003) report notes that the database represents a minimum number of strikes, because the vast majority probably goes undetected or unreported. In contrast, Action Proponent vessels are likely to detect any strike that does occur because of the required personnel training and Lookouts (as described in the Proposed Mitigation Measures section), and they are required to report all vessel strikes involving marine mammals.

In the HCTT Study Area, commercial traffic is heaviest in the nearshore waters, near major ports and in the shipping lanes along the California coast and in Hawaii (specifically Honolulu), including a lane of high intensity farther off the California coast running northwest–southeast, which is a great circle route between the Panama Canal and Asia. Military vessel traffic is primarily concentrated in the waters off San Diego, CA, and the coasts of the Hawaiian islands, particularly south of Oʻahu and east of Hawaii Island (Navy 2025, unpublished data).

In the SOCAL portion of the Study Area, the U.S. Navy has struck a total of 19 marine mammals in the 32-year period from 1993 through 2025, an average of just under one per year. The species struck include gray whale, humpback whale, blue whale, and either fin or sei whale, though for some strikes, the species could not be determined.

In the HRC portion of the Study Area, the Navy struck a total of five marine mammals in the 22-year period from 1993 through 2025, an average of zero to one strikes per year. The Coast Guard has had one known marine mammal strike in Hawaii, a humpback whale in 2020. Of the five Navy vessel strikes over the 22-year period in the HRC, all were reported as injuries. The vessel struck species include: one humpback whale in 1998, one unknown species and one humpback whale in 2003, one sperm whale in 2007, and an unknown species in 2008. No more than two whales were struck by Navy vessels in any given year in the HRC portion of the HSTT within the last 32 years.

Between 2007 and 2009, the Navy developed and distributed additional training, mitigation, and reporting tools to Navy operators to improve marine mammal protection and to ensure compliance with permit requirements. In 2009, the Navy implemented Marine Species Awareness Training designed to improve effectiveness of visual observation for marine mammals and other marine resources. In subsequent years, the Navy issued refined policy guidance on vessel strikes in order to collect the most accurate and detailed data possible in response to a possible incident (also see the Notification and Reporting Plan for this proposed rule). For over a decade, the Navy has implemented the Protective Measures Assessment Protocol software tool, which provides operators with notification of the required mitigation and a visual display of the planned training or testing activity location overlaid with relevant environmental data.

Marine Mammal Habitat

The proposed training and testing activities could potentially affect marine mammal habitat through the introduction of impacts to the prey species of marine mammals, acoustic habitat (sound in the water column), water quality, and biologically important habitat for marine mammals. Each of these potential effects was considered in the 2024 HCTT Draft EIS/OEIS and was determined not to have adverse effects on marine mammal habitat. Based on the information below and the supporting information included in the 2024 HCTT Draft EIS/OEIS, NMFS has determined that the proposed training and testing activities would not have adverse or long-term impacts on marine mammal habitat.

Effects to Prey

Sound may affect marine mammals through impacts on the abundance, behavior, or distribution of prey species (*e.g.,* crustaceans, cephalopods, fish, zooplankton). Marine mammal prey varies by species, season, and location and, for some species, is not well-documented. Here, we describe studies regarding the effects of noise on known marine mammal prey.

Fish utilize the soundscape and components of sound in their environment to perform important functions such as foraging, predator avoidance, mating, and spawning (*e.g.,* Zelick *et al.,* 1999; Fay, 2009). The most likely effects on fishes exposed to loud, intermittent, low-frequency sounds are behavioral responses (*i.e.,* flight or avoidance). Short duration, sharp sounds (such as pile driving or air guns) can cause overt or subtle changes in fish behavior and local distribution. The response of fish to acoustic sources depends on the physiological state of the fish, past exposures, motivation (*e.g.,* feeding, spawning, migration), and other environmental factors. Key impacts to fishes may include behavioral responses, hearing damage, barotrauma (*i.e.,* pressure-related injuries), and mortality. While it is clear that the behavioral responses of individual prey, such as displacement or other changes in distribution, can have direct impacts on the foraging success of marine mammals, the effects on marine mammals of individual prey that experience hearing damage, barotrauma, or mortality is less clear, though obviously population scale impacts that meaningfully reduce the amount of prey available could have more serious impacts.

Fishes, like other vertebrates, have a variety of different sensory systems to glean information from ocean around them (Astrup and Mohl, 1993; Astrup, 1999; Braun and Grande, 2008; Carroll *et al.,* 2017; Hawkins and Johnstone, 1978; Ladich and Popper, 2004; Ladich and Schulz-Mirbach, 2016; Mann, 2016; Nedwell *et al.,* 2004; Popper *et al.,* 2003; Popper *et al.,* 2005). Depending on their hearing anatomy and peripheral sensory structures, which vary among species, fishes hear sounds using pressure and particle motion sensitivity capabilities and detect the motion of surrounding water (Fay *et al.,* 2008), while terrestrial vertebrates generally only detect pressure. Most marine fishes primarily detect particle motion using the inner ear and lateral line system, while some fishes possess additional morphological adaptations or specializations that can enhance their sensitivity to sound pressure, such as a gas-filled swim bladder (Braun and Grande, 2008; Popper and Fay, 2011).

Hearing capabilities vary considerably between different fish species with data only available for just over 100 species out of the 34,000 marine and freshwater fish species (Eschmeyer and Fong, 2016). In order to better understand acoustic impacts on fishes, fish hearing groups are defined by species that possess a similar continuum of anatomical features which result in varying degrees of hearing sensitivity (Popper and Hastings, 2009a). There are four hearing groups defined for all fish species (modified from Popper *et al.,* 2014) within this analysis and they include: fishes without a swim bladder (*e.g.,* flatfish, sharks, rays, *etc.*); fishes with a swim bladder not involved in hearing (*e.g.,* salmon, cod, pollock, *etc.*); fishes with a swim bladder involved in hearing (*e.g.,* sardines, anchovy, herring, *etc.*); and fishes with a swim bladder involved in hearing and high-frequency hearing (*e.g.,* shad and menhaden). Most marine mammal fish prey species would not be likely to perceive or hear mid- or high-frequency sonars. While hearing studies have not been done on sardines and northern anchovies, it would not be unexpected for them to possess hearing similarities to Pacific herring (up to 2–5 kHz) (Mann *et al.,* 2005). Currently, less data are available to estimate the range of best sensitivity for fishes without a swim bladder.

In terms of physiology, multiple scientific studies have documented a lack of mortality or physiological effects to fish from exposure to low- and mid-frequency sonar and other sounds (Cox *et al.,* 2018; Halvorsen *et al.,* 2012; Jørgensen *et al.,* 2005; Kane *et al.,* 2010; Kvadsheim and Sevaldsen, 2005; Popper *et al.,* 2007; Popper *et al.,* 2016; Watwood *et al.,* 2016). Techer *et al.* (2017) exposed carp in floating cages for up to 30 days to low-power 23 and 46 kHz sources without any significant physiological response. Other studies have documented either a lack of TTS in species whose hearing range cannot perceive military sonar, or for those species that could perceive sonar-like signals, any TTS experienced would be recoverable (Halvorsen *et al.,* 2012; Ladich and Fay, 2013; Popper and Hastings, 2009a, 2009b; Popper *et al.,* 2014; Smith, 2016). Only fishes that have specializations that enable them to hear sounds above about 2,500 Hz (2.5 kHz) such as herring (Halvorsen *et al.,* 2012; Mann *et al.,* 2005; Mann, 2016; Popper *et al.,* 2014) would have the potential to receive TTS or exhibit behavioral responses from exposure to mid-frequency sonar. In addition, any sonar induced TTS to fish whose hearing range could perceive sonar would only occur in the narrow spectrum of the source (*e.g.,* 3.5 kHz) compared to the fish's total hearing range (*e.g.,* 0.01 kHz to 5 kHz). Overall, military sonar sources are much narrower in terms of source frequency compared to a given fish species full hearing range (Halvorsen *et al.,* 2012; Jørgensen *et al.,* 2005; Juanes *et al.,* 2017; Kane *et al.,* 2010; Kvadsheim and Sevaldsen, 2005; Popper *et al.,* 2007; Popper and Hawkins, 2016; Watwood *et al.,* 2016).

In terms of behavioral responses, Juanes *et al.* (2017) discuss the potential for negative impacts from anthropogenic soundscapes on fish, but the author's focus was on broader based sounds such as ship and boat noise sources. Watwood *et al.* (2016) also documented no behavioral responses by reef fish after exposure to MFAS. Doksaeter *et al.* (2009; 2012) reported no behavioral responses to mid-frequency naval sonar by Atlantic herring; specifically, no escape responses (vertically or horizontally) were observed in free swimming herring exposed to mid-frequency sonar transmissions. Based on these results (Doksaeter *et al.,* 2009; Doksaeter *et al.,* 2012; Sivle *et al.,* 2012), Sivle *et al.* (2015) created a model in order to report on the possible population-level effects on Atlantic herring from active naval sonar. The authors concluded that the use of naval sonar poses little risk to populations of herring regardless of season, even when the herring populations are aggregated and directly exposed to sonar. Finally, Bruintjes *et al.* (2016) commented that fish exposed to any short-term noise within their hearing range might initially startle, but would quickly return to normal behavior.

Occasional behavioral responses to intermittent explosions and impulsive sound sources are unlikely to cause long-term consequences for individual fish or populations. Fish that experience hearing loss as a result of exposure to explosions and impulsive sound sources may have a reduced ability to detect relevant sounds such as predators, prey, or social vocalizations. However, PTS has not been known to occur in fishes and any hearing loss in fish may be as temporary as the timeframe required to repair or replace the sensory cells that were damaged or destroyed (Popper *et al.,* 2005; Popper *et al.,* 2014; Smith *et al.,* 2006). It is not known if damage to auditory nerve fibers could occur, and if so, whether fibers would recover during this process.

It is also possible for fish to be injured or killed by an explosion in the immediate vicinity of the surface from dropped or fired ordnance, or near the bottom from shallow water bottom-placed underwater mine warfare detonations. Physical effects from pressure waves generated by underwater sounds (*e.g.,* underwater explosions) could potentially affect fish within proximity of training or testing activities. SPLs of sufficient strength have been known to cause injury to fish and fish mortality (summarized in Popper *et al.,* 2014). The shock wave from an underwater explosion is lethal to fish at close range, causing massive organ and tissue damage and internal bleeding (Keevin and Hempen, 1997). At greater distance from the detonation point, the extent of mortality or injury depends on a number of factors including fish size, body shape, orientation, and species (Keevin and Hempen, 1997; Wright, 1982). At the same distance from the source, larger fish are generally less susceptible to death or injury, elongated forms that are round in cross-section are less at risk than deep-bodied forms, and fish oriented sideways to the blast suffer the greatest impact (Edds-Walton and Finneran, 2006; O'Keeffe, 1984; O'Keeffe and Young, 1984; Wiley *et al.,* 1981; Yelverton *et al.,* 1975). Species with gas-filled organs are more susceptible to injury and mortality than those without them (Gaspin, 1975; Gaspin *et al.,* 1976; Goertner *et al.,* 1994). Barotrauma injuries have been documented during controlled exposure to impact pile driving (an impulsive noise source, as are explosives and air guns) (Halvorsen *et al.,* 2012b; Casper *et al.,* 2013).

Fish not killed or driven from a location by an explosion might change their behavior, feeding pattern, or distribution. Changes in behavior of fish have been observed as a result of sound produced by explosives, with effect intensified in areas of hard substrate (Wright, 1982). However, Navy explosive use avoids hard substrate to the best extent practical during underwater detonations, or deep-water surface detonations. Stunning from pressure waves could also temporarily immobilize fish, making them more susceptible to predation. The abundances of various fish (and invertebrates) near the detonation point for explosives could be altered for a few hours before animals from surrounding areas repopulate the area. However, these populations would likely be replenished as waters near the detonation point are mixed with adjacent waters. Repeated exposure of individual fish to sounds from underwater explosions is not likely and exposures are expected to be short-term and localized. Long-term consequences for fish populations would not be expected. Several studies have demonstrated that air gun sounds might affect the distribution and behavior of some fishes, potentially impacting foraging opportunities or increasing energetic costs (*e.g.,* Fewtrell and McCauley, 2012; Pearson *et al.,* 1992; Skalski *et al.,* 1992; Santulli *et al.,* 1999; Paxton *et al.,* 2017).

For fishes exposed to military sonar, there would be limited sonar use spread out in time and space across large offshore areas such that only small areas are actually ensonified (tens of miles) compared to the total life history distribution of fish prey species. There would be no probability for mortality or physical injury from sonar, and for most species, no or little potential for hearing or behavioral effects, except to a few select fishes with hearing specializations (*e.g.,* herring) that could perceive mid-frequency sonar. Training and testing exercises involving explosions are dispersed in space and time; therefore, repeated exposure of individual fishes is unlikely. Mortality and injury effects to fishes from explosives would be localized around the area of a given in-water explosion, but only if individual fish and the explosive (and immediate pressure field) were co-located at the same time. Fishes deeper in the water column or on the bottom would not be affected by water surface explosions. Repeated exposure of individual fish to sound and energy from underwater explosions is not likely given fish movement patterns, especially schooling prey species. Most acoustic effects, if any, are expected to be short-term and localized. Long-term consequences for fish populations, including key prey species within the HCTT Study Area, would not be expected.

Vessels and in-water devices do not normally collide with adult fish, particularly those that are common marine mammal prey, most of which can detect and avoid them. Exposure of fishes to vessel strike stressors is limited to those fish groups that are large, slow-moving, and may occur near the surface, such as ocean sunfish, whale sharks, basking sharks, and manta rays. These species are distributed widely in offshore portions of the HCTT Study Area. Any isolated cases of a military vessel striking an individual could injure that individual, impacting the fitness of an individual fish. Vessel strikes would not pose a risk to most of the other marine fish groups, because many fish can detect and avoid vessel movements, making strikes rare and allowing the fish to return to their normal behavior after the ship or device passes. As a vessel approaches a fish, they could have a detectable behavioral or physiological response (*e.g.,* swimming away and increased heart rate) as the passing vessel displaces them. However, such responses are not expected to have lasting effects on the survival, growth, recruitment, or reproduction of these marine fish groups at the population level and therefore would not have an impact on marine mammal species as prey items.

In addition to fish, prey sources such as marine invertebrates could potentially be impacted by sound stressors as a result of the proposed activities. However, most marine invertebrates' ability to sense sounds is very limited. In most cases, marine invertebrates would not respond to impulsive and non-impulsive sounds, although they may detect and briefly respond to nearby low-frequency sounds. These short-term responses would likely be inconsequential to invertebrate populations.

Invertebrates appear to be able to detect sounds (Pumphrey, 1950; Frings and Frings, 1967) and are most sensitive to low-frequency sounds (Packard *et al.,* 1990; Budelmann and Williamson, 1994; Lovell *et al.,* 2005; Mooney *et al.,* 2010). Data on response of invertebrates such as squid, another marine mammal prey species, to anthropogenic sound is more limited (de Soto, 2016; Sole *et al.,* 2017). Data suggest that cephalopods are capable of sensing the particle motion of sounds and detect low frequencies up to 1–1.5 kHz, depending on the species, and so are likely to detect air gun noise (Kaifu *et al.,* 2008; Hu *et al.,* 2009; Mooney *et al.,* 2010; Samson *et al.,* 2014). Sole *et al.* (2017) reported physiological injuries to cuttlefish in cages placed at-sea when exposed during a controlled exposure experiment to low-frequency sources (315 Hz, 139 to 142 dB re: 1 μPa^2 and 400 Hz, 139 to 141 dB re: 1 μPa^2). Fewtrell and McCauley (2012) reported squids maintained in cages displayed startle responses and behavioral changes when exposed to seismic air gun sonar (136–162 re: 1 $\mu Pa^2 \cdot s$). However, the sources Sole *et al.* (2017) and Fewtrell and McCauley (2012) used are not similar and were much lower than typical Navy sources within the HCTT Study Area. Nor do the studies address the issue of individual displacement outside of a zone of impact when exposed to sound. Jones *et al.* (2020) found that when squid (*Doryteuthis (Amerigo) pealeii*) were exposed to impulse pile driving noise, body pattern changes, inking, jetting, and startle responses were observed and nearly all squid exhibited at least one response. However, these responses occurred primarily during the first eight impulses and diminished quickly, indicating potential rapid, short-term habituation.

Cephalopods have a specialized sensory organ inside the head called a statocyst that may help an animal determine its position in space (orientation) and maintain balance (Budelmann, 1992). Packard *et al.* (1990) showed that cephalopods were sensitive to particle motion, not sound pressure, and Mooney *et al.* (2010) demonstrated that squid statocysts act as an accelerometer through which particle motion of the sound field can be detected. Auditory injuries (lesions occurring on the statocyst sensory hair cells) have been reported upon controlled exposure to low-frequency sounds, suggesting that cephalopods are particularly sensitive to low-frequency sound (Andre *et al.,* 2011; Sole *et al.,* 2013). Behavioral responses, such as inking and jetting, have also been reported upon exposure to low-frequency sound (McCauley *et al.,* 2000b; Samson *et al.,* 2014). Squids, like most fish species, are likely more sensitive to low frequency sounds, and may not perceive mid- and high-frequency sonars such as Navy sonars. Cumulatively for squid as a prey species, individual and population impacts from exposure to Navy sonar and explosives, like fish, are not likely to be significant, and explosive impacts would be short-term and localized.

Explosions and pile driving would likely kill or injure nearby marine invertebrates. Vessels also have the potential to impact marine invertebrates by disturbing the water column or sediments, or directly striking organisms (Bishop, 2008). The propeller wash (water displaced by propellers used for propulsion) from vessel movement and water displaced from vessel hulls can potentially disturb marine invertebrates in the water column and is a likely cause of zooplankton mortality (Bickel *et al.,* 2011). The localized and short-term exposure to explosions or vessels could displace, injure, or kill zooplankton, invertebrate eggs or larvae, and macro-invertebrates. However, mortality or long-term consequences for a few animals is unlikely to have measurable effects on overall populations. Long-term consequences to marine invertebrate populations would not be expected as a result of exposure to sounds of vessels in the HCTT Study Area.

Impacts to benthic communities from impulsive sound generated by active acoustic sound sources are not well documented. (*e.g.,* Andriguetto-Filho *et al.,* 2005; Payne *et al.,* 2007; 2008; Boudreau *et al.,* 2009). There are no published data that indicate whether temporary or permanent threshold shifts, auditory masking, or behavioral effects occur in benthic invertebrates (Hawkins *et al.,* 2014) and some studies showed no short-term or long-term effects of air gun exposure (*e.g.,* Andriguetto-Filho *et al.,* 2005; Payne *et al.,* 2007; 2008; Boudreau *et al.,* 2009). Exposure to air gun signals was found to significantly increase mortality in scallops, in addition to causing significant changes in behavioral patterns during exposure (Day *et al.,* 2017). However, the authors state that the observed levels of mortality were not beyond naturally occurring rates. Explosions and pile driving could potentially kill or injure nearby marine invertebrates; however, mortality or long-term consequences for a few animals is unlikely to have measurable effects on overall populations.

There is little information concerning potential impacts of noise on zooplankton populations. However, one study (McCauley *et al.,* 2017) investigated zooplankton abundance, diversity, and mortality before and after exposure to air gun noise, finding that the mortality rate for zooplankton after air gun exposure was two to three times more compared with controls for all taxa. The majority of taxa present were copepods and cladocerans; for these taxa, the range within which effects on abundance were detected was up to approximately 0.75 mi (1.2 km). In order to have significant impacts on *r*-selected species (*i.e.,* species that produce a large number of offspring and contribute few resources to each individual offspring) such as plankton, the spatial or temporal scale of impact must be large in comparison with the ecosystem concerned (McCauley *et al.,* 2017).

Notably, a recently described study produced results inconsistent with those of McCauley *et al.* (2017). Researchers conducted a field and laboratory study to assess if exposure to air gun noise affects mortality, predator escape response, or gene expression of the copepod *Calanus finmarchicus* (Fields *et al.,* 2019). Immediate mortality of copepods was significantly higher, relative to controls, at distances of 16.4 ft (5 m) or less from the air guns. Mortality one week after the air gun blast was significantly higher in the copepods placed 32.8 ft (10 m) from the air gun but was not significantly different from the controls at a distance of 65.6 ft (20 m) from the air gun. The increase in mortality, relative to controls, did not exceed 30 percent at any distance from the air gun. Moreover, the authors caution that even this higher mortality in the immediate vicinity of the air guns may be more pronounced than what would be observed in free-swimming animals due to increased flow speed of fluid inside bags containing the experimental animals. There were no sublethal effects on the escape performance or the sensory threshold needed to initiate an escape response at any of the distances from the air gun that were tested. Whereas McCauley *et al.* (2017) reported an SEL of 156 dB at a range of 1,670–2,158.8 ft (509–658 m), with zooplankton mortality observed at that range, Fields *et al.* (2019) reported an SEL of 186 dB at a range of 82 ft (25 m), with no reported mortality at that distance. The large scale of effect observed here is of concern—particularly where repeated noise exposure is expected—and further study is warranted.

Military expended materials resulting from training and testing activities could potentially result in minor long-term changes to benthic habitat; however, the impacts of small amount of expended materials are unlikely to have measurable effects on overall populations. Military expended materials may be colonized over time by benthic organisms that prefer hard substrate and would provide structure that could attract some species of fish or invertebrates.

Overall, the combined impacts of sound exposure, explosions, vessel strikes, and military expended materials resulting from the proposed activities would not be expected to have measurable effects on populations of marine mammal prey species. Prey species exposed to sound might move away from the sound source, experience TTS, experience masking of biologically relevant sounds, or show no obvious direct effects. Mortality from decompression injuries is possible in close proximity to a sound, but only limited data on mortality in response to air gun noise exposure are available (Fields *et al.,* 2019, Hawkins *et al.,* 2014, McCauley *et al.,* 2017). The most likely impacts for most prey species in a given area would be temporary avoidance of the area. Surveys using towed air gun arrays move through an area relatively quickly, limiting exposure to multiple impulsive sounds. In all cases, sound levels would return to ambient once a survey ends and the noise source is shut down and, when exposure to sound ends, behavioral and/or physiological responses are expected to end relatively quickly (McCauley *et al.,* 2000b). The duration of fish avoidance of a given area after survey effort stops is unknown, but a rapid return to normal recruitment, distribution, and behavior is anticipated. While the potential for disruption of spawning aggregations or schools of important prey species can be meaningful on a local scale, the mobile and temporary nature of most surveys and the likelihood of temporary avoidance behavior suggest that impacts would be minor. Long-term consequences to marine invertebrate populations would not be expected as a result of exposure to sounds or vessels in the HCTT Study Area.

Acoustic Habitat

Acoustic habitat is the soundscape which encompasses all of the sound present in a particular location and time, as a whole when considered from the perspective of the animals experiencing it. Animals produce sound for, or listen for sounds produced by, conspecifics (*e.g.,* communication during feeding, mating, and other social activities), other animals (*e.g.,* finding prey or avoiding predators), and the physical environment (*e.g.,* finding suitable habitats, navigating). Together, sounds made by animals and the geophysical environment (*e.g.,* produced by earthquakes, lightning, wind, rain, waves) make up the natural contributions to the total acoustics of a place. These acoustic conditions, termed acoustic habitat, are one attribute of an animal's total habitat.

Soundscapes are also defined by, and acoustic habitat influenced by, the total contribution of anthropogenic sound. This may include incidental emissions from sources such as vessel traffic or may be intentionally introduced to the marine environment for data acquisition purposes (*e.g.,* the use of air gun arrays) or for military training and testing purposes (*e.g.,* the use of sonar and explosives and other acoustic sources). Anthropogenic noise varies widely in its frequency, content, duration, and SPL, and these characteristics greatly influence the potential habitat-mediated effects to marine mammals (please also see the previous discussion in the Masking section), which may range from local effects for brief periods of time to chronic effects over large areas and for long durations. Depending on the extent of effects to habitat, animals may alter their communications signals (thereby potentially expending additional energy) or miss acoustic cues (either conspecific or adventitious). Problems arising from a failure to detect cues are more likely to occur when noise stimuli are chronic and overlap with biologically relevant cues used for communication, orientation, and predator/prey detection (Francis and Barber, 2013). For more detail on these concepts see, *e.g.,* Barber *et al.,* 2009; Pijanowski *et al.,* 2011; Lillis *et al.,* 2014.

The term ''listening area'' refers to the region of ocean over which sources of sound can be detected by an animal at the center of the space. Loss of communication space concerns the area over which a specific animal signal (used to communicate with conspecifics in biologically important contexts such as foraging or mating) can be heard, in noisier relative to quieter conditions (Clark *et al.,* 2009). Lost listening area concerns the more generalized contraction of the range over which animals would be able to detect a variety of signals of biological importance, including eavesdropping on predators and prey (Barber *et al.,* 2009). Such metrics do not, in and of themselves, document fitness consequences for the marine animals that live in chronically noisy environments. Long-term population-level consequences mediated through changes in the ultimate survival and reproductive success of individuals are difficult to study, and particularly so underwater. However, it is increasingly well documented that aquatic species rely on qualities of natural acoustic habitats, with researchers quantifying reduced detection of important ecological cues (*e.g.,* Francis and Barber, 2013; Slabbekoorn *et al.,* 2010) as well as survivorship consequences in several species (*e.g.,* Simpson *et al.,* 2015; Nedelec *et al.,* 2015).

The sounds produced during training and testing activities can be widely dispersed or concentrated in small areas for varying periods. Sound produced from training and testing activities in the HCTT Study Area is temporary and transitory. Any anthropogenic noise attributed to training and testing activities in the HCTT Study Area would be temporary and the affected area would be expected to immediately return to the original state when these activities cease.

Water Quality

Training and testing activities may introduce constituents into the water column. Based on the analysis of the 2024 HCTT Draft EIS/OEIS, military expended materials (*e.g.,* undetonated explosive materials) would be released in quantities and at rates that would not result in a violation of any water quality standard or criteria. NMFS has reviewed this analysis and concurs that it reflects the best available science. High-order explosions consume most of the explosive material, creating typical combustion products. For example, in the case of Royal Demolition Explosive, 98 percent of the products are common seawater constituents and the remainder is rapidly diluted below threshold effect level. Explosion by-products associated with high order detonations present no secondary stressors to marine mammals through sediment or water. However, low order detonations and unexploded ordnance present elevated likelihood of impacts on marine mammals.

Indirect effects of explosives and unexploded ordnance to marine mammals via sediment is possible in the immediate vicinity of the ordnance. Degradation products of Royal Demolition Explosive are not toxic to marine organisms at realistic exposure levels (Rosen and Lotufo, 2010). Relatively low solubility of most explosives and their degradation products means that concentrations of these contaminants in the marine environment are relatively low and readily diluted. Furthermore, while explosives and their degradation products were detectable in marine sediment approximately 6–12 inches (0.15–0.3 m) away from degrading ordnance, the concentrations of these compounds were not statistically distinguishable from background beyond 3–6 ft (1–2 m) from the degrading ordnance. Taken together, it is possible that marine mammals could be exposed to degrading explosives, but it would be within a very small radius of the explosive (1–6 ft (0.3–2 m)).

Equipment used by the Action Proponents within the HCTT Study Area, including ships and other marine vessels, aircraft, and other equipment, are also potential sources of by-products. All equipment is properly maintained in accordance with applicable Navy, Coast Guard, Army, and legal requirements. All such operating equipment meets Federal water quality standards, where applicable.

Estimated Take of Marine Mammals

This section indicates the number of takes that NMFS is proposing to authorize, which is based on the amount of take that NMFS anticipates is reasonably likely to occur. NMFS coordinated closely with the Action Proponents in the development of their incidental take application, and preliminarily agrees that the methods the Action Proponents have put forth described herein to estimate take (including the model, thresholds, and density estimates), and the resulting numbers are based on the best available science and appropriate for authorization.

Takes would be predominantly in the form of harassment, but a limited number of mortalities are also possible. For this military readiness activity, the MMPA defines ''harassment'' as (1) 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 (2) 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 the behavioral patterns are abandoned or significantly altered (Level B harassment) (16 U.S.C. 1362(18)(B)).

Proposed authorized takes would primarily be in the form of Level B harassment, as use of the acoustic (*e.g.,* active sonar, pile driving, and seismic air guns) and explosive sources and missile launches is most likely to result in disruption of natural behavioral patterns to a point where they are abandoned or significantly altered (as defined specifically at the beginning of this section, but referred to generally as behavioral disturbance) for marine mammals, either via direct behavioral disturbance or TTS. There is also the potential for Level A harassment, in the form of auditory injury to result from exposure to the sound sources utilized in military readiness activities. Lastly, no more than 7 serious injuries or mortalities total (over the 7-year period) of large whales could potentially occur through vessel strikes, and 40 serious injuries or mortalities (over the 7-year period) from explosive use. Although we analyze the impacts of these potential serious injuries or mortalities that are proposed for authorization, the proposed mitigation and monitoring measures are expected to minimize the likelihood (*i.e.,* further lower the already low probability) that vessel strike (and the associated serious injury or mortality) would occur, as well as the severity of other takes.

Generally speaking, for acoustic impacts NMFS estimates the amount and type of harassment by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals would experience behavioral disturbance or incur some degree of temporary or permanent hearing impairment; (2) the area or volume of water that would be ensonified above these levels in a day or event; (3) the density or occurrence of marine mammals within these ensonified areas; and (4) the number of days of activities or events.

Acoustic Thresholds

Using the best available science, NMFS, in coordination with the Navy, has established acoustic thresholds that identify the most appropriate received level of underwater sound above which marine mammals exposed to these sound sources could be reasonably expected to directly incur a disruption in behavior patterns to a point where they are abandoned or significantly altered (equated to onset of Level B harassment), or to incur TTS onset (equated to Level B harassment via the indirect disruptions of behavioral patterns) or AUD INJ onset (equated to Level A harassment). Thresholds have also been developed to identify the pressure and impulse levels above which animals may incur non-auditory injury or mortality from exposure to explosive detonation.

Hearing Impairment (TTS/AUD INJ), Non-Auditory Injury, and Mortality

NMFS' 2024 Technical Guidance (NMFS, 2024) identifies dual criteria to assess AUD INJ (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). The Updated Technical Guidance also identifies criteria to predict TTS, which is not considered injury and falls into the Level B harassment category. The Action Proponents' specified activities include the use of non-impulsive (*i.e.,* sonar, vibratory pile driving) and impulsive (*i.e.,* explosives, air guns, impact pile driving) sources.

For the consideration of impacts on hearing in Phase IV, marine mammals were divided into nine groups for analysis: VLF, LF, HF, VHF, SI, PCW and PCA, and OCW and OCA. For each group, a frequency-dependent weighting function and numeric thresholds for the onset of TTS and the onset of AUD INJ were estimated. The onset of TTS is defined as a TTS of 6 dB measured approximately 2–5 minutes after exposure. A TTS of 40 dB is used as a proxy for the onset of AUD INJ (*i.e.,* it is assumed that exposures beyond those capable of causing 40 dB of TTS have the potential to result in PTS or other auditory injury (*e.g.,* loss of cochlear neuron synapses)). Exposures just sufficient to cause TTS or AUD INJ are denoted as ''TTS onset'' or ''AUD INJ onset'' exposures. Onset levels are treated as step functions or ''all-or-nothing'' thresholds: exposures above the TTS or AUD INJ onset level are assumed to always result in TTS or AUD INJ, while exposures below the TTS or AUD INJ onset level are assumed to not cause TTS or AUD INJ. For non-impulsive exposures, onset levels are specified in frequency-weighted sound exposure level (SEL); for impulsive exposures, dual metrics of weighted SEL and unweighted peak sound pressure level (SPL) are used.

To compare Phase IV weighting functions and TTS/AUD INJ SEL thresholds to those used in Phase III, both the weighting function shape and the weighted threshold values were considered; the weighted thresholds by themselves only indicate the TTS/AUD INJ threshold at the most susceptible frequency (based on the relevant weighting function). In contrast, the TTS/AUD INJ exposure functions incorporate both the shape of the weighting function and the weighted threshold value and provide the best means of comparing the frequency-dependent TTS/AUD INJ thresholds for Phase III and Phase IV.

The most significant differences between the Phase III and Phase IV functions and thresholds include the following:

- Mysticetes were divided into two groups (VLF and LF), with the upper hearing limit for the LF group increased from Phase III to match recent hearing measurements in minke whales (Houser *et al.,* 2024);
- Group names were changed from Phase III to be consistent with Southall *et al.* (2019). Specifically, the Phase III mid-frequency (MF) cetacean group is now designated as the high-frequency (HF) cetacean group, and the group previously designated as high-frequency (HF) cetaceans is now the very-high frequency (VHF) cetacean group;
- For the HF group, Phase IV onset TTS/AUD INJ thresholds are lower compared to Phase III at frequencies below approximately 10 kHz. This is a result of new TTS onset data for dolphins at low frequencies (Finneran *et al.,* 2023);
- For the PCW group, new TTS data for harbor seals (Kastelein *et al.,* 2020a; Kastelein *et al.,* 2020b) resulted in slightly lower TTS/AUD INJ thresholds at high frequencies compared to Phase III; and
- For group OCW, new TTS data for California sea lions (Kastelein *et al.,* 2021b; Kastelein *et al.,* 2022a, 2022b) resulted in significantly lower TTS/AUD INJ thresholds compared to Phase III.

Of note, the thresholds and weighting function for the LF cetacean hearing group in NMFS' 2024 Technical Guidance (NMFS, 2024) match the Navy's VLF cetacean hearing group. However, the weighting function for those hearing groups differs between the two documents (*i.e.,* the Navy's LF cetacean group has a different weighting function from NMFS) due to the Houser *et al.* (2024) minke whale data incorporated into Navy 2024, but not NMFS (2024). While NMFS' 2024 Technical Guidance differs from the criteria that the Action Proponents used to assess AUD INJ and TTS for low-frequency cetaceans, NMFS concurs that the criteria the Action Proponents applied are appropriate for assessing the impacts of their proposed action. The criteria used by the Action Proponents are conservative in that those criteria show greater sensitivity at higher frequencies (*i.e.,* application of those criteria result in a higher amount of estimated take by higher frequency sonars than would result from application of NMFS' 2024 Technical Guidance) which is where more of the take is expected.

These thresholds (table 18 and table 19) were developed by compiling and synthesizing the best available science and soliciting input multiple times from both public and peer reviewers. The references, analysis, and methodology used in the development of the thresholds are described in Updated Technical Guidance, which may be accessed at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance.*

TABLE 18—ACOUSTIC THRESHOLDS IDENTIFYING THE ONSET OF TTS

Group	TTS threshold SEL (weighted)	AUD INJ threshold SEL (weighted)
Very low-frequency (VLF)	177	197
Low-frequency (LF)	177	197
High-frequency (HF)	181	201
Very high-frequency (VHF)	161	181
Phocid carnivores in water (PW)	175	195
Otariid carnivores in water (OW)	179	199
Phocid carnivores in air (PA)	134	154
Otariid carnivores in air (OA)	157	177

Note: SEL thresholds in dB re 1 μPa² s underwater and dB re 20 μPa² s in air.

Based on the best available science, the Action Proponents (in coordination with NMFS) used the acoustic and pressure thresholds indicated in table 18 to predict the onset of behavioral harassment, AUD INJ, TTS, tissue damage, and mortality due to explosive sources.

For explosive activities using single detonations (*i.e.,* no more than one detonation within a day), such as those described in the proposed activity, NMFS uses TTS onset thresholds to assess the likelihood of behavioral harassment, rather than the Level B harassment threshold for multiple detonations indicated in table 19. While marine mammals may also respond to single explosive detonations, these responses are expected to more typically be in the form of startle response, rather than a more meaningful disruption of a behavioral pattern. On the rare occasion that a single detonation might result in a behavioral response that qualifies as Level B harassment, it would be expected to be in response to a comparatively higher received level. Accordingly, NMFS considers the potential for these responses to be quantitatively accounted for through the application of the TTS criteria, which, as noted above, is 5 dB higher than the behavioral harassment threshold for multiple explosives.

TABLE 19—EXPLOSIVE THRESHOLDS FOR MARINE MAMMALS FOR AUD INJ, TTS, AND BEHAVIOR

[Multiple detonations]

Hearing group	AUD INJ impulsive threshold *	TTS impulsive threshold *	Behavioral threshold (multiple detonations)
Low-Frequency (LF) Cetaceans	*Cell 1:* $L_{p,0\text{-}pk,flat}$: 222 dB; $L_{E,p,LF,24h}$: 183 dB.	*Cell 2:* $L_{p,0\text{-}pk,flat}$: 216 dB; $L_{E,LF,24h}$: 168 dB.	*Cell 3:* $L_{E,LF,24h}$: 163 dB.
High-Frequency (HF) Cetaceans	*Cell 4:* $L_{p,0\text{-}pk,flat}$: 230 dB; $L_{E,p,HF,24h}$: 193 dB.	*Cell 5:* $L_{p,0\text{-}pk,flat}$: 224 dB; $L_{E,HF,24h}$: 178 dB.	*Cell 6:* $L_{E,HF,24h}$: 173 dB.
Very High-Frequency (VHF) Cetaceans.	*Cell 7:* $L_{p,0\text{-}pk,flat}$: 202 dB; $L_{E,p,VHF,24h}$: 159 dB.	*Cell 8:* $L_{p,0\text{-}pk,flat}$: 196 dB; $L_{E,VHF,24h}$: 144 dB.	*Cell 9:* $L_{E,VHF,24h}$: 139 dB.
Phocid Pinnipeds (PW) (Underwater).	*Cell 10:* $L_{p,0\text{-}pk,flat}$: 223 dB; $L_{E,p,PW,24h}$: 183 dB.	*Cell 11:* $L_{p,0\text{-}pk,flat}$: 217 dB; $L_{E,PW,24h}$: 168 dB.	*Cell 12:* $L_{E,PW,24h}$: 163 dB.
Otariid Pinnipeds (OW) (Underwater).	*Cell 13:* $L_{p,0\text{-}pk,flat}$: 230 dB; $L_{E,p,OW,24h}$: 185 dB.	*Cell 14:* $L_{p,0\text{-}pk,flat}$: 224 dB; $L_{E,OW,24h}$: 170 dB.	*Cell 15:* $L_{E,OW,24h}$: 165 dB.
Phocid Pinnipeds (PA) (In-Air)	*Cell 16:* $L_{p,0\text{-}pk,flat}$: 162 dB; $L_{E,p,PA,24h}$: 140 dB.	*Cell 17:* $L_{p,0\text{-}pk,flat}$: 156 dB; $L_{E,PA,24h}$: 125 dB.	*Cell 18:* N/A.
Otariid Pinnipeds (OA) (In-Air)	*Cell 19:* $L_{p,0\text{-}pk,flat}$: 177 dB; $L_{E,p,OA,24h}$: 163 dB.	*Cell 20:* $L_{p,0\text{-}pk,flat}$: 171 dB; $L_{E,OA,24h}$: 148 dB.	*Cell 21:* N/A.

Note: N/A = Not Applicable. Peak sound pressure level ($L_{p,0\text{-}pk}$) has a reference value of 1 µPa, and weighted cumulative sound exposure level ($L_{E,p}$) has a reference value of 1 µPa²s. In this table, criteria are abbreviated to be more reflective of International Organization for Standardization standards (ISO, 2017; ISO, 2020). The subscript "flat" is being included to indicate peak sound pressure are flat weighted or unweighted within the generalized hearing range of marine mammals underwater (*i.e.,* 7 Hz to 165 kHz) or in air (*i.e.,* 42 Hz to 52 kHz). The subscript associated with cumulative sound exposure level criteria indicates the designated marine mammal auditory weighting function (LF, HF, and VHF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The weighted cumulative sound exposure level criteria could be exceeded in a multitude of ways (*i.e.,* varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these criteria will be exceeded.

* Dual metric criteria for impulsive sounds: Use whichever criteria results in the larger isopleth for calculating AUD INJ onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level criteria associated with impulsive sounds, the PK SPL criteria are recommended for consideration for non-impulsive sources.

The criterion for mortality is based on severe lung injury observed in terrestrial mammals exposed to underwater explosions as recorded in Goertner (1982). The criteria for non-auditory injury are based on slight lung injury or gastrointestinal (commonly referred to as G.I.) tract injury observed in the same data set. Mortality and slight lung injury impacts to marine mammals are estimated using impulse thresholds based on both calf/pup/juvenile and adult masses (see the Criteria and Thresholds Technical Report). The peak pressure threshold applies to all species and age classes. Unlike the prior analysis (Phase III), this analysis relies on the onset rather than the mean estimated threshold for these effects. This revision results in a small increase in the predicted non-auditory injuries and mortalities for the same event versus prior analyses. Thresholds are provided in table 20 for use in non-auditory injury assessment for marine mammals exposed to underwater explosives. Of note, non-auditory injury and mortality from land-based missile and target launches are so unlikely as to be discountable under normal conditions.

TABLE 20—NON-AUDITORY INJURY THRESHOLDS FOR UNDERWATER EXPLOSIVES

Hearing group	Mortality—impulse *	Injury—impulse *	Injury—peak pressure
All Marine Mammals	*Cell 1:* Modified Goertner model; Equation 1.	*Cell 2:* Modified Goertner model; Equation 2.	*Cell 3:* $L_{p0\text{-}pk,flat}$: 237 dB.

Note: Peak sound pressure (L_{pk}) has a reference value of 1 μPa. In this table, thresholds are abbreviated to reflect ANSI (2013). However, ANSI defines peak sound pressure as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the overall marine mammal generalized hearing range.

* Lung injury (severe and slight) thresholds are dependent on animal mass (Recommendation: table C.9 from U.S. Department of the Navy (2017a) based on adult and/or calf/pup mass by species).

Modified Goertner Equations for severe and slight lung injury (pascal-second)

Equation 1: $103M^{1/3}(1 + D/10.1)^{1/6}$ Pa-s

Equation 2: $47.5M^{1/3}(1 + D/10.1)^{1/6}$ Pa-s

M animal (adult and/or calf/pup) mass (kg) (table C.9 in DoN 2017)

D animal depth (meters).

Level B Harassment by Behavioral Disturbance

Though significantly driven by received level and distance, the onset of Level B harassment by behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors and can be difficult to predict (Southall *et al.,* 2007; Ellison *et al.,* 2012). As discussed in the Potential Effects of Specified Activities on Marine Mammals and Their Habitat section, marine mammal responses to sound (some of which are considered disturbances that qualify as take under the MMPA) are highly variable and context specific (*i.e.,* they are affected by differences in acoustic conditions; differences between species and populations; differences in gender, age, reproductive status, or social behavior; and other prior experience of the individuals). This means there is support for considering alternative approaches for estimating Level B behavioral harassment.

Despite the rapidly evolving science, there are still challenges in quantifying expected behavioral responses that qualify as take by Level B harassment, especially where the goal is to use one or two predictable indicators (*e.g.,* received level and distance) to predict responses that are also driven by additional factors that cannot be easily incorporated into the thresholds (*e.g.,* context). So, while the criteria that identify Level B harassment by behavioral disturbance (referred to *as* ''behavioral harassment thresholds'') have been refined to better consider the best available science (*e.g.,* incorporating both received level and distance), they also still have some built-in factors to address the challenge noted. For example, while duration of observed responses in the data are now considered in the thresholds, some of the responses that are informing take thresholds are of a very short duration, such that it is possible some of these responses might not always rise to the level of disrupting behavior patterns to a point where they are abandoned or significantly altered. We describe the application of this behavioral harassment threshold as identifying the maximum number of instances in which marine mammals could be reasonably expected to experience a disruption in behavior patterns to a point where they are abandoned or significantly altered. In summary, we believe these behavioral harassment criteria are the most appropriate method for predicting Level B harassment by behavioral disturbance given the best available science and the associated uncertainty.

Sonar—

In its analysis of impacts associated with sonar acoustic sources (which was coordinated with NMFS), the Action Proponents used an updated approach, as described below. Many of the behavioral responses identified using the Action Proponents' quantitative analysis are most likely to be of moderate severity as described in the Southall *et al.* (2021) behavioral response severity scale. These ''moderate'' severity responses were considered significant if they were sustained for the duration of the exposure or longer. Within the Action Proponents' quantitative analysis, many responses are predicted from exposure to sound that may exceed an animal's Level B behavioral harassment threshold for only a single exposure (lasting a few seconds) to several minutes, and it is likely that some of the resulting estimated behavioral responses that are counted as Level B harassment would not constitute ''significantly altering or abandoning natural behavioral patterns'' (*i.e.,* the estimated number of takes by Level B harassment due to behavioral disturbance and response is likely somewhat of an overestimate).

As noted above, the Action Proponents coordinated with NMFS to develop behavioral harassment thresholds specific to their military readiness activities utilizing active sonar that identify at what received level and distance Level B harassment by behavioral disturbance would be expected to result. These behavioral harassment thresholds consist of behavioral response functions (BRFs) and associated distance cut-off conditions, and are also referred to, together, as ''the criteria.'' These criteria are used to estimate the number of animals that may exhibit a behavioral response that qualifies as take under the MMPA when exposed to sonar and other transducers. The way the criteria were derived is discussed in detail in the Criteria and Thresholds Technical Report. Developing these behavioral harassment criteria involved multiple steps. All peer-reviewed published behavioral response studies conducted both in the field and on captive animals were examined in order to understand the breadth of behavioral responses of marine mammals to sonar and other transducers. Marine mammals were divided into four groups for analysis: mysticetes (all baleen whales); odontocetes (most toothed whales, dolphins, and porpoises); sensitive species (beaked whales and harbor porpoise); and pinnipeds and other marine carnivores (true seals, sea lions, walruses, sea otters, polar bears). These groups are like the groups used in the behavioral response analysis (Phase III), with the exception of combining beaked whales and harbor porpoise into a single curve. For each group, a biphasic BRF was developed using the best available data and Bayesian dose response models developed at the University of St. Andrews. The BRF base probability of response on the highest SPL (RMS) received level.

The analysis of BRFs differs from the previous phase (Phase III) due to the addition of new data and the separation of some species groups. Figure 10 in the Criteria and Thresholds Technical Report indicates the changes in BRFs from Phase III to Phase IV. The sensitive species BRF is more sensitive at lower received levels but less sensitive at higher received levels than the prior beaked whale and harbor porpoise functions. The odontocete BRF is less sensitive overall due to additional behavioral response research, which will result in a lower number of behavioral responses than in the prior analysis for the same event, but also reduces the avoidance of auditory effects. The pinnipeds (in-water) BRF is more sensitive due to the inclusion of additional captive pinniped data (only three behavioral studies using captive pinnipeds were available for the derivation of the BRF). Behavioral studies of captive animals can be difficult to extrapolate to wild animals due to several factors (*e.g.,* use of trained subjects). This means the pinniped BRF likely overestimates effects compared to observed responses of wild pinnipeds to sound and anthropogenic activity. The mysticete BRF is less sensitive across most received levels due to including additional behavioral response research. This will result in a lower number of behavioral responses than in the prior analysis for the same event, but also reduces the avoidance of auditory effects.

The BRFs only relate the highest received level of sound to the probability that an animal will have a behavioral response. The BRFs do not account for the duration or pattern of use of any individual sound source or of the activity as a whole, the number of sound sources that may be operating simultaneously, or how loud the animal may perceive the sonar signal to be based on the frequency of the sonar versus the animal's hearing range.

Criteria for assessing marine mammal behavioral responses to sonars use the metric of highest received sound level (RMS) to evaluate the risk of immediate responses by exposed animals. Currently, there are limited data to develop criteria that include the context of an exposure, characteristics of individual animals, behavioral state, duration of an exposure, sound source duty cycle, and the number of individual sources in an activity (although these factors certainly influence the severity of a behavioral response) and, further, even where certain contextual factors may be predictive where known, it is difficult to reliably predict when such factors will be present.

The BRFs also do not account for distance. At moderate to low received levels the correlation between probability of response and received level is very poor and it appears that other variables mediate behavioral responses (*e.g.,* Ellison *et al.,* 2012) such as the distance between the animal and the sound source. For this analysis, distance between the animal and the sound source (*i.e.,* range) was initially included, however, range was too confounded with received level and therefore did not provide additional information about the possibility of response.

Data suggest that beyond a certain distance, significant behavioral responses are unlikely. At shorter ranges (less than 10 km) some behavioral responses have been observed at received levels below 140 dB re 1 μPa. Thus, proximity may mediate behavioral responses at lower received levels. Since most data used to derive the BRFs are within 10 km of the source, probability of response at farther ranges is not well-represented. Therefore, the source-receiver range must be considered separately to estimate likely significant behavioral responses.

This analysis applies behavioral cut-off conditions to responses predicted using the BRFs. Animals within a specified distance and above a minimum probability of response are assumed to have a significant behavioral response. The cut-off distance is based on the farthest source-animal distance across all known studies where animals exhibited a significant behavioral response. Animals beyond the cut-off distance but with received levels above the sound pressure level associated with a probability of response of 0.50 on the BRF are also assumed to have a significant behavioral response. The actual likelihood of significant behavioral responses occurring beyond the distance cut-off is unknown. Significant behavioral responses beyond 100 km are unlikely based on source-animal distance and attenuated received levels. The behavioral cut-off conditions and additional information on the derivation of the cut-off conditions can be found in table 2.2–3 of the Criteria and Thresholds Technical Report.

The Action Proponents used cutoff distances beyond which the potential of significant behavioral responses (and therefore Level B harassment) is considered to be unlikely (see table 21). These distances were determined by examining all available published field observations of behavioral responses to sonar or sonar-like signals that included the distance between the sound source and the marine mammal. Behavioral effects calculations are based on the maximum SPL to which a modeled marine mammal is exposed. There is empirical evidence to suggest that animals are more likely to exhibit significant behavioral responses to moderate levels sounds that are closer and less likely to exhibit behavioral responses when exposed to moderate levels of sound from a source that is far away. To account for this, the Action Proponents have implemented behavioral cutoffs that consider both received sound level and distance from the source. These updated cutoffs conditions are unique to each behavioral hearing group and are outlined in table 21.

TABLE 21—BEHAVIORAL CUT-OFF CONDITIONS FOR EACH BEHAVIORAL HEARING GROUP

Behavioral group	Received level associated with p(0.50) on the behavioral response function (dB RMS)	Cut-off range (km)
Sensitive Species	133	40
Odontocetes	168	15
Mysticetes	185	10
Pinnipeds	156	5

Note: Sensitive Species includes beaked whales and harbor porpoises.

The Action Proponents and NMFS have used the best available science to address the challenging differentiation between significant and non-significant behavioral responses (*i.e.,* whether the behavior has been abandoned or significantly altered such that it qualifies as harassment), but have erred on the cautious side where uncertainty exists (*e.g.,* counting these lower duration responses as take), which likely results in some degree of overestimation of Level B harassment by behavioral disturbance. We consider application of these behavioral harassment thresholds, therefore, as identifying the maximum number of instances in which marine mammals could be reasonably expected to experience a disruption in behavior patterns to a point where they are abandoned or significantly altered (*i.e.,* Level B harassment). NMFS has carefully reviewed the criteria (*i.e.,* BRFs and cutoff distances for the species), and agrees that it is the best available science and is the appropriate method to use at this time for determining impacts to marine mammals from military sonar and other transducers and for calculating take and to support the determinations made in this proposed rule. Because this is the most appropriate method for estimating Level B harassment given the best available science and uncertainty on the topic, it is these numbers of Level B harassment by behavioral disturbance that are analyzed in the Preliminary Analysis and Negligible Impact Determination section and would be authorized.

Air Guns, Pile Driving, and Explosives—

Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses generalized acoustic thresholds based on received level to estimate the onset of behavioral harassment for sources other than active sonar. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 μPa (RMS) for continuous (*e.g.,* vibratory pile-driving, drilling) and above 160 dB re 1 μPa (RMS) for non-explosive impulsive (*e.g.,* seismic air guns) or intermittent (*e.g.,* scientific sonar) sources. For the Action Proponents' activities, to estimate behavioral effects from air guns, the threshold of 160 dB re 1 μPa (RMS) is used and the root mean square calculation for air guns is based on the duration defined by 90 percent of the cumulative energy in the impulse. The indicated thresholds were also applied to estimate behavioral effects from impact and vibratory pile driving (see table 22). These thresholds are the same as those applied in the prior analysis (Phase III) of these stressors in the Study Area, although the explosive behavioral threshold has shifted, corresponding to changes in the TTS thresholds.

TABLE 22—BEHAVIORAL RESPONSE THRESHOLDS FOR AIR GUNS, PILE DRIVING, AND EXPLOSIVES

Sound source	Behavioral threshold
Air gun	160 dB RMS re 1 μPa SPL.
Impact pile driving	160 dB RMS re 1 μPa SPL.
Vibratory pile driving	120 dB RMS re 1 μPa SPL.
Single explosion (underwater)	TTS onset threshold (weighted SEL).
Multiple explosions (underwater)	5 dB less than the TTS onset threshold (weighted SEL).
Explosion in Air *	100 dB 20 μPa (otariid and phocid).

* Estimated takes from land-based missile and rocket launches are based on pinniped observations during prior activities rather than in-air thresholds.

While the best available science for assessing behavioral responses of marine mammals to impulsive sounds relies on data from seismic and pile driving sources, it is likely that these predicted responses using a threshold based on seismic and pile driving represent a worst-case scenario compared to behavioral responses to explosives used in military readiness activities, which would typically consist of single impulses or a cluster of impulses rather than long-duration, repeated impulses (*e.g.,* large-scale air gun arrays).

For single explosions at received sound levels below hearing loss thresholds, the most likely behavioral response is a brief alerting or orienting response. Since no further sounds follow the initial brief impulses, significant behavioral responses would not be expected to occur. If a significant response were to occur, the Action Proponents' analysis assumes it would be as a result of an exposure at levels within the range of auditory impacts (TTS and AUD INJ). Because of this approach, the number of auditory impacts is higher than the number of behavioral impacts in the quantified results for some stocks.

If more than one explosive event occurs within any given 24-hour period during a military readiness activity, behavioral disturbance is considered more likely to occur and specific criteria are applied to predict the number of animals that may have a behavioral response. For events with multiple explosions, the behavioral threshold used in this analysis is 5 dB less than the TTS onset threshold. This value is derived from observed onsets of behavioral response by test subjects (bottlenose dolphins) during non-impulse TTS testing (Schlundt *et al.,* 2000).

Navy Acoustic Effects Model

The Navy Acoustic Effects Model (NAEMO) is their standard model for assessing acoustic effects on marine mammals. NAEMO calculates sound energy propagation from sonar and other transducers, air guns, and explosives during military readiness activities and the sound received by animat dosimeters. Animat dosimeters are virtual representations of marine mammals distributed in the area around the modeled activity and each dosimeter records its individual sound ''dose.'' The model bases the distribution of animats over the HCTT Study Area on the density values in the Navy Marine Species Density Database (NMSDD) and distributes animats in the water column proportional to the known time that species spend at varying depths.

The model accounts for environmental variability of sound propagation in both distance and depth when computing the sound level received by the animats. The model conducts a statistical analysis based on multiple model runs to compute the estimated effects on animals. The number of animats that exceed the thresholds for effects is tallied to provide an estimate of the number of marine mammals that could be affected.

Assumptions in NAEMO intentionally err on the side of overestimation when there are unknowns. The specified activities are modeled as though they would occur regardless of proximity to marine mammals, meaning that the implementation of power downs or shutdowns are not modeled or, thereby, considered in the take estimates. For more information on this process, see the discussion in the *Estimated Take from Acoustic Stressors* section below. Many explosions from ordnance such as bombs and missiles actually occur upon impact with above-water targets. However, for this analysis, sources such as these were modeled as exploding underwater. This overestimates the amount of explosive and acoustic energy entering the water.

The model estimates the acoustic impacts caused by sonars and other transducers, explosives, and air guns during individual military readiness activities. During any individual modeled event, impacts to individual animats are considered over 24-hour periods. The animats do not represent actual animals, but rather they represent a distribution of animals based on density and abundance data, which allows for a statistical analysis of the number of instances that marine mammals may be exposed to sound levels resulting in an effect. Therefore, the model estimates the number of instances in which an effect threshold was exceeded over the course of a year, but does not estimate the number of individual marine mammals that may be impacted over a year (*i.e.,* some marine mammals could be impacted several times, while others would not experience any impact). A detailed explanation of NAEMO is provided in the Acoustic Impacts Technical Report.

As NAEMO interrogates the simulation data in the Animat Processor, exposures that are both outside the distance cutoff and below the received level cutoff are omitted when determining the maximum SPL for each animat. This differs from Phase III, in which only distance cutoffs were applied, meaning that all exposures outside the distance cutoffs were omitted, with no consideration of received level.

The presence of the two cutoff criteria in Phase IV provides a more accurate and conservative estimation of behavioral effects because louder exposures that would have been omitted previously, when only a distance cutoff was applied, are considered in Phase IV, while the estimation of behavioral effects still omits exposures at distances and received levels that would be unlikely to produce a significant behavioral response. NAEMO retains the capability of calculating behavioral effects without the cutoffs applied, depending on user preference.

The impulsive behavioral criteria are not based on the probability of a behavioral response but rather on a single SPL metric. For consideration of impulsive behavioral effects, the cutoff conditions in table 21 are not applied.

Pile Driving

The Action Proponents performed a quantitative analysis without NAEMO to estimate the number of times marine mammals could be affected by pile driving and extraction used during port damage repair activities at Port Hueneme. The analysis considered details of the activity, sound exposure criteria, and the number and distribution of marine mammals. This information was then used in an ''area*density'' model in which the areas within each footprint (*i.e.,* harassment zone) that encompassed a potential effect were calculated for a given day's activities. The effects analyzed included behavioral response, TTS, and AUD INJ for marine mammals.

Then, these areas were multiplied by the density of each marine species within the Port Hueneme area (California sea lion and harbor seal) to estimate the number of effects. Uniform density values for species expected to be present in the nearshore areas where pile driving could occur were estimated using the NMSDD or available survey data specific to the activity location. More detail is provided in the 2024 HCTT Draft EIS/OEIS. Since the same animal can be ''taken'' every day (*i.e.,* 24-hour reset time), the number of predicted effects from a given day were multiplied by the number of days for that activity. This generated a total estimated number of effects over the entire activity, which was then multiplied by the maximum number of times per year this activity could happen. The result was the estimated effects per species and stock in a year.

Range to Effects

This section provides range (distance) to effects for sonar and other active acoustic sources as well as explosives to specific acoustic thresholds determined using NAEMO. Ranges are determined by modeling the distance that noise from a source will need to propagate to reach exposure level thresholds specific to a hearing group that will cause behavioral response, TTS, AUD INJ, non-auditory injury, and mortality. Ranges to effects (table 23 through table 36) are utilized to help predict impacts from acoustic and explosive sources and assess the benefit of mitigation zones. Marine mammals exposed within these ranges for the shown duration are predicted to experience the associated effect. Range to effects is important information in not only predicting acoustic impacts, but also in verifying the accuracy of model results against real-world situations and determining adequate mitigation ranges to avoid higher level effects, especially physiological effects to marine mammals.

Sonar

Ranges to effects for sonar were determined by modeling the distance that sound would need to propagate to reach exposure level thresholds specific to a hearing group that would cause behavioral response, TTS, and AUD INJ, as described in the Criteria and Thresholds Technical Report. The ranges do not account for an animal avoiding a source nor for the movement of the platform, both of which would influence the actual range to onset of auditory effects during an actual exposure.

Table 23 through table 28 below provide the ranges to TTS and AUD INJ for marine mammals from exposure durations of 1, 30, 60, and 120 seconds (s) for six sonar systems proposed for use (see also appendix A of the application). Due to the lower acoustic thresholds for TTS versus AUD INJ, ranges to TTS are larger. Successive pings can be expected to add together, further increasing the range to the onset of TTS and AUD INJ.

TABLE 23—VERY LOW-FREQUENCY CETACEAN RANGES TO EFFECTS FOR SONAR

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
Dipping sonar	≤200	1	160 m (30 m)	12 m (4 m).
Dipping sonar	≤200	30	312 m (75 m)	21 m (6 m).
Dipping sonar	≤200	60	423 m (97 m)	25 m (5 m).

TABLE 23—VERY LOW-FREQUENCY CETACEAN RANGES TO EFFECTS FOR SONAR—Continued

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
Dipping sonar	≤200	120	628 m (135 m)	35 m (6 m).
Dipping sonar	>200	1	140 m (20 m)	0 m (1 m).
Dipping sonar	>200	30	260 m (49 m)	0 m (8 m).
Dipping sonar	>200	60	340 m (70 m)	23 m (10 m).
Dipping sonar	>200	120	500 m (112 m)	35 m (15 m).
MF1 ship sonar	≤200	1	1,069 m (252 m)	90 m (17 m).
MF1 ship sonar	≤200	30	1,069 m (252 m)	90 m (17 m).
MF1 ship sonar	≤200	60	1,528 m (465 m)	140 m (24 m).
MF1 ship sonar	≤200	120	1,792 m (636 m)	180 m (32 m).
MF1 ship sonar	>200	1	1,000 m (85 m)	85 m (3 m).
MF1 ship sonar	>200	30	1,000 m (85 m)	85 m (3 m).
MF1 ship sonar	>200	60	1,500 m (252 m)	130 m (7 m).
MF1 ship sonar	>200	120	1,944 m (484 m)	170 m (9 m).
MF1C ship sonar	≤200	1	1,069 m (252 m)	90 m (17 m).
MF1C ship sonar	≤200	30	1,792 m (636 m)	180 m (32 m).
MF1C ship sonar	≤200	60	2,319 m (1,021 m)	260 m (56 m).
MF1C ship sonar	≤200	120	2,845 m (1,479 m)	390 m (72 m).
MF1C ship sonar	>200	1	1,000 m (85 m)	85 m (3 m).
MF1C ship sonar	>200	30	1,944 m (484 m)	170 m (9 m).
MF1C ship sonar	>200	60	2,792 m (1,103 m)	250 m (21 m).
MF1C ship sonar	>200	120	4,000 m (1,599 m)	370 m (31 m).
MF1K ship sonar	≤200	1	193 m (37 m)	12 m (4 m).
MF1K ship sonar	≤200	30	355 m (73 m)	24 m (2 m).
MF1K ship sonar	≤200	60	470 m (83 m)	30 m (3 m).
MF1K ship sonar	≤200	120	668 m (126 m)	45 m (13 m).
MF1K ship sonar	>200	1	190 m (15 m)	5 m (5 m).
MF1K ship sonar	>200	30	340 m (34 m)	21 m (11 m).
MF1K ship sonar	>200	60	440 m (52 m)	25 m (3 m).
MF1K ship sonar	>200	120	625 m (66 m)	40 m (2 m).
Mine-hunting sonar	≤200	1	3 m (1 m)	0 m (0 m).
Mine-hunting sonar	≤200	30	6 m (1 m)	0 m (0 m).
Mine-hunting sonar	≤200	60	9 m (1 m)	0 m (0 m).
Mine-hunting sonar	≤200	120	13 m (2 m)	1 m (0 m).
Mine-hunting sonar	>200	1	0 m (0 m)	0 m (0 m).
Mine-hunting sonar	>200	30	5 m (2 m)	0 m (0 m).
Mine-hunting sonar	>200	60	8 m (3 m)	0 m (0 m).
Mine-hunting sonar	>200	120	12 m (0 m)	0 m (0 m).
Sonobuoy sonar	≤200	1	13 m (6 m)	0 m (0 m).
Sonobuoy sonar	≤200	30	25 m (6 m)	0 m (0 m).
Sonobuoy sonar	≤200	60	35 m (7 m)	0 m (1 m).
Sonobuoy sonar	≤200	120	50 m (4 m)	0 m (1 m).
Sonobuoy sonar	>200	1	0 m (6 m)	0 m (0 m).
Sonobuoy sonar	>200	30	23 m (10 m)	0 m (0 m).
Sonobuoy sonar	>200	60	35 m (11 m)	0 m (0 m).
Sonobuoy sonar	>200	120	50 m (3 m)	0 m (0 m).

Note: Median ranges are shown with standard deviation (SD) in parentheses. The Action Proponents split the LF functional hearing group into LF and VLF based on Houser *et al.,* (2024). NMFS updated acoustic technical guidance (NMFS, 2024) does not include these data but we have included the VLF group here for reference.

TABLE 24—LOW-FREQUENCY CETACEAN RANGES TO EFFECTS FOR SONAR

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
Dipping sonar	≤200	1	160 m (56 m)	12 m (4 m).
Dipping sonar	≤200	30	311 m (100 m)	21 m (6 m).
Dipping sonar	≤200	60	411 m (119 m)	25 m (7 m).
Dipping sonar	≤200	120	581 m (137 m)	35 m (11 m).
Dipping sonar	>200	1	150 m (82 m)	0 m (6 m).
Dipping sonar	>200	30	240 m (123 m)	17 m (10 m).
Dipping sonar	>200	60	287 m (160 m)	25 m (13 m).
Dipping sonar	>200	120	409 m (133 m)	35 m (18 m).
MF1 ship sonar	≤200	1	1,069 m (280 m)	95 m (19 m).
MF1 ship sonar	≤200	30	1,069 m (280 m)	95 m (19 m).
MF1 ship sonar	≤200	60	1,500 m (500 m)	140 m (24 m).
MF1 ship sonar	≤200	120	1,736 m (668 m)	180 m (30 m).
MF1 ship sonar	>200	1	1,000 m (185 m)	90 m (5 m).
MF1 ship sonar	>200	30	1,000 m (185 m)	90 m (5 m).
MF1 ship sonar	>200	60	1,569 m (415 m)	140 m (12 m).
MF1 ship sonar	>200	120	2,153 m (734 m)	180 m (14 m).

TABLE 24—LOW-FREQUENCY CETACEAN RANGES TO EFFECTS FOR SONAR—Continued

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
MF1C ship sonar	≤200	1	1,069 m (280 m)	95 m (19 m).
MF1C ship sonar	≤200	30	1,736 m (668 m)	180 m (30 m).
MF1C ship sonar	≤200	60	2,194 m (1,062 m)	270 m (49 m).
MF1C ship sonar	≤200	120	2,667 m (1,519 m)	399 m (68 m).
MF1C ship sonar	>200	1	1,000 m (185 m)	90 m (5 m).
MF1C ship sonar	>200	30	2,153 m (734 m)	180 m (14 m).
MF1C ship sonar	>200	60	3,111 m (1,305 m)	260 m (21 m).
MF1C ship sonar	>200	120	4,333 m (1,845 m)	380 m (29 m).
MF1K ship sonar	≤200	1	200 m (34 m)	14 m (1 m).
MF1K ship sonar	≤200	30	360 m (67 m)	25 m (1 m).
MF1K ship sonar	≤200	60	480 m (84 m)	30 m (4 m).
MF1K ship sonar	≤200	120	661 m (135 m)	45 m (14 m).
MF1K ship sonar	>200	1	200 m (21 m)	12 m (1 m).
MF1K ship sonar	>200	30	350 m (32 m)	24 m (0 m).
MF1K ship sonar	>200	60	450 m (44 m)	30 m (0 m).
MF1K ship sonar	>200	120	650 m (88 m)	45 m (0 m).
Mine-hunting sonar	≤200	1	8 m (5 m)	0 m (0 m).
Mine-hunting sonar	≤200	30	15 m (8 m)	1 m (0 m).
Mine-hunting sonar	≤200	60	21 m (12 m)	2 m (1 m).
Mine-hunting sonar	≤200	120	30 m (12 m)	3 m (2 m).
Mine-hunting sonar	>200	1	8 m (5 m)	0 m (0 m).
Mine-hunting sonar	>200	30	15 m (8 m)	0 m (0 m).
Mine-hunting sonar	>200	60	21 m (12 m)	0 m (1 m).
Mine-hunting sonar	>200	120	30 m (12 m)	0 m (1 m).
Sonobuoy sonar	≤200	1	0 m (8 m)	0 m (0 m).
Sonobuoy sonar	≤200	30	25 m (12 m)	0 m (0 m).
Sonobuoy sonar	≤200	60	35 m (18 m)	0 m (0 m).
Sonobuoy sonar	≤200	120	55 m (25 m)	0 m (1 m).
Sonobuoy sonar	>200	1	0 m (7 m)	0 m (0 m).
Sonobuoy sonar	>200	30	19 m (12 m)	0 m (0 m).
Sonobuoy sonar	>200	60	35 m (19 m)	0 m (0 m).
Sonobuoy sonar	>200	120	55 m (28 m)	0 m (1 m).

Note: Median ranges are shown with standard deviation (SD) in parentheses. The Action Proponents split the LF functional hearing group into LF and VLF based on Houser *et al.,* (2024). NMFS updated acoustic technical guidance (NMFS, 2024) does not include these data but we have included the VLF group here for reference.

TABLE 25—HIGH-FREQUENCY CETACEAN RANGES TO EFFECTS FOR SONAR

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
Dipping sonar	≤200	1	55 m (15 m)	5 m (2 m).
Dipping sonar	≤200	30	120 m (34 m)	9 m (4 m).
Dipping sonar	≤200	60	170 m (50 m)	12 m (5 m).
Dipping sonar	≤200	120	250 m (85 m)	18 m (6 m).
Dipping sonar	>200	1	50 m (28 m)	0 m (2 m).
Dipping sonar	>200	30	100 m (54 m)	0 m (4 m).
Dipping sonar	>200	60	130 m (74 m)	0 m (5 m).
Dipping sonar	>200	120	200 m (105 m)	0 m (8 m).
MF1 ship sonar	≤200	1	644 m (113 m)	45 m (7 m).
MF1 ship sonar	≤200	30	644 m (113 m)	45 m (7 m).
MF1 ship sonar	≤200	60	910 m (177 m)	65 m (12 m).
MF1 ship sonar	≤200	120	1,011 m (243 m)	85 m (14 m).
MF1 ship sonar	>200	1	600 m (52 m)	40 m (11 m).
MF1 ship sonar	>200	30	600 m (52 m)	40 m (11 m).
MF1 ship sonar	>200	60	875 m (93 m)	65 m (14 m).
MF1 ship sonar	>200	120	1,000 m (126 m)	85 m (7 m).
MF1C ship sonar	≤200	1	644 m (113 m)	45 m (7 m).
MF1C ship sonar	≤200	30	1,011 m (243 m)	85 m (14 m).
MF1C ship sonar	≤200	60	1,458 m (437 m)	130 m (23 m).
MF1C ship sonar	≤200	120	1,903 m (730 m)	200 m (36 m).
MF1C ship sonar	>200	1	600 m (52 m)	40 m (11 m).
MF1C ship sonar	>200	30	1,000 m (126 m)	85 m (7 m).
MF1C ship sonar	>200	60	1,500 m (309 m)	130 m (12 m).
MF1C ship sonar	>200	120	2,142 m (786 m)	200 m (17 m).
MF1K ship sonar	≤200	1	100 m (21 m)	7 m (3 m).
MF1K ship sonar	≤200	30	190 m (34 m)	13 m (4 m).
MF1K ship sonar	≤200	60	250 m (51 m)	17 m (5 m).
MF1K ship sonar	≤200	120	363 m (72 m)	25 m (2 m).
MF1K ship sonar	>200	1	100 m (19 m)	0 m (3 m).

TABLE 25—HIGH-FREQUENCY CETACEAN RANGES TO EFFECTS FOR SONAR—Continued

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
MF1K ship sonar	>200	30	180 m (20 m)	11 m (6 m).
MF1K ship sonar	>200	60	240 m (27 m)	16 m (8 m).
MF1K ship sonar	>200	120	350 m (39 m)	24 m (11 m).
Mine-hunting sonar	≤200	1	8 m (3 m)	0 m (0 m).
Mine-hunting sonar	≤200	30	15 m (5 m)	1 m (0 m).
Mine-hunting sonar	≤200	60	21 m (6 m)	1 m (1 m).
Mine-hunting sonar	≤200	120	30 m (6 m)	2 m (1 m).
Mine-hunting sonar	>200	1	7 m (3 m)	0 m (0 m).
Mine-hunting sonar	>200	30	15 m (6 m)	0 m (0 m).
Mine-hunting sonar	>200	60	21 m (7 m)	0 m (1 m).
Mine-hunting sonar	>200	120	30 m (5 m)	0 m (1 m).
Sonobuoy sonar	≤200	1	8 m (4 m)	0 m (0 m).
Sonobuoy sonar	≤200	30	18 m (8 m)	0 m (0 m).
Sonobuoy sonar	≤200	60	25 m (12 m)	0 m (0 m).
Sonobuoy sonar	≤200	120	35 m (14 m)	0 m (1 m).
Sonobuoy sonar	>200	1	0 m (4 m)	0 m (0 m).
Sonobuoy sonar	>200	30	0 m (9 m)	0 m (0 m).
Sonobuoy sonar	>200	60	0 m (12 m)	0 m (0 m).
Sonobuoy sonar	>200	120	30 m (16 m)	0 m (1 m).

Note: Median ranges are shown with standard deviation (SD) in parentheses.

TABLE 26—VERY HIGH-FREQUENCY CETACEAN RANGES TO EFFECTS FOR SONAR

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
Dipping sonar	≤200	1	100 m (30 m)	8 m (2 m).
Dipping sonar	≤200	30	202 m (77 m)	14 m (4 m).
Dipping sonar	≤200	60	278 m (93 m)	19 m (5 m).
Dipping sonar	≤200	120	420 m (100 m)	25 m (7 m).
Dipping sonar	>200	1	95 m (50 m)	0 m (3 m).
Dipping sonar	>200	30	180 m (101 m)	0 m (6 m).
Dipping sonar	>200	60	240 m (123 m)	14 m (8 m).
Dipping sonar	>200	120	330 m (85 m)	24 m (12 m).
MF1 ship sonar	≤200	1	1,528 m (471 m)	150 m (25 m).
MF1 ship sonar	≤200	30	1,528 m (471 m)	150 m (25 m).
MF1 ship sonar	≤200	60	2,000 m (756 m)	220 m (39 m).
MF1 ship sonar	≤200	120	2,250 m (974 m)	280 m (57 m).
MF1 ship sonar	>200	1	1,569 m (357 m)	150 m (12 m).
MF1 ship sonar	>200	30	1,569 m (357 m)	150 m (12 m).
MF1 ship sonar	>200	60	2,403 m (885 m)	220 m (20 m).
MF1 ship sonar	>200	120	2,944 m (1,143 m)	270 m (27 m).
MF1C ship sonar	≤200	1	1,528 m (471 m)	150 m (25 m).
MF1C ship sonar	≤200	30	2,250 m (974 m)	280 m (57 m).
MF1C ship sonar	≤200	60	2,722 m (1,373 m)	417 m (68 m).
MF1C ship sonar	≤200	120	3,330 m (1,819 m)	588 m (99 m).
MF1C ship sonar	>200	1	1,569 m (357 m)	150 m (12 m).
MF1C ship sonar	>200	30	2,944 m (1,143 m)	270 m (27 m).
MF1C ship sonar	>200	60	4,097 m (1,620 m)	390 m (29 m).
MF1C ship sonar	>200	120	5,972 m (2,314 m)	550 m (38 m).
MF1K ship sonar	≤200	1	315 m (60 m)	20 m (2 m).
MF1K ship sonar	≤200	30	550 m (103 m)	35 m (5 m).
MF1K ship sonar	≤200	60	712 m (139 m)	50 m (12 m).
MF1K ship sonar	≤200	120	958 m (214 m)	85 m (12 m).
MF1K ship sonar	>200	1	300 m (37 m)	16 m (2 m).
MF1K ship sonar	>200	30	525 m (43 m)	35 m (1 m).
MF1K ship sonar	>200	60	675 m (66 m)	50 m (2 m).
MF1K ship sonar	>200	120	975 m (116 m)	85 m (4 m).
Mine-hunting sonar	≤200	1	90 m (26 m)	9 m (1 m).
Mine-hunting sonar	≤200	30	190 m (85 m)	16 m (2 m).
Mine-hunting sonar	≤200	60	329 m (128 m)	22 m (2 m).
Mine-hunting sonar	≤200	120	521 m (166 m)	30 m (3 m).
Mine-hunting sonar	>200	1	90 m (6 m)	7 m (1 m).
Mine-hunting sonar	>200	30	150 m (30 m)	15 m (0 m).
Mine-hunting sonar	>200	60	210 m (57 m)	22 m (0 m).
Mine-hunting sonar	>200	120	300 m (79 m)	30 m (0 m).
Sonobuoy sonar	≤200	1	65 m (20 m)	0 m (2 m).
Sonobuoy sonar	≤200	30	126 m (39 m)	9 m (5 m).
Sonobuoy sonar	≤200	60	191 m (79 m)	15 m (5 m).
Sonobuoy sonar	≤200	120	314 m (120 m)	22 m (7 m).

TABLE 26—VERY HIGH-FREQUENCY CETACEAN RANGES TO EFFECTS FOR SONAR—Continued

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
Sonobuoy sonar	>200	1	65 m (31 m)	0 m (1 m).
Sonobuoy sonar	>200	30	110 m (59 m)	0 m (4 m).
Sonobuoy sonar	>200	60	180 m (75 m)	10 m (7 m).
Sonobuoy sonar	>200	120	276 m (72 m)	21 m (10 m).

Note: Median ranges are shown with standard deviation (SD) in parentheses.

TABLE 27—PHOCID CARNIVORE IN WATER RANGES TO EFFECTS FOR SONAR

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
Dipping sonar	≤200	1	200 m (52 m)	0 m (7 m).
Dipping sonar	≤200	30	370 m (101 m)	21 m (12 m).
Dipping sonar	≤200	60	496 m (134 m)	30 m (15 m).
Dipping sonar	≤200	120	707 m (144 m)	45 m (12 m).
Dipping sonar	>200	1	160 m (71 m)	0 m (4 m).
Dipping sonar	>200	30	298 m (129 m)	0 m (8 m).
Dipping sonar	>200	60	370 m (170 m)	0 m (10 m).
Dipping sonar	>200	120	550 m (80 m)	0 m (19 m).
MF1 ship sonar	≤200	1	1,250 m (384 m)	120 m (20 m).
MF1 ship sonar	≤200	30	1,250 m (384 m)	120 m (20 m).
MF1 ship sonar	≤200	60	1,625 m (632 m)	180 m (33 m).
MF1 ship sonar	≤200	120	1,875 m (833 m)	230 m (45 m).
MF1 ship sonar	>200	1	1,250 m (282 m)	120 m (53 m).
MF1 ship sonar	>200	30	1,250 m (282 m)	120 m (53 m).
MF1 ship sonar	>200	60	1,792 m (696 m)	180 m (21 m).
MF1 ship sonar	>200	120	2,264 m (982 m)	230 m (23 m).
MF1C ship sonar	≤200	1	1,250 m (384 m)	120 m (20 m).
MF1C ship sonar	≤200	30	1,875 m (833 m)	230 m (45 m).
MF1C ship sonar	≤200	60	2,333 m (1,223 m)	330 m (73 m).
MF1C ship sonar	≤200	120	2,833 m (1,633 m)	481 m (97 m).
MF1C ship sonar	>200	1	1,250 m (282 m)	120 m (53 m).
MF1C ship sonar	>200	30	2,264 m (982 m)	230 m (23 m).
MF1C ship sonar	>200	60	3,368 m (1,399 m)	330 m (31 m).
MF1C ship sonar	>200	120	4,500 m (1,973 m)	462 m (46 m).
MF1K ship sonar	≤200	1	248 m (58 m)	0 m (9 m).
MF1K ship sonar	≤200	30	435 m (97 m)	25 m (8 m).
MF1K ship sonar	≤200	60	550 m (133 m)	35 m (10 m).
MF1K ship sonar	≤200	120	771 m (190 m)	65 m (14 m).
MF1K ship sonar	>200	1	240 m (26 m)	0 m (8 m).
MF1K ship sonar	>200	30	430 m (48 m)	24 m (13 m).
MF1K ship sonar	>200	60	550 m (61 m)	35 m (16 m).
MF1K ship sonar	>200	120	775 m (105 m)	65 m (28 m).
Mine-hunting sonar	≤200	1	12 m (7 m)	0 m (0 m).
Mine-hunting sonar	≤200	30	24 m (11 m)	0 m (1 m).
Mine-hunting sonar	≤200	60	35 m (11 m)	0 m (1 m).
Mine-hunting sonar	≤200	120	50 m (15 m)	0 m (2 m).
Mine-hunting sonar	>200	1	0 m (5 m)	0 m (0 m).
Mine-hunting sonar	>200	30	22 m (9 m)	0 m (0 m).
Mine-hunting sonar	>200	60	30 m (4 m)	0 m (1 m).
Mine-hunting sonar	>200	120	45 m (5 m)	0 m (1 m).
Sonobuoy sonar	≤200	1	0 m (11 m)	0 m (0 m).
Sonobuoy sonar	≤200	30	35 m (16 m)	0 m (1 m).
Sonobuoy sonar	≤200	60	50 m (19 m)	0 m (1 m).
Sonobuoy sonar	≤200	120	75 m (20 m)	0 m (3 m).
Sonobuoy sonar	>200	1	0 m (7 m)	0 m (0 m).
Sonobuoy sonar	>200	30	0 m (16 m)	0 m (0 m).
Sonobuoy sonar	>200	60	45 m (23 m)	0 m (0 m).
Sonobuoy sonar	>200	120	70 m (32 m)	0 m (1 m).

Note: Median ranges are shown with standard deviation (SD) in parentheses.

TABLE 28—OTARIID CARNIVORE IN WATER RANGES TO EFFECTS FOR SONAR

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
Dipping sonar	≤200	1	60 m (16 m)	0 m (3 m).
Dipping sonar	≤200	30	130 m (40 m)	0 m (5 m).
Dipping sonar	≤200	60	180 m (58 m)	0 m (6 m).

TABLE 28—OTARIID CARNIVORE IN WATER RANGES TO EFFECTS FOR SONAR—Continued

Sonar type	Depth (m)	Duration (s)	Range to TTS (SD)	Range to AUD INJ (SD)
Dipping sonar	≤200	120	274 m (88 m)	11 m (9 m).
Dipping sonar	>200	1	55 m (30 m)	0 m (2 m).
Dipping sonar	>200	30	120 m (66 m)	0 m (4 m).
Dipping sonar	>200	60	160 m (90 m)	0 m (5 m).
Dipping sonar	>200	120	210 m (116 m)	0 m (8 m).
MF1 ship sonar	≤200	1	726 m (148 m)	50 m (10 m).
MF1 ship sonar	≤200	30	726 m (148 m)	50 m (10 m).
MF1 ship sonar	≤200	60	981 m (220 m)	80 m (12 m).
MF1 ship sonar	≤200	120	1,139 m (296 m)	109 m (18 m).
MF1 ship sonar	>200	1	725 m (93 m)	50 m (1 m).
MF1 ship sonar	>200	30	725 m (93 m)	50 m (1 m).
MF1 ship sonar	>200	60	1,000 m (157 m)	80 m (5 m).
MF1 ship sonar	>200	120	1,250 m (251 m)	100 m (8 m).
MF1C ship sonar	≤200	1	726 m (148 m)	50 m (10 m).
MF1C ship sonar	≤200	30	1,139 m (296 m)	109 m (18 m).
MF1C ship sonar	≤200	60	1,500 m (462 m)	160 m (23 m).
MF1C ship sonar	≤200	120	1,861 m (690 m)	240 m (40 m).
MF1C ship sonar	>200	1	725 m (93 m)	50 m (1 m).
MF1C ship sonar	>200	30	1,250 m (251 m)	100 m (8 m).
MF1C ship sonar	>200	60	1,750 m (549 m)	160 m (12 m).
MF1C ship sonar	>200	120	2,250 m (1,071 m)	240 m (22 m).
MF1K ship sonar	≤200	1	120 m (22 m)	8 m (4 m).
MF1K ship sonar	≤200	30	230 m (40 m)	16 m (4 m).
MF1K ship sonar	≤200	60	300 m (56 m)	20 m (3 m).
MF1K ship sonar	≤200	120	426 m (77 m)	25 m (4 m).
MF1K ship sonar	>200	1	120 m (12 m)	0 m (4 m).
MF1K ship sonar	>200	30	220 m (30 m)	14 m (6 m).
MF1K ship sonar	>200	60	290 m (38 m)	20 m (5 m).
MF1K ship sonar	>200	120	420 m (58 m)	25 m (1 m).
Mine-hunting sonar	≤200	1	6 m (3 m)	0 m (0 m).
Mine-hunting sonar	≤200	30	11 m (6 m)	0 m (0 m).
Mine-hunting sonar	≤200	60	18 m (8 m)	0 m (0 m).
Mine-hunting sonar	≤200	120	25 m (10 m)	0 m (1 m).
Mine-hunting sonar	>200	1	6 m (3 m)	0 m (0 m).
Mine-hunting sonar	>200	30	11 m (5 m)	0 m (0 m).
Mine-hunting sonar	>200	60	18 m (7 m)	0 m (0 m).
Mine-hunting sonar	>200	120	25 m (10 m)	0 m (1 m).
Sonobuoy sonar	≤200	1	0 m (6 m)	0 m (0 m).
Sonobuoy sonar	≤200	30	18 m (11 m)	0 m (0 m).
Sonobuoy sonar	≤200	60	30 m (13 m)	0 m (1 m).
Sonobuoy sonar	≤200	120	45 m (20 m)	0 m (1 m).
Sonobuoy sonar	>200	1	0 m (5 m)	0 m (0 m).
Sonobuoy sonar	>200	30	0 m (11 m)	0 m (0 m).
Sonobuoy sonar	>200	60	25 m (14 m)	0 m (0 m).
Sonobuoy sonar	>200	120	40 m (22 m)	0 m (1 m).

Note: Median ranges are shown with standard deviation (SD) in parentheses.

Air Guns

Ranges to effects for air guns were determined by modeling the distance that sound would need to propagate to reach exposure level thresholds specific to a hearing group that would cause behavioral response, TTS, and AUD INJ, as described in the Criteria and Thresholds Technical Report. The air gun ranges to effects for TTS and AUD INJ in table 29 are based on the metric (*i.e.,* SEL or SPL) that produced larger ranges.

TABLE 29—RANGE TO EFFECTS FOR AIR GUNS

Functional hearing group	Depth (m)	Cluster size	Behavioral disturbance	Range to TTS (SD)	Range to AUD INJ (SD)
VLF	≤200	1	N/A	5 m (0 m)	1 m (1 m).
VLF	≤200	10	114 m (6 m)	81 m (1 m)	14 m (0 m).
VLF	>200	1	N/A	5 m (0 m)	1 m (1 m).
VLF	>200	10	115 m (7 m)	81 m (1 m)	14 m (0 m).
LF	≤200	1	N/A	5 m (0 m)	2 m (0 m).
LF	≤200	10	104 m (10 m)	36 m (1 m)	6 m (0 m).
LF	>200	1	N/A	5 m (0 m)	2 m (0 m).
LF	>200	10	107 m (11 m)	35 m (1 m)	6 m (0 m).
HF	≤200	1	N/A	2 m (1 m)	0 m (0 m).
HF	≤200	10	111 m (10 m)	2 m (1 m)	0 m (0 m).

TABLE 29—RANGE TO EFFECTS FOR AIR GUNS—Continued

Functional hearing group	Depth (m)	Cluster size	Behavioral disturbance	Range to TTS (SD)	Range to AUD INJ (SD)
HF	>200	1	N/A	2 m (1 m)	0 m (0 m).
HF	>200	10	112 m (13 m)	2 m (1 m)	0 m (0 m).
VHF	≤200	1	N/A	51 m (2 m)	25 m (0 m).
VHF	≤200	10	111 m (13 m)	51 m (2 m)	25 m (0 m).
VHF	>200	1	N/A	50 m (1 m)	25 m (0 m).
VHF	>200	10	119 m (14 m)	50 m (1 m)	25 m (0 m).
PCW	≤200	1	N/A	5 m (2 m)	2 m (1 m).
PCW	≤200	10	110 m (11 m)	7 m (3 m)	2 m (1 m).
PCW	>200	1	N/A	5 m (2 m)	2 m (1 m).
PCW	>200	10	113 m (23 m)	7 m (3 m)	2 m (1 m).
OCW	≤200	1	N/A	2 m (0 m)	1 m (0 m).
OCW	≤200	10	112 m (18 m)	2 m (0 m)	1 m (0 m).
OCW	>200	1	N/A	2 m (0 m)	1 m (0 m).
OCW	>200	10	118 m (19 m)	2 m (0 m)	1 m (0 m).

Note: N/A = Not Applicable. The values listed for TTS and AUD INJ are the greater of the respective SPL and SEL ranges. Median ranges are shown with standard deviation (SD) in parentheses. The Action Proponents split the LF functional hearing group into LF and VLF based on Houser *et al.,* (2024). NMFS updated acoustic technical guidance (NMFS, 2024) does not include these data but we have included the VLF group here for reference.

Pile Driving

Only California sea lions (U.S. stock) and harbor seals (California stock) are expected to be present in the waters of Port Hueneme, where impact and vibratory pile driving and extraction is proposed to occur up to 12 times per year. Table 30 shows the predicted ranges to AUD INJ, TTS, and behavioral response for the otariid carnivore in water and phocid carnivore in water hearing groups (the only functional hearing groups expected in the vicinity of pile driving and extraction activities) that were analyzed for their exposure to impact and vibratory pile driving. These ranges were estimated based on activity parameters described in the Acoustic Stressors section of the Explosive and Acoustic Analysis Report (see appendix A of the application) and using the calculations described in the Acoustic Impacts Technical Report.

TABLE 30—RANGE TO EFFECTS FOR PINNIPEDS FROM PILE DRIVING

Pile type	Method	Functional hearing group	Behavioral response (m)	Range to TTS (m)	Range to AUD INJ (m)
20-inch (51 cm) round timber/plastic	Impact	OCW	46	43	4
20-inch (51 cm) H steel	Impact	OCW	215	201	20
20-inch (51 cm) round or H steel/timber/plastic	Impact	OCW	858	685	69
27.5-inch (70 cm) sheet or Z steel	Vibratory	OCW	3,981	12	1
20-inch (51 cm) round steel/timber/plastic	Vibratory	OCW	3,981	36	2
20-inch (51 cm) round timber/plastic	Impact	PCW	46	116	12
20-inch (51 cm) H steel	Impact	PCW	215	538	54
20-inch (51 cm) round or H steel/timber/plastic	Impact	PCW	858	1,839	184
27.5-inch (70 cm) sheet or Z steel	Vibratory	PCW	11,659	35	2
20-inch (51 cm) round steel/timber/plastic	Vibratory	PCW	11,659	105	5

Note: cm = centimeter.

Explosives

This section provides the range (*i.e.,* distance) over which specific physiological or behavioral effects are expected to occur based on the explosive criteria (see section 6.2.1 (Impacts from Explosives) of the application and the Criteria and Thresholds Technical Report and the explosive propagation calculations from NAEMO. The range to effects are shown for a range of explosive bins, from E1 (0.1–0.25 lb (0.045–0.113 kg) NEW) to E16 (greater than 7,250–14,500 lb (3,288–6,577 kg) NEW (ship shock trial only)) (table 31 through table 36). Ranges are determined by modeling the distance that noise from an explosion would need to propagate to reach exposure level thresholds specific to a hearing group that would cause behavioral response (to the degree of Level B behavioral harassment), TTS, and AUD INJ. NMFS has reviewed the range distance to effect data provided by the Action Proponents and concurs with the analysis. Range to effects is important information in not only predicting impacts from explosives, but also in verifying the accuracy of model results against real-world situations and determining appropriate mitigation ranges to avoid higher level effects, especially injury to marine mammals. For additional information on how ranges to impacts from explosions were estimated, see the Acoustic Impacts Technical Report.

Table 31 through table 36 show the minimum, average, and maximum ranges to onset of auditory and likely behavioral effects that qualify as Level B harassment for all functional hearing groups based on the developed thresholds. Ranges are provided for a representative source depth and cluster size (*i.e.,* the number of rounds fired, or buoys dropped, within a very short duration) for each bin. Ranges for behavioral response are only provided if more than one explosive cluster occurs. As noted previously, single explosions at received sound levels below TTS and AUD INJ thresholds are most likely to result in a brief alerting or orienting response. For events with multiple explosions, sound from successive explosions can be expected to accumulate and increase the range to the onset of an impact based on SEL thresholds. Modeled ranges to TTS and AUD INJ based on peak pressure for a single explosion generally exceed the modeled ranges based on SEL even when accumulated for multiple explosions. Peak pressure-based ranges are estimated using the best available science; however, data on peak pressure at far distances from explosions are very limited. The explosive ranges to effects for TTS and AUD INJ that are in the tables are based on the metric (*i.e.,* SEL or SPL) that produced larger ranges.

Table 37 shows ranges to non-auditory injury and mortality as a function of animal mass and explosive bin. For non-auditory injury, the larger of the ranges to slight lung injury or gastrointestinal tract injury was used as a conservative estimate, and the boxplots in appendix A to the application present ranges for both metrics for comparison. For the non-auditory metric, ranges are only available for a cluster size of one. Animals within water volumes encompassing the estimated range to non-auditory injury would be expected to receive minor injuries at the outer ranges, increasing to more substantial injuries, and finally mortality as an animal approaches the detonation point.

TABLE 31—VERY LOW-FREQUENCY CETACEAN RANGES TO EFFECTS FOR EXPLOSIVES

Bin	Depth (m)	Cluster size	Range to behavioral disturbance (SD)	Range to TTS (SD)	Range to AUD INJ (SD)
E1	≤200	1	N/A	206 m (73 m)	95 m (2 m).
E1	≤200	5	618 m (230 m)	390 m (161 m)	95 m (19 m).
E1	≤200	25	1,246 m (444 m)	785 m (267 m)	182 m (61 m).
E1	≤200	50	1,419 m (471 m)	800 m (178 m)	250 m (34 m).
E1	>200	1	N/A	220 m (55 m)	95 m (3 m).
E1	>200	5	600 m (61 m)	430 m (18 m)	95 m (2 m).
E1	>200	25	950 m (155 m)	700 m (84 m)	190 m (5 m).
E1	>200	50	1,000 m (290 m)	850 m (98 m)	270 m (5 m).
E2	≤200	1	N/A	362 m (42 m)	130 m (12 m).
E2	>200	1	N/A	370 m (46 m)	130 m (13 m).
E3	≤200	1	N/A	489 m (387 m)	213 m (6 m).
E3	≤200	5	1,531 m (615 m)	909 m (370 m)	213 m (6 m).
E3	≤200	25	2,764 m (1,211 m)	1,722 m (685 m)	414 m (178 m).
E3	>200	1	N/A	825 m (304 m)	214 m (7 m).
E3	>200	5	1,000 m (346 m)	751 m (154 m)	220 m (5 m).
E3	>200	25	1,750 m (971 m)	1,000 m (369 m)	420 m (26 m).
E4	≤200	1	N/A	1,875 m (768 m)	382 m (26 m).
E4	>200	1	N/A	1,250 m (277 m)	377 m (28 m).
E5	≤200	1	N/A	815 m (851 m)	358 m (27 m).
E5	≤200	5	2,986 m (1,306 m)	1,586 m (714 m)	358 m (27 m).
E5	>200	1	N/A	650 m (152 m)	343 m (25 m).
E5	>200	5	2,146 m (956 m)	1,056 m (452 m)	350 m (54 m).
E5	>200	20	3,889 m (975 m)	2,625 m (600 m)	575 m (178 m).
E6	≤200	1	N/A	1,836 m (1,341 m)	534 m (382 m).
E6	≤200	15	7,258 m (1,106 m)	5,397 m (814 m)	2,029 m (104 m).
E6	>200	1	N/A	1,347 m (762 m)	516 m (48 m).
E7	≤200	1	N/A	1,651 m (729 m)	535 m (25 m).
E7	>200	1	N/A	1,556 m (1,347 m)	537 m (24 m).
E8	≤200	1	N/A	2,549 m (485 m)	769 m (55 m).
E8	>200	1	N/A	2,519 m (477 m)	754 m (54 m).
E9	≤200	1	N/A	3,417 m (1,563 m)	755 m (49 m).
E9	>200	1	N/A	2,667 m (1,186 m)	754 m (49 m).
E10	≤200	1	N/A	4,272 m (840 m)	891 m (88 m).
E10	>200	1	N/A	4,264 m (820 m)	889 m (100 m).
E11	≤200	1	N/A	14,182 m (3,939 m)	1,778 m (60 m).
E11	>200	1	N/A	14,814 m (4,258 m)	1,833 m (116 m).
E12	≤200	1	N/A	4,523 m (910 m)	992 m (78 m).
E12	>200	1	N/A	4,349 m (813 m)	981 m (165 m).
E13	≤200	1	N/A	7,208 m (5,750 m)	3,361 m (1,875 m).
E16	>200	1	N/A	10,778 m (8,250 m)	2,438 m (65 m).

Note: N/A = Not Applicable. Behavioral response criteria are applied to explosive clusters >1. The values listed for TTS and AUD INJ are the greater of the respective SPL and SEL ranges. Median ranges are shown with standard deviation (SD) in parentheses. The Action Proponents split the LF functional hearing group into LF and VLF based on Houser *et al.* (2024). NMFS updated acoustic technical guidance (NMFS, 2024) does not include these data but we have included the VLF group here for reference. E1 (0.1–0.25 lbs (0.045–0.113 kg)), E2 (>0.25–0.5 lbs (0.113–0.23 kg)), E3 (>0.5–2.5 lbs (0.23–1.13 kg)), E4 (>2.5–5 lbs (1.13–2.27 kg)), E5 (>5–10 lbs (2.27–4.54 kg)), E6 (>10–20 lbs (4.54–9.07 kg)), E7 (>20–60 lbs (9.07–27.2 kg)), E8 (>60–100 lbs (27.2–45.4 kg)), E9 (>100–250 lbs (45.4–113 kg)), E10 (>250–500 lbs (113–227 kg)), E11 (>500–675 lbs (227–306 kg)), E12 (>675–1,000 lbs (306–454 kg)), E13 (>1,000–1,740 lbs (454–789 kg)), E16 (10,000 lbs (4,536 kg)).

TABLE 32—LOW-FREQUENCY CETACEAN RANGES TO EFFECTS FOR EXPLOSIVES

Bin	Depth (m)	Cluster size	Range to behavioral disturbance (SD)	Range to TTS (SD)	Range to AUD INJ (SD)
E1	≤200	1	N/A	214 m (76 m)	92 m (7 m).

TABLE 32—LOW-FREQUENCY CETACEAN RANGES TO EFFECTS FOR EXPLOSIVES—Continued

Bin	Depth (m)	Cluster size	Range to behavioral disturbance (SD)	Range to TTS (SD)	Range to AUD INJ (SD)
E1	≤200	5	726 m (232 m)	428 m (164 m)	100 m (22 m).
E1	≤200	25	1,342 m (462 m)	884 m (266 m)	194 m (63 m).
E1	≤200	50	1,457 m (602 m)	846 m (296 m)	240 m (47 m).
E1	>200	1	N/A	250 m (60 m)	93 m (7 m).
E1	>200	5	725 m (140 m)	480 m (87 m)	110 m (8 m).
E1	>200	25	1,000 m (243 m)	800 m (162 m)	220 m (24 m).
E1	>200	50	1,153 m (318 m)	950 m (179 m)	310 m (39 m).
E2	≤200	1	N/A	375 m (57 m)	128 m (16 m).
E2	>200	1	N/A	381 m (59 m)	129 m (17 m).
E3	≤200	1	N/A	542 m (257 m)	198 m (13 m).
E3	≤200	5	1,482 m (563 m)	946 m (328 m)	205 m (86 m).
E3	≤200	25	2,346 m (1,019 m)	1,664 m (605 m)	435 m (159 m).
E3	>200	1	N/A	775 m (206 m)	199 m (14 m).
E3	>200	5	1,000 m (364 m)	861 m (191 m)	240 m (33 m).
E3	>200	25	1,500 m (916 m)	1,000 m (405 m)	361 m (110 m).
E4	≤200	1	N/A	1,586 m (653 m)	372 m (42 m).
E4	>200	1	N/A	1,000 m (257 m)	365 m (44 m).
E5	≤200	1	N/A	854 m (753 m)	305 m (39 m).
E5	≤200	5	2,306 m (1,138 m)	1,433 m (604 m)	319 m (83 m).
E5	>200	1	N/A	725 m (184 m)	297 m (38 m).
E5	>200	5	1,861 m (965 m)	1,000 m (415 m)	380 m (70 m).
E5	>200	20	3,944 m (1,014 m)	2,618 m (614 m)	747 m (112 m).
E6	≤200	1	N/A	1,597 m (1,167 m)	485 m (63 m).
E6	≤200	15	4,916 m (981 m)	3,605 m (763 m)	1,433 m (181 m).
E6	>200	1	N/A	1,250 m (836 m)	488 m (61 m).
E7	≤200	1	N/A	1,372 m (576 m)	427 m (80 m).
E7	>200	1	N/A	1,458 m (1,037 m)	429 m (82 m).
E8	≤200	1	N/A	2,013 m (388 m)	652 m (83 m).
E8	>200	1	N/A	1,985 m (376 m)	643 m (82 m).
E9	≤200	1	N/A	2,528 m (1,170 m)	689 m (85 m).
E9	>200	1	N/A	2,183 m (938 m)	692 m (84 m).
E10	≤200	1	N/A	3,220 m (660 m)	841 m (112 m).
E10	>200	1	N/A	3,203 m (664 m)	836 m (122 m).
E11	≤200	1	N/A	7,977 m (2,054 m)	1,468 m (173 m).
E11	>200	1	N/A	7,750 m (3,163 m)	1,570 m (266 m).
E12	≤200	1	N/A	3,844 m (1,097 m)	903 m (163 m).
E12	>200	1	N/A	3,453 m (1,050 m)	979 m (170 m).
E13	≤200	1	N/A	4,542 m (1,609 m)	2,757 m (1,128 m).
E16	>200	1	N/A	5,194 m (1,347 m)	2,667 m (513 m).

Note: N/A = Not Applicable. Behavioral response criteria are applied to explosive clusters >1. The values listed for TTS and AUD INJ are the greater of the respective SPL and SEL ranges. Median ranges are shown with standard deviation (SD) in parentheses. The Action Proponents split the LF functional hearing group into LF and VLF based on Houser *et al.* (2024). NMFS updated acoustic technical guidance (NMFS, 2024) does not include these data but we have included the VLF group here for reference. E1 (0.1–0.25 lbs (0.045–0.113 kg)), E2 (>0.25–0.5 lbs (0.113–0.23 kg)), E3 (>0.5–2.5 lbs (0.23–1.13 kg)), E4 (>2.5–5 lbs (1.13–2.27 kg)), E5 (>5–10 lbs (2.27–4.54 kg)), E6 (>10–20 lbs (4.54–9.07 kg)), E7 (>20–60 lbs (9.07–27.2 kg)), E8 (>60–100 lbs (27.2–45.4 kg)), E9 (>100–250 lbs (45.4–113 kg)), E10 (>250–500 lbs (113–227 kg)), E11 (>500–675 lbs (227–306 kg)), E12 (>675–1,000 lbs (306–454 kg)), E13 (>1,000–1,740 lbs (454–789 kg)), E16 (10,000 lbs (4,536 kg)).

TABLE 33—HIGH-FREQUENCY CETACEAN RANGES TO EFFECTS FOR EXPLOSIVES

Bin	Depth (m)	Cluster size	Range to behavioral disturbance (SD)	Range to TTS (SD)	Range to AUD INJ (SD)
E1	≤200	1	N/A	91 m (18 m)	42 m (2 m).
E1	≤200	5	260 m (90 m)	180 m (49 m)	42 m (2 m).
E1	≤200	25	479 m (201 m)	316 m (122 m)	85 m (17 m).
E1	≤200	50	497 m (182 m)	367 m (101 m)	110 m (8 m).
E1	>200	1	N/A	90 m (3 m)	42 m (2 m).
E1	>200	5	280 m (29 m)	180 m (9 m)	42 m (2 m).
E1	>200	25	490 m (109 m)	310 m (46 m)	85 m (3 m).
E1	>200	50	800 m (176 m)	500 m (80 m)	110 m (4 m).
E2	≤200	1	N/A	122 m (12 m)	57 m (6 m).
E2	>200	1	N/A	122 m (12 m)	57 m (7 m).
E3	≤200	1	N/A	181 m (48 m)	93 m (4 m).
E3	≤200	5	491 m (183 m)	321 m (110 m)	93 m (4 m).
E3	≤200	25	847 m (281 m)	582 m (182 m)	154 m (43 m).
E3	>200	1	N/A	180 m (15 m)	93 m (5 m).
E3	>200	5	538 m (106 m)	330 m (46 m)	93 m (5 m).
E3	>200	25	986 m (258 m)	725 m (173 m)	160 m (6 m).
E4	≤200	1	N/A	356 m (106 m)	135 m (34 m).

TABLE 33—HIGH-FREQUENCY CETACEAN RANGES TO EFFECTS FOR EXPLOSIVES—Continued

Bin	Depth (m)	Cluster size	Range to behavioral disturbance (SD)	Range to TTS (SD)	Range to AUD INJ (SD)
E4	>200	1	N/A	282 m (35 m)	132 m (19 m).
E5	≤200	1	N/A	294 m (137 m)	151 m (17 m).
E5	≤200	5	812 m (233 m)	513 m (166 m)	151 m (17 m).
E5	>200	1	N/A	260 m (25 m)	149 m (14 m).
E5	>200	5	794 m (213 m)	500 m (98 m)	149 m (14 m).
E5	>200	20	1,250 m (299 m)	875 m (178 m)	220 m (17 m).
E6	≤200	1	N/A	455 m (218 m)	213 m (28 m).
E6	≤200	15	1,624 m (167 m)	1,223 m (117 m)	427 m (47 m).
E6	>200	1	N/A	403 m (50 m)	216 m (26 m).
E7	≤200	1	N/A	422 m (93 m)	237 m (42 m).
E7	>200	1	N/A	450 m (154 m)	236 m (44 m).
E8	≤200	1	N/A	621 m (71 m)	334 m (32 m).
E8	>200	1	N/A	610 m (70 m)	332 m (32 m).
E9	≤200	1	N/A	646 m (99 m)	378 m (48 m).
E9	>200	1	N/A	701 m (160 m)	381 m (46 m).
E10	≤200	1	N/A	830 m (142 m)	482 m (76 m).
E10	>200	1	N/A	820 m (164 m)	481 m (73 m).
E11	≤200	1	N/A	1,271 m (157 m)	699 m (70 m).
E11	>200	1	N/A	1,325 m (194 m)	738 m (88 m).
E12	≤200	1	N/A	1,005 m (226 m)	650 m (114 m).
E12	>200	1	N/A	1,008 m (219 m)	632 m (109 m).
E13	≤200	1	N/A	5,569 m (4,190 m)	2,701 m (4,433 m).
E16	>200	1	N/A	3,778 m (8,655 m)	1,882 m (7,911 m)

Note: N/A = Not Applicable. Behavioral response criteria are applied to explosive clusters >1. The values listed for TTS and AUD INJ are the greater of the respective SPL and SEL ranges. Median ranges are shown with standard deviation (SD) in parentheses. E1 (0.1–0.25 lbs (0.045–0.113 kg)), E2 (>0.25–0.5 lbs (0.113–0.23 kg)), E3 (>0.5–2.5 lbs (0.23–1.13 kg)), E4 (>2.5–5 lbs (1.13–2.27 kg)), E5 (>5–10 lbs (2.27–4.54 kg)), E6 (>10–20 lbs (4.54–9.07 kg)), E7 (>20–60 lbs (9.07–27.2 kg)), E8 (>60–100 lbs (27.2–45.4 kg)), E9 (>100–250 lbs (45.4–113 kg)), E10 (>250–500 lbs (113–227 kg)), E11 (>500–675 lbs (227–306 kg)), E12 (>675–1,000 lbs (306–454 kg)), E13 (>1,000–1,740 lbs (454–789 kg)), E16 (10,000 lbs (4,536 kg)).

TABLE 34—VERY HIGH-FREQUENCY CETACEAN RANGES TO EFFECTS FOR EXPLOSIVES

Bin	Depth (m)	Cluster size	Range to behavioral disturbance (SD)	Range to TTS (SD)	Range to AUD INJ (SD)
E1	≤200	1	N/A	1,034 m8 (156 m)	662 m (87 m).
E1	≤200	5	1,778 m (1,398 m)	1,250 m (1,056 m)	662 m (87 m).
E1	≤200	25	2,667 m (1,883 m)	1,965 m (1,556 m)	835 m (577 m).
E1	≤200	50	4,056 m (2,398 m)	2,917 m (2,027 m)	924 m (695 m).
E1	>200	1	N/A	1,500 m (413 m)	646 m (85 m).
E1	>200	5	2,500 m (1,219 m)	2,000 m (708 m)	729 m (105 m).
E1	>200	25	3,972 m (2,279 m)	2,861 m (1,520 m)	1,250 m (251 m).
E1	>200	50	3,806 m (2,522 m)	3,035 m (1,737 m)	1,000 m (428 m).
E2	≤200	1	N/A	1,397 m (241 m)	798 m (107 m).
E2	>200	1	N/A	1,431 m (235 m)	799 m (104 m).
E3	≤200	1	N/A	2,100 m (410 m)	1,350 m (173 m).
E3	≤200	5	2,708 m (1,843 m)	2,100 m (410 m)	1,350 m (173 m).
E3	≤200	25	3,171 m (2,026 m)	2,500 m (1,738 m)	1,350 m (173 m).
E3	>200	1	N/A	2,250 m (913 m)	1,352 m (167 m).
E3	>200	5	3,708 m (2,026 m)	2,750 m (1,330 m)	1,352 m (167 m).
E3	>200	25	3,000 m (2,086 m)	2,500 m (1,596 m)	1,471 m (526 m).
E4	≤200	1	N/A	3,216 m (516 m)	2,189 m (251 m).
E4	>200	1	N/A	3,321 m (522 m)	2,250 m (256 m).
E5	≤200	1	N/A	2,229 m (447 m)	1,472 m (260 m).
E5	≤200	5	3,931 m (2,098 m)	3,322 m (1,800 m)	1,642 m (786 m).
E5	>200	1	N/A	2,264 m (1,091 m)	1,415 m (254 m).
E5	>200	5	4,924 m (3,027 m)	3,681 m (2,102 m)	1,750 m (457 m).
E5	>200	20	11,958 m (2,934 m)	8,125 m (2,005 m)	2,250 m (555 m).
E6	≤200	1	N/A	3,622 m (828 m)	2,385 m (514 m).
E6	≤200	15	4,411 m (761 m)	3,945 m (631 m)	2,633 m (362 m).
E6	>200	1	N/A	3,667 m (779 m)	2,423 m (488 m).
E7	≤200	1	N/A	4,083 m (767 m)	2,750 m (478 m).
E7	>200	1	N/A	4,458 m (1,831 m)	2,838 m (465 m).
E8	≤200	1	N/A	7,163 m (3,017 m)	3,215 m (825 m).
E8	>200	1	N/A	6,023 m (2,763 m)	3,069 m (731 m).
E9	≤200	1	N/A	5,469 m (992 m)	3,194 m (633 m).
E9	>200	1	N/A	5,319 m (1,041 m)	3,092 m (601 m).
E10	≤200	1	N/A	7,028 m (1,433 m)	4,067 m (867 m).
E10	>200	1	N/A	6,974 m (1,482 m)	4,000 m (825 m).

TABLE 34—VERY HIGH-FREQUENCY CETACEAN RANGES TO EFFECTS FOR EXPLOSIVES—Continued

Bin	Depth (m)	Cluster size	Range to behavioral disturbance (SD)	Range to TTS (SD)	Range to AUD INJ (SD)
E11	≤200	1	N/A	27,993 m (6,335 m)	16,304 m (5,256 m).
E11	>200	1	N/A	26,087 m (6,856 m)	15,150 m (6,163 m).
E12	≤200	1	N/A	8,639 m (1,966 m)	4,514 m (1,389 m).
E12	>200	1	N/A	8,882 m (2,905 m)	4,812 m (1,608 m).
E13	≤200	1	N/A	11,222 m (3,196 m)	4,931 m (1,169 m).
E16	>200	1	N/A	6,639 m (6,673 m)	2,257 m (1,560 m).

Note: N/A = Not Applicable. Behavioral response criteria are applied to explosive clusters >1. The values listed for TTS and AUD INJ are the greater of the respective SPL and SEL ranges. Median ranges are shown with standard deviation (SD) in parentheses. E1 (0.1–0.25 lbs (0.045–0.113 kg)), E2 (>0.25–0.5 lbs (0.113–0.23 kg)), E3 (>0.5–2.5 lbs (0.23–1.13 kg)), E4 (>2.5–5 lbs (1.13–2.27 kg)), E5 (>5–10 lbs (2.27–4.54 kg)), E6 (>10–20 lbs (4.54–9.07 kg)), E7 (>20–60 lbs (9.07–27.2 kg)), E8 (>60–100 lbs (27.2–45.4 kg)), E9 (>100–250 lbs (45.4–113 kg)), E10 (>250–500 lbs (113–227 kg)), E11 (>500–675 lbs (227–306 kg)), E12 (>675–1,000 lbs (306–454 kg)), E13 (>1,000–1,740 lbs (454–789 kg)), E16 (10,000 lbs (4,536 kg)).

TABLE 35—PHOCID CARNIVORE IN WATER RANGES TO EFFECTS FOR EXPLOSIVES

Bin	Depth (m)	Cluster size	Range to behavioral disturbance (SD)	Range to TTS (SD)	Range to AUD INJ (SD)
E1	≤200	1	N/A	227 m (67 m)	83 m (6 m).
E1	≤200	5	673 m (210 m)	421 m (145 m)	110 m (27 m).
E1	≤200	25	1,138 m (420 m)	822 m (242 m)	199 m (61 m).
E1	≤200	50	1,264 m (577 m)	785 m (286 m)	259 m (51 m).
E1	>200	1	N/A	260 m (41 m)	84 m (6 m).
E1	>200	5	675 m (179 m)	480 m (85 m)	110 m (4 m).
E1	>200	25	975 m (360 m)	725 m (209 m)	230 m (20 m).
E1	>200	50	1,500 m (563 m)	1,000 m (295 m)	305 m (35 m).
E2	≤200	1	N/A	347 m (52 m)	110 m (15 m).
E2	>200	1	N/A	355 m (55 m)	112 m (16 m).
E3	≤200	1	N/A	490 m (227 m)	188 m (13 m).
E3	≤200	5	1,221 m (433 m)	837 m (245 m)	209 m (59 m).
E3	≤200	25	1,969 m (787 m)	1,428 m (468 m)	397 m (113 m).
E3	>200	1	N/A	675 m (141 m)	188 m (13 m).
E3	>200	5	1,250 m (396 m)	917 m (205 m)	240 m (20 m).
E3	>200	25	2,250 m (868 m)	1,499 m (559 m)	490 m (103 m).
E4	≤200	1	N/A	1,124 m (441 m)	295 m (114 m).
E4	>200	1	N/A	900 m (114 m)	283 m (59 m).
E5	≤200	1	N/A	748 m (445 m)	301 m (45 m).
E5	≤200	5	1,917 m (829 m)	1,258 m (431 m)	311 m (85 m).
E5	>200	1	N/A	768 m (184 m)	294 m (42 m).
E5	>200	5	1,611 m (814 m)	1,000 m (379 m)	370 m (60 m).
E5	>200	20	3,674 m (1,149 m)	1,750 m (581 m)	664 m (82 m).
E6	≤200	1	N/A	1,108 m (704 m)	431 m (79 m).
E6	≤200	15	3,584 m (735 m)	2,786 m (457 m)	1,048 m (152 m).
E6	>200	1	N/A	1,000 m (546 m)	429 m (69 m).
E7	≤200	1	N/A	1,080 m (368 m)	472 m (95 m).
E7	>200	1	N/A	1,250 m (545 m)	471 m (96 m).
E8	≤200	1	N/A	1,780 m (552 m)	646 m (90 m).
E8	>200	1	N/A	1,750 m (531 m)	642 m (91 m).
E9	≤200	1	N/A	1,708 m (690 m)	721 m (138 m).
E9	>200	1	N/A	1,604 m (628 m)	711 m (128 m).
E10	≤200	1	N/A	2,078 m (579 m)	839 m (162 m).
E10	>200	1	N/A	2,114 m (550 m)	836 m (167 m).
E11	≤200	1	N/A	4,881 m (1,625 m)	1,433 m (588 m).
E11	>200	1	N/A	5,028 m (1,523 m)	1,556 m (568 m).
E12	≤200	1	N/A	2,489 m (848 m)	1,020 m (322 m).
E12	>200	1	N/A	2,480 m (822 m)	1,058 m (310 m).
E13	≤200	1	N/A	4,139 m (776 m)	2,146 m (522 m).
E16	>200	1	N/A	2,389 m (840 m)	1,361 m (528 m).

Note: N/A = Not Applicable. Behavioral response criteria are applied to explosive clusters >1. The values listed for TTS and AUD INJ are the greater of the respective SPL and SEL ranges. Median ranges are shown with standard deviation (SD) in parentheses. E1 (0.1–0.25 lbs (0.045–0.113 kg)), E2 (>0.25–0.5 lbs (0.113–0.23 kg)), E3 (>0.5–2.5 lbs (0.23–1.13 kg)), E4 (>2.5–5 lbs (1.13–2.27 kg)), E5 (>5–10 lbs (2.27–4.54 kg)), E6 (>10–20 lbs (4.54–9.07 kg)), E7 (>20–60 lbs (9.07–27.2 kg)), E8 (>60–100 lbs (27.2–45.4 kg)), E9 (>100–250 lbs (45.4–113 kg)), E10 (>250–500 lbs (113–227 kg)), E11 (>500–675 lbs (227–306 kg)), E12 (>675–1,000 lbs (306–454 kg)), E13 (>1,000–1,740 lbs (454–789 kg)), E16 (10,000 lbs (4,536 kg)).

TABLE 36—OTARIID CARNIVORE IN WATER RANGES TO EFFECTS FOR EXPLOSIVES

Bin	Depth (m)	Cluster size	Range to behavioral disturbance (SD)	Range to TTS (SD)	Range to AUD INJ (SD)
E1	≤200	1	N/A	156 m (48 m)	41 m (2 m).
E1	≤200	5	424 m (170 m)	288 m (102 m)	85 m (17 m).
E1	≤200	25	779 m (306 m)	543 m (198 m)	140 m (45 m).
E1	≤200	50	835 m (454 m)	550 m (229 m)	210 m (37 m).
E1	>200	1	N/A	190 m (25 m)	41 m (2 m).
E1	>200	5	450 m (78 m)	322 m (52 m)	85 m (4 m).
E1	>200	25	600 m (135 m)	480 m (93 m)	170 m (19 m).
E1	>200	50	769 m (133 m)	597 m (96 m)	230 m (30 m).
E2	≤200	1	N/A	258 m (39 m)	60 m (8 m).
E2	>200	1	N/A	261 m (41 m)	62 m (9 m).
E3	≤200	1	N/A	321 m (126 m)	90 m (8 m).
E3	≤200	5	757 m (286 m)	532 m (185 m)	140 m (42 m).
E3	≤200	25	1,306 m (572 m)	903 m (358 m)	260 m (91 m).
E3	>200	1	N/A	400 m (111 m)	90 m (9 m).
E3	>200	5	675 m (135 m)	525 m (89 m)	170 m (19 m).
E3	>200	25	876 m (285 m)	674 m (158 m)	300 m (52 m).
E4	≤200	1	N/A	764 m (196 m)	122 m (36 m).
E4	>200	1	N/A	525 m (118 m)	117 m (18 m).
E5	≤200	1	N/A	525 m (253 m)	147 m (22 m).
E5	≤200	5	1,264 m (472 m)	873 m (285 m)	225 m (60 m).
E5	>200	1	N/A	440 m (77 m)	141 m (19 m).
E5	>200	5	758 m (197 m)	575 m (129 m)	250 m (38 m).
E6	≤200	1	N/A	808 m (379 m)	208 m (34 m).
E6	≤200	15	2,221 m (258 m)	1,767 m (186 m)	791 m (65 m).
E6	>200	1	N/A	565 m (265 m)	215 m (31 m).
E7	≤200	1	N/A	694 m (244 m)	200 m (46 m).
E7	>200	1	N/A	650 m (210 m)	180 m (100 m).
E8	≤200	1	N/A	877 m (114 m)	320 m (46 m).
E8	>200	1	N/A	846 m (118 m)	314 m (46 m).
E9	≤200	1	N/A	929 m (361 m)	317 m (40 m).
E9	>200	1	N/A	729 m (158 m)	331 m (44 m).
E10	≤200	1	N/A	1,055 m (174 m)	406 m (73 m).
E10	>200	1	N/A	1,014 m (222 m)	413 m (71 m).
E11	≤200	1	N/A	1,764 m (212 m)	717 m (86 m).
E11	>200	1	N/A	1,694 m (280 m)	750 m (108 m).
E12	≤200	1	N/A	880 m (132 m)	406 m (67 m).
E12	>200	1	N/A	854 m (152 m)	418 m (71 m).
E13	≤200	1	N/A	4,514 m (1,620 m)	2,701 m (1,249 m).
E16	>200	1	N/A	3,708 m (7,259 m)	2,181 m (822 m).

Note: N/A = Not Applicable. Behavioral response criteria are applied to explosive clusters >1. The values listed for TTS and AUD INJ are the greater of the respective SPL and SEL ranges. Median ranges are shown with standard deviation (SD) in parentheses. E1 (0.1–0.25 lbs (0.045–0.113 kg)), E2 (>0.25–0.5 lbs (0.113–0.23 kg)), E3 (>0.5–2.5 lbs (0.23–1.13 kg)), E4 (>2.5–5 lbs (1.13–2.27 kg)), E5 (>5–10 lbs (2.27–4.54 kg)), E6 (>10–20 lbs (4.54–9.07 kg)), E7 (>20–60 lbs (9.07–27.2 kg)), E8 (>60–100 lbs (27.2–45.4 kg)), E9 (>100–250 lbs (45.4–113 kg)), E10 (>250–500 lbs (113–227 kg)), E11 (>500–675 lbs (227–306 kg)), E12 (>675–1,000 lbs (306–454 kg)), E13 (>1,000–1,740 lbs (454–789 kg)), E16 (10,000 lbs (4,536 kg)).

TABLE 37—EXPLOSIVE RANGES TO NON-AUDITORY INJURY AND MORTALITY FOR ALL MARINE MAMMAL HEARING GROUPS AS A FUNCTION OF ANIMAL MASS

Bin	Effect	10 kg (SD)	250 kg (SD)	1,000 kg (SD)	5,000 kg (SD)	25,000 kg (SD)	72,000 kg (SD)
E1	Non-auditory injury	22 m (2 m)	21 m (2 m)	19 m (3 m)	21 m (2 m)	22 m (1 m)	21 m (1 m).
E1	Mortality	3 m (1 m)	1 m (1 m)	0 m (0 m)	0 m (0 m)	0 m (0 m)	0 m (0 m).
E2	Non-auditory injury	27 m (3 m)	26 m (3 m)	26 m (2 m)	25 m (2 m)	26 m (2 m)	26 m (1 m).
E2	Mortality	6 m (2 m)	2 m (2 m)	1 m (1 m)	0 m (0 m)	0 m (0 m)	0 m (0 m).
E3	Non-auditory injury	37 m (8 m)	38 m (8 m)	41 m (6 m)	43 m (3 m)	38 m (6 m)	45 m (1 m).
E3	Mortality	6 m (3 m)	3 m (2 m)	0 m (1 m)	0 m (0 m)	0 m (0 m)	0 m (0 m).
E4	Non-auditory injury	55 m (9 m)	57 m (9 m)	60 m (7 m)	61 m (7 m)	60 m (8 m)	60 m (6 m).
E4	Mortality	19 m (6 m)	9 m (5 m)	4 m (1 m)	1 m (1 m)	1 m (0 m)	0 m (0 m).
E5	Non-auditory injury	76 m (4 m)	76 m (4 m)	76 m (4 m)	75 m (3 m)	75 m (4 m)	76 m (3 m).

TABLE 37—EXPLOSIVE RANGES TO NON-AUDITORY INJURY AND MORTALITY FOR ALL MARINE MAMMAL HEARING GROUPS AS A FUNCTION OF ANIMAL MASS—Continued

Bin	Effect	10 kg (SD)	250 kg (SD)	1,000 kg (SD)	5,000 kg (SD)	25,000 kg (SD)	72,000 kg (SD)
E5	Mortality	16 m (4 m)	8 m (3 m)	3 m (1 m)	2 m (1 m)	0 m (0 m)	0 m (0 m).
E6	Non-auditory injury	102 m (11 m)	101 m (11 m)	102 m (11 m)	103 m (10 m)	102 m (11 m)	102 m (9 m).
E6	Mortality	41 m (14 m)	19 m (8 m)	9 m (2 m)	6 m (1 m)	3 m (1 m)	2 m (0 m).
E7	Non-auditory injury	101 m (17 m)	109 m (21 m)	127 m (21 m)	116 m (16 m)	98 m (22 m)	109 m (13 m).
E7	Mortality	20 m (7 m)	10 m (4 m)	5 m (1 m)	3 m (1 m)	2 m (1 m)	1 m (0 m).
E8	Non-auditory injury	215 m (41 m)	160 m (10 m)	160 m (11 m)	164 m (5 m)	149 m (12 m)	165 m (4 m).
E8	Mortality	64 m (27 m)	30 m (13 m)	14 m (3 m)	9 m (2 m)	4 m (1 m)	2 m (1 m).
E9	Non-auditory injury	345 m (75 m)	192 m (19 m)	194 m (21 m)	204 m (13 m)	180 m (18 m)	211 m (10 m).
E9	Mortality	156 m (47 m)	22 m (30 m)	11 m (2 m)	8 m (2 m)	4 m (1 m)	3 m (1 m).
E10	Non-auditory injury	501 m (131 m)	243 m (127 m)	247 m (34 m)	256 m (28 m)	236 m (31 m)	267 m (23 m).
E10	Mortality	258 m (69 m)	67 m (64 m)	15 m (5 m)	10 m (2 m)	5 m (1 m)	4 m (0 m).
E11	Non-auditory injury	652 m (125 m)	367 m (50 m)	374 m (48 m)	361 m (26 m)	363 m (27 m)	371 m (26 m).
E11	Mortality	346 m (71 m)	176 m (55 m)	90 m (8 m)	55 m (7 m)	25 m (3 m)	22 m (3 m).
E12	Non-auditory injury	522 m (181 m)	317 m (41 m)	334 m (36 m)	345 m (32 m)	326 m (50 m)	353 m (2 m).
E12	Mortality	309 m (85 m)	136 m (92 m)	19 m (1 m)	12 m (3 m)	7 m (1 m)	5 m (0 m).
E13	Non-auditory injury	4,167 m (1,504 m)	2,135 m (1,522 m)	1,906 m (1,156 m)	2,073 m (1,404 m)	1,199 m (1,046 m)	953 m (182 m).
E13	Mortality	1,831 m (783 m)	717 m (759 m)	573 m (572 m)	677 m (658 m)	335 m (410 m)	260 m (202 m).
E16	Non-auditory injury	1,597 m (484 m)	1,000 m (628 m)	1,053 m (205 m)	1,069 m (341 m)	1,081 m (257 m)	975 m (4 m).
E16	Mortality	1,024 m (225 m)	678 m (284 m)	665 m (214 m)	753 m (263 m)	529 m (277 m)	415 m (233 m).

Note: Median ranges with standard deviation (SD) in parentheses. For non-auditory injury ranges, the greater of the respective ranges for 1 percent chance of gastro-intestinal tract injury and 1 percent chance of injury. E1 (0.1–0.25 lbs (0.045–0.113 kg)), E2 (>0.25–0.5 lbs (0.113–0.23 kg)), E3 (>0.5–2.5 lbs (0.23–1.13 kg)), E4 (>2.5–5 lbs (1.13–2.27 kg)), E5 (>5–10 lbs (2.27–4.54 kg)), E6 (>10–20 lbs (4.54–9.07 kg)), E7 (>20–60 lbs (9.07–27.2 kg)), E8 (>60–100 lbs (27.2–45.4 kg)), E9 (>100–250 lbs (45.4–113 kg)), E10 (>250–500 lbs (113–227 kg)), E11 (>500–675 lbs (227–306 kg)), E12 (>675–1,000 lbs (306–454 kg)), E13 (>1,000–1,740 lbs (454–789 kg)), E16 (10,000 lbs (4,536 kg)).

Marine Mammal Density

A quantitative analysis of impacts on a species or stock requires data on their abundance and distribution that may be affected by anthropogenic activities in the potentially impacted area. The most appropriate metric for this type of analysis is density, which is the number of animals present per unit area. Marine species density estimation requires a significant amount of effort to both collect and analyze data to produce a reasonable estimate. Unlike surveys for terrestrial wildlife, many marine species spend much of their time submerged and are not easily observed. In order to collect enough sighting data to make reasonable density estimates, multiple observations are required, often in areas that are not easily accessible (*e.g.,* far offshore). Ideally, marine mammal species sighting data would be collected for the specific area and time period (*e.g.,* season) of interest and density estimates derived accordingly. However, in many places, poor weather conditions and high sea states prohibit the completion of comprehensive visual surveys.

For most cetacean species, abundance is estimated using line-transect surveys or mark-recapture studies (*e.g.,* Barlow, 2010; Barlow and Forney, 2007; Calambokidis *et al.,* 2008). This is the general approach applied in estimating cetacean abundance in NMFS SARs. Although the single value provides a good average estimate of abundance (*i.e.,* total number of individuals) for a specified area, it does not provide information on the species distribution or concentrations within that area, and it does not estimate density for other timeframes or seasons that were not surveyed. More recently, spatial habitat modeling has been used to estimate cetacean densities (*e.g.,* Becker *et al.,* 2022a, Becker *et al.,* 2022b, Becker *et al.,* 2021, Becker *et al.,* 2020a; Becker *et al.,* 2020b). These models estimate cetacean density as a continuous function of habitat variables (*e.g.,* sea surface temperature, seafloor depth, *etc.*) and thus allow predictions of cetacean densities on finer spatial scales than traditional line-transect or mark recapture analyses, and for areas that have not been surveyed. Within the geographic area that was modeled, densities can be predicted wherever these habitat variables can be measured or estimated.

Ideally, density data would be available for all species throughout the Study Area year-round, in order to best estimate the impacts of specified activities on marine species. However, in many places, vessel availability, lack of funding, inclement weather conditions, and high sea states prevent the completion of comprehensive year-round surveys. Even with surveys that are completed, poor conditions may result in lower sighting rates for species that would typically be sighted with greater frequency under favorable conditions. Lower sighting rates preclude having an acceptably low uncertainty in the density estimates. A high level of uncertainty, indicating a low level of confidence in the density estimate, is typical for species that are rare or difficult to sight. In areas where survey data are limited or non-existent, known or inferred associations between marine habitat features and the likely presence of specific species are sometimes used to predict densities in the absence of actual animal sightings. Consequently, there is no single source of density data for every area, species, and season because of the fiscal costs, resources, and effort involved in providing enough survey coverage to sufficiently estimate density.

To characterize the marine species density for large oceanic regions, the Action Proponents review, critically assess, and prioritize existing density estimates from multiple sources, requiring the development of a systematic method for selecting the most appropriate density estimate for each combination of species/stock, area, and season. The selection and compilation of the best available marine species density data resulted in the NMSDD, which includes seasonal density values for every marine mammal species and stock present within the HCTT Study Area. This database is described in the ''U.S. Navy Marine Species Density Database Phase IV for the Hawaii-California Training and Testing Study Area'' technical report (U.S. Department of the Navy, 2024), hereafter referred to as the Density Technical Report. NMFS reviewed all marine mammal densities provided by the Action Proponents prior to use in their acoustic analysis for the current rulemaking process.

A variety of density data and density models are needed to develop a density database that encompasses the entirety of the HCTT Study Area. Because these data are collected using different methods with varying amounts of accuracy and uncertainty, the Action Proponents have developed a hierarchy to ensure the most accurate data are used when available. The Density Technical Report describes these models in detail and provides detailed explanations of the best available density estimate for each species. The list below describes possible sources of density data in order of preference:

1. Density spatial models are preferred and used when available because they provide spatially-explicit density estimates (typically at 10 km by 10 km (5.4 nmi by 5.4 nmi) spatial resolution) throughout the study area with the least amount of uncertainty). These models (see Becker *et al.,* 2022a, Becker *et al.,* 2022b, Becker *et al.,* 2021, Becker *et al.,* 2020a; Becker *et al.,* 2020b, Becker *et al.,* 2018, Forney *et al.,* 2015) predict spatial variability of animal density based on habitat variables (*e.g.,* sea surface temperature, seafloor depth, *etc.*). Density spatial models are developed for areas, species, and, when available, specific timeframes (*e.g.,* months or seasons) with sufficient survey data; therefore, these models cannot be used for species with low numbers of sightings.

2. Stratified design-based density estimates use line-transect survey data with the sampling area divided (*i.e.,* stratified) into sub-regions, and a density is derived for each sub-region (see Barlow, 2016; Barlow and Forney, 2007; Bradford *et al.,* 2021). While geographically stratified density estimates provide a better indication of a species' distribution within the study area, the uncertainty is typically high because each sub-region estimate is based on a smaller stratified segment of the overall survey effort.

3. Design-based density estimations use line-transect survey data collected from ship or aerial surveys designed to cover a specific geographic area (see Carretta *et al.,* 2024). These estimates use the same survey data as stratified design-based estimates, but are not segmented into sub-regions and instead provide one estimate for a large, surveyed area.

When interpreting the results of the quantitative analysis, as described in the Density Technical Report for the Phase III Atlantic Fleet Training and Testing Study Area (U.S. Department of the Navy, 2017a), ''it is important to consider that even the best estimate of marine species density is really a model representation of the values of concentration where these animals might occur. Each model is limited to the variables and assumptions considered by the original data source provider. No mathematical model representation of any biological population is perfect and with regards to marine species biodiversity, any single model method will not completely explain the actual distribution and abundance of marine mammal species. It is expected that there would be anomalies in the results that need to be evaluated, with independent information for each case, to support if we might accept or reject a model or portions of the model.''

The Action Proponents' estimates of abundance (based on density estimates used in the HCTT Study Area) utilize NMFS' SARs. For some species, the stock assessment for a given species may exceed the Navy's density prediction because those species' home range extends beyond the study area boundaries. For other species, the stock assessment abundance may be much less than the number of animals in the Navy's modeling given that the HCTT Study Area extends beyond the U.S. waters covered by the SAR abundance estimate. The primary source of density estimates are geographically specific survey data and either peer-reviewed line-transect estimates or habitat-based density models that have been extensively validated to provide the most accurate estimates possible.

NMFS coordinated with the Navy in the development of its take estimates and concurs that the Navy's approach for density appropriately utilizes the best available science. Later, in the Preliminary Analysis and Negligible Impact Determination section, we assess how the estimated take numbers compare to stock abundance in order to better understand the potential number of individuals impacted, and the rationale for which abundance estimate is used is included there.

Estimated Take From Acoustic Stressors

The 2024 HCTT Draft EIS/OEIS considered all military readiness activities proposed to occur in the HCTT Study Area that have the potential to result in the MMPA defined take of marine mammals. The Action Proponents determined that the four stressors below could result in the incidental taking of marine mammals. NMFS has reviewed the Action Proponents' data and analysis and determined that it is complete and accurate and agrees that the following stressors have the potential to result in takes by harassment of marine mammals from the specified activities:

- Acoustics (*i.e.,* sonars and other transducers, air guns, pile driving/extraction);
- Explosives (*i.e.,* explosive shock wave and sound, assumed to encompass the risk due to fragmentation);
- Land-based launch noise from missile and target launches at SNI and weapons firing and launch noise at PMRF; and
- Vessel strike.

Acoustic and explosive sources and land-based launch noise are likely to result in incidental takes of marine mammals by harassment. Vessel strikes have the potential to result in incidental take from injury, serious injury, and/or mortality.

The quantitative analysis process used for the 2024 HCTT Draft EIS/OEIS and the application to estimate potential exposures to marine mammals resulting from acoustic and explosive stressors is detailed in the Acoustic Impacts Technical Report.

Regarding how avoidance of loud sources is considered in the take estimation, NAEMO does not simulate horizontal animat (*i.e.,* a virtual animal) movement during an event. However, NAEMO approximates marine mammal avoidance of high sound levels due to exposure to sonars in a one-dimensional calculation that scales how far an animat would be from a sound source based on sensitivity to disturbance, swim speed, and avoidance duration. This process reduces the SEL, defined as the accumulation for a given animat, by reducing the received SPL of individual exposures based on a spherical spreading calculation from sources on each unique platform in an event. The onset of avoidance was based on the behavioral response functions. Avoidance speeds and durations were informed by a review of available exposure and baseline data. This method captures a more accurate representation of avoidance by using the received sound levels, distance to platform, and species-specific criteria to calculate potential avoidance for each animat than the approach used in Phase III. However, this avoidance method may underestimate avoidance of long-duration sources with lower sound levels because it triggers avoidance calculations based on the highest modeled SPL received level exceeding p(0.5) on the BRF, rather than on cumulative exposure. This is because initiation of the avoidance calculation is based on the highest modeled SPL received level over p(0.5) on the BRF. Please see section 4.4.2.2 of the Acoustic Impacts Technical Report.

Regarding the consideration of mitigation effectiveness in the take estimation, during military readiness activities, there is typically at least one, if not numerous, support personnel involved in the activity (*e.g.,* range support personnel aboard a torpedo retrieval boat or support aircraft). In addition to the Lookout posted for the purpose of mitigation, these additional personnel observe and disseminate marine species sighting information amongst the units participating in the activity whenever possible as they conduct their primary mission responsibilities. However, unlike in previous phases of HCTT, this quantitative analysis does not reduce model-estimated impacts to account for activity-based mitigation. While the activity-based mitigation is not quantitatively included in the take estimates (which, of note, would result in a reduction in the number of takes), table A–6 of appendix A of the application indicates the percentage of the instances of take where an animal's closest point of approach was within a mitigation zone and, therefore, AUD INJ could potentially be mitigated. Note that these percentages do not account for other factors, such as the sightability of a given species or viewing conditions.

Unlike activity-based mitigation, in some cases, implementation of the proposed geographic mitigation areas are incorporated into the quantitative analysis. The extent to which the mitigation areas reduce impacts on the affected species is addressed in the Preliminary Analysis and Negligible Impact Determination section.

For additional information on the quantitative analysis process, refer to the Acoustic Impacts Technical Report and sections 6 and 11 of the application.

As a general matter, NMFS does not prescribe the methods for estimating take for any applicant, but we review and ensure that applicants use the best available science, and methodologies that are logical and technically sound. Applicants may use different methods of calculating take (especially when using models) and still get to a result that is representative of the best available science and that allows for a rigorous and accurate evaluation of the effects on the affected populations. There are multiple pieces of the Navy's take estimation methods—propagation models, animat movement models, and behavioral thresholds, for example. NMFS evaluates the acceptability of these pieces as they evolve and are used in different rules and impact analyses. Some of the pieces of the Action Proponents' take estimation process have been used in Navy incidental take rules since 2009 and undergone multiple public comment processes; all of them have undergone extensive internal Navy review, and all of them have undergone comprehensive review by NMFS, which has sometimes resulted in modifications to methods or models.

The Navy uses rigorous review processes (verification, validation, and accreditation processes; peer and public review) to ensure the data and methodology it uses represent the best available science. For instance, NAEMO is the result of a NMFS-led Center for Independent Experts review of the components used in earlier models. The acoustic propagation component of NAEMO (titled CASS/GRAB) is accredited by the Oceanographic and Atmospheric Master Library (OAML), and many of the environmental variables used in NAEMO come from approved OAML databases and are based on in-situ data collection. The animal density components of NAEMO are base products of the NMSDD, which includes animal density components that have been validated and reviewed by a variety of scientists from NMFS Science Centers and academic institutions. Several components of the model, for example, habitat-based density model results for species off Hawaii and California have been published in several peer-reviewed journals (Becker *et al.,* 2020; Becker *et al.,* 2021; Becker *et al.,* 2022a; Becker *et al.,* 2022b). Additionally, NAEMO simulation components underwent quality assurance and quality control (commonly referred to as QA/QC) review and validation for model parts such as the scenario builder, acoustic builder, scenario simulator, *etc.,* conducted by qualified statisticians and modelers to ensure accuracy. Other models and methodologies have gone through similar review processes.

In summary, we believe the Action Proponents' methods, including the method for incorporating avoidance, are the most appropriate methods for predicting AUD INJ, non-auditory injury, TTS, and behavioral disturbance. But even with the consideration of avoidance, given some of the more conservative components of the methodology (*e.g.,* the thresholds do not consider ear recovery between pulses), we would describe the application of these methods as identifying the maximum number of instances in which marine mammals would be reasonably expected to be taken through AUD INJ, non-auditory injury, TTS, or behavioral disturbance.

Based on the methods discussed in the previous sections and NAEMO, the Action Proponents provided their take estimate and request for authorization of takes incidental to the use of acoustic and explosive sources for military readiness activities annually (based on the maximum number of activities that could occur per 12-month period) and over the 7-year period, as well as the Navy's take request for ship shock trials, covered by the application. The following species/stocks present in the HCTT Study Area were modeled by the Navy and estimated to have 0 takes of any type from any activity source: killer whale (Eastern North Pacific Southern Resident stock) and spinner dolphin (Midway Atoll/Kure stock and Pearl and Hermes stock). NMFS has reviewed the Action Proponents' data, methodology, and analysis and determined that it is complete and accurate. NMFS agrees that the estimates for incidental takes by harassment from all sources requested for authorization are the maximum number of instances in which marine mammals are reasonably expected to be taken and that the takes by mortality requested for authorization are for the maximum number of instances mortality or serious injury could occur, as in the case of ship shock trials and vessel strikes.

Table 38, table 39, table 40, and table 41 summarize the maximum annual and 7-year total amount and type of Level A harassment and Level B harassment that NMFS concurs is reasonably expected to occur by species and stock for Navy training activities, Navy testing activities, Coast Guard training activities, and Army training activities, respectively.

TABLE 38—INCIDENTAL TAKE ESTIMATE BY STOCK DUE TO ACOUSTIC AND EXPLOSIVE SOURCES DURING NAVY TRAINING ACTIVITIES

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-year total Level B harassment	7-year total Level A harassment	7-year total mortality
Gray Whale	Eastern North Pacific.	4,918	98	0	32,444	645	0
Gray Whale	Western North Pacific.	48	1	0	305	2	0
Blue Whale	Central North Pacific.	67	0	0	389	0	0
Blue Whale	Eastern North Pacific.	2,716	17	0	14,681	84	0
Bryde's Whale	Eastern Tropical Pacific.	179	2	0	1,041	5	0
Bryde's Whale	Hawaii	306	2	0	1,809	10	0
Fin Whale	Hawaii	59	0	0	334	0	0
Fin Whale	California/Oregon/Washington.	7,409	28	0	37,629	144	0
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	1,042	14	0	5,361	68	0
Humpback Whale	Mainland Mexico—California/Oregon/Washington.	2,401	34	0	12,414	171	0
Humpback Whale	Hawaii	2,244	18	0	14,250	113	0
Minke Whale	Hawaii	229	2	0	1,330	12	0
Minke Whale	California/Oregon/Washington.	1,686	24	0	8,980	144	0
Sei Whale	Hawaii	200	1	0	1,146	2	0
Sei Whale	Eastern North Pacific.	195	1	0	1,028	7	0
Sperm Whale	Hawaii	1,296	1	0	7,829	1	0
Sperm Whale	California/Oregon/Washington.	2,897	2	0	15,447	4	0
Dwarf Sperm Whale.	Hawaii	36,298	501	0	215,688	3,065	0
Dwarf Sperm Whale.	California/Oregon/Washington.	4,329	50	0	22,647	271	0
Pygmy Sperm Whale.	Hawaii	36,722	518	0	217,948	3,153	0
Pygmy Sperm Whale.	California/Oregon/Washington.	4,240	66	0	22,246	371	0
Baird's Beaked Whale.	California/Oregon/Washington.	7,290	0	0	39,692	0	0
Blainville's Beaked Whale.	Hawaii	5,812	0	0	36,916	0	0
Goose-Beaked Whale.	Hawaii	23,258	0	0	147,787	0	0
Goose-Beaked Whale.	California/Oregon/Washington.	110,853	1	0	638,374	2	0
Longman's Beaked Whale.	Hawaii	14,051	1	0	89,592	4	0
Mesoplodont Beaked Whale.	California/Oregon/Washington.	64,655	1	0	371,374	2	0
False Killer Whale	Main Hawaiian Islands Insular.	122	0	0	752	0	0
False Killer Whale	Northwest Hawaiian Islands.	151	0	0	959	0	0

TABLE 38—INCIDENTAL TAKE ESTIMATE BY STOCK DUE TO ACOUSTIC AND EXPLOSIVE SOURCES DURING NAVY TRAINING ACTIVITIES—Continued

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-year total Level B harassment	7-year total Level A harassment	7-year total mortality
False Killer Whale	Hawaii Pelagic	1,371	0	0	8,293	0	0
False Killer Whale	Baja California Peninsula Mexico.	2,127	1	0	11,552	1	0
Killer Whale	Hawaii	103	0	0	610	0	0
Killer Whale	Eastern North Pacific Offshore.	545	3	0	3,310	21	0
Killer Whale	West Coast Transient.	46	0	0	204	0	0
Melon-Headed Whale.	Hawaiian Islands	26,120	9	0	155,607	53	0
Melon-Headed Whale.	Kohala Resident (Hawaii).	23	0	0	130	0	0
Pygmy Killer Whale	Hawaii	7,428	2	0	44,514	7	0
Pygmy Killer Whale	California—Baja California Peninsula Mexico.	477	0	0	2,705	0	0
Short-Finned Pilot Whale.	Hawaii	13,851	3	0	85,991	18	0
Short-Finned Pilot Whale.	California/Oregon/Washington.	1,995	9	1	11,567	54	4
Bottlenose Dolphin	Maui Nui	189	0	0	1,301	0	0
Bottlenose Dolphin	Hawaii Island	6	0	0	25	0	0
Bottlenose Dolphin	Hawaii Pelagic	37,546	18	1	252,429	123	2
Bottlenose Dolphin	Kaua'i/Ni'ihau	1,179	0	0	7,728	0	0
Bottlenose Dolphin	O'ahu	6,789	5	1	47,410	29	1
Bottlenose Dolphin	California Coastal	516	7	0	3,521	42	0
Bottlenose Dolphin	California/Oregon/Washington Offshore.	16,938	13	0	94,638	74	0
Fraser's Dolphin	Hawaii	30,371	5	0	184,274	26	0
Long-Beaked Common Dolphin.	California	102,352	113	3	583,062	722	15
Northern Right Whale Dolphin.	California/Oregon/Washington.	35,313	15	0	170,387	64	0
Pacific White-Sided Dolphin.	California/Oregon/Washington.	41,928	33	1	209,903	188	1
Pantropical Spotted Dolphin.	Maui Nui	830	2	0	5,549	10	0
Pantropical Spotted Dolphin.	Hawaii Island	4,974	5	0	29,501	23	0
Pantropical Spotted Dolphin.	Hawaii Pelagic	36,298	13	0	219,400	67	0
Pantropical Spotted Dolphin.	O'ahu	5,618	5	0	39,051	21	0
Pantropical Spotted Dolphin.	Baja California Peninsula Mexico.	82,440	43	1	448,311	224	1
Risso's Dolphin	Hawaii	5,380	1	0	32,054	1	0
Risso's Dolphin	California/Oregon/Washington.	25,085	15	0	140,377	98	0
Rough-Toothed Dolphin.	Hawaii	80,173	27	1	497,078	157	1
Short-Beaked Common Dolphin.	California/Oregon/Washington.	1,428,183	694	13	7,867,127	4,036	91
Spinner Dolphin	Hawaii Pelagic	3,781	1	0	22,583	3	0
Spinner Dolphin	Hawaii Island	97	1	0	562	1	0
Spinner Dolphin	Kaua'i/Ni'ihau	3,528	1	0	23,147	5	0
Spinner Dolphin	O'ahu/4 Islands Region.	991	1	0	6,922	2	0
Striped Dolphin	Hawaii Pelagic	31,260	8	0	186,357	43	0
Striped Dolphin	California/Oregon/Washington.	110,641	37	1	600,412	193	1
Dall's Porpoise	California/Oregon/Washington.	43,844	708	0	218,178	3,727	0
Harbor Porpoise	Monterey Bay	1,314	0	0	5,627	0	0
Harbor Porpoise	Morro Bay	3,883	11	0	23,051	71	0
Harbor Porpoise	Northern California/Southern Oregon.	357	0	0	1,576	0	0

TABLE 38—INCIDENTAL TAKE ESTIMATE BY STOCK DUE TO ACOUSTIC AND EXPLOSIVE SOURCES DURING NAVY TRAINING ACTIVITIES—Continued

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-year total Level B harassment	7-year total Level A harassment	7-year total mortality
Harbor Porpoise	San Francisco/Russian River.	6,920	24	0	30,248	164	0
California Sea Lion	U.S.	876,054	532	4	4,997,524	3,406	22
Guadalupe Fur Seal.	Mexico	295,304	37	1	1,598,780	194	1
Northern Fur Seal	Eastern Pacific	29,250	3	0	134,187	10	0
Northern Fur Seal	California	19,649	3	0	90,918	9	0
Steller Sea Lion	Eastern	524	3	0	2,470	13	0
Harbor Seal	California	16,662	243	1	98,994	1,536	7
Hawaiian Monk Seal.	Hawaii	748	4	0	5,065	18	0
Northern Elephant Seal.	California Breeding	68,627	49	0	351,382	284	0

Note: The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

TABLE 39—INCIDENTAL TAKE ESTIMATE BY STOCK DUE TO ACOUSTIC AND EXPLOSIVE SOURCE DURING NAVY TESTING

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-year total Level B harassment	7-year total Level A harassment	7-year total mortality
Gray Whale	Eastern North Pacific.	11,777	69	0	54,745	365	0
Gray Whale	Western North Pacific.	120	1	0	545	3	0
Blue Whale	Central North Pacific.	24	1	0	134	2	0
Blue Whale	Eastern North Pacific.	1,836	10	0	10,002	66	0
Bryde's Whale	Eastern Tropical Pacific.	142	3	0	828	9	0
Bryde's Whale	Hawaii	99	1	0	531	1	0
Fin Whale	Hawaii	25	1	0	145	1	0
Fin Whale	California/Oregon/Washington.	6,030	27	0	30,497	156	0
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	839	5	0	4,492	28	0
Humpback Whale	Mainland Mexico—California/Oregon/Washington.	2,033	10	0	10,859	49	0
Humpback Whale	Hawaii	779	6	0	4,627	38	0
Minke Whale	Hawaii	64	1	0	351	1	0
Minke Whale	California/Oregon/Washington.	1,300	8	0	7,088	49	0
Sei Whale	Hawaii	52	1	0	287	3	0
Sei Whale	Eastern North Pacific.	106	2	0	579	2	0
Sperm Whale	Hawaii	346	0	0	1,745	0	0
Sperm Whale	California/Oregon/Washington.	966	1	0	4,963	1	0
Dwarf Sperm Whale.	Hawaii	8,443	399	0	43,341	1,941	0
Dwarf Sperm Whale.	California/Oregon/Washington.	1,283	43	0	7,101	245	0
Pygmy Sperm Whale.	Hawaii	8,603	402	0	44,150	1,966	0
Pygmy Sperm Whale.	California/Oregon/Washington.	1,325	41	0	7,289	238	0
Baird's Beaked Whale.	California/Oregon/Washington.	2,830	0	0	16,079	0	0
Blainville's Beaked Whale.	Hawaii	1,704	0	0	8,917	0	0

TABLE 39—INCIDENTAL TAKE ESTIMATE BY STOCK DUE TO ACOUSTIC AND EXPLOSIVE SOURCE DURING NAVY TESTING—Continued

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-year total Level B harassment	7-year total Level A harassment	7-year total mortality
Goose-Beaked Whale.	Hawaii	6,956	0	0	36,245	0	0
Goose-Beaked Whale.	California/Oregon/ Washington.	55,310	1	0	296,069	2	0
Longman's Beaked Whale.	Hawaii	4,118	0	0	21,544	0	0
Mesoplodont Beaked Whale.	California/Oregon/ Washington.	27,768	1	0	146,662	4	0
False Killer Whale	Main Hawaiian Islands Insular.	43	0	0	230	0	0
False Killer Whale	Northwest Hawaiian Islands.	38	0	0	197	0	0
False Killer Whale	Hawaii Pelagic	287	1	0	1,489	1	0
False Killer Whale	Baja California Peninsula Mexico.	393	0	0	2,226	0	0
Killer Whale	Hawaii	22	0	0	113	0	0
Killer Whale	Eastern North Pacific Offshore.	477	1	0	2,772	2	0
Killer Whale	West Coast Transient.	8	0	0	52	0	0
Melon-Headed Whale.	Hawaiian Islands	5,110	3	0	26,599	14	0
Melon-Headed Whale.	Kohala Resident (Hawaii).	31	0	0	195	0	0
Pygmy Killer Whale	Hawaii	1,410	1	0	7,152	1	0
Pygmy Killer Whale	California—Baja California Peninsula Mexico.	315	0	0	1,635	0	0
Short-Finned Pilot Whale.	Hawaii	3,367	2	0	18,188	5	0
Short-Finned Pilot Whale.	California/Oregon/ Washington.	2,274	2	0	12,896	2	0
Bottlenose Dolphin	Maui Nui	137	0	0	850	0	0
Bottlenose Dolphin	Hawaii Island	3	0	0	19	0	0
Bottlenose Dolphin	Hawaii Pelagic	5,731	6	0	34,450	39	0
Bottlenose Dolphin	Kauaʻi/Niʻihau	281	0	0	1,586	0	0
Bottlenose Dolphin	Oʻahu	443	1	0	2,965	1	0
Bottlenose Dolphin	California Coastal	832	0	0	5,228	0	0
Bottlenose Dolphin	California/Oregon/ Washington Offshore.	10,999	2	0	62,160	9	0
Fraser's Dolphin	Hawaii	5,086	1	0	26,111	2	0
Long-Beaked Common Dolphin.	California	193,599	39	1	1,215,256	230	2
Northern Right Whale Dolphin.	California/Oregon/ Washington.	9,950	6	1	51,898	32	1
Pacific White-Sided Dolphin.	California/Oregon/ Washington.	27,035	9	1	149,417	54	1
Pantropical Spotted Dolphin.	Maui Nui	1,542	2	0	9,642	8	0
Pantropical Spotted Dolphin.	Hawaii Island	1,026	2	0	5,919	2	0
Pantropical Spotted Dolphin.	Hawaii Pelagic	7,862	4	0	41,161	12	0
Pantropical Spotted Dolphin.	Oʻahu	807	1	0	5,142	2	0
Pantropical Spotted Dolphin.	Baja California Peninsula Mexico.	14,695	4	1	83,941	15	1
Risso's Dolphin	Hawaii	1,143	2	0	5,746	3	0
Risso's Dolphin	California/Oregon/ Washington.	18,560	6	0	99,161	27	0
Rough-Toothed Dolphin.	Hawaii	16,289	7	1	87,872	37	1
Short-Beaked Common Dolphin.	California/Oregon/ Washington.	731,713	182	5	3,869,698	1,037	16
Spinner Dolphin	Hawaii Pelagic	739	1	0	3,791	1	0
Spinner Dolphin	Hawaii Island	13	0	0	82	0	0
Spinner Dolphin	Kauaʻi/Niʻihau	918	1	0	5,187	1	0

TABLE 39—INCIDENTAL TAKE ESTIMATE BY STOCK DUE TO ACOUSTIC AND EXPLOSIVE SOURCE DURING NAVY TESTING—Continued

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-year total Level B harassment	7-year total Level A harassment	7-year total mortality
Spinner Dolphin	O'ahu/4 Islands Region.	210	0	0	1,283	0	0
Striped Dolphin	Hawaii Pelagic	6,270	2	0	31,482	7	0
Striped Dolphin	California/Oregon/Washington.	21,982	7	0	118,342	38	0
Dall's Porpoise	California/Oregon/Washington.	15,363	528	0	84,387	3,056	0
Harbor Porpoise	Monterey Bay	865	0	0	5,307	0	0
Harbor Porpoise	Morro Bay	490	77	0	3,265	519	0
Harbor Porpoise	Northern California/Southern Oregon.	124	0	0	763	0	0
Harbor Porpoise	San Francisco/Russian River.	3,038	2	0	18,641	5	0
California Sea Lion	U.S.	997,758	191	1	5,449,070	1,166	5
Guadalupe Fur Seal.	Mexico	48,392	17	0	275,065	106	0
Northern Fur Seal	Eastern Pacific	3,311	9	0	20,183	45	0
Northern Fur Seal	California	1,894	7	0	11,495	38	0
Steller Sea Lion	Eastern	471	0	0	2,854	0	0
Harbor Seal	California	54,180	18	0	287,858	106	0
Hawaiian Monk Seal.	Hawaii	139	2	0	802	7	0
Northern Elephant Seal.	California Breeding	48,052	61	0	262,329	360	0

Note: The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

TABLE 40—INCIDENTAL TAKE ESTIMATE BY STOCK DUE TO ACOUSTIC AND EXPLOSIVE SOURCES DURING COAST GUARD TRAINING ACTIVITIES

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-year total Level B harassment	7-year total Level A harassment	7-year total mortality
Gray Whale	Eastern North Pacific	16	0	0	103	0	0
Gray Whale	Western North Pacific	1	0	0	2	0	0
Blue Whale	Central North Pacific	1	0	0	1	0	0
Blue Whale	Eastern North Pacific	19	0	0	125	0	0
Bryde's Whale	Eastern Tropical Pacific	1	0	0	5	0	0
Bryde's Whale	Hawaii	2	0	0	13	0	0
Fin Whale	Hawaii	2	0	0	8	0	0
Fin Whale	California/Oregon/Washington.	62	0	0	432	0	0
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	7	0	0	45	0	0
Humpback Whale	Mainland Mexico—California/Oregon/Washington.	15	0	0	97	0	0
Humpback Whale	Hawaii	7	0	0	46	0	0
Minke Whale	Hawaii	2	0	0	14	0	0
Minke Whale	California/Oregon/Washington.	7	0	0	48	0	0
Sei Whale	Hawaii	1	0	0	4	0	0
Sei Whale	Eastern North Pacific	1	0	0	4	0	0
Sperm Whale	Hawaii	7	0	0	45	0	0
Sperm Whale	California/Oregon/Washington.	28	0	0	196	0	0
Dwarf Sperm Whale	Hawaii	386	3	0	2,695	13	0
Dwarf Sperm Whale	California/Oregon/Washington.	52	1	0	345	1	0
Pygmy Sperm Whale	Hawaii	354	1	0	2,469	1	0
Pygmy Sperm Whale	California/Oregon/Washington.	50	0	0	333	0	0
Baird's Beaked Whale	California/Oregon/Washington.	54	0	0	378	0	0
Blainville's Beaked Whale	Hawaii	25	0	0	170	0	0
Goose-Beaked Whale	Hawaii	143	0	0	1,001	0	0
Goose-Beaked Whale	California/Oregon/Washington.	653	0	0	4,569	0	0
Longman's Beaked Whale	Hawaii	145	0	0	1,013	0	0

TABLE 40—INCIDENTAL TAKE ESTIMATE BY STOCK DUE TO ACOUSTIC AND EXPLOSIVE SOURCES DURING COAST GUARD TRAINING ACTIVITIES—Continued

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-year total Level B harassment	7-year total Level A harassment	7-year total mortality
Mesoplodont Beaked Whale	California/Oregon/Washington.	416	0	0	2,902	0	0
False Killer Whale	Main Hawaiian Islands Insular.	4	0	0	27	0	0
False Killer Whale	Northwest Hawaiian Islands	2	0	0	9	0	0
False Killer Whale	Hawaii Pelagic	12	0	0	83	0	0
False Killer Whale	Baja California Peninsula Mexico.	17	1	0	110	1	0
Killer Whale	Hawaii	2	0	0	10	0	0
Killer Whale	Eastern North Pacific Offshore.	1	0	0	7	0	0
Killer Whale	West Coast Transient	1	0	0	5	0	0
Melon-Headed Whale	Hawaiian Islands	224	0	0	1,559	0	0
Pygmy Killer Whale	Hawaii	56	0	0	390	0	0
Pygmy Killer Whale	California—Baja California Peninsula Mexico.	3	0	0	18	0	0
Short-Finned Pilot Whale	Hawaii	83	0	0	578	0	0
Short-Finned Pilot Whale	California/Oregon/Washington.	10	0	0	69	0	0
Bottlenose Dolphin	Hawaii Pelagic	33	0	0	226	0	0
Bottlenose Dolphin	California Coastal	2	0	0	12	0	0
Bottlenose Dolphin	California/Oregon/Washington Offshore.	121	0	0	830	0	0
Fraser's Dolphin	Hawaii	18	0	0	114	0	0
Long-Beaked Common Dolphin.	California	927	0	0	6,475	0	0
Northern Right Whale Dolphin.	California/Oregon/Washington.	251	0	0	1,754	0	0
Pacific White-Sided Dolphin	California/Oregon/Washington.	247	0	0	1,729	0	0
Pantropical Spotted Dolphin	Hawaii Island	24	0	0	164	0	0
Pantropical Spotted Dolphin	Hawaii Pelagic	227	0	0	1,580	0	0
Pantropical Spotted Dolphin	O'ahu	1	0	0	7	0	0
Pantropical Spotted Dolphin	Baja California Peninsula Mexico.	491	0	0	3,429	0	0
Risso's Dolphin	Hawaii	35	0	0	240	0	0
Risso's Dolphin	California/Oregon/Washington.	188	0	0	1,309	0	0
Rough-Toothed Dolphin	Hawaii	406	0	0	2,838	0	0
Short-Beaked Common Dolphin.	California/Oregon/Washington.	9,658	1	0	67,598	2	0
Spinner Dolphin	Hawaii Pelagic	24	0	0	165	0	0
Striped Dolphin	Hawaii Pelagic	249	0	0	1,738	0	0
Striped Dolphin	California/Oregon/Washington.	776	0	0	5,420	0	0
Dall's Porpoise	California/Oregon/Washington.	412	1	0	2,867	3	0
Harbor Porpoise	San Francisco/Russian River	2	0	0	11	0	0
California Sea Lion	U.S.	14,937	0	0	104,545	0	0
Guadalupe Fur Seal	Mexico	3,857	0	0	26,989	0	0
Northern Fur Seal	Eastern Pacific	634	0	0	4,426	0	0
Northern Fur Seal	California	555	0	0	3,885	0	0
Steller Sea Lion	Eastern	4	0	0	22	0	0
Harbor Seal	California	141	0	0	977	0	0
Hawaiian Monk Seal	Hawaii	1	0	0	5	0	0
Northern Elephant Seal	California Breeding	1,795	1	0	12,549	1	0

Note: The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

TABLE 41—INCIDENTAL TAKE ESTIMATE BY STOCK DUE TO ACOUSTIC AND EXPLOSIVE SOURCES DURING NAVY TRAINING ACTIVITIES

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-year total Level B harassment	7-year total Level A harassment	7-year total mortality
Bryde's Whale	Hawaii	2	0	0	3	0	0
Humpback Whale	Hawaii	4	0	0	22	0	0
Minke Whale	Hawaii	1	0	0	3	0	0
Dwarf Sperm Whale	Hawaii	97	12	0	677	84	0
Pygmy Sperm Whale	Hawaii	108	15	0	755	101	0
Blainville's Beaked Whale	Hawaii	1	0	0	1	0	0
Goose-Beaked Whale	Hawaii	2	0	0	6	0	0
Longman's Beaked Whale	Hawaii	2	0	0	3	0	0
Melon-Headed Whale	Hawaiian Islands	2	1	0	8	1	0
Melon-Headed Whale	Kohala Resident (Hawaii)	2	0	0	7	0	0

TABLE 41—INCIDENTAL TAKE ESTIMATE BY STOCK DUE TO ACOUSTIC AND EXPLOSIVE SOURCES DURING NAVY TRAINING ACTIVITIES—Continued

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-year total Level B harassment	7-year total Level A harassment	7-year total mortality
Pygmy Killer Whale	Hawaii	1	0	0	3	0	0
Short-Finned Pilot Whale	Hawaii	3	2	0	15	3	0
Bottlenose Dolphin	Hawaii Pelagic	3	1	0	14	1	0
Fraser's Dolphin	Hawaii	5	2	0	27	6	0
Pantropical Spotted Dolphin	Maui Nui	1	0	0	1	0	0
Pantropical Spotted Dolphin	Hawaii Pelagic	3	2	0	14	2	0
Risso's Dolphin	Hawaii	0	1	0	0	1	0
Rough-Toothed Dolphin	Hawaii	5	2	0	31	2	0
Striped Dolphin	Hawaii Pelagic	3	2	0	17	2	0
Hawaiian Monk Seal	Hawaii	1	0	0	3	0	0

Note: The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

Estimated Take From Sonar and Other Transducers

Table 42, table 43, and table 44 provide estimated effects from sonar and other transducers, including the comparative amounts of TTS and behavioral disturbance for each species and stock annually, noting that if a modeled marine mammal was "taken" through exposure to both TTS and behavioral disturbance in the model, it was recorded as a TTS. Of note, a higher proportion of the takes by Level B harassment of mysticetes include the potential for TTS (as compared to other taxa and prior rules) due to a combination of the fact that mysticetes are relatively less sensitive to behavioral disturbance and the number of auditory impacts from sonar (both TTS and AUD INJ) have increased for some species since the Phase III analysis (84 FR 70712, December 23, 2019) largely due to changes in how avoidance was modeled; for some stocks, changes in densities in areas that overlap activities have also contributed to increased or decreased impacts compared to those modeled in Phase III.

Compared to the prior analysis, the Action Proponents propose to use more hours of hull-mounted surface ship sonar, and these activities are newly analyzed in the NOCAL range complex and in PMSR. Compared to the prior analysis, this analysis considers increased use of MF1 (regular duty cycle) and MF1C (continuous duty cycle) associated with Navy training activities and decreased use of MF1 and MF1C associated with Navy testing activities. This analysis also considers the training and testing usage of these sonars across an expanded study area. For the maximum analyzed year of training and testing activities under this proposed action, MF1 has increased 20 percent and MF1C has increased 50 percent in the expanded California Study Area (which now includes PMSR and NOCAL). In the Hawaii Study Area MF1 and MF1C is proposed to increase greater than 10 percent and 60 percent respectively when compared to the prior HSTT analysis.

Additionally, the updated HF cetacean criteria reflect greater susceptibility to auditory effects at low and mid-frequencies than previously analyzed. Consequently, the predicted auditory effects due to sources under 10 kHz, including but not limited to MF1 hull-mounted sonar and other anti-submarine warfare sonars, are substantially higher for this auditory group than in prior analyses of the same activities. Thus, for activities with sonars, some modeled exposures that would previously have been categorized as significant behavioral responses may now instead be counted as auditory effects (TTS and AUD INJ). Similarly, the updated HF cetacean criteria reflect greater susceptibility to auditory effects at low and mid-frequencies in impulsive sounds. For VHF cetaceans, susceptibility to auditory effects has not changed substantially since the prior analysis.

TABLE 42—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM SONAR AND OTHER ACTIVE TRANSDUCERS DURING NAVY TRAINING ACTIVITIES

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
Gray Whale	Eastern North Pacific	1,903	2,390	65	12,356	16,019	428
Gray Whale	Western North Pacific	18	28	1	119	182	2
Blue Whale	Central North Pacific	10	56	0	63	325	0
Blue Whale	Eastern North Pacific	646	1,924	16	3,810	9,921	80
Bryde's Whale	Eastern Tropical Pacific	48	80	1	295	414	1
Bryde's Whale	Hawaii	41	263	2	259	1,543	10
Fin Whale	Hawaii	12	46	0	73	260	0
Fin Whale	California/Oregon/Washington.	1,727	5,470	22	9,743	26,506	108
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	166	831	13	989	4,076	65
Humpback Whale	Mainland Mexico—California/Oregon/Washington.	375	1,906	31	2,245	9,370	153
Humpback Whale	Hawaii	780	1,358	11	5,134	8,414	70
Minke Whale	Hawaii	27	200	2	171	1,154	12
Minke Whale	California/Oregon/Washington.	334	1,242	15	2,035	6,234	81
Sei Whale	Hawaii	25	173	1	162	978	2
Sei Whale	Eastern North Pacific	38	151	1	223	765	7

TABLE 42—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM SONAR AND OTHER ACTIVE TRANSDUCERS DURING NAVY TRAINING ACTIVITIES—Continued

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
Sperm Whale	Hawaii	939	354	0	5,806	2,008	0
Sperm Whale	California/Oregon/Washington.	2,133	758	1	11,738	3,677	1
Dwarf Sperm Whale	Hawaii	8,114	27,505	329	53,404	157,962	1,955
Dwarf Sperm Whale	California/Oregon/Washington.	936	3,346	37	5,472	16,881	188
Pygmy Sperm Whale	Hawaii	8,131	27,918	350	53,462	160,158	2,068
Pygmy Sperm Whale	California/Oregon/Washington.	964	3,216	43	5,629	16,228	218
Baird's Beaked Whale	California/Oregon/Washington.	7,234	55	-	39,426	262	-
Blainville's Beaked Whale	Hawaii	5,780	31	-	36,734	180	-
Goose-Beaked Whale	Hawaii	23,137	118	-	147,104	668	-
Goose-Beaked Whale	California/Oregon/Washington.	110,330	504	-	635,735	2,514	-
Longman's Beaked Whale	Hawaii	13,966	83	-	89,112	475	-
Mesoplodont Beaked Whale	California/Oregon/Washington.	64,298	350	0	369,597	1,732	0
False Killer Whale	Main Hawaiian Islands Insular.	68	54	-	436	316	-
False Killer Whale	Northwest Hawaiian Islands	96	55	-	616	343	-
False Killer Whale	Hawaii Pelagic	731	638	0	4,647	3,641	0
False Killer Whale	Baja California Peninsula Mexico *.	1,361	765	1	7,599	3,949	1
Killer Whale	Hawaii	41	62	-	256	354	-
Killer Whale	Eastern North Pacific Offshore.	422	110	0	2,682	543	0
Killer Whale	West Coast Transient	19	27	-	87	117	-
Melon-Headed Whale	Hawaiian Islands	12,560	13,553	8	79,341	76,222	48
Melon-Headed Whale	Kohala Resident (Hawaii)	15	8	-	85	45	-
Pygmy Killer Whale	Hawaii	3,666	3,758	1	23,256	21,234	4
Pygmy Killer Whale	California—Baja California Peninsula Mexico *.	357	118	-	2,103	600	-
Short-Finned Pilot Whale	Hawaii	8,905	4,931	2	57,475	28,419	11
Short-Finned Pilot Whale	California/Oregon/Washington.	1,436	547	1	8,777	2,716	1
Bottlenose Dolphin	Maui Nui	186	2	-	1,285	12	-
Bottlenose Dolphin	Hawaii Island	2	3	-	8	16	-
Bottlenose Dolphin	Hawaii Pelagic	32,258	5,040	3	220,679	30,047	20
Bottlenose Dolphin	Kaua'i/Ni'ihau	945	233	-	6,098	1,629	-
Bottlenose Dolphin	O'ahu	6,672	67	0	46,638	430	0
Bottlenose Dolphin	California Coastal	484	8	-	3,308	51	-
Bottlenose Dolphin	California/Oregon/Washington Offshore.	11,368	5,492	3	65,775	28,363	14
Fraser's Dolphin	Hawaii	16,259	14,089	1	103,900	80,236	7
Long-Beaked Common Dolphin.	California	70,884	30,889	20	423,266	156,179	107
Northern Right Whale Dolphin.	California/Oregon/Washington.	15,672	19,635	13	81,148	89,202	60
Pacific White-Sided Dolphin	California/Oregon/Washington.	22,095	19,683	14	119,888	89,082	68
Pantropical Spotted Dolphin	Maui Nui	811	14	-	5,444	75	-
Pantropical Spotted Dolphin	Hawaii Island	2,086	2,879	2	13,121	16,318	8
Pantropical Spotted Dolphin	Hawaii Pelagic	18,458	17,816	9	118,066	101,178	50
Pantropical Spotted Dolphin	O'ahu	5,489	97	1	38,207	626	2
Pantropical Spotted Dolphin	Baja California Peninsula Mexico *.	48,096	34,318	37	270,474	177,669	189
Risso's Dolphin	Hawaii	2,781	2,595	1	17,461	14,575	1
Risso's Dolphin	California/Oregon/Washington.	17,117	7,907	3	99,536	40,443	19
Rough-Toothed Dolphin	Hawaii	45,968	34,070	18	301,367	194,804	102
Short-Beaked Common Dolphin.	California/Oregon/Washington.	876,990	548,702	389	5,081,159	2,770,024	2,023
Spinner Dolphin	Hawaii Pelagic	1,679	2,100	1	10,633	11,946	3
Spinner Dolphin	Hawaii Island	46	49	-	273	280	-
Spinner Dolphin	Kaua'i/Ni'ihau	2,660	866	1	17,090	6,046	5
Spinner Dolphin	O'ahu/4 Islands Region	971	13	-	6,790	86	-
Striped Dolphin	Hawaii Pelagic	14,566	16,678	6	92,249	94,018	36
Striped Dolphin	California/Oregon/Washington.	63,661	46,945	32	359,520	240,671	160
Dall's Porpoise	California/Oregon/Washington.	6,430	36,826	522	37,679	176,737	2,512
Harbor Porpoise	Monterey Bay	1,314	0	-	5,627	0	-
Harbor Porpoise	Morro Bay	3,824	46	0	22,754	221	0
Harbor Porpoise	Northern California/Southern Oregon.	357	0	-	1,576	0	-
Harbor Porpoise	San Francisco/Russian River	6,869	29	0	29,968	127	0
California Sea Lion	U.S.	662,716	186,625	115	3,903,717	911,677	653

TABLE 42—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM SONAR AND OTHER ACTIVE TRANSDUCERS DURING NAVY TRAINING ACTIVITIES—Continued

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
Guadalupe Fur Seal	Mexico	217,808	77,386	32	1,213,525	384,582	162
Northern Fur Seal	Eastern Pacific	19,371	9,876	2	90,896	43,276	9
Northern Fur Seal	California	13,512	6,134	2	63,833	27,073	8
Steller Sea Lion	Eastern	389	122	1	1,870	519	1
Harbor Seal	California	10,510	1,457	3	61,064	8,093	13
Hawaiian Monk Seal	Hawaii	590	123	0	4,076	764	0
Northern Elephant Seal	California Breeding	28,461	39,790	17	160,245	188,696	82

Note: Zero (0) impacts indicate total less than 0.5 and a dash (-) is a true zero. In some cases where the estimated take within a cell is equal to 1, that value has been rounded up from a value that is less than 0.5 to avoid underestimating potential impacts to a species or stock based on the 7-year rounding rules discussed in section 2.4 of appendix E (Explosive and Acoustic Analysis Report) of the 2024 HCTT Draft EIS/OEIS.

* The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

TABLE 43—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM SONAR AND OTHER ACTIVE TRANSDUCERS DURING NAVY TESTING ACTIVITIES

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
Gray Whale	Eastern North Pacific.	4,876	6,722	64	28,937	24,742	335
Gray Whale	Western North Pacific.	50	67	1	302	233	3
Blue Whale	Central North Pacific.	5	19	1	27	107	2
Blue Whale	Eastern North Pacific.	696	1,094	8	4,028	5,743	52
Bryde's Whale	Eastern Tropical Pacific.	47	89	2	275	517	8
Bryde's Whale	Hawaii	22	75	1	112	412	1
Fin Whale	Hawaii	5	19	1	29	114	1
Fin Whale	California/Oregon/Washington.	1,741	4,144	21	10,107	19,655	117
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	343	472	4	2,076	2,269	23
Humpback Whale	Mainland Mexico—California/Oregon/Washington.	818	1,155	8	4,947	5,553	43
Humpback Whale	Hawaii	348	358	4	2,045	2,082	27
Minke Whale	Hawaii	12	50	1	64	283	1
Minke Whale	California/Oregon/Washington.	563	718	7	3,412	3,555	43
Sei Whale	Hawaii	11	41	1	57	230	3
Sei Whale	Eastern North Pacific.	37	65	1	215	345	1
Sperm Whale	Hawaii	288	56	0	1,452	291	0
Sperm Whale	California/Oregon/Washington.	834	129	-	4,350	594	-
Dwarf Sperm Whale.	Hawaii	2,189	6,048	371	10,769	31,271	1,805
Dwarf Sperm Whale.	California/Oregon/Washington.	519	709	26	2,796	3,966	149
Pygmy Sperm Whale.	Hawaii	2,243	6,137	373	10,987	31,760	1,821
Pygmy Sperm Whale.	California/Oregon/Washington.	525	743	23	2,819	4,116	129
Baird's Beaked Whale.	California/Oregon/Washington.	2,823	5	-	16,049	23	-
Blainville's Beaked Whale.	Hawaii	1,702	2	-	8,904	13	-
Goose-Beaked Whale.	Hawaii	6,945	8	-	36,195	44	-
Goose-Beaked Whale.	California/Oregon/Washington.	55,207	92	-	295,610	393	-

TABLE 43—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM SONAR AND OTHER ACTIVE TRANSDUCERS DURING NAVY TESTING ACTIVITIES—Continued

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
Longman's Beaked Whale.	Hawaii	4,106	12	-	21,483	61	-
Mesoplodont Beaked Whale.	California/Oregon/ Washington.	27,697	62	-	146,347	259	-
False Killer Whale	Main Hawaiian Islands Insular.	32	9	-	171	53	-
False Killer Whale	Northwest Hawaiian Islands.	30	8	-	150	47	-
False Killer Whale	Hawaii Pelagic	192	95	1	987	502	1
False Killer Whale	Baja California Peninsula Mexico *.	332	60	0	1,831	392	0
Killer Whale	Hawaii	14	8	-	71	42	-
Killer Whale	Eastern North Pacific Offshore.	399	75	0	2,318	440	0
Killer Whale	West Coast Transient.	7	1	-	45	7	-
Melon-Headed Whale.	Hawaiian Islands	3,396	1,711	2	17,285	9,306	13
Melon-Headed Whale.	Kohala Resident (Hawaii).	25	6	-	161	34	-
Pygmy Killer Whale	Hawaii	928	481	1	4,641	2,510	1
Pygmy Killer Whale	California—Baja California Peninsula Mexico *.	260	53	-	1,376	257	-
Short-Finned Pilot Whale.	Hawaii	2,625	734	1	14,186	3,955	2
Short-Finned Pilot Whale.	California/Oregon/ Washington.	1,899	371	1	10,796	2,075	1
Bottlenose Dolphin	Maui Nui	121	12	0	751	72	0
Bottlenose Dolphin	Hawaii Island	3	-	-	19	-	-
Bottlenose Dolphin	Hawaii Pelagic	4,805	842	1	28,873	4,998	7
Bottlenose Dolphin	Kaua'i/Ni'ihau	276	5	-	1,559	27	-
Bottlenose Dolphin	O'ahu	407	35	1	2,727	237	1
Bottlenose Dolphin	California Coastal	811	20	-	5,123	103	-
Bottlenose Dolphin	California/Oregon/ Washington Offshore.	9,699	1,286	1	55,144	6,926	3
Fraser's Dolphin	Hawaii	3,562	1,524	1	18,148	7,963	2
Long-Beaked Common Dolphin.	California	181,795	11,646	6	1,156,935	57,311	31
Northern Right Whale Dolphin.	California/Oregon/ Washington.	7,934	1,997	2	43,020	8,762	9
Pacific White-Sided Dolphin.	California/Oregon/ Washington.	23,127	3,851	2	132,034	17,006	13
Pantropical Spotted Dolphin.	Maui Nui	1,358	157	1	8,514	943	1
Pantropical Spotted Dolphin.	Hawaii Island	789	234	1	4,524	1,389	1
Pantropical Spotted Dolphin.	Hawaii Pelagic	5,521	2,324	2	28,528	12,527	9
Pantropical Spotted Dolphin.	O'ahu	748	58	1	4,749	392	2
Pantropical Spotted Dolphin.	Baja California Peninsula Mexico *.	12,181	2,468	2	67,222	16,411	10
Risso's Dolphin	Hawaii	745	396	1	3,652	2,091	2
Risso's Dolphin	California/Oregon/ Washington.	15,852	2,686	1	86,994	12,028	5
Rough-Toothed Dolphin.	Hawaii	11,455	4,768	3	62,028	25,394	15
Short-Beaked Common Dolphin.	California/Oregon/ Washington.	611,376	119,400	58	3,312,917	550,748	324
Spinner Dolphin	Hawaii Pelagic	473	265	1	2,345	1,445	1
Spinner Dolphin	Hawaii Island	13	0	-	82	0	-
Spinner Dolphin	Kaua'i/Ni'ihau	901	16	-	5,096	90	-
Spinner Dolphin	O'ahu/4 Islands Region.	180	28	0	1,120	155	0
Striped Dolphin	Hawaii Pelagic	3,793	2,473	1	18,660	12,807	6
Striped Dolphin	California/Oregon/ Washington.	16,581	5,362	2	88,084	29,998	12

TABLE 43—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM SONAR AND OTHER ACTIVE TRANSDUCERS DURING NAVY TESTING ACTIVITIES—Continued

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
Dall's Porpoise	California/Oregon/Washington.	6,191	8,086	222	34,212	43,404	1,300
Harbor Porpoise	Monterey Bay	865	-	-	5,307	-	-
Harbor Porpoise	Morro Bay	254	3	1	1,660	19	1
Harbor Porpoise	Northern California/Southern Oregon.	124	-	-	763	-	-
Harbor Porpoise	San Francisco/Russian River.	3,023	6	0	18,554	36	0
California Sea Lion	U.S.	928,540	67,321	16	5,191,344	245,578	71
Guadalupe Fur Seal.	Mexico	44,414	3,814	3	249,924	24,054	21
Northern Fur Seal	Eastern Pacific	3,080	183	1	18,776	1,111	1
Northern Fur Seal	California	1,769	87	0	10,740	521	0
Steller Sea Lion	Eastern	439	31	-	2,678	174	-
Harbor Seal	California	38,391	15,461	3	204,018	81,833	14
Hawaiian Monk Seal.	Hawaii	75	43	1	406	257	1
Northern Elephant Seal.	California Breeding	34,434	13,065	5	203,952	54,851	27

Note: Zero (0) impacts indicate total less than 0.5 and a dash (-) is a true zero. In some cases where the estimated take within a cell is equal to 1, that value has been rounded up from a value that is less than 0.5 to avoid underestimating potential impacts to a species or stock based on the 7-year rounding rules discussed in section 2.4 of appendix E (Explosive and Acoustic Analysis Report) of the 2024 HCTT Draft EIS/OEIS.

* The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

TABLE 44—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM SONAR AND OTHER ACTIVE TRANSDUCERS DURING COAST GUARD TRAINING ACTIVITIES

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
Gray Whale	Eastern North Pacific	15	-	-	102	-	-
Gray Whale	Western North Pacific	1	-	-	2	-	-
Blue Whale	Central North Pacific	1	-	-	1	-	-
Blue Whale	Eastern North Pacific	18	-	-	124	-	-
Bryde's Whale	Eastern Tropical Pacific	1	-	-	5	-	-
Bryde's Whale	Hawaii	2	-	-	13	-	-
Fin Whale	Hawaii	2	-	-	8	-	-
Fin Whale	California/Oregon/Washington.	62	-	-	432	-	-
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	7	-	-	45	-	-
Humpback Whale	Mainland Mexico—California/Oregon/Washington.	14	-	-	96	-	-
Humpback Whale	Hawaii	7	-	-	46	-	-
Minke Whale	Hawaii	2	-	-	14	-	-
Minke Whale	California/Oregon/Washington.	7	-	-	48	-	-
Sei Whale	Hawaii	1	-	-	4	-	-
Sei Whale	Eastern North Pacific	1	-	-	4	-	-
Sperm Whale	Hawaii	7	-	-	45	-	-
Sperm Whale	California/Oregon/Washington.	28	-	-	196	-	-
Dwarf Sperm Whale	Hawaii	159	225	2	1,109	1,575	12
Dwarf Sperm Whale	California/Oregon/Washington.	16	34	-	108	235	-
Pygmy Sperm Whale	Hawaii	160	192	-	1,117	1,342	-
Pygmy Sperm Whale	California/Oregon/Washington.	17	31	-	116	215	-
Baird's Beaked Whale	California/Oregon/Washington.	54	-	-	378	-	-
Blainville's Beaked Whale	Hawaii	25	-	-	170	-	-
Goose-Beaked Whale	Hawaii	143	-	-	1,001	-	-
Goose-Beaked Whale	California/Oregon/Washington.	653	-	-	4,569	-	-
Longman's Beaked Whale	Hawaii	145	-	-	1,013	-	-
Mesoplodont Beaked Whale	California/Oregon/Washington.	415	-	-	2,901	-	-
False Killer Whale	Main Hawaiian Islands Insular.	4	-	-	27	-	-

TABLE 44—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM SONAR AND OTHER ACTIVE TRANSDUCERS DURING COAST GUARD TRAINING ACTIVITIES—Continued

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
False Killer Whale	Northwest Hawaiian Islands	2	-	-	9	-	-
False Killer Whale	Hawaii Pelagic	12	-	-	83	-	-
False Killer Whale	Baja California Peninsula Mexico*.	16	-	-	109	-	-
Killer Whale	Hawaii	2	-	-	10	-	-
Killer Whale	Eastern North Pacific Offshore.	1	-	-	7	-	-
Killer Whale	West Coast Transient	1	-	-	5	-	-
Melon-Headed Whale	Hawaiian Islands	223	-	-	1,558	-	-
Pygmy Killer Whale	Hawaii	56	-	-	390	-	-
Pygmy Killer Whale	California—Baja California Peninsula Mexico*.	3	-	-	18	-	-
Short-Finned Pilot Whale	Hawaii	83	-	-	578	-	-
Short-Finned Pilot Whale	California/Oregon/Washington.	10	-	-	69	-	-
Bottlenose Dolphin	Hawaii Pelagic	33	-	-	226	-	-
Bottlenose Dolphin	California Coastal	2	-	-	12	-	-
Bottlenose Dolphin	California/Oregon/Washington Offshore.	119	-	-	828	-	-
Fraser's Dolphin	Hawaii	17	-	-	113	-	-
Long-Beaked Common Dolphin.	California	924	1	-	6,467	6	-
Northern Right Whale Dolphin.	California/Oregon/Washington.	249	2	-	1,742	12	-
Pacific White-Sided Dolphin	California/Oregon/Washington.	246	1	-	1,722	7	-
Pantropical Spotted Dolphin	Hawaii Island	24	-	-	164	-	-
Pantropical Spotted Dolphin	Hawaii Pelagic	226	-	-	1,579	-	-
Pantropical Spotted Dolphin	O'ahu	1	-	-	7	-	-
Pantropical Spotted Dolphin	Baja California Peninsula Mexico*.	490	-	-	3,428	-	-
Risso's Dolphin	Hawaii	35	-	-	240	-	-
Risso's Dolphin	California/Oregon/Washington.	187	-	-	1,308	-	-
Rough-Toothed Dolphin	Hawaii	406	-	-	2,838	-	-
Short-Beaked Common Dolphin.	California/Oregon/Washington.	9,634	19	-	67,436	131	-
Spinner Dolphin	Hawaii Pelagic	24	-	-	165	-	-
Striped Dolphin	Hawaii Pelagic	247	2	-	1,726	12	-
Striped Dolphin	California/Oregon/Washington.	775	-	-	5,419	-	-
Dall's Porpoise	California/Oregon/Washington.	169	239	-	1,178	1,669	-
Harbor Porpoise	San Francisco/Russian River	2	-	-	11	-	-
California Sea Lion	U.S.	14,931	2	-	104,514	13	-
Guadalupe Fur Seal	Mexico	3,852	4	-	26,963	24	-
Northern Fur Seal	Eastern Pacific	633	-	-	4,425	-	-
Northern Fur Seal	California	555	-	-	3,885	-	-
Steller Sea Lion	Eastern	4	-	-	22	-	-
Harbor Seal	California	140	-	-	976	-	-
Hawaiian Monk Seal	Hawaii	1	-	-	5	-	-
Northern Elephant Seal	California Breeding	1,790	1	-	12,529	1	-

Note: Zero (0) impacts indicate total less than 0.5 and a dash (-) is a true zero. In some cases where the estimated take within a cell is equal to 1, that value has been rounded up from a value that is less than 0.5 to avoid underestimating potential impacts to a species or stock based on the 7-year rounding rules discussed in section 2.4 of appendix E (Explosive and Acoustic Analysis Report) of the 2024 HCTT Draft EIS/OEIS.

*The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

Estimated Take From Air Guns and Pile Driving

Table 45 provides estimated effects from air guns, including the comparative amounts of TTS and behavioral disturbance for each species and stock annually, noting that if a modeled marine mammal was "taken" through exposure to both TTS and behavioral disturbance in the model, it was recorded as a TTS.

TABLE 45—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM AIR GUNS DURING NAVY TRAINING AND TESTING ACTIVITIES

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
Gray Whale	Eastern North Pacific	0	-	-	0	-	-
Blue Whale	Eastern North Pacific	0	-	-	0	-	-

TABLE 45—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM AIR GUNS DURING NAVY TRAINING AND TESTING ACTIVITIES—Continued

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
Fin Whale	California/Oregon/Washington.	0	0	-	0	0	-
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	0	-	-	0	-	-
Humpback Whale	Mainland Mexico—California/Oregon/Washington.	0	0	-	0	0	-
Humpback Whale	Hawaii	1	-	-	1	-	-
Minke Whale	California/Oregon/Washington.	0	-	-	0	-	-
Sperm Whale	Hawaii	1	-	-	1	-	-
Dwarf Sperm Whale	Hawaii	8	5	1	50	34	1
Dwarf Sperm Whale	California/Oregon/Washington.	1	1	-	4	3	-
Pygmy Sperm Whale	Hawaii	6	6	1	34	37	3
Pygmy Sperm Whale	California/Oregon/Washington.	1	1	-	3	6	-
Goose-Beaked Whale	Hawaii	1	-	-	1	-	-
Mesoplodont Beaked Whale	California/Oregon/Washington.	0	-	-	0	-	-
Melon-Headed Whale	Hawaiian Islands	1	-	-	2	-	-
Pygmy Killer Whale	California—Baja California Peninsula Mexico.	1	-	-	1	-	-
Short-Finned Pilot Whale	Hawaii	1	-	-	1	-	-
Bottlenose Dolphin	Hawaii Pelagic	1	-	-	3	-	-
Bottlenose Dolphin	California/Oregon/Washington Offshore.	1	-	-	2	-	-
Long-Beaked Common Dolphin.	California	3	-	-	13	-	-
Northern Right Whale Dolphin.	California/Oregon/Washington.	1	-	-	2	-	-
Pacific White-Sided Dolphin	California/Oregon/Washington.	1	-	-	5	-	-
Pantropical Spotted Dolphin	Hawaii Island	1	-	-	1	-	-
Pantropical Spotted Dolphin	Hawaii Pelagic	1	-	-	1	-	-
Pantropical Spotted Dolphin	Baja California Peninsula Mexico.	2	-	-	9	-	-
Risso's Dolphin	California/Oregon/Washington.	1	-	-	6	-	-
Rough-Toothed Dolphin	Hawaii	1	-	-	1	-	-
Short-Beaked Common Dolphin.	California/Oregon/Washington.	17	-	-	85	-	-
Striped Dolphin	Hawaii Pelagic	-	1	-	-	1	-
Striped Dolphin	California/Oregon/Washington.	1	-	-	5	-	-
Dall's Porpoise	California/Oregon/Washington.	9	8	1	58	48	4
Harbor Porpoise	San Francisco/Russian River	1	2	1	6	12	1
California Sea Lion	U.S.	8	1	-	33	1	-
Guadalupe Fur Seal	Mexico	1	-	-	5	-	-
Northern Fur Seal	Eastern Pacific	1	-	-	2	-	-
Northern Fur Seal	California	1	-	-	1	-	-
Northern Elephant Seal	California Breeding	1	-	-	3	-	-

Note: Zero (0) impacts indicate total less than 0.5 and a dash (-) is a true zero. In some cases where the estimated take within a cell is equal to 1, that value has been rounded up from a value that is less than 0.5 to avoid underestimating potential impacts to a species or stock based on the 7-year rounding rules discussed in section 2.4 of appendix E (Explosive and Acoustic Analysis Report) of the 2024 HCTT Draft EIS/OEIS.

Table 46 provides the estimated effects from pile driving and extraction, including the comparative amounts of TTS and behavioral disturbance for each species and stock annually, noting that if a modeled marine mammal was ''taken'' through exposure to both TTS and behavioral disturbance in the model, it was recorded as a TTS.

TABLE 46—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM PILE DRIVING DURING NAVY TRAINING ACTIVITIES

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ
California Sea Lion	U.S	16,992	1,891	61	118,938	13,237	423
Harbor Seal	California	952	183	20	6,664	1,281	138

Estimated Take From Target and Missile Launch Activities

Table 47 provides the estimated effects from target and missile launch activities at SNI and PMRF, including the amounts of behavioral disturbance for each species and stock annually. Pinnipeds hauled out on the shoreline of SNI have been observed to behaviorally react to the sound of launches of targets and missiles from launch pads on the island (Naval Air Warfare Center Weapons Division, 2018; U.S. Department of the Navy, 2020b, 2022b, 2023). The estimate of the number of behavioral effects that would be expected due to in-air noise from launches was based on observations of pinnipeds over three monitoring seasons (2015–2017) divided by the number of launch events over that same time period. The Navy determined that the numbers presented in table 46 (see table 5–6 of the application) represent the number of pinnipeds expected to be hauled out at SNI based on surveys over the five-year period from 2014 to 2019 (U.S. Department of the Navy, 2020a) and the average number of effects observed per launch event (U.S. Department of the Navy, 2020b, 2022b, 2023). Of note, the estimated behavioral effects presented in table 47 are the same as those authorized in the July 2022 PMSR LOA (87 FR 40888, July 8, 2022).

For California sea lions, take estimates at SNI were derived from three monitoring seasons (2015 to 2017) where an average of 274.44 instances of take of sea lions by Level B harassment occurred per launch event. Therefore, 275 sea lions was multiplied by 40 launch events, for a take estimate of 11,000 instances of take by Level B harassment of California sea lions annually (table 47). Of note, the Navy has not conducted more than 25 launch events in a given year since 2001. For harbor seals, a total of 12 takes were derived from the 2016 and 2017 monitoring seasons and multiplied by 40 launch events for a total of 480 instances of take by Level B harassment annually (table 47). For northern elephant seals, take estimates were derived from three monitoring seasons (2015 to 2017) where an average of 0.61 instances of take of northern elephant seals by Level B harassment occurred per launch event. Therefore, one northern elephant seal was multiplied by 40 launch events for a take estimate of 40 instances of take by Level B harassment of northern elephant seals annually (table 47). Generally, northern elephant seals do not react to launch events other than simple alerting responses such as raising their heads or temporarily going from sleeping to being awake; however, to account for the rare instances where they have reacted, the Navy considered that some northern elephant seals could be taken during launch events.

At PMRF from 2020 to 2023, an annual average of 215 monk seals have been counted hauled out on the beach (unpublished Navy data). The maximum number of seals observed during a single observation was five and the minimum was zero; on most observations no hauled out seals were observed. Based on the annual average number of animals documented at the site, the Action Proponents estimate that weapons firing noise at PMRF would result in 215 behavioral effects annually on hauled out monk seals (table 47; see table 5–7 of the application). The analysis conservatively assumes that: (1) at least one monk seal is hauled out when a launch or firing event would occur, an assumption contradicted by the observational data, which indicates that most frequently no monk seals are hauled out on the beach; and (2) that a monk seal would be disturbed and behaviorally respond during each event. This estimate is well beyond the anticipated take due to the 35 missile, rocket, drone launches and 3 artillery events (38 total) events on average per year. Monk seal in-air hearing is less sensitive than hearing in other phocid seals (Ruscher *et al.,* 2021; Ruscher *et al.,* 2025), suggesting that monk seals may be less likely to respond to in-air noise.

Neither TTS nor auditory injury is anticipated from missile and launch activities, as marine mammals are not anticipated to be exposed to noise from these activities that exceed the TTS or auditory injury thresholds (see the 2024 HCTT Draft EIS/OEIS appendix E.1, In-Air Acoustic Effects on Pinnipeds from Weapons Firing Noise).

TABLE 47—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM IN-AIR ACOUSTIC STRESSORS FROM MISSILE, AERIAL TARGET, AND AIR VEHICLE LAUNCHES AND ARTILLERY FIRING

Species	Stock	Maximum annual behavioral	Maximum 7-year behavioral
California sea lion	U.S	11,000	77,000
Harbor seal	California	480	3,360
Hawaiian monk seal	Hawai'i	215	1,505
Northern elephant seal	California	40	280

Note: California sea lion, harbor seal, and northern elephant seal are expected at San Nicolas Island only. Hawaiian monk seal is expected at the Pacific Missile Range Facility only.

Estimated Take From Explosives

Table 48 provides estimated effects from explosives during Navy training activities and table 49 provides estimated effects from explosives including small ship shock trials from Navy testing activities. Table 50 provides estimated effects from small ship shock trials over a maximum year (*i.e.,* one event) of Navy testing activities, which is a subset of the information included in table 49. Table 51 provides estimated effects from explosives during Coast Guard training activities, and table 52 provides estimated effects from explosives during Army training activities.

TABLE 48—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM EXPLOSIVES DURING NAVY TRAINING ACTIVITIES

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum annual non-auditory injury	Maximum annual mortality	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ	Maximum 7-year non-auditory injury	Maximum 7-year mortality
Gray Whale	Eastern North Pacific	234	391	33	0		1,491	2,578	217	0	
Gray Whale	Western North Pacific	1	1	0			2	2	0		
Blue Whale	Central North Pacific	1					1				
Blue Whale	Eastern North Pacific	65	81	1			415	535	4		
Bryde's Whale	Eastern Tropical Pacific	12	39	1			73	259	4		
Bryde's Whale	Hawaii	1	1	0			5	2	0		
Fin Whale	Hawaii	1	0	0			1	0	0		
Fin Whale	California/Oregon/Washington	98	114	5	1		633	747	35	1	
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	18	27	1			115	181	3		
Humpback Whale	Mainland Mexico—California/Oregon/Washington.	35	85	3			225	574	18		
Humpback Whale	Hawaii	48	58	7			312	390	43		
Minke Whale	Hawaii	1	1				4	1			
Minke Whale	California/Oregon/Washington	29	81	9			182	529	63		
Sei Whale	Hawaii	1	1	0			4	2	0		
Sei Whale	Eastern North Pacific	5	1	0			34	6	0		
Sperm Whale	Hawaii	2	1	1			9	6	1		
Sperm Whale	California/Oregon/Washington	2	4	1			8	24	3		
Dwarf Sperm Whale	Hawaii	272	407	171	1	0	1,692	2,630	1,109	1	0
Dwarf Sperm Whale	California/Oregon/Washington	12	35	13			75	219	83		
Pygmy Sperm Whale	Hawaii	259	414	167	1	0	1,617	2,711	1,084	1	0
Pygmy Sperm Whale	California/Oregon/Washington	19	41	23	0		117	272	153	0	
Baird's Beaked Whale	California/Oregon/Washington		1					4			
Blainville's Beaked Whale	Hawaii	1					2				
Goose-Beaked Whale	Hawaii	2	1	0			11	4	0		
Goose-Beaked Whale	California/Oregon/Washington	6	13	1			36	89	2		
Longman's Beaked Whale	Hawaii	1	1	1			2	3	4		
Mesoplodont Beaked Whale	California/Oregon/Washington	2	5	1			11	34	2		
False Killer Whale	Main Hawaiian Islands Insular		0					0			
False Killer Whale	Hawaii Pelagic	1	1				2	3			
False Killer Whale	Baja California Peninsula Mexico	0	1				0	4			
Killer Whale	Hawaii		0	0				0	0		
Killer Whale	Eastern North Pacific Offshore	6	7	3			38	47	21		
Melon-Headed Whale	Hawaiian Islands	4	3	1	0	0	24	20	5	0	0
Pygmy Killer Whale	Hawaii	2	2	1	0		11	13	3	0	
Pygmy Killer Whale	California—Baja California Peninsula Mexico.	1	1				1	1			
Short-Finned Pilot Whale	Hawaii	6	9	1	0	0	40	57	7	0	0
Short-Finned Pilot Whale	California/Oregon/Washington	6	6	6	2	1	35	39	41	12	4
Bottlenose Dolphin	Maui Nui	0	1				0	4			
Bottlenose Dolphin	Hawaii Island	0	1				0	1			
Bottlenose Dolphin	Hawaii Pelagic	134	114	14	1	1	920	783	96	7	2
Bottlenose Dolphin	Kaua'i/Ni'ihau		1	0	0			1	0	0	
Bottlenose Dolphin	O'ahu	29	21	4	1	1	200	142	26	3	1
Bottlenose Dolphin	California Coastal	9	15	6	1		59	103	41	1	
Bottlenose Dolphin	California/Oregon/Washington Offshore.	38	40	9	1	0	240	260	57	3	0
Fraser's Dolphin	Hawaii	13	10	3	1		74	64	18	1	
Long-Beaked Common Dolphin	California	273	306	75	18	3	1,641	1,976	498	117	15
Northern Right Whale Dolphin	California/Oregon/Washington	2	4	1	1	0	13	24	1	3	0
Pacific White-Sided Dolphin	California/Oregon/Washington	77	73	16	3	1	463	470	101	19	1
Pantropical Spotted Dolphin	Maui Nui	3	2	2	0		18	12	10	0	
Pantropical Spotted Dolphin	Hawaii Island	1	8	2	1		7	55	13	2	
Pantropical Spotted Dolphin	Hawaii Pelagic	11	13	3	1	0	69	87	15	2	0
Pantropical Spotted Dolphin	O'ahu	17	15	3	1		118	100	18	1	
Pantropical Spotted Dolphin	Baja California Peninsula Mexico	15	11	5	1	1	93	75	29	6	1
Risso's Dolphin	Hawaii	2	2	0	0		9	9	0	0	

TABLE 48—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM EXPLOSIVES DURING NAVY TRAINING ACTIVITIES—Continued

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum annual non-auditory injury	Maximum annual mortality	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ	Maximum 7-year non-auditory injury	Maximum 7-year mortality
Risso's Dolphin	California/Oregon/Washington	23	38	9	3	....	146	252	62	17	....
Rough-Toothed Dolphin	Hawaii	72	63	6	3	1	481	426	38	17	1
Short-Beaked Common Dolphin	California/Oregon/Washington	1,413	1,078	255	50	13	8,979	6,965	1,684	329	91
Spinner Dolphin	Hawaii Pelagic	1	1	0	0	....	2	2	0	0	....
Spinner Dolphin	Hawaii Island	1	1	1	0	....	7	2	1	0	....
Spinner Dolphin	Kaua'i/Ni'ihau	0	2	0	0	0	0	11	0	0	0
Spinner Dolphin	O'ahu/4 Islands Region	4	3	1	0	0	27	19	2	0	0
Striped Dolphin	Hawaii Pelagic	11	5	1	1	....	59	31	4	3	....
Striped Dolphin	California/Oregon/Washington	12	23	4	1	1	73	148	27	6	1
Dall's Porpoise	California/Oregon/Washington	155	433	185	1	....	975	2,787	1,214	1	....
Harbor Porpoise	Morro Bay	....	13	11	0	....	....	76	71	0	....
Harbor Porpoise	San Francisco/Russian River	....	22	24	....	....	....	153	164	....	....
California Sea Lion	U.S.	3,254	4,576	313	43	4	20,202	29,753	2,048	282	22
Guadalupe Fur Seal	Mexico	50	60	4	1	1	312	361	25	7	1
Northern Fur Seal	Eastern Pacific	1	2	1	0	....	1	14	1	0	....
Northern Fur Seal	California	1	2	1	0	....	1	11	1	0	....
Steller Sea Lion	Eastern	5	8	2	....	....	31	50	12	....	....
Harbor Seal	California	1,510	2,050	214	6	1	9,224	12,668	1,343	42	7
Hawaiian Monk Seal	Hawaii	14	21	3	1	0	89	136	17	1	0
Northern Elephant Seal	California Breeding	147	229	31	1	....	936	1,505	201	1	....

Note: The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.*, 2024), but separate density estimates were derived to support the Navy's analysis.

TABLE 49—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM EXPLOSIVES DURING NAVY TESTING ACTIVITIES (INCLUDES SMALL SHIP SHOCK TRIALS)

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum annual non-auditory injury	Maximum annual mortality	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ	Maximum 7-year non-auditory injury	Maximum 7-year mortality
Gray Whale	Eastern North Pacific	123	56	5	0	-	713	353	30	0	-
Gray Whale	Western North Pacific	2	1	0	-	-	9	1	0	-	-
Blue Whale	Eastern North Pacific	21	25	2	-	-	135	96	14	-	-
Bryde's Whale	Eastern Tropical Pacific	3	3	1	-	-	16	20	1	-	-
Bryde's Whale	Hawaii	1	1	0	-	-	1	6	0	-	-
Fin Whale	Hawaii	1	0	-	-	-	2	0	-	-	-
Fin Whale	California/Oregon/Washington	76	69	6	0	-	451	284	39	0	-
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	13	11	1	-	-	80	67	5	-	-
Humpback Whale	Mainland Mexico—California/Oregon/Washington.	31	29	1	1	-	187	172	5	1	-
Humpback Whale	Hawaii	40	32	2	-	-	275	224	11	-	-
Minke Whale	Hawaii	1	1	0	-	-	3	1	0	-	-
Minke Whale	California/Oregon/Washington	9	10	1	-	0	58	63	6	-	0
Sei Whale	Hawaii	0	0	-	-	-	0	0	-	-	-
Sei Whale	Eastern North Pacific	2	2	1	-	-	11	8	1	-	-
Sperm Whale	Hawaii	0	1	-	-	-	0	1	-	-	-
Sperm Whale	California/Oregon/Washington	2	1	1	-	-	12	7	1	-	-
Dwarf Sperm Whale	Hawaii	86	107	27	0	0	548	669	135	0	0
Dwarf Sperm Whale	California/Oregon/Washington	20	33	17	-	0	127	205	96	-	0
Pygmy Sperm Whale	Hawaii	97	114	28	0	-	614	718	142	0	-
Pygmy Sperm Whale	California/Oregon/Washington	22	33	18	-	-	145	200	109	-	-
Baird's Beaked Whale	California/Oregon/Washington	1	1	0	-	-	5	2	0	-	-
Blainville's Beaked Whale	Hawaii	0	-	-	-	-	0	-	-	-	-
Goose-Beaked Whale	Hawaii	1	1	0	-	-	4	1	0	-	-
Goose-Beaked Whale	California/Oregon/Washington	8	3	1	0	-	50	16	2	0	-

Longman's Beaked Whale	Hawaii	0	0	-	-	-	0	0	-	-	-
Mesoplodont Beaked Whale	California/Oregon/Washington	6	3	1	0	0	35	21	4	0	0
False Killer Whale	Main Hawaiian Islands Insular	1	1	-	-	-	3	3	-	-	-
False Killer Whale	Hawaii Pelagic	0	0	0	-	-	0	0	0	-	-
False Killer Whale	Baja California Peninsula Mexico *	0	1	0	0	-	0	3	0	0	-
Killer Whale	Eastern North Pacific Offshore	2	1	1	0	-	8	6	2	0	-
Melon-Headed Whale	Hawaiian Islands	1	1	1	0	-	4	2	1	0	-
Pygmy Killer Whale	Hawaii	1	0	0	0	-	1	0	0	0	-
Pygmy Killer Whale	California—Baja California Peninsula Mexico *.	-	1	0	0	-	-	1	0	0	-
Short-Finned Pilot Whale	Hawaii	4	3	1	-	-	26	20	3	-	-
Short-Finned Pilot Whale	California/Oregon/Washington	2	2	1	-	-	14	11	1	-	-
Bottlenose Dolphin	Maui Nui	2	2	-	-	-	13	14	-	-	-
Bottlenose Dolphin	Hawaii Pelagic	51	32	4	1	-	354	222	27	5	-
Bottlenose Dolphin	Kaua'i/Ni'ihau	0	0	0	-	-	0	0	0	-	-
Bottlenose Dolphin	O'ahu	-	1	0	0	-	-	1	0	0	-
Bottlenose Dolphin	California Coastal	-	1	0	0	-	-	2	0	0	-
Bottlenose Dolphin	California/Oregon/Washington Offshore.	6	7	1	0	-	40	48	6	0	-
Fraser's Dolphin	Hawaii	0	0	0	-	-	0	0	0	-	-
Long-Beaked Common Dolphin	California	72	83	27	6	1	472	525	168	31	2
Northern Right Whale Dolphin	California/Oregon/Washington	9	9	3	1	1	59	55	20	3	1
Pacific White-Sided Dolphin	California/Oregon/Washington	25	31	6	1	1	168	204	36	5	1
Pantropical Spotted Dolphin	Maui Nui	19	8	1	0	-	131	54	7	0	-
Pantropical Spotted Dolphin	Hawaii Island	1	1	1	-	-	3	2	1	-	-
Pantropical Spotted Dolphin	Hawaii Pelagic	12	4	1	1	0	78	27	2	1	0
Pantropical Spotted Dolphin	O'ahu	-	1	0	-	-	-	1	0	-	-
Pantropical Spotted Dolphin	Baja California Peninsula Mexico *	25	19	1	1	1	171	128	4	1	1
Risso's Dolphin	Hawaii	1	1	1	-	-	2	1	1	-	-
Risso's Dolphin	California/Oregon/Washington	11	10	4	1	0	71	62	21	1	0
Rough-Toothed Dolphin	Hawaii	42	23	3	1	1	289	160	19	3	1
Short-Beaked Common Dolphin	California/Oregon/Washington	428	492	103	21	5	2,819	3,129	601	112	16
Spinner Dolphin	Hawaii Pelagic	0	1	0	0	-	0	1	0	0	-
Spinner Dolphin	Hawaii Island	0	-	-	-	-	0	-	-	-	-
Spinner Dolphin	Kaua'i/Ni'ihau	0	1	1	-	-	0	1	1	-	-
Spinner Dolphin	O'ahu/4 Islands Region	1	1	-	-	-	5	3	-	-	-
Striped Dolphin	Hawaii Pelagic	2	1	1	0	-	9	5	1	0	-
Striped Dolphin	California/Oregon/Washington	16	22	4	1	0	108	147	23	3	0
Dall's Porpoise	California/Oregon/Washington	438	631	304	1	0	2,808	3,857	1,748	4	0
Harbor Porpoise	Monterey Bay	0	-	-	-	-	0	-	-	-	-
Harbor Porpoise	Morro Bay	74	159	75	1	0	495	1,091	516	2	0
Harbor Porpoise	San Francisco/Russian River	3	3	1	-	-	15	18	4	-	-
California Sea Lion	U.S.	842	1,046	161	14	1	5,409	6,705	1,008	87	5
Guadalupe Fur Seal	Mexico	73	90	12	2	0	483	599	76	9	0
Northern Fur Seal	Eastern Pacific	19	28	7	1	0	117	177	42	2	0
Northern Fur Seal	California	15	22	6	1	0	93	140	35	3	0
Steller Sea Lion	Eastern	0	1	0	-	-	0	2	0	-	-
Harbor Seal	California	170	158	14	1	0	1,030	977	90	2	0
Hawaiian Monk Seal	Hawaii	10	11	1	-	-	65	74	6	-	-
Northern Elephant Seal	California Breeding	220	332	55	1	0	1,427	2,096	332	1	0

Note: Zero (0) impacts indicate total less than 0.5 and a dash (-) is a true zero. In some cases where the estimated take within a cell is equal to 1, that value has been rounded up from a value that is less than 0.5 to avoid underestimating potential impacts to a species or stock based on the 7-year rounding rules discussed in section 2.4 of appendix E (Explosive and Acoustic Analysis Report) of the 2024 HCTT Draft EIS/OEIS.

* The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

TABLE 50—ANNUAL ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM SMALL SHIP SHOCK TRIALS OVER A MAXIMUM YEAR OF NAVY TESTING

[One event]

Species	Stock	Maximum annual TTS	Maximum annual AUD INJ	Maximum annual non-auditory injury	Maximum annual mortality
Blue Whale	Eastern North Pacific	12	-	-	-
Fin Whale	California/Oregon/Washington	24	0	-	-
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	1	0	-	-
Humpback Whale	Mainland Mexico—California/Oregon/Washington	2	0	0	-
Minke Whale	California/Oregon/Washington	1	0	-	-
Sei Whale	Eastern North Pacific	0	-	-	-
Sperm Whale	California/Oregon/Washington	0	0	-	-
Dwarf Sperm Whale	California/Oregon/Washington	2	2	-	-
Pygmy Sperm Whale	California/Oregon/Washington	2	2	-	-
Baird's Beaked Whale	California/Oregon/Washington	0	0	-	-
Goose-Beaked Whale	California/Oregon/Washington	1	0	0	-
Mesoplodont Beaked Whale	California/Oregon/Washington	0	0	0	0
Short-Finned Pilot Whale	California/Oregon/Washington	0	-	-	-
Bottlenose Dolphin	California/Oregon/Washington Offshore	0	0	0	-
Long-Beaked Common Dolphin	California	4	1	1	1
Northern Right Whale Dolphin	California/Oregon/Washington	0	0	0	0
Pacific White-Sided Dolphin	California/Oregon/Washington	1	-	0	0
Pantropical Spotted Dolphin	Baja California Peninsula Mexico *	1	0	0	0
Risso's Dolphin	California/Oregon/Washington	1	0	0	0
Short-Beaked Common Dolphin	California/Oregon/Washington	17	5	3	3
Striped Dolphin	California/Oregon/Washington	0	0	0	-
Dall's Porpoise	California/Oregon/Washington	39	34	-	0
California Sea Lion	U.S	6	1	0	0
Guadalupe Fur Seal	Mexico	0	-	-	-
Northern Elephant Seal	California Breeding	6	4	0	0

Note: Zero (0) impacts indicate total less than 0.5 and a dash (-) is a true zero. The estimated takes in this table are included in table 48 and not additional to table 48.

* The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

TABLE 51—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM EXPLOSIVES DURING COAST GUARD TRAINING ACTIVITIES

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum annual non-auditory injury	Maximum annual mortality	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ	Maximum 7-year non-auditory injury	Maximum 7-year mortality
Gray Whale	Eastern North Pacific	0	1	-	-	-	0	1	-	-	-
Blue Whale	Eastern North Pacific	1	-	-	-	-	1	-	-	-	-
Fin Whale	California/Oregon/Washington	0	0	0	-	-	0	0	0	-	-
Humpback Whale	Central America/Southern Mexico—California/Oregon/Washington.	0	0	-	-	-	0	0	-	-	-
Humpback Whale	Mainland Mexico—California/Oregon/Washington.	1	0	-	-	-	1	0	-	-	-
Minke Whale	California/Oregon/Washington	0	0	-	-	-	0	0	-	-	-
Sei Whale	Hawaii	-	0	-	-	-	-	0	-	-	-
Sperm Whale	California/Oregon/Washington	0	-	-	-	-	0	-	-	-	-
Dwarf Sperm Whale	Hawaii	1	1	1	-	-	6	5	1	-	-
Dwarf Sperm Whale	California/Oregon/Washington	1	1	1	-	-	1	1	1	-	-
Pygmy Sperm Whale	Hawaii	1	1	1	-	-	7	3	1	-	-
Pygmy Sperm Whale	California/Oregon/Washington	1	1	0	-	-	1	1	0	-	-
Goose-Beaked Whale	California/Oregon/Washington	0	-	-	-	-	0	-	-	-	-
Mesoplodont Beaked Whale	California/Oregon/Washington	1	-	0	-	-	1	-	0	-	-
False Killer Whale	Baja California Peninsula Mexico *	1	-	1	-	-	1	-	1	-	-
Melon-Headed Whale	Hawaiian Islands	1	-	-	-	-	1	-	-	-	-
Bottlenose Dolphin	California/Oregon/Washington Offshore	1	1	-	-	-	1	1	-	-	-
Fraser's Dolphin	Hawaii	1	0	-	-	-	1	0	-	-	-
Long-Beaked Common Dolphin	California	1	1	0	-	-	1	1	0	-	-
Northern Right Whale Dolphin	California/Oregon/Washington	0	0	-	-	-	0	0	-	-	-
Pacific White-Sided Dolphin	California/Oregon/Washington	0	0	-	-	-	0	0	-	-	-
Pantropical Spotted Dolphin	Hawaii Island	0	0	-	-	-	0	0	-	-	-
Pantropical Spotted Dolphin	Hawaii Pelagic	-	1	-	-	-	-	1	-	-	-
Pantropical Spotted Dolphin	Baja California Peninsula Mexico *	-	1	-	-	-	-	1	-	-	-
Risso's Dolphin	California/Oregon/Washington	0	1	-	-	-	0	1	-	-	-
Rough-Toothed Dolphin	Hawaii	0	-	-	-	-	0	-	-	-	-
Short-Beaked Common Dolphin	California/Oregon/Washington	3	2	1	-	-	17	14	2	-	-
Striped Dolphin	Hawaii Pelagic	-	0	0	-	-	-	0	0	-	-
Striped Dolphin	California/Oregon/Washington	-	1	-	-	-	-	1	-	-	-
Dall's Porpoise	California/Oregon/Washington	2	2	1	-	-	11	9	3	-	-
Harbor Porpoise	San Francisco/Russian River	0	0	0	-	-	0	0	0	-	-
California Sea Lion	U.S	2	2	0	0	-	10	8	0	0	-
Guadalupe Fur Seal	Mexico	1	-	-	-	-	2	-	-	-	-
Northern Fur Seal	Eastern Pacific	0	1	-	-	-	0	1	-	-	-
Northern Fur Seal	California	0	0	-	-	-	0	0	-	-	-
Harbor Seal	California	1	0	-	-	-	1	0	-	-	-
Northern Elephant Seal	California Breeding	2	2	1	-	-	8	11	1	-	-

Note: Zero (0) impacts indicate total less than 0.5 and a dash (-) is a true zero. In some cases where the estimated take within a cell is equal to 1, that value has been rounded up from a value that is less than 0.5 to avoid underestimating potential impacts to a species or stock based on the 7-year rounding rules discussed in section 2.4 of appendix E (Explosive and Acoustic Analysis Report) of the 2024 HCTT Draft EIS/OEIS.

* The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

TABLE 52—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM EXPLOSIVES DURING ARMY TRAINING ACTIVITIES

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum annual non-auditory injury	Maximum annual mortality	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ	Maximum 7-year non-auditory injury	Maximum 7-year mortality
Bryde's Whale	Hawaii	1	1	-	-	-	2	1	-	-	-
Humpback Whale	Hawaii	3	1	-	-	-	15	7	-	-	-
Minke Whale	Hawaii	1	-	-	-	-	3	-	-	-	-
Dwarf Sperm Whale	Hawaii	51	46	12	-	-	355	322	84	-	-
Pygmy Sperm Whale	Hawaii	57	51	15	-	-	399	356	101	-	-
Blainville's Beaked Whale	Hawaii	-	1	-	-	-	-	1	-	-	-
Goose-Beaked Whale	Hawaii	1	1	0	-	-	3	3	0	-	-

TABLE 52—ANNUAL AND 7-YEAR ESTIMATED TAKE OF MARINE MAMMAL STOCKS FROM EXPLOSIVES DURING ARMY TRAINING ACTIVITIES—Continued

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum annual non-auditory injury	Maximum annual mortality	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ	Maximum 7-year non-auditory injury	Maximum 7-year mortality
Longman's Beaked Whale	Hawaii	1	1	-	-	-	2	1	-	-	-
Melon-Headed Whale	Hawaiian Islands	1	1	1	-	-	5	3	1	-	-
Melon-Headed Whale	Kohala Resident (Hawaii)	1	1	-	-	-	4	3	-	-	-
Pygmy Killer Whale	Hawaii	1	-	-	-	-	3	-	-	-	-
Short-Finned Pilot Whale	Hawaii	2	1	1	1	-	9	6	2	1	-
Bottlenose Dolphin	Hawaii Pelagic	2	1	1	0	-	10	4	1	0	-
Fraser's Dolphin	Hawaii	2	3	1	1	-	12	15	5	1	-
Pantropical Spotted Dolphin	Maui Nui	-	1	-	-	-	-	1	-	-	-
Pantropical Spotted Dolphin	Hawaii Pelagic	2	1	1	1	0	8	6	1	1	0
Risso's Dolphin	Hawaii	-	-	1	0	-	-	-	1	0	-
Rough-Toothed Dolphin	Hawaii	3	2	1	1	-	17	14	1	1	-
Striped Dolphin	Hawaii Pelagic	1	2	1	1	-	7	10	1	1	-
Hawaiian Monk Seal	Hawaii	1	-	-	-	-	3	-	-	-	-

Note: Zero (0) impacts indicate total less than 0.5 and a dash (-) is a true zero. In some cases where the estimated take within a cell is equal to 1, that value has been rounded up from a value that is less than 0.5 to avoid underestimating potential impacts to a species or stock based on the 7-year rounding rules discussed in section 2.4 of appendix E (Explosive and Acoustic Analysis Report) of the 2024 HCTT Draft EIS/OEIS.

* The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

Estimated Take From Vessel Strike by Serious Injury or Mortality

Vessel strikes from commercial, recreational, and military vessels are known to affect large whales and have resulted in serious injury and fatalities to cetaceans (Abramson *et al.,* 2011; Berman-Kowalewski *et al.,* 2010a; Calambokidis, 2012; Douglas *et al.,* 2008; Laggner, 2009; Lammers *et al.,* 2003; Van der Hoop *et al.,* 2013; Van der Hoop *et al.,* 2012). Records of vessel strikes of large whales date back to the early 17th century, and the worldwide number of vessel strikes of large whales appears to have increased steadily during recent decades (Laist *et al.,* 2001; Ritter 2012).

Numerous studies of interactions between surface vessels and marine mammals have demonstrated that free-ranging marine mammals often, but not always (*e.g.,* McKenna *et al.,* 2015), engage in avoidance behavior when surface vessels move toward them. It is not clear whether these responses are caused by the physical presence of a surface vessel, the underwater noise generated by the vessel, or an interaction between the two (Amaral and Carlson, 2005; Au and Green, 2000; Bain *et al.,* 2006; Bauer 1986; Bejder *et al.,* 1999; Bejder and Lusseau, 2008; Bejder *et al.,* 2009; Bryant *et al.,* 1984; Corkeron, 1995; Erbe, 2002; Félix, 2001; Goodwin and Cotton, 2004; Greig *et al.,* 2020; Guilpin *et al.,* 2020; Keen *et al.,* 2019; Lemon *et al.,* 2006; Lusseau, 2003; Lusseau, 2006; Magalhaes *et al.,* 2002; Nowacek *et al.,* 2001; Redfern *et al.,* 2020; Richter *et al.,* 2003; Scheidat *et al.,* 2004; Simmonds, 2005; Szesciorka *et al.,* 2019; Watkins, 1986; Williams *et al.,* 2002; Wursig *et al.,* 1998). Several authors suggest that the noise generated during motion is probably an important factor (Blane and Jaakson, 1994; Evans *et al.,* 1992; Evans *et al.,* 1994). These studies suggest that the behavioral responses of marine mammals to surface vessels are similar to their behavioral responses to predators. Avoidance behavior is expected to be even stronger in the subset of instances during which the Action Proponents are conducting military readiness activities using active sonar or explosives.

The marine mammals most vulnerable to vessel strikes are those that spend extended periods of time at the surface in order to restore oxygen levels within their tissues after deep dives (*e.g.,* sperm whales). In addition, some baleen whales seem generally unresponsive to vessel sound, making them more susceptible to vessel strikes (Nowacek *et al.,* 2004). These species are primarily large, slow moving whales. There are 8 species (17 stocks) of large whales that are known to occur within the HCTT Study Area (table 14): gray whale, blue whale, Bryde's whale, fin whale, humpback whale, minke whale, sei whale, and sperm whale.

Some researchers have suggested the relative risk of a vessel strike can be assessed as a function of animal density and the magnitude of vessel traffic (*e.g.,* Fonnesbeck *et al.,* 2008; Vanderlaan *et al.,* 2008). Differences among vessel types also influence the probability of a vessel strike. The ability of any vessel to detect a marine mammal and avoid a collision depends on a variety of factors, including environmental conditions, vessel design, size, speed, and ability and number of personnel observing, as well as the behavior of the animal. Vessel speed, size, and mass are all important factors in determining if injury or death of a marine mammal is likely due to a vessel strike. For large vessels, speed and angle of approach can influence the severity of a strike. Large whales also do not have to be at the water's surface to be struck. Silber *et al.* (2010) found that when a whale is below the surface (about one to two times the vessel draft), under certain circumstances (vessel speed and location of the whale relative to the ship's centerline), there is likely to be a pronounced propeller suction effect. This suction effect may draw the whale into the hull of the ship, increasing the probability of propeller strikes.

There are some key differences between the operation of military and non-military vessels which make the likelihood of a military vessel striking a whale lower than some other vessels (*e.g.,* commercial merchant vessels). Key differences include:

• Military vessels have personnel assigned to stand watch at all times, day and night, when moving through the water (*i.e.,* when the vessel is underway). Watch personnel undertake extensive training and are certified to stand watch only after demonstrating competency in all necessary skills. While on watch, personnel employ visual search and reporting procedures in accordance with the U.S. Navy Lookout Training Handbook, the Coast Guard's Shipboard Lookout Manual, or civilian equivalent.

• The bridges of many military vessels are positioned closer to the bow, offering better visibility ahead of the vessel (compared to a commercial merchant vessel);

• Military readiness activities often involve aircraft (which can serve as part of the Lookout team), that can more readily detect cetaceans in the vicinity of a vessel or ahead of a vessel's present course, often before crew on the vessel would be able to detect them;

• Military vessels are generally more maneuverable than commercial merchant vessels, and are therefore capable of changing course more quickly in the event cetaceans are spotted in the vessel's path;

• Military vessels operate at the slowest speed practical consistent with operational requirements. While minimum speed is intended as a fuel conservation measure particular to a certain ship class, secondary benefits include a better ability to detect and avoid objects in the water, including marine mammals;

• Military ships often operate within a defined area for a period of time, in contrast to point-to-point commercial shipping over greater distances;

• The crew size on military vessels is generally larger than merchant vessels, allowing for stationing more trained Lookouts on the bridge. At all times when the Action Proponents' vessels are underway, trained Lookouts and bridge navigation teams are used to detect objects on the surface of the water ahead of the ship, including cetaceans. Some events may have additional personnel (beyond the minimum number of required Lookouts) who are already standing watch in or on the platform conducting the event or additional participating platforms and would have eyes on the water for all or part of an event. These additional personnel serve as members of the Lookout team; and

• When submerged, submarines are generally slow moving (to avoid detection); as a result, marine mammals at depth with a submarine are likely able to avoid collision with the submarine. When a submarine is transiting on the surface, the Navy posts Lookouts serving the same function as they do on surface vessels.

Vessel strike to marine mammals is not associated with any specific military readiness activity. Rather, vessel strike is a limited and sporadic, but possible, accidental result of military vessel movement within the HCTT Study Area or while in transit.

There were two recorded U.S. Navy vessel strikes of large whales in the HSTT (now HCTT) Study Area in 2009. There were no known strikes from June 2009 until May 2021, a period of approximately 12 years. (Of note, between 2009–2024, the Navy documented 384 U.S. Navy vessel movements in HSTT to avoid marine mammals during MTEs.) Since 2021 there have been five strikes of large whales in SOCAL attributed to naval vessels, three by the U.S. Navy and two by the Royal Australian Navy. As stated previously, the U.S. Navy struck a large whale in waters off Southern California in May 2023. Based on available photos and video, NMFS and the Navy have determined this whale was either a fin whale or sei whale. The U.S. Navy struck two unidentified large whales during the months of June and July 2021, and prior to that, on May 7, 2021, the Royal Australian Navy HMAS Sydney, a 147.5 m (161.3 yd) Hobart Class Destroyer, struck and killed two fin whales (a mother and her calf) while operating within SOCAL. Please see the *Authorized Take From Vessel Strikes and Explosives by Serious Injury or Mortality* section of the 2025 HSTT final rule (90 FR 4944, January 16, 2025) for detailed descriptions of the naval vessel strikes that occurred in 2021 and 2023.

In March 2024 a dead fin whale was discovered off of Pier 10 in Naval Station San Diego within the Navy's security barrier. The security barrier, which consists of a series of connected floating sections, is intended to discourage unauthorized boat entry to the piers. The necropsy indicated that vessel strike was the most likely cause of death. Given the location the whale was discovered, this could have been the result of a military vessel strike. However, the Navy reviewed its vessel activity during that time frame and available observations of those vessels coming and going to port, as well as at port, and determined it was unlikely that the whale was carried into port by a Navy vessel. Based on this and other information from Navy's investigation, we cannot determine whether this whale was struck by a Navy vessel during HSTT activities or was struck by a commercial or other vessel and drifted into the Navy pier area.

There has been one recorded Coast Guard vessel strike of a large whale (humpback) in the HCTT Study Area since 2009. The strike occurred in 2020 off Maui, HI. There have been no known strikes within the California portion of the HCTT Study Area. However, there were two Coast Guard strikes outside of and inshore of the California portion of the HCTT Study Area, a humpback whale in 2023 and a gray whale in 2024. The vessels involved in the 2023 and 2024 strikes were moving at slow speed less than 6 kn and no obvious injury to the whales were observed after the strikes.

In light of the key differences between the operation of military and non-military vessels discussed above, it is highly unlikely that a military vessel would strike any type of marine mammal without detecting it. Specifically, Lookouts posted on or near the ship's bow can visually detect a strike in the absence of other indications that a strike has occurred. The Action Proponents' internal procedures and mitigation requirements include reporting of any vessel strikes of marine mammals, and the Action Proponents' discipline, extensive training (not only for detecting marine mammals, but for detecting and reporting any potential navigational obstruction), and strict chain of command give NMFS a high level of confidence that all strikes are reported. Accordingly, NMFS is confident that the Navy and Coast Guard's reported strikes are accurate and appropriate for use in the analysis.

When generally compared to mysticetes, odontocetes are more capable of physically avoiding a vessel strike and since some species occur in large groups, they are more easily seen when they are closer to the water surface. The smaller size and maneuverability of dolphins, small whales (not including large whale calves), porpoises, and pinnipeds generally make vessel strike very unlikely. For as long as records have been kept, neither the Navy nor the Coast Guard have any record of any small whales or pinnipeds being struck by a vessel as a result of military readiness activities. Over the same time period, NMFS, the Navy, and the Coast Guard have only one record of a dolphin being struck by a vessel as a result of Navy or Coast Guard activities. The dolphin was accidentally struck by a Navy small boat in fall 2021 in Saint Andrew's Pass, Florida. Other than this one reported strike of a dolphin in 2021, NMFS has never received any reports from other LOA or IHA holders indicating that these species have been struck by vessels. Worldwide vessel strike records show little evidence of strikes of these groups or marine mammals from the shipping sector and larger vessels (though for many species, records do exist (*e.g.,* West *et al.* 2024, Van Waerebeek *et al.,* 2007)), and the majority of the Action Proponents' activities involving faster-moving vessels (that could be considered more likely to hit a marine mammal) are located in offshore areas where smaller delphinid, porpoise, and pinniped densities are lower.

In order to account for the accidental nature of vessel strike to large whales in general, and the potential risk from vessel movement within the HCTT Study Area within the 7-year period of this proposed authorization, the Action Proponents requested incidental takes based on probabilities derived from a Poisson distribution. A Poisson distribution is often used to describe random occurrences when the probability of an occurrence is small. Count data, such as cetacean sighting data, or in this case strike data, are often described as a Poisson or over-dispersed Poisson distribution. The Poisson distribution was calculated using vessel strike data between 2009–2024 in the HCTT Study Area, historical at-sea days in the HCTT Study Area for the Navy and the Coast Guard (described in detail in section 6 of the application), and estimated potential at-sea days for both Action Proponents during the 7-year period from 2025–2032 covered by the requested regulations. The analysis incorporates data beginning in 2009 as that was the start of the Navy's Marine Species Awareness Training and adoption of additional mitigation measures to address vessel strike, which will remain in place along with additional and modified mitigation measures during the 7 years of this proposed rulemaking. The analysis for the period of 2025 to 2032 is described in detail below and in section 6.3.2 (Probability of Vessel Strike of Large Whale Species) of the application.

Between 2009 and early 2024, there were a total of 35,006 Navy at-sea days for Navy manned vessels greater than 127 m (418 ft, or Littoral Combat Ship size and above) in the HCTT Study Area, an average 2,188 days per year. This estimate is based on positional tracking data records from the Navy's Authoritative Maritime Services database for the years 2016–2023. The Navy used the average of the 2016–2023 annual values as a surrogate for annual at-sea days for each year between 2009 and 2015. Given variation in vessel traffic from year to year, the Navy anticipates that the annual average from this period is a sufficient prediction of future at-sea days for manned surface ships for the period of this proposed rule (*i.e.,* 2025–2032) (*i.e.,* 2,188 days per year). In addition, this vessel strike analysis considers the potential for larger sized USVs (longer than 61 m (200 ft)) to strike a large whale, as these vessels would be used for military readiness activities during the proposed effective period of this proposed rule. While there have been no known vessel strikes from USVs, this analysis incorporates an estimated 728 at-sea days for large USVs, for a predicted total of 2,916 annual at-sea days from large, manned vessels and large USVs from 2025–2032 (*i.e.,* 20,412 at-sea days over the 7-year period).

Between 2009 and early 2024, there were a total of 4,179 Coast Guard at-sea days for vessels larger than 100 m (328 ft) in the HCTT Study Area, an average of 262 days per year. To account for limitations in data availability particular to Coast Guard vessel size classes, future new vessel or repositioning home port assignments, in consideration of documented strikes from Coast Guard medium sized vessels <100 m, and out of an abundance of caution, the Coast Guard predicted that there could be up to 60 additional at-sea days per year for the 2025–2032 period, for a predicted total of 322 annual at-sea days for vessels that may strike a large whale from 2025–2032 (*i.e.,* 2,254 at-sea days over the 7-year period).

As described above, during the same 2009 to 2024 period, there were five Navy vessel strikes of large whales and one Coast Guard vessel strike of a large whale. To calculate a vessel strike rate for each Action Proponent for the period of 2009 through 2024, the Action Proponents used the respective number of past vessel strikes of large whales and the respective number of at-sea days. Navy at-sea days (for vessels greater than 65 ft (19.8 m)) from 2009 through 2024 was estimated to be 35,006 days. Dividing the five known Navy strikes during that period by the at-sea days (*i.e.,* 5 strikes/35,006 at-sea days) results in a strike rate of 0.000143 strikes per at-sea day. Coast Guard at-sea days from 2009 through 2024 was estimated to be 4,179 days. Dividing the one known Coast Guard strike during that period by the at-sea days (*i.e.,* 1 strike/4,179 at-sea days) results in a strike rate of 0.000239 strikes per day.

As described above, the Action Proponents estimated that 20,412 Navy and 2,254 Coast Guard at-sea days would occur over the 7-year period associated with the requested authorization. Given a strike rate of 0.000143 Navy strikes per at-sea day, and 0.000239 Coast Guard strikes per at-sea day, the predicted number of vessel strikes over a 7-year period would be 2.9 strikes by the Navy and 0.5 strikes by the Coast Guard.

Using this predicted number of strikes, the Poisson distribution predicted the probabilities of a specific number of strikes (n = 0, 1, 2, *etc.*) from 2025 through 2032 for each Action Proponent. The probability analysis concluded that there is a 95 percent chance that a Navy vessel would strike at least one whale over the 7-year period, and a 79, 56, 34, 17, or 8 percent chance that more than one, two, three, four, or five whales, respectively, would be struck by the Navy over the 7-year period.

The probability analysis concluded that there is a 42 percent chance that a Coast Guard vessel would strike at least one whale over the 7-year period, and a 10 or 1 percent chance that more than one or two whales, respectively, would be struck by the Coast Guard over the 7-year period.

Based on this analysis, the Navy is requesting authorization to take five large whales by serious injury or mortality by vessel strike incidental to Navy training and testing activities, and the Coast Guard is requesting authorization to take two large whales by serious injury or mortality by vessel strike incidental to Coast Guard training activities. NMFS concurs that take by serious injury or mortality by vessel strike of up to five large whales by the Navy and two large whales by the Coast Guard (seven large whales total) could occur over the 7-year regulations and, based on the information provided earlier in this section, NMFS concurs with the Action Proponents' assessment and recognizes the potential for incidental take by vessel strike of large whales only (*i.e.,* no dolphins, small whales (not including large whale calves), porpoises, or pinnipeds) over the course of the 7-year regulations from military readiness activities.

While the Poisson distribution allows the Action Proponents and NMFS to determine the likelihood of vessel strike of all large whales, it does not indicate the likelihood of each strike occurring to a particular species or stock. As described above, the Action Proponents have not always been able to identify the species of large whale struck during previous known vessel strikes. However, based on the information available, the Navy requested authorization for take by serious injury or mortality by vessel strike of five whales, and of those five, no more than the following numbers from these stocks: one blue whale (Eastern North Pacific stock), four fin whales (California/Oregon/Washing (CA/OR/WA) stock), two gray whales (Eastern North Pacific stock), two humpback whale (one each of the Mainland Mexico-CA/OR/WA stock and the Central North Pacific stock), and one sperm whale (Hawaii stock). The Coast Guard requested authorization for take by serious injury or mortality by vessel strike of two whales, and of those two, no more than the following numbers from these stocks: one blue whale (Eastern North Pacific stock), two fin whales (CA/OR/WA stock), two gray whales (Eastern Pacific stock), and two humpback whales (one each of the Mainland Mexico-CA/OR/WA stock and Central North Pacific stock).

After concurring that take of up to seven large whales could occur (five takes by Navy, two by Coast Guard), and in consideration of the Action Proponents' request, NMFS considered which species could be among the seven large whales struck. NMFS conducted an analysis that considered several factors, in addition to the overlap of Navy activities with stock distribution: (1) the relative likelihood of striking one stock versus another based on available strike data from all vessel types as denoted in the SARs, and (2) whether each Action Proponent has ever struck an individual from a particular species or stock in the HCTT Study Area, and if so, how many times.

To address number (1) above, for SOCAL, NMFS compiled information from the 2023 SARs (Carretta *et al.,* 2024, Young *et al.,* 2024) on detected annual rates of large whale M/SI from vessel strike (table 53). (Of note, these data include the strike of two fin whales by the Royal Australian Navy in 2021, but do not include Navy strikes in 2021 and 2023 because the species struck is not known.) The M/SI in the 2023 SAR considers modeled takes (accounting for undetected vessel strike mortality) for some, but not most species and stocks (*i.e.,* M/SI for humpback whale includes modeled takes from Rockwood *et al.* (2017)). Using known strike data for all species and stocks allows NMFS to consider similar metrics for this comparative analysis. (Note that we rely on the M/SI estimates from the 2023 SAR (or draft 2024 SAR, where relevant) in our negligible impact analysis.) We also consider modeled takes of species from Rockwood *et al.* (2017) in table 53. The annual rates of large whale serious injury or mortality from vessel strike reported in the SARs help inform the relative susceptibility of large whale species to vessel strike in HCTT Study Area as recorded systematically over the five-year period used for the SARs. We summed the annual rates of serious injury or mortality from vessel strikes as reported in the SARs (excluding strikes that the SAR indicates occurred outside of the Study Area (*e.g.,* in Alaska)) and then divided each species' annual rate by this sum to get the percentage of total annual strikes for each species/stock (table 53).

TABLE 53—SUMMARY OF FACTORS CONSIDERED IN DETERMINING THE NUMBER OF INDIVIDUALS IN EACH STOCK POTENTIALLY STRUCK BY A VESSEL

Species	Stock	Total known U.S. Navy or Coast Guard strikes in HCTT study area	Rockwood *et al.* (2017) modeled vessel strikes [a]	Annual rate of M/SI from vessel strike [b]	Percentage of total annual strikes	Percent likelihood of 1 strike over 7 years	Percent likelihood of 2 strikes over 7 years	Percent likelihood of 3 strikes over 7 years
Blue whale	Eastern North Pacific.	Navy 2004	18	0.6	6.06	5.76	0.33	0.02
Fin whale	California/Oregon/Washington.	Navy 2009; Navy 2009; Navy 2023 (fin or sei).	43	1.6	16.16	15.35	2.36	0.36
Humpback whale	Mainland Mexico-California-Oregon-Washington.	Coast Guard 2016 (northern California) [c].	22	2.6	26.26	24.95	6.22	1.55
Humpback whale	Central America/Southern Mexico-California-Oregon-Washington.							
Sperm whale	Hawaii	Navy 2007		0.0	0.00	UNK	UNK	UNK
Gray whale	Eastern North Pacific.	Navy 1993; Navy 1998; Navy 1998.		1.8	18.18	17.27	2.98	0.52
Humpback whale	Hawaii	Navy 1998; Navy 2003; Coast Guard 2020.		3.3	33.33	31.67	10.03	3.18
Sei whale	Eastern North Pacific.	Navy 2023 (fin or sei).		0.0	0.0	0.00	0.00	0.00
Sei whale	Hawaii			0.0	0.0	0.00	0.00	0.00
Sperm whale	California/Oregon/Washington.			0.0	0.0	0.00	0.00	0.00
Bryde's whale	Eastern Tropical Pacific.			0.0	0.0	0.00	0.00	0.00
Bryde's whale	Hawaii			0.0	0.0	0.00	0.00	0.00
Minke whale	Hawaii			0.0	0.0	0.00	0.00	0.00
Minke whale	California/Oregon/Washington.			0.0	0.0	0.00	0.00	0.00

[a] Rockwood *et al.* (2017) modeled likely annual vessel strikes off the West Coast for these three species only.
[b] Values are from the most recent stock assessment report (Carretta *et al.,* 2024).
[c] The strike by the Coast Guard in 2016 was in San Francisco Bay, CA, outside the boundary of the HCTT Study Area.

To inform the likelihood of a single action proponent striking a particular species of large whale, we multiplied the percent of total annual strikes for a given species in table 53 by the total percent likelihood of a single action proponent striking at least one whale (*i.e.,* 95 and 42 percent for the Navy and Coast Guard, respectively, as described by the probability analysis above). We also calculated the percent likelihood of a single action proponent striking a particular species of large whale two or three times by squaring or cubing, respectively, the value estimated for the probability of striking a particular species of whale once (*i.e.,* to calculate the probability of an event occurring twice, multiply the probability of the first event by the second). The results of these calculations are reflected in the last three columns of table 53. We note that these probabilities vary from year to year as the average annual mortality changes depending on the specific range of time considered; however, over the years and through updated data in the SARs, stocks tend to consistently maintain a relatively higher or relatively lower likelihood of being struck.

The percent likelihood calculated (as described above) are then considered in combination with the information indicating the known species that the Navy or Coast Guard has struck in the HCTT Study Area since 1991 (since they started tracking consistently) (see table 53). We note that for the lethal take of species specifically denoted in table 53, 47 percent of those struck by the Navy (8 of 17 in the Pacific) remained unidentified (including the May 2023 strike, which as stated above, NMFS and the Navy have determined was of either a fin whale or sei whale), and 20 percent of those struck by the Coast Guard (1 of 5 in the Pacific) remained unidentified. However, given the information on known stocks struck, the analysis below remains appropriate. We also note that Rockwood *et al.* (2017) modeled the likelihood of vessel strike of blue whales, fin whales, and humpback whales on the U.S. West Coast (discussed in more detail in the *Serious Injury or Mortality* subsection of the Preliminary Analysis and Negligible Impact Determination section), and those numbers help inform the relative likelihood that the Navy or Coast Guard could strike those stocks.

Accordingly, stocks that have no record of ever having been struck by any vessel are considered to have a zero percent likelihood of being struck by the Navy or Coast Guard in the 7-year period of the proposed rule. Marine mammal stocks that have never been struck by the Navy or Coast Guard, have rarely been struck by other vessels, and have a low percent likelihood based on the historical vessel strike calculation are also considered to have a zero percent likelihood to be struck by the Navy or Coast Guard during the 7-year rule. We note that while vessel strike records have not differentiated between Eastern North Pacific and Western North Pacific gray whales, given their small population size and the comparative rarity with which individuals from the Western North Pacific stock are detected off the U.S. West Coast, it is highly unlikely that they would be encountered, much less struck. This rules out all but eight stocks. This leaves the following stocks for further analysis: blue whale (Eastern North Pacific stock), fin whale (CA/OR/WA stock), gray whale (Eastern North Pacific stock), humpback whale (Mainland Mexico-CA/OR/WA, Central America/Southern Mexico-CA/OR/WA, and Hawaii stocks), sei whale (Eastern North Pacific stock), and sperm whale (Hawaii stock).

As stated previously, based on available photos and video of the whale struck by the U.S. Navy in Southern

California in 2023, NMFS and the Navy have determined this whale was either a fin whale or sei whale. While the species of the two whales struck by the U.S. Navy in 2021 are unknown, given the following factors, NMFS expects these strikes may have been CA/OR/WA fin whales or Eastern North Pacific gray whales, or some combination of these two stocks. These species have the highest annual rates of M/SI from vessel collision in California (1.6, 1.8, respectively, as noted above). Additionally, gray whale and fin whale have the most recorded vessel strike incidents by military vessels in California and are the only stocks known to have been hit more than one time by naval or Coast Guard vessels in the California portion of the study area (three gray whale strikes by the U.S. Navy (1993, 1998), two or three fin whale strikes by the U.S. Navy (2009, potentially 2023), and two fin whale strikes by the Royal Australian Navy (2021)). Further, accounting for undocumented vessel strikes, Rockwood *et al.* (2021) estimated that in their study area off Southern California from 2012–2018, on average 8.9 blue, 4.6 humpback, and 9.7 fin whales were killed by civilian vessel strikes from June to November each year. In addition, they estimated that, on average, 5.7 humpback whales were killed by civilian vessel strike from January–April per year (Rockwood *et al.* 2021). For fin whales in particular, model-predicted densities of large whales in the Southern California Bight from May to July 2021 (the time period during which the 2021 strikes of two unidentified whales by the U.S. Navy occurred) estimated fin whale abundance as being nearly an order of magnitude higher than either blue or humpback whale abundance during this time period (Becker *et al.* 2020b; Zickel *et al.* 2021). Ship-whale encounter models for the U.S. West Coast Exclusive Economic Zone also indicated that vessel strike mortality estimates for fin whales were significantly higher than for blue whales and humpback whales (Rockwood *et al.* 2017). The comparatively higher modeled vessel strike rates for fin whales result from both the larger population as well as the more offshore distribution that overlaps significantly with several major shipping routes for a much greater spatial extent (Rockwood *et al.* 2017). Based on 1,243 visual boat-based sightings of 2,638 fin whales from 1991–2011, Calambokidis *et al.* (2015) found fin whale concentration areas included the San Clemente Basin where the 2021 Navy vessel strikes occurred. Tanner and Cortes Banks area and the shelf edge west of SNI were also reported as fin whale concentration areas. There are two different populations of fin whales that occur in the Southern California Bight: a seasonal population, and a population that occurs year-round with offshore/inshore movements (Campbell *et al.* 2015; Falcone *et al.* 2022). This would likely make fin whales more susceptible to vessel strike year-round, as compared to other large whale species that may occur seasonally within SOCAL. Therefore, we find that, of the five total takes by serious injury or mortality by vessel strike of large whales proposed for authorization for the Navy over the course of the 7-year rule, up to three of those takes could be of the CA/OR/WA stock of fin whale and up to two could be of the Eastern North Pacific stock of gray whale given that the two strikes of unidentified large whales in 2021 could have been of either stock. Further, we expect that, of the five total takes by serious injury or mortality by vessel strike of large whales proposed for authorization for the Navy, up to two of those takes could occur in Hawaii, and therefore be of individuals of the Hawaii stock of humpback whale. NMFS expects that, of the two total takes by serious injury or mortality by vessel strike of large whales proposed for authorization for the Coast Guard, one of those takes could be of the CA/OR/WA stock of fin whale, Eastern North Pacific stock of gray whale, or Hawaii stock of humpback whale. (Coast Guard struck a humpback whale in Hawaii in 2020.)

For U.S. Navy vessel strikes in California, based on the information summarized in table 53 and the fact that there is the potential for up to five large whales to be struck by the Navy over the 7-year rule, one individual from the Eastern North Pacific stock of blue whale, Mainland Mexico-CA/OR/WA and Central America/Southern Mexico CA/OR/WA stocks of humpback whale, or Eastern North Pacific stock of sei whale could be among the five whales struck. The total strikes of Eastern North Pacific blue whales and the percent likelihood of striking one based on the historic strike calculation above can both be considered moderate compared to other stocks, and the Navy struck a blue whale in 2004 (based on the historic strike calculation, the likelihood of striking two blue whales is well below one percent (table 52)). Therefore, we consider it reasonably likely that the Navy could strike one individual over the course of the 7-year proposed rule. The total strikes of Eastern North Pacific sei whales are low (*i.e.,* 0) compared to other stocks, but NMFS and the Navy think it is possible that the Navy may have struck a sei whale in SOCAL in 2023. Therefore, we consider it reasonably likely that the Navy could strike a sei whale over the period of the rule. The Navy has not struck a humpback whale in the California portion of the HCTT Study Area. However, in 2016 a U.S. Coast Guard vessel struck a humpback whale heading out of San Francisco Bay, and as a species, humpbacks have a high number of total strikes and percent likelihood of being struck. The likelihood of Central America/Southern Mexico-CA/OR/WA (Central America DPS) or Mainland Mexico-CA/OR/WA (Mexico DPS) humpback whales being struck by any vessel type is moderate to high relative to other stocks, and NMFS anticipates that the Navy could strike one individual humpback whale from the Mainland Mexico-CA/OR/WA stock (Mexico DPS) and/or one individual from the Central America/Southern Mexico- CA/OR/WA (Central America DPS) over the 7-year duration of the rule.

For Coast Guard vessel strikes in California, NMFS anticipates that the Coast Guard may potentially strike the same species as listed above for the Navy. Based on the information summarized in table 53 and the fact that there is the potential for up to two large whales to be struck by the Coast Guard over the 7-year rule, one individual from the Eastern North Pacific stock of blue whale, CA/OR/WA stock of fin whale, Mainland Mexico-CA/OR/WA and Central America/Southern Mexico CA/OR/WA stocks of humpback whale, Eastern North Pacific stock of gray whale, or Eastern North Pacific stock of sei whale could be among the two whales struck. While, as noted above, NMFS anticipates that the U.S. Navy is more likely to strike a fin whale than some other stocks, NMFS does not anticipate that the same is true for the Coast Guard, as its vessel traffic is not concentrated in the area where previous known Navy vessel strikes of fin whales have occurred. Given the lower potential total number of vessel strikes by the Coast Guard, NMFS does not anticipate that the Coast Guard is likely to strike more than one of any given species.

For Hawaii stocks, given that all known vessel strikes between 2015 and 2021 were of humpback whales, we anticipate that any vessel strike of a large whale in Hawaii would likely be of the Hawaii stock of humpback whale. Given that this stock has the highest percentage of total annual strikes (33.3 percent) and a 10.3 percent chance of being struck twice over the effective period of the rule, NMFS is proposing to authorize two lethal takes of Hawaii humpback whales for the Navy and one for the Coast Guard. NMFS also anticipates that the Navy may strike up to one Hawaii sperm whale given the 2007 sperm whale strike. Given the already lower likelihood of striking the Hawaii stock of sperm whales, the relatively lower vessel activity in the Hawaii portion of the HCTT Study Area, and the relatively lower Coast Guard vessel traffic compared to Navy vessel traffic, NMFS neither anticipates, nor proposes to authorize, a Coast Guard strike of this stock.

As described above, the Navy's analysis suggests and NMFS' analysis concurs that the likelihood of vessel strikes to the stocks below is discountable due to the stocks' relatively low occurrence in the HCTT Study Area, particularly in core HCTT training and testing subareas, and the fact that the stocks have not been struck by the Navy and are rarely, if ever, recorded struck by other vessels. Therefore, NMFS is not authorizing lethal take for the following stocks: blue whale (Central North Pacific stock), Bryde's whale (Eastern Tropical Pacific stock and Hawaii stock), fin whale (Hawaii stock), gray whale (Western North Pacific stock), minke whale (CA/OR/WA stock and Hawaii stock), sei whale (Hawaii stock), and sperm whale (CA/OR/WA stock).

Also of note, while information on past Navy vessel strikes can serve as a reasonable indicator of future vessel strike risk, future conditions may differ from the past in ways that could influence the likelihood of a large whale vessel strike occurring. In general, the magnitude of vessel strike risk may be increasing over time as many whale populations are gradually recovering from centuries of commercial whaling (Redfern *et al.* 2020). Increased vessel strike risk off California in recent decades has been associated with increases in the abundance of fin and humpback whale populations in the North Pacific (Redfern *et al.* 2020). It has also been suggested that the blue whale population in the Eastern North Pacific, inclusive of the California portion of the HCTT Study Area, is at carrying capacity and recovered to pre-whaling levels (Monnahan *et al.* 2014). In addition, the magnitude of risk may also be affected by shifts in whale distributions over time in response to environmental factors including marine heatwaves and associated changes in prey distribution.

Historically, military vessel strikes of large whales within the HCTT Study Area have been rare events with only eight such strikes occurring over the past 14 years, five U.S. Navy strikes, one Coast Guard strike, and two Royal Australian Navy strikes. However, the fact that four of these strikes occurred within a 3-month period (May–July) in 2021, and two occurred within a 4-month period (February–May) in 2009, suggests that military vessel strikes in California can be both highly episodic and clustered. The four large whale strikes in 2021 (two strikes of unidentified large whales by the U.S. Navy and two fin whale strikes by the Royal Australian Navy) appear to be outliers in the time series of military vessel strikes in SOCAL for that period. Particularly in consideration of the 2023 U.S. Navy strike, these strikes could also represent an early indicator of an increased military vessel strike risk within SOCAL based on the factors discussed above. Results from a survey of whale watching vessel operators and crew in Southern California, combined with remote sensing data in the area, suggest that the number of large whales may have been greater in May through July of 2021 compared with previous years in certain high military vessel traffic and "core" use HCTT areas off southern California, particularly farther offshore as well as closer to shore off San Diego Bay (Zickel *et al.,* 2021).

In conclusion, while take by vessel strike across any given year is sporadic, based on the information and analysis above, including consideration of the 2021 and 2023 strikes by the U.S. Navy, NMFS anticipates no more than seven takes of large whales by M/SI could occur over the 7-year period of the rule (no more than five by Navy, no more than two by Coast Guard). Of those seven whales over the 7-years, no more than four may come from the CA/OR/WA stock of fin whale. No more than three may come from the following stocks: gray whale (Eastern North Pacific stock); and humpback whale (Hawaii stock). No more than two may come from the following stocks: blue whale (Eastern North Pacific stock); sei whale (Eastern North Pacific); and humpback whale (Mainland Mexico-CA/OR/WA and Central America/Southern Mexico-CA/OR/WA stocks (Mexico and Central America DPSs, respectively)). No more than one may come from the Hawaii stock of sperm whale. (Note that these species and stock conclusions vary slightly from that requested by Navy and Coast Guard.) Accordingly, NMFS has evaluated under the negligible impact standard the M/SI of 0.14, 0.29, 0.43, or 0.57 whales annually from each of these species or stocks (*i.e.,* one, two, three, or four takes, respectively, divided by 7 years to get the annual number), along with the expected incidental takes by harassment.

Summary of Requested Take From Military Readiness Activities

Table 54 and table 55 summarize the Action Proponents' take proposed by harassment type and effect type, respectively.

TABLE 54—TOTAL ANNUAL AND 7-YEAR INCIDENTAL TAKE PROPOSED BY STOCK DURING ALL ACTIVITIES BY HARASSMENT TYPE

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-Year total Level B harassment	7-Year total Level A harassment	7-Year total mortality
Gray Whale	Eastern North Pacific	16,711	167	0.43	87,292	1,010	3
Gray Whale	Western North Pacific	169	2	0	852	5	0
Blue Whale	Central North Pacific	92	1	0	524	2	0
Blue Whale	Eastern North Pacific	4,571	27	0.29	24,808	150	2
Bryde's Whale	Eastern Tropical Pacific	322	5	0	1,874	14	0
Bryde's Whale	Hawaii	409	3	0	2,356	11	0
Fin Whale	Hawaii	86	1	0	487	1	0
Fin Whale	California/Oregon/Washington	13,501	55	0.57	68,558	300	4
Humpback Whale	Central America/Southern Mexico-California/Oregon/Washington.	1,888	19	0.29	9,898	96	2
Humpback Whale	Mainland Mexico-California/Oregon/Washington.	4,449	44	0.29	23,370	220	2
Humpback Whale	Hawaii	3,034	24	0.43	18,945	151	3
Minke Whale	Hawaii	296	3	0	1,698	13	0

TABLE 54—TOTAL ANNUAL AND 7-YEAR INCIDENTAL TAKE PROPOSED BY STOCK DURING ALL ACTIVITIES BY HARASSMENT TYPE—Continued

Species	Stock	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	7-Year total Level B harassment	7-Year total Level A harassment	7-Year total mortality
Minke Whale	California/Oregon/Washington	2,993	32	0	16,116	193	0
Sei Whale	Hawaii	253	2	0	1,437	5	0
Sei Whale	Eastern North Pacific	302	3	0.29	1,611	9	2
Sperm Whale	Hawaii	1,649	1	0.14	9,619	1	1
Sperm Whale	California/Oregon/Washington	3,891	3	0	20,606	5	0
Dwarf Sperm Whale	Hawaii	45,224	915	0	262,401	5,103	0
Dwarf Sperm Whale	California/Oregon/Washington	5,664	94	0	30,093	517	0
Pygmy Sperm Whale	Hawaii	45,787	936	0	265,322	5,221	0
Pygmy Sperm Whale	California/Oregon/Washington	5,615	107	0	29,868	609	0
Baird's Beaked Whale	California/Oregon/Washington	10,174	0	0	56,149	0	0
Blainville's Beaked Whale	Hawaii	7,542	0	0	46,004	0	0
Goose-Beaked Whale	Hawaii	30,359	0	0	185,039	0	0
Goose-Beaked Whale	California/Oregon/Washington	166,816	2	0	939,012	4	0
Longman's Beaked Whale	Hawaii	18,316	1	0	112,152	4	0
Mesoplodont Beaked Whale	California/Oregon/Washington	92,839	2	0	520,938	6	0
False Killer Whale	Main Hawaiian Islands Insular	169	0	0	1,009	0	0
False Killer Whale	Northwest Hawaiian Islands	191	0	0	1,165	0	0
False Killer Whale	Hawaii Pelagic	1,670	1	0	9,865	1	0
False Killer Whale	Baja California Peninsula Mexico	2,537	2	0	13,888	2	0
Killer Whale	Hawaii	127	0	0	733	0	0
Killer Whale	Eastern North Pacific Offshore	1,023	4	0	6,089	23	0
Killer Whale	West Coast Transient	55	0	0	261	0	0
Melon-Headed Whale	Hawaiian Islands	31,456	13	0	183,773	68	0
Melon-Headed Whale	Kohala Resident (Hawaii)	56	0	0	332	0	0
Pygmy Killer Whale	Hawaii	8,895	3	0	52,059	8	0
Pygmy Killer Whale	California—Baja California Peninsula Mexico.	795	0	0	4,358	0	0
Short-Finned Pilot Whale	Hawaii	17,304	7	0	104,772	26	0
Short-Finned Pilot Whale	California/Oregon/Washington	4,279	11	0.57	24,532	56	4
Bottlenose Dolphin	Maui Nui	326	0	0	2,151	0	0
Bottlenose Dolphin	Hawaii Island	9	0	0	44	0	0
Bottlenose Dolphin	Hawaii Pelagic	43,313	25	0.29	287,119	163	2
Bottlenose Dolphin	Kaua'i/Ni'ihau	1,460	0	0	9,314	0	0
Bottlenose Dolphin	O'ahu	7,232	6	0.14	50,375	30	1
Bottlenose Dolphin	California Coastal	1,350	7	0	8,761	42	0
Bottlenose Dolphin	California/Oregon/Washington Offshore.	28,058	15	0	157,628	83	0
Fraser's Dolphin	Hawaii	35,480	8	0	210,526	34	0
Long-Beaked Common Dolphin	California	296,878	152	2.43	1,804,793	952	17
Northern Right Whale Dolphin	California/Oregon/Washington	45,514	21	0.14	224,039	96	1
Pacific White-Sided Dolphin	California/Oregon/Washington	69,210	42	0.29	361,049	242	2
Pantropical Spotted Dolphin	Maui Nui	2,373	4	0	15,192	18	0
Pantropical Spotted Dolphin	Hawaii Island	6,024	7	0	35,584	25	0
Pantropical Spotted Dolphin	Hawaii Pelagic	44,390	19	0	262,155	81	0
Pantropical Spotted Dolphin	O'ahu	6,426	6	0	44,200	23	0
Pantropical Spotted Dolphin	Baja California Peninsula Mexico	97,626	47	0.29	535,681	239	2
Risso's Dolphin	Hawaii	6,558	4	0	38,040	5	0
Risso's Dolphin	California/Oregon/Washington	43,833	21	0	240,847	125	0
Rough-Toothed Dolphin	Hawaii	96,873	36	0.29	587,819	196	2
Short-Beaked Common Dolphin	California/Oregon/Washington	2,169,554	877	15.29	11,804,423	5,075	107
Spinner Dolphin	Hawaii Pelagic	4,544	2	0	26,539	4	0
Spinner Dolphin	Hawaii Island	110	1	0	644	1	0
Spinner Dolphin	Kaua'i/Ni'ihau	4,446	2	0	28,334	6	0
Spinner Dolphin	O'ahu/4 Islands Region	1,201	1	0	8,205	2	0
Striped Dolphin	Hawaii Pelagic	37,782	12	0	219,594	52	0
Striped Dolphin	California/Oregon/Washington	133,399	44	0.14	724,174	231	1
Dall's Porpoise	California/Oregon/Washington	59,619	1,237	0	305,432	6,786	0
Harbor Porpoise	Monterey Bay	2,179	0	0	10,934	0	0
Harbor Porpoise	Morro Bay	4,373	88	0	26,316	590	0
Harbor Porpoise	Northern California/Southern Oregon	481	0	0	2,339	0	0
Harbor Porpoise	San Francisco/Russian River	9,960	26	0	48,900	169	0
California Sea Lion	U.S.	1,899,749	723	3.86	10,628,139	4,572	27
Guadalupe Fur Seal	Mexico	347,553	54	0.14	1,900,834	300	1
Northern Fur Seal	Eastern Pacific	33,195	12	0	158,796	55	0
Northern Fur Seal	California	22,098	10	0	106,298	47	0
Steller Sea Lion	Eastern	999	3	0	5,346	13	0
Harbor Seal	California	71,463	261	1.00	391,189	1,642	7
Hawaiian Monk Seal	Hawaii	1,104	6	0	7,380	25	0
Northern Elephant Seal	California Breeding	118,514	111	0	626,540	645	0

Note: The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

TABLE 55—TOTAL ANNUAL AND 7-YEAR INCIDENTAL TAKE PROPOSED BY STOCK DURING ALL ACTIVITIES BY EFFECT TYPE

Species	Stock	Maximum annual behavioral	Maximum annual TTS	Maximum annual AUD INJ	Maximum annual non-auditory injury	Maximum annual mortality	Maximum 7-year behavioral	Maximum 7-year TTS	Maximum 7-year AUD INJ	Maximum 7-year non-auditory injury	Maximum 7-year mortality
Gray Whale	Eastern North Pacific	7,151	9,560	167	0	0.43	43,599	43,693	1,010	0	3
Gray Whale	Western North Pacific	72	97	2	0	0	434	418	5	0	0
Blue Whale	Central North Pacific	17	75	1	0	0	92	432	2	0	0
Blue Whale	Eastern North Pacific	1,447	3,124	27	0	0.29	8,513	16,295	150	0	2
Bryde's Whale	Eastern Tropical Pacific	111	211	5	0	0	664	1,210	14	0	0
Bryde's Whale	Hawaii	68	341	3	0	0	392	1,964	11	0	0
Fin Whale	Hawaii	21	65	1	0	0	113	374	1	0	0
Fin Whale	California/Oregon/Washington	3,704	9,797	54	1	0.57	21,366	47,192	299	1	4
Humpback Whale	Central America/Southern Mexico-California/Oregon/Washington.	547	1,341	19	0	0.29	3,305	6,593	96	0	2
Humpback Whale	Mainland Mexico-California/Oregon/Washington.	1,274	3,175	43	1	0.29	7,701	15,669	219	1	2
Humpback Whale	Hawaii	1227	1,807	24	0	0.43	7,828	11,117	151	0	3
Minke Whale	Hawaii	44	252	3	0	0	259	1,439	13	0	0
Minke Whale	California/Oregon/Washington	942	2,051	32	0	0	5,735	10,381	193	0	0
Sei Whale	Hawaii	38	215	2	0	0	227	1,210	5	0	0
Sei Whale	Eastern North Pacific	83	219	3	0	0.29	487	1,124	9	0	2
Sperm Whale	Hawaii	1237	412	1	0	0.14	7,313	2,306	1	0	1
Sperm Whale	California/Oregon/Washington	2,999	892	3	0	0	16,304	4,302	5	0	0
Dwarf Sperm Whale	Hawaii	10,880	34,344	914	1	0	67,933	194,468	5,102	1	0
Dwarf Sperm Whale	California/Oregon/Washington	1,505	4,159	94	0	0	8,583	21,510	517	0	0
Pygmy Sperm Whale	Hawaii	10,954	34,833	935	1	0	68,237	197,085	5,220	1	0
Pygmy Sperm Whale	California/Oregon/Washington	1549	4,066	107	0	0	8,830	21,038	609	0	0
Baird's Beaked Whale	California/Oregon/Washington	10,112	62	0	0	0	55,858	291	0	0	0
Blainville's Beaked Whale	Hawaii	7,508	34	0	0	0	45,810	194	0	0	0
Goose-Beaked Whale	Hawaii	30230	129	0	0	0	184,319	720	0	0	0
Goose-Beaked Whale	California/Oregon/Washington	166,204	612	2	0	0	936,000	3,012	4	0	0
Longman's Beaked Whale	Hawaii	18,219	97	1	0	0	111,612	540	4	0	0
Mesoplodont Beaked Whale	California/Oregon/Washington	92,419	420	2	0	0	518,892	2,046	6	0	0
False Killer Whale	Main Hawaiian Islands Insular	105	64	0	0	0	637	372	0	0	0
False Killer Whale	Northwest Hawaiian Islands	128	63	0	0	0	775	390	0	0	0
False Killer Whale	Hawaii Pelagic	936	734	1	0	0	5,719	4,146	1	0	0
False Killer Whale	Baja California Peninsula Mexico *.	1,710	827	2	0	0	9,540	4,348	2	0	0
Killer Whale	Hawaii	57	70	0	0	0	337	396	0	0	0
Killer Whale	Eastern North Pacific Offshore	830	193	4	0	0	5,053	1,036	23	0	0
Killer Whale	West Coast Transient	27	28	0	0	0	137	124	0	0	0
Melon-Headed Whale	Hawaiian Islands	16187	15,269	13	0	0	98,220	85,553	68	0	0
Melon-Headed Whale	Kohala Resident (Hawaii)	41	15	0	0	0	250	82	0	0	0
Pygmy Killer Whale	Hawaii	4,654	4,241	3	0	0	28,302	23,757	8	0	0
Pygmy Killer Whale	California-Baja California Peninsula Mexico *.	622	173	0	0	0	3,499	859	0	0	0
Short-Finned Pilot Whale	Hawaii	11626	5,678	6	1	0	72,315	32,457	25	1	0
Short-Finned Pilot Whale	California/Oregon/Washington	3,353	926	9	2	0.57	19,691	4,841	44	12	4
Bottlenose Dolphin	Maui Nui	309	17	0	0	0	2,049	102	0	0	0
Bottlenose Dolphin	Hawaii Island	5	4	0	0	0	27	17	0	0	0
Bottlenose Dolphin	Hawaii Pelagic	37284	6,029	23	2	0.29	251,065	36,054	151	12	2
Bottlenose Dolphin	Kauaʻi/Niʻihau	1,221	239	0	0	0	7,657	1,657	0	0	0
Bottlenose Dolphin	Oʻahu	7,108	124	5	1	0.14	49,565	810	27	3	1
Bottlenose Dolphin	California Coastal	1,306	44	6	1	0	8,502	259	41	1	0
Bottlenose Dolphin	California/Oregon/Washington Offshore.	21232	6,826	14	1	0	122,030	35,598	80	3	0
Fraser's Dolphin	Hawaii	19,854	15,626	6	2	0	122,248	88,278	32	2	0
Long-Beaked Common Dolphin	California	253,952	42,926	128	24	2.43	1,588,795	215,998	804	148	17
Northern Right Whale Dolphin	California/Oregon/Washington	23867	21,647	19	2	0.14	125,984	98,055	90	6	1
Pacific White-Sided Dolphin	California/Oregon/Washington	45,571	23,639	38	4	0.29	254,280	106,769	218	24	2
Pantropical Spotted Dolphin	Maui Nui	2,191	182	4	0	0	14,107	1,085	18	0	0
Pantropical Spotted Dolphin	Hawaii Island	2902	3,122	6	1	0	17,820	17,764	23	2	0

Pantropical Spotted Dolphin	Hawaii Pelagic	24231	20,159	16	3	0	148,329	113,826	77	4	0
Pantropical Spotted Dolphin	O'ahu	6,255	171	5	1	0	43,081	1,119	22	1	0
Pantropical Spotted Dolphin	Baja California Peninsula Mexico*	60,809	36,817	45	2	0.29	341,397	194,284	232	7	2
Risso's Dolphin	Hawaii	3,564	2,994	4	0	0	21,364	16,676	5	0	0
Risso's Dolphin	California/Oregon/Washington	33,191	10,642	17	4	0	188,061	52,786	107	18	0
Rough-Toothed Dolphin	Hawaii	57947	38,926	31	5	0.29	367,021	220,798	175	21	2
Short-Beaked Common Dolphin	California/Oregon/Washington	1,499,861	669,693	806	71	15.29	8,473,412	3,331,011	4,634	441	107
Spinner Dolphin	Hawaii Pelagic	2,177	2,367	2	0	0	13,145	13,394	4	0	0
Spinner Dolphin	Hawaii Island	60	50	1	0	0	362	282	1	0	0
Spinner Dolphin	Kaua'i/Ni'ihau	3,561	885	2	0	0	22,186	6,148	6	0	0
Spinner Dolphin	O'ahu/4 Islands Region	1,156	45	1	0	0	7,942	263	2	0	0
Striped Dolphin	Hawaii Pelagic	18,620	19162	10	2	0	112,710	106,884	48	4	0
Striped Dolphin	California/Oregon/Washington	81,046	52,353	42	2	0.14	453,209	270,965	222	9	1
Dall's Porpoise	California/Oregon/Washington	13,394	46,225	1,235	2	0	76,921	228,511	6,781	5	0
Harbor Porpoise	Monterey Bay	2,179	0	0	0	0	10,934	0	0	0	0
Harbor Porpoise	Morro Bay	4,152	221	87	1	0	24,909	1,407	588	2	0
Harbor Porpoise	Northern California/Southern Oregon.	481	0	0	0	0	2,339	0	0	0	0
Harbor Porpoise	San Francisco/Russian River	9,898	62	26	0	0	48,554	346	169	0	0
California Sea Lion	U.S	1,638,285	261464	666	57	3.86	9,421,167	1,206,972	4,203	369	27
Guadalupe Fur Seal	Mexico	266199	81,354	51	3	0.14	1,491,214	409,620	284	16	1
Northern Fur Seal	Eastern Pacific	23105	10,090	11	1	0	114,217	44,579	53	2	0
Northern Fur Seal	California	15853	6,245	9	1	0	78,553	27,745	44	3	0
Steller Sea Lion	Eastern	837	162	3	0	0	4,601	745	13	0	0
Harbor Seal	California	52,154	19,309	254	7	1.00	286,337	104,852	1,598	44	7
Hawaiian Monk Seal	Hawaii	906	198	5	1	0	6,149	1231	24	1	0
Northern Elephant Seal	California Breeding	65,095	53,419	109	2	0	379,380	247,160	643	2	0

Note: Zero (0) impacts indicate total less than 0.5 and a dash (-) is a true zero. In some cases where the estimated take within a cell is equal to 1, that value has been rounded up from a value that is less than 0.5 to avoid underestimating potential impacts to a species or stock based on the 7-year rounding rules discussed in section 2.4 of appendix E (Explosive and Acoustic Analysis Report) of the 2024 HCTT Draft EIS/OEIS.

* The Baja California Peninsula Mexico and California—Baja California Peninsula Mexico populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta *et al.,* 2024), but separate density estimates were derived to support the Navy's analysis.

Proposed Mitigation Measures

Under section 101(a)(5)(A) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable adverse impact on the species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for subsistence uses (''least practicable adverse impact''). NMFS does not have a regulatory definition for least practicable adverse impact. The 2004 NDAA amended the MMPA as it relates to military readiness activities and the incidental take authorization process such that a determination of ''least practicable adverse impact'' shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity. For additional discussion of NMFS' interpretation of the least practicable adverse impact standard, see the Mitigation Measures section of the Gulf of Alaska Study Area final rule (88 FR 604, January 4, 2023).

Implementation of Least Practicable Adverse Impact Standard

Here, we discuss how we determine whether a measure or set of measures meets the ''least practicable adverse impact'' standard. Our separate analysis of whether the take anticipated to result from the Action Proponents' activities meets the ''negligible impact'' standard appears in the Preliminary Analysis and Negligible Impact Determination section below.

Our evaluation of potential mitigation measures includes consideration of two primary factors: (1) The manner in which, and the degree to which, implementation of the potential measure(s) is expected to reduce adverse impacts to marine mammal species or stocks, their habitat, or their availability for subsistence uses (where relevant). This analysis considers such things as the nature of the potential adverse impact (*e.g.,* likelihood, scope, and range), the likelihood that the measure will be effective if implemented, and the likelihood of successful implementation. (2) The practicability of the measure(s) for applicant implementation. Practicability of implementation may consider such things as cost, impact on activities, and, in the case of a military readiness activity, specifically considers personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

While the language of the least practicable adverse impact standard calls for minimizing impacts to affected species or stocks, we recognize that the reduction of impacts to those species or stocks accrues through the application of mitigation measures that limit impacts to individual animals. Accordingly, NMFS' analysis focuses on measures that are designed to avoid or minimize impacts on individual marine mammals that are more likely to increase the probability or severity of population-level effects.

While direct evidence of impacts to species or stocks from a specified activity is rarely available, and additional study is still needed to understand how specific disturbance events affect the fitness of individuals of certain species, there have been improvements in understanding the process by which disturbance effects are translated to the population. With recent scientific advancements (both marine mammal energetic research and the development of energetic frameworks), the relative likelihood or degree of impacts on species or stocks may often be inferred given a detailed understanding of the activity, the environment, and the affected species or stocks—and the best available science has been used here. This same information is used in the development of mitigation measures and helps us understand how mitigation measures contribute to lessening effects (or the risk thereof) to species or stocks. We also acknowledge that there is always the potential that new information, or a new recommendation, could become available in the future and necessitate reevaluation of mitigation measures (which may be addressed through adaptive management) to see if further reductions of population impacts are possible and practicable.

In the evaluation of specific measures, the details of the specified activity will necessarily inform each of the two primary factors discussed above (expected reduction of impacts and practicability) and are carefully considered to determine the types of mitigation that are appropriate under the least practicable adverse impact standard. Analysis of how a potential mitigation measure may reduce adverse impacts on a marine mammal stock or species, consideration of personnel safety, practicality of implementation, and consideration of the impact on effectiveness of military readiness activities are not issues that can be meaningfully evaluated through a yes/no lens. The manner in which, and the degree to which, implementation of a measure is expected to reduce impacts, as well as its practicability in terms of these considerations, can vary widely. For example, a time/area restriction could be of very high value for decreasing population-level impacts (*e.g.,* avoiding disturbance of feeding females in an area of established biological importance) or it could be of lower value (*e.g.,* decreased disturbance in an area of high productivity but of less biological importance). Regarding practicability, a measure might involve restrictions in an area or time that impede the Navy's ability to certify a strike group (higher impact on mission effectiveness), or it could mean delaying a small in-port training event by 30 minutes to avoid exposure of a marine mammal to injurious levels of sound (*i.e.,* lower impact). A responsible evaluation of ''least practicable adverse impact'' will consider the factors along these realistic scales. Accordingly, the greater the likelihood that a measure will contribute to reducing the probability or severity of adverse impacts to the species or stock or its habitat, the greater the weight that measure is given when considered in combination with practicability to determine the appropriateness of the mitigation measure, and vice versa. We discuss consideration of these factors in greater detail below.

1. Reduction of adverse impacts to marine mammal species or stocks and their habitat.

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

The ultimate impact on any individual from a disturbance event (which informs the likelihood of adverse species- or stock-level effects) is dependent on the circumstances and associated contextual factors, such as duration of exposure to stressors. Though any proposed mitigation needs to be evaluated in the context of the specific activity and the species or stocks affected, measures with the following types of effects have greater value in reducing the likelihood or severity of adverse species- or stock-level impacts: avoiding or minimizing injury or mortality; limiting interruption of known feeding, breeding, mother/young, or resting behaviors; minimizing the abandonment of important habitat (temporally and spatially); minimizing the number of individuals subjected to these types of disruptions; and limiting degradation of habitat. Mitigating these types of effects is intended to reduce the likelihood that the activity will result in energetic or other types of impacts that are more likely to result in reduced reproductive success or survivorship. It is also important to consider the degree of impacts that are expected in the absence of mitigation in order to assess the added value of any potential measures. Finally, because the least practicable adverse impact standard gives NMFS discretion to weigh a variety of factors when determining appropriate mitigation measures and because the focus of the standard is on reducing impacts at the species or stock level, the least practicable adverse impact standard does not compel mitigation for every kind of take, or every individual taken, if that mitigation is unlikely to meaningfully contribute to the reduction of adverse impacts on the species or stock and its habitat, even when practicable for implementation by the applicant.

The status of the species or stock is also relevant in evaluating the appropriateness of potential mitigation measures in the context of least practicable adverse impact. The following are examples of factors that may, alone or in combination, result in greater emphasis on the importance of a mitigation measure in reducing impacts on a species or stock: the stock is known to be decreasing or status is unknown, but believed to be declining; the known annual mortality (from any source) is approaching or exceeding the PBR level (as defined in MMPA section 3(20)); the affected species or stock is a small, resident population; or the stock is involved in a UME or has other known vulnerabilities (*e.g.,* recovering from an oil spill).

Habitat mitigation, particularly as it relates to rookeries, mating grounds, and areas of similar significance, is also relevant to achieving the standard and can include measures such as reducing impacts of the activity on known prey utilized in the activity area or reducing impacts on physical habitat. As with species- or stock-related mitigation, the emphasis given to a measure's ability to reduce impacts on a species or stock's habitat considers the degree, likelihood, and context of the anticipated reduction of impacts to habitat. Because habitat value is informed by marine mammal presence and use, in some cases there may be overlap in measures for the species or stock and for use of habitat.

We consider available information indicating the likelihood of any measure to accomplish its objective. If evidence shows that a measure has not typically been effective nor successful, then either that measure should be modified or the potential value of the measure to reduce effects should be lowered.

2. Practicability.

Factors considered may include cost, impact on activities, and, in the case of a military readiness activity, will include personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity (see 16 U.S.C. 1371(a)(5)(A)(iii)).

Assessment of Mitigation Measures for the HCTT Study Area

NMFS has fully reviewed the specified activities and the mitigation measures included in the application and the 2024 HCTT Draft EIS/OEIS to determine if the mitigation measures would result in the least practicable adverse impact on marine mammals and their habitat. NMFS worked with the Action Proponents in the development of their initially proposed measures, which are informed by years of implementation and monitoring. A complete discussion of the Action Proponents' evaluation process used to develop, assess, and select mitigation measures, which was informed by input from NMFS, can be found in chapter 5 (Mitigation) and appendix K (Geographic Mitigation Assessment) of the 2024 HCTT Draft EIS/OEIS. The process described in chapter 5 (Mitigation) and appendix A (Activity Descriptions) of the 2024 HCTT Draft EIS/OEIS robustly supported NMFS' independent evaluation of whether the mitigation measures would meet the least practicable adverse impact standard. The Action Proponents would be required to implement the mitigation measures identified in this proposed rule for the full 7 years to avoid or reduce potential impacts from acoustic, explosive, and physical disturbance and strike stressors.

As a general matter, where an applicant proposes measures that are likely to reduce impacts to marine mammals, the fact that they are included in the application indicates that the measures are practicable, and it is not necessary for NMFS to conduct a detailed analysis of the measures the applicant proposed (rather, they are simply included). However, it is still necessary for NMFS to consider whether there are additional practicable measures that would meaningfully reduce the probability or severity of impacts that could affect reproductive success or survivorship.

The Action Proponents have agreed to mitigation measures that would reduce the probability and/or severity of impacts expected to result from acute exposure to acoustic sources or explosives, vessel strike, and impacts to marine mammal habitat. Specifically, the Action Proponents would use a combination of delayed starts, powerdowns, and shutdowns to avoid mortality or serious injury, minimize the likelihood or severity of AUD INJ or non-auditory injury, and reduce instances of TTS or more severe behavioral disturbance caused by acoustic sources or explosives. The Action Proponents would also implement multiple time/area restrictions that would reduce take of marine mammals in areas or at times where they are known to engage in important behaviors (*e.g.,* calving, where the disruption of those behaviors would have a higher probability of resulting in impacts on reproduction or survival of individuals that could lead to population-level impacts.

The Action Proponents assessed the practicability of the proposed measures in the context of personnel safety, practicality of implementation, and their impacts on the Action Proponents' ability to meet their Congressionally mandated requirements and found that the measures are supportable. As described in more detail below, NMFS has independently evaluated the measures the Action Proponents proposed in the manner described earlier in this section (*i.e.,* in consideration of their ability to reduce adverse impacts on marine mammal species and their habitat and their practicability for implementation). We have determined that the measures would significantly reduce impacts on the affected marine mammal species and stocks and their habitat and, further, be practicable for implementation by the Action Proponents. We have preliminarily determined that the mitigation measures assure that the Action Proponents' activities would have the least practicable adverse impact on the species or stocks and their habitat.

The Action Proponents also evaluated numerous measures in the 2024 HCTT Draft EIS/OEIS that were not included in the application, and NMFS independently reviewed and preliminarily concurs with the Action Proponents' analysis that their inclusion was not appropriate under the least practicable adverse impact standard based on our assessment. The Action Proponents considered these additional potential mitigation measures in the context of the potential benefits to marine mammals and whether they are practical or impractical.

Section 5.9 (Measures Considered but Eliminated) of chapter 5 (Mitigation) of the 2024 HCTT Draft EIS/OEIS, includes an analysis of an array of different types of mitigation that have been recommended over the years by non-governmental organizations or the public, through scoping or public comment on environmental compliance documents. These recommendations generally fall into three categories, discussed below: reduction of activity; activity-based operational measures; and time/area limitations.

As described in section 5.9 (Measures Considered but Eliminated) of the 2024 HCTT Draft EIS/OEIS, the Action Proponents considered reducing the overall amount of training, reducing explosive use, modifying sound sources, completely replacing live training with computer simulation, and including time of day restrictions. Many of these mitigation measures could potentially reduce the number of marine mammals taken via direct reduction of the activities or amount of sound energy put in the water. However, as described in chapter 5 (Mitigation) of the 2024 HCTT Draft EIS/OEIS, the Action Proponents need to train in the conditions in which they fight—and these types of modifications fundamentally change the activity in a manner that would not support the purpose and need for the training (*i.e.,* are entirely impracticable) and therefore are not considered further. NMFS finds the Action Proponents' explanation of why adoption of these recommendations would unacceptably undermine the purpose of the training persuasive. After independent review, NMFS finds the Action Proponents' judgment on the impacts of these potential mitigation measures to personnel safety, practicality of implementation, and the effectiveness of training persuasive, and for these reasons, NMFS finds that these measures do not meet the least practicable adverse impact standard because they are not practicable.

In chapter 5 (Mitigation) of the 2024 HCTT Draft EIS/OEIS, the Action Proponents also evaluated additional potential activity—based mitigation measures, including increased mitigation zones, ramp-up measures, additional passive acoustic and visual monitoring, and decreased vessel speeds. Some of these measures have the potential to incrementally reduce take to some degree in certain circumstances, though the degree to which this would occur is typically low or uncertain. However, as described in the Action Proponents' analysis, the measures would have significant direct negative effects on mission effectiveness and are considered impracticable. NMFS independently reviewed the Action Proponents' evaluation and concurs with this assessment, which supports NMFS' preliminary findings that the impracticability of this additional mitigation would greatly outweigh any potential minor reduction in marine mammal impacts that might result; therefore, these additional mitigation measures are not warranted.

Lastly, chapter 5 (Mitigation) of the 2024 HCTT Draft EIS/OEIS also describes a comprehensive analysis of potential geographic mitigation that includes consideration of both a biological assessment of how the potential time/area limitation would benefit the species and its habitat (*e.g.,* is a key area of biological importance or would result in avoidance or reduction of impacts) in the context of the stressors of concern in the specific area and an operational assessment of the practicability of implementation (*e.g.,* including an assessment of the specific importance of an area for training, considering proximity to training ranges and emergency landing fields and other issues). In some cases, potential benefits to marine mammals were non-existent, while in others the consequences on mission effectiveness were too great.

NMFS has reviewed the Action Proponents' analysis in chapter 5 (Mitigation) and appendix A (Activity Descriptions) of the 2024 HCTT Draft EIS/OEIS, which consider the same factors that NMFS considers to satisfy the least practicable adverse impact standard, and concurs with the analysis and conclusions. Therefore, NMFS is not proposing to include any of the measures that the Action Proponents ruled out in the 2024 HCTT Draft EIS/OEIS. Below are the mitigation measures that NMFS has preliminarily determined would ensure the least practicable adverse impact on all affected species and their habitat, including the specific considerations for military readiness activities. Table 56 describes the information designed to aid Lookouts and other applicable personnel with their observation, environmental compliance, and reporting responsibilities. The following sections describe the mitigation measures that would be implemented in association with the activities analyzed in this document. The mitigation measures are organized into two categories: activity-based mitigation and geographic mitigation areas.

Of note, according to the U.S. Navy, consistent with customary international law, when a foreign military vessel participates in a U.S. Navy exercise within the U.S. territorial sea (*i.e.,* 0 to 12 nmi (0 to 22.2 km) from shore), the U.S. Navy will request that the foreign vessel follow the U.S. Navy's mitigation measures for that particular event. When a foreign military vessel participates in a U.S. Navy exercise beyond the U.S. territorial sea but within the U.S. Exclusive Economic Zone, the U.S. Navy will encourage the foreign vessel to follow the U.S. Navy's mitigation measures for that particular event (Navy 2022a; Navy 2022b). In either scenario (*i.e.,* both within and beyond the territorial sea), U.S. Navy personnel will provide the foreign vessels participating with a description of the mitigation measures to follow.

TABLE 56—ENVIRONMENTAL AWARENESS AND EDUCATION

Stressor or Activity: All training and testing activities, as applicable.
Requirements: Navy personnel (including civilian personnel) involved in mitigation and training or testing activity reporting under the specified activities must complete one or more modules of the U.S. Navy Afloat Environmental Compliance Training Series, as identified in their career path training plan. Modules include: • Introduction to Afloat Environmental Compliance Training Series. The introductory module provides information on environmental laws (*e.g.,* ESA, MMPA) and the corresponding responsibilities that are relevant to military readiness activities. The material explains why environmental compliance is important in supporting the Action Proponents' commitment to environmental stewardship. • Marine Species Awareness Training. All bridge watch personnel, Commanding Officers, Executive Officers, maritime patrol aircraft aircrews, anti-submarine warfare and mine warfare rotary-wing aircrews, Lookouts, and equivalent civilian personnel must successfully complete the Marine Species Awareness Training prior to standing watch or serving as a Lookout. The Marine Species Awareness Training provides information on sighting cues, visual observation tools and techniques, and sighting notification procedures. Navy biologists developed Marine Species Awareness Training to improve the effectiveness of visual observations for biological resources, focusing on marine mammals and sea turtles, and including floating vegetation, jellyfish aggregations, and flocks of seabirds. • Protective Measures Assessment Protocol. This module provides the necessary instruction for accessing mitigation requirements during the event planning phase using the Protective Measures Assessment Protocol (PMAP) software tool.

TABLE 56—ENVIRONMENTAL AWARENESS AND EDUCATION—Continued

• Sonar Positional Reporting System and Marine Mammal Incident Reporting. This module provides instruction on the procedures and activity reporting requirements for the Sonar Positional Reporting System and marine mammal incident reporting.

Activity-Based Mitigation

Activity-based mitigation is mitigation that the Action Proponents would implement whenever and wherever an applicable military readiness activity takes place within the HCTT Study Area. Previously referred to as ''Procedural Mitigation,'' the primary objective of activity-based mitigation is to reduce overlap of marine mammals with stressors that have the potential to cause injury or mortality in real time. Activity-based mitigations are fundamentally consistent across stressor activity, although specific variations account for differences in platform configuration, event characteristics, and stressor types. The Action Proponents customize mitigation for each applicable activity category or stressor. Activity-based mitigation generally involves: (1) the use of one or more trained Lookouts to diligently observe for marine mammals and other specific biological resources (*e.g.,* indicator species like floating vegetation, jelly aggregations, large schools of fish, and flocks of seabirds) within a mitigation zone; (2) requirements for Lookouts to immediately communicate sightings of marine mammals and other specific biological resources to the appropriate watch station for information dissemination; and (3) requirements for the watch station to implement mitigation (*e.g.,* halt an activity) until certain recommencement conditions have been met. The remainder of the mitigation measures are activity-based mitigation measures (table 57 through table 76) organized by stressor type and activity category and include acoustic stressors (*i.e.,* active sonar, air guns, pile driving, weapons firing noise), explosive stressors (*i.e.,* bombs, gunnery, underwater demolition, mine counter-measure and neutralization activities, missiles and rockets, sonobuoys and research-based sub-surface explosives, ship shock trials, and sinking exercises), and physical disturbance and strike stressors (*i.e.,* aerial-deployed mines and non-explosive bombs, non-explosive gunnery, non-explosive torpedoes missiles and rockets, vessel movement, towed in-water devices, and net deployment).

The Action Proponents must implement the proposed mitigation measures described in table 57 through table 76, as appropriate, in response to an applicable sighting within, or entering into, the relevant mitigation zone for acoustic stressors, explosives, and non-explosive munitions. Each table describes the activities that the requirements apply to, the required mitigation zones in which the action proponents must take a mitigation action, the required number of Lookouts and observation platform, the required mitigation actions that the action proponents must take before, during, and/or after an activity, and a required wait period prior to commencing or recommencing an activity after a delay, power down, or shutdown of an activity.

The Action Proponents proposed wait periods because events cannot be delayed or ceased indefinitely for the purpose of mitigation due to impacts on safety, sustainability, and the ability to meet mission requirements. Wait periods are designed to allow animals the maximum amount of time practical to resurface (*i.e.,* become available to be observed) before activities resume. The action proponents factored in an assumption that mitigation may need to be implemented more than once when developing wait period durations. Wait periods are 10 minutes, 15 minutes, or 30 minutes depending on the fuel constraints of the platform and feasibility of implementation. NMFS concurs with these proposed wait periods.

If an applicable species (identified in the relevant mitigation tables) is observed within a required mitigation zone prior to the initial start of the activity, the Action Proponents must: (1) relocate the event to a location where applicable species are not observed; or (2) delay the initial start of the event (or stressor use) until one of the ''Mitigation Zone All-Clear Conditions'' (defined below) has been met. If an applicable stressor is observed within a required mitigation zone during the event (*i.e.,* during use of the indicated source) the Action Proponents must take the action described in the ''Mitigation Zones'' section of the table until one of the Mitigation Zone All-Clear Conditions has been met.

For all activities, an activity may not commence or recommence until one of the following ''Mitigation Zone All-Clear Conditions'' have been met: (1) a Lookout observes the applicable species exiting the mitigation zone; (2) a Lookout concludes that the animal has exited the mitigation zone based on its observed course, speed, and movement relative to the mitigation zone; (3) a Lookout affirms the mitigation zone has been clear from additional sightings for a designated ''wait period''; or (4) for mobile events, the stressor has transited a distance equal to double the mitigation zone size beyond the location of the last sighting.

Activity-Based Mitigation for Active Acoustic Stressors

Mitigation measures for acoustic stressors are provided below and include active acoustic sources (table 57), pile driving and extraction (table 58), and weapons firing noise (table 59). For this proposed action, the following ranges apply to the use of small, medium, and large caliber: small is up to and including 50 caliber machine gun rounds; medium is greater than 50 caliber and less than 57 millimeter (mm; 2.24 inch); and large is 57 mm (2.24 inch) and larger. Small caliber items are solid projectiles (*i.e.,* bullets). Medium caliber items are 30–57 mm (1.18–2.24 inch) and can have both inert non-explosive rounds and high explosive rounds. High caliber items are greater than or equal to 57 mm (2.24 inch) and can have both inert non-explosive rounds and high explosive rounds. Activity-based mitigation for acoustic stressors does not apply to:

- sources not operated under positive control (*e.g.,* moored oceanographic sources);
- sources used for safety of navigation (*e.g.,* fathometers);
- sources used or deployed by aircraft operating at high altitudes (*e.g.,* bombs deployed from high altitude (since personnel cannot effectively observe the surface of the water));
- sources used, deployed, or towed by unmanned platforms except when escort vessels are already participating in the event and have positive control over the source;
- sources used by submerged submarines (*e.g.,* sonar (since they cannot conduct visual observation));
- de minimis sources (*e.g.,* those >200 kHz); and
- vessel-based, unmanned vehicle-based, or towed in-water sources when marine mammals (*e.g.,* dolphins) are determined to be intentionally swimming at the bow or alongside or

directly behind the vessel, vehicle, or device (*e.g.,* to bow-ride or wake-ride).

TABLE 57—MITIGATION FOR ACTIVE ACOUSTIC SOURCES

Stressor or Activity: Active acoustic sources with power down and shut down capabilities:

- Low-frequency active sonar ≥200 dB.
- Mid-frequency active sonar sources that are hull mounted on a surface ship (including surfaced submarines).
- Broadband and other active acoustic sources >200 dB.

- Mitigation Zones:
  - 1,000 yd (914.4 m) from active acoustic sources (power down of 6 dB total).
  - 500 yd (457.2 m) from active acoustic sources (power down of 10 dB total).
  - 200 yd (182.9 m) from active acoustic sources (shut down).
- Mitigation Requirements:
  - One Lookout in/on one of the following:
    - Aircraft.
    - Pierside, moored, or anchored vessel
    - Underway vessel with space/crew restrictions (including small boats).
    - Underway vessel already participating in the event that is escorting (and has positive control over sources used, deployed, or towed by) an unmanned platform.
  - Two Lookouts on an underway vessel without space/crew restrictions.
  - Lookouts would use information from passive acoustic detections to inform visual observations when passive acoustic devices are already being used in the event.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of using active acoustic sources (*e.g.,* while maneuvering on station).
  - Action Proponent personnel must observe the applicable mitigation zone for marine mammals during use of active acoustic sources.
- Wait Period:
  - 10 or 30 minutes (depending on fuel constraints of the platform).

Stressor or Activity: Active acoustic sources with shut down (but not power down) capabilities:

- Low-frequency active sonar <200 dB.
- Mid-frequency active sonar sources that are not hull mounted on a surface ship (*e.g.,* dipping sonar, towed arrays).
- High-frequency active sonar.
- Air guns.
- Broadband and other active acoustic sources <200 dB.

- Mitigation Zones:
  - 200 yd (182.9 m) from active acoustic sources (shut down).
- Mitigation Requirements:
  - One Lookout in/on one of the following:
    - Aircraft.
    - Pierside, moored, or anchored vessel.
    - Underway vessel with space/crew restrictions (including small boats).
    - Underway vessel already participating in the event that is escorting (and has positive control over sources used, deployed, or towed by) an unmanned platform.
  - Two Lookouts on an underway vessel without space/crew restrictions.
  - Lookouts would use information from passive acoustic detections to inform visual observations when passive acoustic devices are already being used in the event.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of using active acoustic sources (*e.g.,* while maneuvering on station).
  - Action Proponent personnel must observe the mitigation zone for marine mammals during use of active acoustic sources.
- Wait Period:
  - 10 or 30 minutes (depending on fuel constraints of the platform).

TABLE 58—MITIGATION FOR PILE DRIVING AND EXTRACTION

Stressor or Activity: Vibratory and impact pile driving and extraction.

- Mitigation Zone:
  - 5 yd (4.6 m) from piles being driven or extracted (cease pile driving or extraction).
- Mitigation Requirements:
  - One Lookout on one of the following:
    - Shore.
    - Pier.
    - Small boat.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation for 15 minutes prior to the initial start of pile driving or pile extraction.
  - Action Proponent personnel must observe the mitigation zone for marine mammals during pile driving or extraction.
- Wait Period:
  - 15 minutes.

TABLE 59—MITIGATION FOR WEAPONS FIRING NOISE

Stressor or Activity: Explosive and non-explosive large-caliber gunnery firing noise (surface-to-surface and surface-to-air).

- Mitigation Zone:
  - 30 degrees on either side of the firing line out to 70 yd (64 m) from the gun muzzle (cease fire).
- Mitigation Requirements:
  - One Lookout on a vessel.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of large-caliber gun firing (*e.g.,* during target deployment).
  - Action Proponent personnel must observe the mitigation zone for marine mammals during large-caliber gun firing.
- Wait Period:
  - 30 minutes.

Activity-Based Mitigation for Explosive Stressors

Mitigation measures for explosive stressors are provided below and include explosive bombs (table 60), explosive gunnery (table 61), explosive underwater demolition multiple charge—mat weave and obstacle loading (table 62), explosive mine countermeasure and neutralization without divers (table 63), explosive mine neutralization with divers (table 64), explosive missiles and rockets (table 65), explosive sonobuoys and research-based sub-surface explosives (table 66), explosive torpedoes (table 67), ship shock trials (table 68), and SINKEX (table 69). After the event, the Action Proponents must observe the area for marine mammals. Post-event observations are intended to aid incident reporting requirements for marine mammals. Practicality and the duration of post-event observations will be determined on site by fuel restrictions and mission-essential follow-on commitments. For example, it is more challenging to remain on-site for extended periods of time for some activities due to factors such as range from the target or altitude of an aircraft. For all activities involving explosives, if a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately. Activity-based mitigation for explosive stressors does not apply to explosives:

- deployed by aircraft operating at high altitudes;
- deployed by submerged submarines, except for explosive torpedoes;
- deployed against aerial targets;
- during vessel- or shore-launched missile or rocket events;
- used at or below the de minimis threshold; and
- deployed by unmanned platforms except when escort vessels are already participating in the event and have positive control over the explosive.

TABLE 60—MITIGATION FOR EXPLOSIVE BOMBS

Stressor or Activity: Any NEW.

- Mitigation Zone:
  - 2,500 yd (2,286 m) from the intended target (cease fire).
- Mitigation Requirements:
  - One Lookout in an aircraft.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of bomb delivery (*e.g.,* when arriving on station).
  - Action Proponent personnel must observe the applicable mitigation zone for marine mammals during bomb delivery.
  - After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.
- Wait Period:
  - 10 minutes.

TABLE 61—MITIGATION FOR EXPLOSIVE GUNNERY

Stressor or Activity: Air-to-surface medium-caliber, surface-to-surface medium-caliber, surface-to-surface large-caliber.

- Mitigation Zones:
  - Air-to-surface medium-caliber:
    - 200 yd (182.9 m) from the intended impact location (cease fire).
  - Surface-to-surface medium-caliber:
    - 600 yd (548.6 m) from the intended impact location (cease fire).
  - Surface-to-surface large-caliber:
    - 1,000 yd (914.4 m) from the intended impact location (cease fire).
- Mitigation Requirements:
  - One Lookout on a vessel or in an aircraft.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of gun firing (*e.g.,* while maneuvering on station).
  - Action Proponent personnel must observe the applicable mitigation zone for marine mammals during gunnery fire.

TABLE 61—MITIGATION FOR EXPLOSIVE GUNNERY—Continued

- After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.
- Wait Period:
  - 10 or 30 minutes (depending on fuel constraints of the platform).

TABLE 62—MITIGATION FOR EXPLOSIVE UNDERWATER DEMOLITION MULTIPLE CHARGE—MAT WEAVE AND OBSTACLE LOADING

Stressor or Activity: Any NEW.

- Mitigation Zones:
  - 700 yd (640 m) from the detonation site (cease fire).
- Mitigation Requirements:
  - Two Lookouts: one on a small boat and one on shore from an elevated platform.
- Mitigation Requirement Timing:
  - The Lookout positioned on a small boat must observe the mitigation zone for marine mammals and floating vegetation for 30 minutes prior to the first detonation.
  - The Lookout positioned onshore must use binoculars to observe for marine mammals for 10 minutes prior to the first detonation.
  sbull; Action Proponent personnel must observe the mitigation zone for marine mammals during detonations.
  - After the event, when practical, Action Proponent personnel must observe the detonation vicinity for 30 minutes for marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.
- Wait Period:
  - 10 minutes (determined by the shore observer).

TABLE 63—MITIGATION FOR EXPLOSIVE MINE COUNTERMEASURE AND NEUTRALIZATION

[No divers]

Stressor or Activity: 0.1–5 lb (0.05–2.3 kg) NEW, >5 lb (2.3 kg) NEW.

- Mitigation Zones:
  - 0.1–5 lb (0.05–2.3 kg) NEW:
    - 600 yd (548.6 m) from the detonation site (cease fire).
  - >5 lb (2.3 kg) NEW:
    - 2,100 yd (1,920.2 m) from the detonation site (cease fire).
- Mitigation Requirements:
  - 0.1–5 lb (0.05–2.3 kg) NEW:
    - One Lookout on a vessel or in an aircraft.
  - >5 lb (2.3 kg) NEW:
    - Two Lookouts: one on a small boat and one in an aircraft.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of detonations (*e.g.,* while maneuvering on station; typically, 10 or 30 minutes depending on fuel constraints).
  - Action Proponent personnel must observe the applicable mitigation zone for marine mammals, concentrations of seabirds, and individual foraging seabirds (in the water and not on shore) during detonations or fuse initiation.
  - After the event, when practical, Action Proponent personnel must observe the detonation vicinity for 10 or 30 minutes (depending on fuel constraints) for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.
- Wait Period:
  - 10 or 30 minutes (depending on fuel constraints of the platform).

TABLE 64—MITIGATION FOR EXPLOSIVE MINE NEUTRALIZATION

[With divers]

Stressor or Activity: 0.1–20 lb (0.05–9.1 kg) NEW (positive control), 0.1–29 lb (0.05–13.2 kg) NEW (time-delay), >20–60 lb (9.1–27.2 kg) NEW (positive control).

- Mitigation Zones:
  - 0.1–20 lb (0.05–9.1 kg) NEW (positive control).
    - 500 yd (457.2 m) from the detonation site (cease fire).
  - 0.1–29 lb (0.05–13.2 kg) NEW (time-delay), >20–60 lb (9.1–27.2 kg) NEW (positive control).
    - 1,000 yd (914.4 m) from the detonation site (cease fire).
- Mitigation Requirements:
  - 0.1–20 lb (0.05–9.1 kg) NEW (positive control).
    - Lookouts in two small boats (one Lookout per boat), or one small boat and one rotary-wing aircraft (with one Lookout each), and one Lookout on shore for shallow-water events during 0.1–20 lb (0.05–9.1 kg) NEW (positive control) use.
  - 0.1–29 lb (0.05–13.2 kg) NEW (time-delay), >20–60 lb (9.1–27.2 kg) NEW (positive control).
    - Four Lookouts in two small boats (two Lookouts per boat), and one additional Lookout in an aircraft if used in the event.
- Mitigation Requirement Timing:

TABLE 64—MITIGATION FOR EXPLOSIVE MINE NEUTRALIZATION—Continued

[With divers]

- Time-delay devices must be set not to exceed 10 minutes.
- Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of detonations or fuse initiation for positive control events (*e.g.,* while maneuvering on station) or for 30 minutes prior for time-delay events.
- Action Proponent personnel must observe the applicable mitigation zone for marine mammals, concentrations of seabirds, and individual foraging seabirds (in the water and not on shore) during detonations or fuse initiation.
- When practical based on mission, safety, and environmental conditions:
  - Boats must observe from the mitigation zone radius mid-point.
  - When two boats are used, boats must observe from opposite sides of the mine location.
  - Platforms must travel a circular pattern around the mine location.
  - Boats must have one Lookout observe inward toward the mine location and one Lookout observe outward toward the mitigation zone perimeter.
  - Divers must be part of the Lookout Team.
- After the event, when practical, Action Proponent personnel must observe the detonation vicinity for 30 minutes for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

- Wait Period:
  - 10 or 30 minutes (depending on fuel constraints of the platform).

TABLE 65—MITIGATION FOR EXPLOSIVE MISSILES AND ROCKETS

Stressor or Activity: 0.6–20 lb (0.3–9.1 kg) NEW (air-to-surface), >20–500 lb (9.1–226.8 kg) NEW (air-to-surface).

- Mitigation Zones:
  - 0.6–20 lb (0.3–9.1 kg) NEW (air-to-surface).
    - 900 yd (823 m) from the intended impact location (cease fire).
  - >20–500 lb (9.1–226.8 kg) NEW (air-to-surface).
    - 2,000 yd (1,828.8 m) from the intended impact location (cease fire).
- Mitigation Requirements:
  - One Lookout in an aircraft.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of missile or rocket delivery (*e.g.,* during a fly-over of the mitigation zone).
  - Action Proponent personnel must observe the applicable mitigation zone for marine mammals during missile or rocket delivery.
  - After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.
- Wait Period:
  - 10 or 30 minutes (depending on fuel constraints of the platform).

TABLE 66—MITIGATION FOR EXPLOSIVE SONOBUOYS AND RESEARCH-BASED SUB-SURFACE EXPLOSIVES

Stressor or Activity: Any NEW of sonobuoys, 0.1–5 lb (0.05–2.3 kg) NEW for other types of sub-surface explosives used in research applications.

- Mitigation Zone:
  - 600 yd (548.6 m) from the device or detonation sites (cease fire).
- Mitigation Requirements:
  - One Lookout on a small boat or in an aircraft.
  - Conduct passive acoustic monitoring for marine mammals; use information from detections to assist visual observations.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of detonations (*e.g.,* during sonobuoy deployment, which typically lasts 20–30 minutes).
  - Action Proponent personnel must observe the mitigation zone for marine mammals during detonations.
  - After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.
- Wait Period:
  - 10 or 30 minutes (depending on fuel constraints of the platform).

TABLE 67—MITIGATION FOR EXPLOSIVE TORPEDOES

Stressor or Activity: Any NEW.

- Mitigation Zone:
  - 2,100 yd (1,920.2 m) from the intended impact location (cease fire).
- Mitigation Requirements:
  - One Lookout in an aircraft.
  - Conduct passive acoustic monitoring for marine mammals; use information from detections to assist visual observations.
- Mitigation Requirement Timing:

TABLE 67—MITIGATION FOR EXPLOSIVE TORPEDOES—Continued

- Action Proponent personnel must observe the mitigation zone for marine mammals, floating vegetation, and jellyfish aggregations immediately prior to the initial start of detonations (*e.g.,* during target deployment).
- Action Proponent personnel must observe the mitigation zone for marine mammals during torpedo launches.
- After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

• Wait Period:
  - 10 or 30 minutes (depending on fuel constraints of the platform).

TABLE 68—MITIGATION FOR SHIP SHOCK TRIALS

Stressor or Activity: Any NEW.

- Mitigation Zone:
  - 3.5 nmi (6.5 km) from the target ship hull (cease fire).
- Mitigation Requirements:
  - On the day of the event, 10 observers (Lookouts and third-party observers combined), spread between aircraft or multiple vessels as specified in the event-specific mitigation plan.
- Mitigation Requirement Timing:
  - Action Proponent personnel must develop a detailed, event-specific monitoring and mitigation plan in the year prior to the event and provide it to NMFS for review.
  - Beginning at first light on days of detonation, until the moment of detonation (as allowed by safety measures) Action Proponent personnel must observe the mitigation zone for marine mammals, floating vegetation, jellyfish aggregations, large schools of fish, and flocks of seabirds.
  - If any dead or injured marine mammals are observed after an individual detonation, Action Proponent personnel must follow established incident reporting procedures and halt any remaining detonations until Action Proponent personnel or third-party observers can consult with NMFS and review or adapt the event-specific mitigation plan, if necessary.
  - During the 2 days following the event (minimum) and up to 7 days following the event (maximum), and as specified in the event-specific mitigation plan, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals.
- Wait Period:
  - 30 minutes.

TABLE 69—MITIGATION FOR SINKING EXERCISES (SINKEX)

Stressor or Activity: Any NEW.

- Mitigation Zone:
  - 2.5 nmi (4.6 km) from the target ship hull (cease fire).
- Mitigation Requirements:
  - Two Lookouts: one on a vessel and one in an aircraft.
  - Lookouts would use information from passive acoustic detections to inform visual observations when passive acoustic devices are already being used during weapon firing.
- Mitigation Requirement Timing:
  - During aerial observations for 90 minutes prior to the initial start of weapon firing, Action Proponent personnel must observe the mitigation zone for marine mammals, floating vegetation, and jellyfish aggregations.
  - From the vessel during weapon firing, and from the aircraft and vessel immediately after planned or unplanned breaks in weapon firing of more than 2 hours, Action Proponent personnel must observe the mitigation zone for marine mammals.
  - Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals for 2 hours after sinking the vessel or until sunset, whichever comes first. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.
- Wait Period:
  - 30 minutes.

Activity-Based Mitigation for Non-Explosive Ordnance

Mitigation measures for non-explosive ordnance are provided below and include aerial-deployed mines and non-explosive bombs (table 70), non-explosive gunnery (table 71), and non-explosive missiles and rockets (table 72). Explosive aerial-deployed mines do not detonate upon contact with the water surface and are therefore considered non-explosive when mitigating the potential for a mine shape to strike a marine mammal at the water surface. Activity-based mitigation for non-explosive ordnance does not apply to non-explosive ordnance:

- deployed by aircraft operating at high altitudes;
- deployed against aerial targets and land-based targets;
- deployed during vessel- or shore-launched missile or rocket events; and
- deployed by unmanned platforms except when escort vessels are already participating in the event and have positive control over ordnance deployment.

TABLE 70—MITIGATION FOR AERIAL-DEPLOYED MINES AND NON-EXPLOSIVE BOMBS

Stressor or Activity: Explosive aerial-deployed mines, non-explosive aerial-deployed mines and non-explosive bombs.

- Mitigation Zone:

TABLE 70—MITIGATION FOR AERIAL-DEPLOYED MINES AND NON-EXPLOSIVE BOMBS—Continued

- 1,000 yd (914.4 m) from the intended target (cease fire).
- Mitigation Requirements:
  - One Lookout in an aircraft.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of mine or bomb delivery (*e.g.,* when arriving on station).
  - Action Proponent personnel must observe the mitigation zone for marine mammals during mine or bomb delivery.
- Wait Period:
  - 10 minutes.

TABLE 71—MITIGATION FOR NON-EXPLOSIVE GUNNERY

Stressor or Activity: Non-explosive surface-to-surface large-caliber ordnance, non-explosive surface-to-surface and air-to-surface medium-caliber ordnance, non-explosive surface-to-surface and air-to-surface small-caliber ordnance.

- Mitigation Zone:
  - 200 yd (182.9 m) from the intended impact location (cease fire).
- Mitigation Requirements:
  - One Lookout on a vessel or in an aircraft.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the start of gun firing (*e.g.,* while maneuvering on station).
  - Action Proponent personnel must observe the mitigation zone for marine mammals during gunnery firing.
- Wait Period:
  - 10 or 30 minutes (depending on fuel constraints of the platform).

TABLE 72—MITIGATION FOR NON-EXPLOSIVE MISSILES AND ROCKETS

Stressor or Activity: Non-explosives (air-to-surface).

- Mitigation Zone:
  - 900 yd (823 m) from the intended impact location (cease fire).
- Mitigation Requirements:
  - One Lookout in an aircraft.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the start of missile or rocket delivery (*e.g.,* during a fly-over of the mitigation zone).
  - Action Proponent personnel must observe the mitigation zone for marine mammals during missile or rocket delivery.
- Wait Period:
  - 10 or 30 minutes (depending on fuel constraints of the platform).

Activity-Based Mitigation for Physical Disturbance and Strike Stressors

Mitigation measures for physical disturbance and strike stressors are provided below and include crewed surface vessels (table 73), unmanned vehicles (table 74), towed in-water devices (table 75), and net deployment (table 76). Activity-based mitigation for physical disturbance and strike stressors will not be implemented:

- by submerged submarines;
- by unmanned vehicles except when escort vessels are already participating in the event and have positive control over the unmanned vehicle movements;
- when marine mammals (*e.g.,* dolphins) are determined to be intentionally swimming at the bow, alongside the vessel or vehicle, or directly behind the vessel or vehicle (*e.g.,* to bow-ride or wake-ride);
- when pinnipeds are hauled out on man-made navigational structures, port structures, and vessels;
- by manned surface vessels and towed in-water devices actively participating in cable laying during Modernization & Sustainment of Ranges activities; and
- when impractical based on mission requirements (*e.g.,* during certain aspects of amphibious exercises).

TABLE 73—MITIGATION FOR MANNED SURFACE VESSELS

Stressor or Activity: Manned surface vessels, including surfaced submarines.

- Mitigation Zones:
  - Underway manned surface vessels must maneuver themselves (which may include reducing speed) to maintain the following distances as mission and circumstances allow:
    - 500 yd (457.2 m) from whales.
    - 200 yd (182.9 m) from other marine mammals.
- Mitigation Requirements:
  - One or more Lookouts on manned underway surface vessels in accordance with the most recent navigation safety instruction.
- Mitigation Requirement Timing:
  - Action Proponent personnel must observe the mitigation zone for marine mammals immediately prior to manned surface vessels getting underway and while underway.

TABLE 74—MITIGATION FOR UNMANNED VEHICLES

Stressor or Activity: Unmanned Surface Vehicles and Unmanned Underwater Vehicles already being escorted (and operated under positive control) by a manned surface support vessel.
• Mitigation Zones: • A surface support vessel that is already participating in the event, and has positive control over the unmanned vehicle, must maneuver the unmanned vehicle (which may include reducing its speed) to ensure it maintains the following distances as mission and circumstances allow: • 500 yd (457.2 m) from whales. • 200 yd (182.9 m) from other marine mammals. • Mitigation Requirements: • One Lookout on a surface support vessel that is already participating in the event and has positive control over the unmanned vehicle. • Mitigation Requirement Timing: • Action Proponent personnel must observe the mitigation zone for marine mammals immediately prior to unmanned vehicles getting underway and while underway.

TABLE 75—MITIGATION FOR TOWED IN-WATER DEVICES

Stressor or Activity: In-water devices towed by an aircraft, a manned surface vessel, or an Unmanned Surface Vehicle or Unmanned Underwater Vehicle already being escorted (and operated under positive control) by a manned surface vessel.
• Mitigation Zone: • Manned towing platforms, or surface support vessels already participating in the event that have positive control over an unmanned vehicle that is towing an in-water device, must maneuver itself or the unmanned vehicle (which may include reducing speed) to ensure towed in-water devices maintain the following distances as mission and circumstances allow: • 250 yd (228.6 m) from marine mammals. • Mitigation Requirements: • One Lookout on the manned towing vessel or aircraft, or on a surface support vessel that is already participating in the event and has positive control over an unmanned vehicle that is towing an in-water device. • Mitigation Requirement Timing: • Action Proponent personnel must observe the mitigation zone for marine mammals immediately prior to and while in-water devices are being towed.

TABLE 76—MITIGATION FOR NET DEPLOYMENT

Stressor or Activity: Nets deployed for testing of an Unmanned Underwater Vehicle.
• Mitigation Zone: • If a marine mammal is sighted within 500 yd of the deployment location, the support vessel must: • Delay deployment of nets until the mitigation zone has been clear for 15 minutes. • Recover nets if they are deployed. • Mitigation Requirements: • One Lookout on the support vessel. • Mitigation Requirement Timing: • Action Proponent personnel must observe the mitigation zone for marine mammals for 15 minutes prior to the deployment of nets and while the nets are deployed. • Nets must be deployed during daylight hours only.

Geographic Mitigation Areas

In addition to activity-based mitigation, the Action Proponents would implement mitigation measures within mitigation areas to avoid or minimize potential impacts on marine mammals (see figures 11–1 and 11–2 of the application). A full technical analysis of the mitigation areas that the Action Proponents considered for marine mammals is provided in appendix K (Geographic Mitigation Assessment) of the 2024 HCTT Draft EIS/OEIS. The Action Proponents took into account public comments received on the 2017 HSTT Draft EIS/OEIS, the best available science, and the practicability of implementing additional mitigation measures and has enhanced its mitigation areas and mitigation measures beyond those that were included in the 2018–2025 regulations to further reduce impacts to marine mammals.

Information on the mitigation measures that the Action Proponents propose to implement within mitigation areas is provided in table 77 through table 86. The mitigation applies year-round unless specified otherwise in the tables.

NMFS conducted an independent analysis of the mitigation areas that the Action Proponent proposed, which are described below. NMFS preliminarily concurs with the Action Proponents' analysis, which indicates that the measures in these mitigation areas are both practicable and will reduce the likelihood, magnitude, or severity of adverse impacts to marine mammals or their habitat in the manner described in the Action Proponents' analysis and this proposed rule. NMFS is heavily reliant on the Action Proponents' description of operational practicability, since the Action Proponents are best equipped to describe the degree to which a given mitigation measure affects personnel safety or mission effectiveness, and how practical it is to implement. The Action Proponents consider the measures in this proposed rule to be practicable, and NMFS concurs. We further discuss the manner in which the Geographic Mitigation Areas in the proposed rule will reduce the likelihood, magnitude, or severity of adverse impacts to marine mammal species or their habitat in the Preliminary Analysis and Negligible Impact Determination section.

Geographic Mitigation Areas in Hawaii

Table 77 details geographic mitigation related to the use of active sonar and explosives off Hawaii Island. The mitigation is a continuation from Phase III.

TABLE 77—HAWAII ISLAND MARINE MAMMAL MITIGATION AREA

Category	Mitigation requirements	Mitigation benefits
Acoustic	The Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar or 20 hours of helicopter dipping sonar (a mid-frequency active sonar source) annually within the mitigation area.	Mitigation in this area is designed to reduce exposure of numerous small and resident marine mammal populations (including Blainville's beaked whales, bottlenose dolphins, goose-beaked whales, dwarf sperm whales, false killer whales, melon-headed whales, pantropical spotted dolphins, pygmy killer whales, rough-toothed dolphins, short-finned pilot whales, and spinner dolphins), humpback whales within important seasonal reproductive habitat, and Hawaiian monk seals within critical habitat, to levels of sound that have the potential to cause injurious or behavioral impacts.
Explosives	The Action Proponents must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets) within the mitigation area.	Mitigation in this area is designed to prevent exposure of the species listed above to explosives that have the potential to cause injury, mortality, or behavioral disturbance.

Table 78 details geographic mitigation related to the use of active sonar and explosives off Molokaʻi, Maui, Lānaʻi, and Kahoʻolawe Islands. The mitigation is a continuation from Phase III.

TABLE 78—HAWAII 4-ISLANDS MARINE MAMMAL MITIGATION AREA

Category	Mitigation requirements	Mitigation benefits
Acoustic	From November 15–April 15, the Action Proponents must not use MF1 surface ship hull-mounted mid-frequency active sonar within the mitigation area.	Mitigation in this area is designed to minimize exposure of humpback whales in high-density seasonal reproductive habitats (*e.g.,* north of Maui and Molokaʻi) and Main Hawaiian Islands insular false killer whales in high seasonal occurrence areas to levels of sound that have the potential to cause injurious or behavioral impacts.
Explosives	The Action Proponents must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets) within the mitigation area (year-round).	Mitigation in this area is designed to prevent exposure of humpback whales in high-density seasonal reproductive habitats (*e.g.,* north of Maui and Molokaʻi), Main Hawaiian Islands insular false killer whales in high seasonal occurrence areas, and numerous small and resident marine mammal populations that occur year-round (including bottlenose dolphins, pantropical spotted dolphins, and spinner dolphins, and Hawaiian monk seals) to explosives that have the potential to cause injury, mortality, or behavioral disturbance.

Table 79 details special reporting requirements related to the use of active sonar off Oʻahu, Molokaʻi, and Hawaii Island. The mitigation is a continuation from Phase III with a modified geographic extent based on based available science.

TABLE 79—HAWAII HUMPBACK WHALE SPECIAL REPORTING MITIGATION AREA

Category	Mitigation requirements	Mitigation benefits
Acoustic	The Action Proponents must report the total hours of MF1 surface ship hull-mounted mid-frequency active sonar used from November through May in the mitigation area in their training and testing activity reports submitted to NMFS.	Special reporting requirements are designed to aid NMFS' and the Action Proponents' analysis of potential impacts in the mitigation area, which contains the Hawaiian Islands Humpback Whale National Marine Sanctuary plus a 5-km (2.7 nmi) sanctuary buffer (excluding the PMRF).

Table 80 details awareness notification message requirements for the Hawaii Range Complex. The mitigation is a continuation from Phase III.

TABLE 80—HAWAII HUMPBACK WHALE AWARENESS MESSAGES

Category	Mitigation requirements	Mitigation benefits
Acoustic, Explosives, Physical disturbance and strike.	The Action Proponents must broadcast awareness messages to alert applicable assets (and their Lookouts) transiting and training or testing in the Hawaii Range Complex to the possible presence of concentrations of humpback whales from November through May. Lookouts must use that knowledge to help inform their visual observations during military readiness activities that involve vessel movements, active sonar, in-water explosives (including underwater explosives and explosives deployed against surface targets), or the deployment of non-explosive ordnance against surface targets in the mitigation area.	Mitigation in this area is designed to minimize potential humpback whale vessel interactions and exposure to acoustic, explosive, and physical disturbance and strike stressors that have the potential to cause mortality, injury, or behavioral disturbance during the reproductive season. The Hawaii Humpback Whale Awareness Messages apply to the entire Hawaii Range Complex; therefore, the mitigation described in table 77, table 78, and table 79 is in addition to the requirements described for this overlapping area.

Geographic Mitigation Areas in California

Table 81 details geographic mitigation related to the use of active sonar off the coast of northern California. The mitigation is new for this phase.

TABLE 81—NORTHERN CALIFORNIA LARGE WHALE MITIGATION AREA

Category	Mitigation requirements	Mitigation benefits
Acoustic	From June 1–October 31, the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar (excluding normal maintenance and systems checks) total during training and testing within the combination of this mitigation area, the Central California Large Whale Mitigation Area, and the Southern California Blue Whale Mitigation Area.	Mitigation in this area is designed to reduce exposure of blue whales, fin whales, gray whales, and humpback whales in important seasonal foraging, migratory, and calving habitats to levels of sound that have the potential to cause injurious or behavioral impacts.

Table 82 details geographic mitigation related to the use of active sonar off the coast of Central California. The mitigation is a continuation from Phase III with a modified geographic extent based on best available science.

TABLE 82—CENTRAL CALIFORNIA LARGE WHALE MITIGATION AREA

Category	Mitigation requirements	Mitigation benefits
Acoustic	From June 1–October 31, the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar (excluding normal maintenance and systems checks) total during training and testing within the combination of this mitigation area, the Northern California Large Whale Mitigation Area, and the Southern California Blue Whale Mitigation Area.	Mitigation in this area is designed to reduce exposure of blue whales, fin whales, gray whales, and humpback whales in important seasonal foraging, migratory, and calving habitats to levels of sound that have the potential to cause injurious or behavioral impacts.

Table 83 details geographic mitigation related to the use of active sonar and explosives off the coast of Southern California. The mitigation is a continuation from Phase III.

TABLE 83—SOUTHERN CALIFORNIA BLUE WHALE MITIGATION AREA

Category	Mitigation requirements	Mitigation benefits
Acoustic	From June 1–October 31, the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar (excluding normal maintenance and systems checks) total during training and testing within the combination of this mitigation area, the Northern California Large Whale Mitigation Area, and the Central California Large Whale Mitigation Area.	Mitigation in this area is designed to reduce exposure of blue whales within important seasonal foraging habitats to levels of sound that have the potential to cause injurious or behavioral impacts.

TABLE 83—SOUTHERN CALIFORNIA BLUE WHALE MITIGATION AREA—Continued

Category	Mitigation requirements	Mitigation benefits
Explosives	From June 1–October 31, the Action Proponents must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets) during large-caliber gunnery, torpedo, bombing, and missile (including 2.75-inch rockets) training and testing.	Mitigation in this area is designed to reduce exposure of blue whales within important seasonal foraging habitats to explosives that have the potential to cause injury, mortality, or behavioral disturbance.

Table 84 details awareness notification message requirements for the SOCAL Range Complex. The mitigation is a continuation from Phase III.

TABLE 84—CALIFORNIA LARGE WHALE AWARENESS MESSAGES

Category	Mitigation requirements	Mitigation benefits
Acoustic, Explosives, Physical disturbance and strike.	The Action Proponents must broadcast awareness messages to alert applicable assets (and their Lookouts) transiting and training or testing off the U.S. West Coast to the possible presence of concentrations of large whales, including gray whales (November–March), fin whales (November–May), and mixed concentrations of blue, humpback, and fin whales that may occur based on predicted oceanographic conditions for a given year (*e.g.,* May–November, April–November). Awareness messages may provide the following types of information which could vary annually: • While blue whales tend to be more transitory, some fin whales are year-round residents that can be expected in nearshore waters within 10 nmi (18.5 km) of the California mainland and offshore operating areas at any time. • Fin whales occur in groups of one to three individuals, 90 percent of the time, and in groups of four or more individuals, 10 percent of the time. • Unique to fin whales offshore southern California (including the Santa Barbara Channel and PMSR area), there could be multiple individuals and/or separate groups scattered within a relatively small area (1–2 nmi; 1.9–2.7 km) due to foraging or social interactions. • When a large whale is observed, this may be an indicator that additional marine mammals are present and nearby, and the vessel should take this into consideration when transiting. • Lookouts must use that knowledge to help inform their visual observations during military readiness activities that involve vessel movements, active sonar, in-water explosives (including underwater explosives and explosives deployed against surface targets), or the deployment of non-explosive ordnance against surface targets in the mitigation area.	Mitigation in this area is designed to minimize potential blue whale, gray whale, and fin whale vessel interactions and exposure to acoustic stressors, explosives, and physical disturbance and strike stressors that have the potential to cause mortality, injury, or behavioral disturbance during the foraging and migration seasons, and to resident whales.

Table 85 details real-time notification requirements for a designated area within the SOCAL Range Complex. The mitigation is a continuation from the 2025 HSTT Final Rule (90 FR 4944, January 16, 2025).

TABLE 85—CALIFORNIA LARGE WHALE REAL-TIME NOTIFICATION MITIGATION AREA

Category	Mitigation requirements	Mitigation benefits
Physical disturbance and strike.	The Action Proponents must issue real-time notifications to alert Action Proponent vessels operating in the vicinity of large whale aggregations (four or more whales) sighted within 1 nmi (1.9 km) of an Action Proponent vessel within an area of the Southern California Range Complex (between 32–33 degrees North and 117.2–119.5 degrees West).	The real-time notification area encompasses the locations of recent (2009, 2021, 2023) vessel strikes, and historic strikes where precise latitude and longitude were known.

TABLE 85—CALIFORNIA LARGE WHALE REAL-TIME NOTIFICATION MITIGATION AREA—Continued

Category	Mitigation requirements	Mitigation benefits
	The four whales that make up a defined "aggregation" would not all need to be from the same species, and the aggregation could consist either of a single group of four (or more) whales, or any combination of smaller groups totaling four (*e.g.,* two groups of two whales each or a group of three whales and a solitary whale) within the 1 nmi (1.9 km) zone. Lookouts must use the information from the real-time notifications to inform their visual observations of applicable mitigation zones. If Lookouts observe a large whale aggregation within 1 nmi (1.9 km) of the event vicinity within the area between 32–33 degrees North and 117.2–119.5 degrees West, the watch station must initiate communication with the designated point of contact to contribute to the Navy's real-time sighting notification system.	

Table 86 details geographic mitigation related to in-air vehicle launch noise and associated monitoring for pinniped haulout locations on San Nicolas Island, California. The mitigation is an adaptation of procedural mitigation for the same activities in the 2022 PMSR final rule (87 FR 40888, July 8, 2022).

TABLE 86—SAN NICOLAS ISLAND PINNIPED HAULOUT MITIGATION AREA

Category	Mitigation requirements	Mitigation benefits
In-air vehicle launch noise.	Navy personnel must not enter pinniped haulout or rookery areas. Personnel may be adjacent to pinniped haulouts and rookery prior to and following a launch for monitoring purposes. Missiles and targets must not cross over pinniped haulout areas at altitudes less than 305 m (1,000 ft), except in emergencies or for real-time security incidents. For unmanned aircraft systems (UAS), the following minimum altitudes will be maintained over pinniped haulout areas and rookeries: Class 0–2 UAS will maintain a minimum altitude of 92 m (300 ft); Class 3 UAS will maintain a minimum altitude of 153 m (500 ft); Class 4 or 5 UAS will not be flown below 305 m (1,000 ft). The Navy may not conduct more than 40 launch events annually. The Navy may not conduct more than 10 launch events at night annually. Launch events must be scheduled to avoid the peak pinniped pupping seasons (from January through July) to the maximum extent practicable. The Navy must implement a monitoring plan using video and acoustic monitoring of up to three pinniped haulout areas and rookeries during launch events that include missiles or targets that have not been previously monitored for at least three launch events. The Navy will review the launch procedure and monitoring methods, in cooperation with NMFS, if any incidents of injury or mortality of a pinniped are discovered during post-launch surveys, or if surveys indicate possible effects to the distribution, size, or productivity of the affected pinniped populations as a result of the specified activities. If necessary, appropriate changes will be made through modification to the Authorization prior to conducting the next launch of the same vehicle.	Mitigation is designed to minimize in-air launch noise and physical disturbance to pinnipeds hauled out on beaches, as well as to continue assessing baseline pinniped distribution/abundance and potential changes in pinniped use of these beaches after launch events.

Mitigation Conclusions

NMFS has carefully evaluated the Action Proponents' proposed mitigation measures—many of which were developed with NMFS' input during the previous phases of HCTT (formerly HSTT) authorizations but several of which are new since implementation of the 2018 to 2025 regulations—and considered a broad range of other measures (*i.e.,* the measures considered but eliminated in the 2024 HCTT Draft EIS/OEIS, which reflect many of the comments that have arisen from public input or through discussion with NMFS in past years) in the context of ensuring that NMFS prescribes the means of effecting the least practicable adverse impact on the affected marine mammal species 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 mitigation measures is expected to reduce the likelihood and/or magnitude of adverse impacts to marine mammal species and their habitat; the proven or likely efficacy of the measures; and the practicability of the measures for applicant implementation, including consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Based on our evaluation of the Action Proponents' proposed measures, as well as other measures considered by the Action Proponents and NMFS (see section 5.9 (Measures Considered but Eliminated) of chapter 5 (Mitigation) of the 2024 HCTT Draft EIS/OEIS), NMFS has preliminarily determined that these proposed mitigation measures are appropriate means of effecting the least practicable adverse impact on marine mammal species and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and considering specifically personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity. Additionally, an adaptive management component helps further ensure that mitigation is regularly assessed and provides a mechanism to improve the mitigation, based on the factors above, through modification as appropriate.

The proposed rule comment period provides the public an opportunity to submit recommendations, views, and/or concerns regarding the Action Proponents' activities and the proposed mitigation measures. While NMFS has preliminarily determined that the Action Proponents' proposed mitigation measures would effect the least practicable adverse impact on the affected species and their habitat, NMFS will consider all public comments to help inform our final determination. Consequently, proposed mitigation measures may be refined, modified, removed, or added prior to the issuance of the final rule based on public comments received and, as appropriate, analysis of additional potential mitigation measures.

Proposed Monitoring

Section 101(a)(5)(A) of the MMPA states that in order to authorize incidental take for an activity, NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for incidental take authorizations 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.

Although the Navy has been conducting research and monitoring for over 20 years in areas where it has been training, it developed a formal marine species monitoring program in support of the HCTT Study Area MMPA and ESA processes in 2009. Across all Navy training and testing study areas, the robust marine species monitoring program has resulted in hundreds of technical reports and publications on marine mammals that have informed Navy and NMFS analyses in environmental planning documents, rules, and Biological Opinions. The reports are made available to the public on the Navy's marine species monitoring website (*https://www.navymarinespeciesmonitoring.us*) and the data on the Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations (OBIS–SEAMAP) (*https://seamap.env.duke.edu/*).

The Navy would continue collecting monitoring data to inform our understanding of the occurrence of marine mammals in the HCTT Study Area, the likely exposure of marine mammals to stressors of concern in the HCTT Study Area, the response of marine mammals to exposures to stressors, the consequences of a particular marine mammal response to their individual fitness and, ultimately, populations, and the effectiveness of implemented mitigation measures. Taken together, mitigation and monitoring comprise the Navy's integrated approach for reducing environmental impacts from the specified activities. The Navy's overall monitoring approach seeks to leverage and build on existing research efforts whenever possible.

As agreed upon between the Action Proponents and NMFS, the monitoring measures presented here, as well as the mitigation measures described above, focus on the protection and management of potentially affected marine mammals. A well-designed monitoring program can provide important feedback for validating assumptions made in analyses and allow for adaptive management of marine mammals and their habitat, and other marine resources. Monitoring is required under the MMPA, and details of the monitoring program for the specified activities have been developed through coordination between NMFS and the Action Proponents through the regulatory process for previous Navy at-sea training and testing activities.

Navy Marine Species Research and Monitoring Strategic Framework

The initial structure for the U.S. Navy's marine species monitoring efforts was developed in 2009 with the Integrated Comprehensive Monitoring Program (ICMP). The intent of the ICMP was to provide an overarching framework for coordination of the Navy's monitoring efforts during the early years of the program's establishment. A Strategic Planning Process (U.S. Department of the Navy, 2013) was subsequently developed and together with the ICMP framework serves as a planning tool to focus marine species monitoring priorities defined by ESA and MMPA requirements, and to coordinate monitoring efforts across regions based on a set of common objectives. Using an underlying conceptual framework incorporating a progression of knowledge from occurrence to exposure/response, and ultimately consequences, the Strategic Planning Process was developed as a tool to help guide the investment of resources to address top level objectives and goals of the monitoring program most efficiently. The Strategic Planning Process identifies Intermediate Scientific Objectives (see *https://www.navymarinespeciesmonitoring.us/about/strategic-planning-process/*), which form the basis of evaluating, prioritizing, and selecting new monitoring projects or investment topics and serve as the basis for developing and executing new monitoring projects across the Navy's training and testing ranges (both Atlantic and Pacific).

Monitoring activities relating to the effects of military readiness activities on marine species are generally designed to address one or more of the following top-level goals:

- An increase in the understanding of the likely occurrence of marine mammals and ESA-listed marine species in the vicinity of the action (*i.e.,* presence, abundance, distribution, and density);
- An increase in the understanding of the nature, scope, or context of the likely exposure of marine mammals and ESA-listed species to any of the potential stressors associated with the action (*e.g.,* sound, explosive detonation, or military expended materials), through better understanding of one or more of the following:
  - the nature of the action and its surrounding environment (*e.g.,* sound-source characterization, propagation, and ambient noise levels),

○ the affected species (*e.g.,* life history or dive patterns),

○ the likely co-occurrence of marine mammals and ESA-listed marine species with the action (in whole or part), or

○ the likely biological or behavioral context of exposure to the stressor for the marine mammal and ESA-listed marine species (*e.g.,* age class of exposed animals or known pupping, calving, or feeding areas).

• An increase in the understanding of how individual marine mammals or ESA-listed marine species respond (behaviorally or physiologically) to the specific stressors associated with the action (in specific contexts, where possible (*e.g.,* at what distance or received level)).

• An increase in the understanding of how anticipated individual responses, to individual stressors or anticipated combinations of stressors, may impact either:

○ the long-term fitness and survival of an individual; or

○ the population, species, or stock (*e.g.,* through impacts on annual rates of recruitment or survival).

• An increase in the understanding of the effectiveness of mitigation and monitoring measures.

• A better understanding and record of the manner in which the authorized entity complies with the Incidental Take Authorization and Incidental Take Statement.

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

• Ensuring that adverse impact of activities remains at the least practicable level.

The Navy's Marine Species Monitoring Program investments are evaluated through the Adaptive Management Review process to: (1) assess overall progress; (2) review goals and objectives; and (3) make recommendations for refinement and evolution of the monitoring program's focus and direction. The Marine Species Monitoring Program has developed and matured significantly since its inception and now supports a portfolio of several dozen active projects across a range of geographic areas and protected species taxa addressing both regional priorities (*i.e.,* particular species of concern), and Navy-wide needs such as the behavioral response of beaked whales to training and testing activities.

A Research and Monitoring Summit was held in early 2023 to evaluate the current state of the Marine Species Monitoring Program in terms of progress, objectives, priorities, and needs, and to solicit valuable input from meeting participants including NMFS, Marine Mammal Commission, Navy, and scientific experts. The overarching goal of the summit was to facilitate updating the ICMP framework for guiding marine species research and monitoring investments, and to identify data gaps and priorities to be addressed over the next 5–10 years across a range of basic research through applied monitoring. One of the outcomes of this summit meeting is a refreshed strategic framework effectively replacing the ICMP which will provide increased coordination and synergy across the Navy's protected marine species investment programs (see section 13.1 of the application). This will contribute to the collective goal of supporting improved assessment of effects from training and testing activities through development of first in class science and data.

For over a decade, the Navy has implemented the PMAP software tool, which provides operators with notification of the required mitigation and a visual display of the planned training or testing activity location overlaid with relevant environmental data. This module was developed by civilian marine biologists employed by the Navy and was reviewed and approved by NMFS. It provides information on marine species sighting cues, visual observation tools and techniques, and sighting notification procedures. It is a video-based complement to the U.S. Navy Lookout Training Handbook or equivalent. Since 2007, this module has been required for commanding officers, executive officers, equivalent civilian personnel, and personnel who will stand watch as a Lookout.

Additionally, the U.S. Navy Lookout Training Handbook was updated in 2022 to include a more robust chapter on environmental compliance, mitigation, and marine species observation tools and techniques. Environmental awareness and education training is also provided to Navy personnel through the Afloat Environmental Compliance Training program or equivalent. Training is designed to help personnel gain an understanding of their personal environmental compliance roles and responsibilities (including mitigation implementation). Finally, the Navy's current generation of land-based ship bridge simulators now incorporate marine mammal response in team training scenarios for bridge watch standers and Lookouts.

Past and Current Action Proponent Monitoring in the HCTT Study Area

The Navy's monitoring program has undergone significant changes since the first rules were issued for the HRC and SOCAL Study Areas in 2009 through the process of adaptive management. The monitoring program developed for the first cycle of environmental compliance documents (*e.g.,* U.S. Department of the Navy, 2008a, 2008b) utilized effort-based compliance metrics that were somewhat limiting. Through adaptive management discussions, the Navy designed and conducted monitoring studies according to scientific objectives and eliminated specific effort requirements.

Progress has also been made on the conceptual framework categories from the Scientific Advisory Group for Navy Marine Species Monitoring (U.S. Department of the Navy, 2011), ranging from occurrence of animals, to their exposure, response, and population consequences. The Navy continues to manage the Atlantic and Pacific program as a whole, with monitoring in each range complex taking a slightly different but complementary approach. The Navy has continued to use the approach of layering multiple simultaneous components in many of the range complexes to leverage an increase in return of the progress toward answering scientific monitoring questions. For example, in later Phase I HRC monitoring through Phase III HSTT monitoring, several monitoring efforts coincided on the instrumented Navy training range off PMRF during an actual anti-submarine warfare training exercise. This included: (1) deploying civilian marine mammal observers aboard a Navy destroyer employing mid-frequency active sonar; (2) a civilian marine mammal aerial survey aircraft orbiting the destroyer during the course of the exercise; (3) Navy acousticians monitoring the exercise participants and animals via the hydrophones of the instrumented range during the exercise; and (4) having satellite tagging of animals performed on the training range just prior to the exercise.

Numerous publications, dissertations, and conference presentations have resulted from research conducted under the marine species monitoring program (*https://www.navymarinespeciesmonitoring.us/reading-room/*), leading to a significant contribution to the body of marine mammal science. Publications on occurrence, distribution, and density have fed the modeling input, and publications on exposure and response have informed Navy and NMFS analysis of behavioral response and consideration of mitigation measures.

Furthermore, collaboration between the monitoring program and the Navy's research and development (*e.g.,* the ONR) and demonstration-validation (*e.g.,* Living Marine Resources (LMR)) programs has been strengthened, leading to research tools and products that have already transitioned to the monitoring program. These include Marine Mammal Monitoring on Ranges, controlled exposure experiment behavioral response studies, acoustic sea glider surveys, and global positioning system-enabled satellite tags. Recent progress has been made with better integration with monitoring across all Navy at-sea study areas, including the HCTT Study Area and various other ranges. Publications from the LMR and ONR programs have also resulted in significant contributions to hearing, acoustic criteria used in effects modeling, exposure, and response, as well as in developing tools to assess biological significance (*e.g.,* consequences).

NMFS and the Navy also consider data collected during mitigations as monitoring. Data are collected by shipboard personnel on hours spent training and hours of sonar use. Additionally, during MTEs, data are collected when marine mammals are observed within the mitigation zones when mitigations are implemented. These data are provided to NMFS in both classified and unclassified annual exercise reports, which would continue under this proposed rule.

NMFS has received multiple years' worth of annual exercise and monitoring reports addressing active sonar use and explosive detonations within the HCTT Study Area and other Navy range complexes. The data and information contained in these reports have been considered in developing mitigation and monitoring measures for the proposed military readiness activities within the HCTT Study Area. The Navy's annual exercise and monitoring reports may be viewed at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities* and *https://www.navymarinespeciesmonitoring.us/reporting/.*

The Navy's marine species monitoring program supports several monitoring projects in the HCTT Study Area at any given time. Additional details on the scientific objectives for each project can be found at: *https://www.navymarinespeciesmonitoring.us/regions/pacific/current-projects/.* Some projects may only require one or two years of field effort. Other projects could entail multi-year field efforts (2–5 years). Most current HCTT projects are multi-year ongoing studies such as odontocete tagging and behavioral response to sonar in Hawaii, and beaked whale distribution and response to sonar in California.

Specific monitoring under the 2018–2025 regulations included the following projects:

- Pacific Marine Assessment Program for Protected Species (PACMAPPS) survey;
- Effectiveness of Navy Lookout Teams in Detecting Cetaceans;
- Long Term Acoustic Monitoring of Marine Mammals Utilizing the Instrumented Range at Pacific Missile Range Facility (PMRF) (ongoing);
- Pacific Islands comprehensive stranding investigations (ongoing);
- North Pacific Humpback Whale Tagging;
- Estimation of Received Levels of MFAS and Behavioral Response of Marine Mammals at PMRF (ongoing);
- Marine Mammal Monitoring on Navy Ranges (ongoing);
- Marine Mammal Sightings During CalCOFI Cruises (ongoing);
- Blue and Fin Whale Satellite Tagging;
- Guadalupe Fur Seal Satellite Tracking;
- Passive Acoustic Monitoring of Marine Mammals in SOCAL Range Complex (ongoing); and
- Cuvier's Beaked Whale and Fin Whale Population Dynamics and Impact Assessment at the Southern California Offshore Antisubmarine Warfare Range (SOAR) (ongoing).

Future monitoring efforts by the Action Proponents in the HCTT Study Area are anticipated to continue along the same objectives: establish the baseline habitat uses and movement patterns; establish the baseline behavior (*e.g.,* foraging, dive patterns, *etc.*); and evaluate potential exposure and behavioral responses of marine mammals exposed to training and testing activities.

Currently planned monitoring projects and their Intermediate Scientific Objective for the 2025–2032 rule are listed below, many of which are continuations of projects currently underway. Other than those ongoing projects, monitoring projects are typically planned one year in advance; therefore, this list does not include all projects that will occur over the entire period of the rule.

- Long Term Acoustic Monitoring of Marine Mammals Utilizing the Instrumented Range at Pacific Missile Range Facility (PMRF) (ongoing)—The objectives are: (1) determine what species and populations of marine mammals and ESA-listed species are present in Navy range complexes, testing ranges, and in specific training and testing areas; (2) establish the baseline habitat uses, seasonality, and movement patterns of marine mammals and ESA-listed species where Navy training and testing activities occur; (3) evaluate potential exposure of marine mammals and ESA-listed species to Navy training and testing activities; (4) establish the regional baseline vocalization behavior, including seasonality and acoustic characteristics, of marine mammals where Navy training and testing activities occur; (5) apply passive acoustic tools and techniques for detecting, classifying, locating, and tracking marine mammals; (6) apply analytic methods to evaluate exposure and/or behavioral response of marine mammals to Navy training and testing activities; (7) evaluate acoustic exposure levels associated with behavioral responses of marine mammals to support development and refinement of acoustic risk functions; (8) evaluate trends in distribution and abundance for populations of marine mammals and ESA-listed species that are regularly exposed to Navy training and testing activities; and (9) leverage existing data with newly developed analysis tools and techniques.
- Pacific Islands comprehensive stranding investigations (ongoing)—The objectives are to: (1) determine what species and populations of marine mammals and ESA-listed species are present in Navy range complexes, testing ranges, and in specific training and testing areas; and (2) establish the baseline habitat uses, seasonality, and movement patterns of marine mammals and ESA-listed species where Navy training and testing activities occur.
- Estimation of Received Levels of MFAS and Behavioral Response of Marine Mammals at PMRF (ongoing)—The objectives are to: (1) determine what species and populations of marine mammals and ESA-listed species are exposed to U.S. Navy training and testing activities; (2) establish the baseline habitat uses, seasonality, and movement patterns of marine mammals and ESA-listed species where Navy training and testing activities occur; (3) establish the regional baseline vocalization behavior, including seasonality and acoustic characteristics, of marine mammals where Navy training and testing activities occur; (4) determine what behaviors can most effectively be assessed for potential

response to Navy training and testing activities; (5) evaluate behavioral responses of marine mammals exposed to Navy training and testing activities to support PCoD development and application; (6) application of passive acoustic tools and techniques for detecting, classifying, locating, and tracking marine mammals; (7) evaluate trends in distribution and abundance for populations of marine mammals and ESA-listed species that are regularly exposed to Navy training and testing activities; and (8) leverage existing data with newly developed analysis tools and techniques.

- Marine Mammal Monitoring on Navy Ranges (ongoing)—The objectives are to: (1) estimate the distribution, abundance, and density of marine mammals and ESA-listed species in Navy range complexes, testing ranges, and in specific training and testing areas; (2) establish the regional baseline vocalization behavior, including seasonality and acoustic characteristics, of marine mammals where Navy training and testing activities occur; (3) application of passive acoustic tools and techniques for detecting, classifying, locating, and tracking marine mammals; (4) application of analytic methods to evaluate exposure and/or behavioral response of marine mammals to Navy training and testing activities; and (5) evaluate trends in distribution and abundance for populations of marine mammals and ESA-listed species that are regularly exposed to Navy training and testing activities.
- Marine Mammal Sightings During CalCOFI Cruises (ongoing)—The objectives are to: (1) determine what species and populations of marine mammals and ESA-listed species are present in Navy range complexes, testing ranges, and in specific training and testing areas; (2) estimate the distribution, abundance, and density of marine mammals and ESA-listed species in Navy range complexes, testing ranges, and in specific training and testing areas; and (3) establish the baseline habitat uses, seasonality, and movement patterns of marine mammals and ESA-listed species where Navy training and testing activities occur.
- Passive Acoustic Monitoring of Marine Mammals in SOCAL Range Complex (ongoing)—The objectives are to: (1) determine what species and populations of marine mammals and ESA-listed species are present in Navy range complexes, testing ranges, and in specific training and testing areas; (2) establish the baseline habitat uses, seasonality, and movement patterns of marine mammals and ESA-listed species where Navy training and testing activities occur; (3) establish the regional baseline vocalization behavior, including seasonality and acoustic characteristics, of marine mammals where Navy training and testing activities occur; and (4) apply passive acoustic tools and techniques for detecting, classifying, locating, and tracking marine mammals.
- Cuvier's Beaked Whale and Fin Whale Population Dynamics and Impact Assessment at the Southern California Offshore Antisubmarine Warfare Range (SOAR) (ongoing)—The objectives are to: (1) determine what species and populations of marine mammals and ESA-listed species are present in Navy range complexes, testing ranges, and in specific training and testing areas; (2) establish the baseline habitat uses, seasonality, and movement patterns of marine mammals and ESA-listed species where Navy training and testing activities occur; (3) establish the regional baseline vocalization behavior, including seasonality and acoustic characteristics, of marine mammals where Navy training and testing activities occur, (4) determine what behaviors can most effectively be assessed for potential response to Navy training and testing activities; (5) apply passive acoustic tools and techniques for detecting, classifying, locating, and tracking marine mammals; (6) evaluate behavioral responses of marine mammals exposed to Navy training and testing activities to support PCoD development and application; (7) evaluate trends in distribution and abundance for populations of marine mammals and ESA-listed species that are regularly exposed to Navy training and testing activities; and (8) leverage existing data with newly developed analysis tools and techniques.

Adaptive Management

The proposed regulations governing the take of marine mammals incidental to military readiness activities in the HCTT Study Area contain an adaptive management component. Our understanding of the effects of military readiness activities (*e.g.,* acoustic and explosive stressors) on marine mammals continues to evolve, which makes the inclusion of an adaptive management component both valuable and necessary within the context of 7-year regulations.

The reporting requirements associated with this proposed rule are designed to provide NMFS with monitoring data from the previous year to allow NMFS to consider whether any changes to existing mitigation and monitoring requirements are appropriate. The use of adaptive management allows NMFS to consider new information from different sources to determine (with input from the Action Proponents regarding practicability) on an annual or biennial basis if mitigation or monitoring measures should be modified (including additions or deletions). Mitigation measures could be modified if new data suggests that such modifications would have a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring and if the measures are practicable. If the modifications to the mitigation, monitoring, or reporting measures are substantial, NMFS would publish a notice of the planned LOAs in the **Federal Register** and solicit public comment.

The following are some of the possible sources of applicable data to be considered through the adaptive management process: (1) results from monitoring and exercise reports, as required by MMPA authorizations; (2) compiled results of Navy-funded research and development studies; (3) results from specific stranding investigations; (4) results from general marine mammal and sound research; and (5) any information which reveals that marine mammals may have been taken in a manner, extent, or number not authorized by these regulations or subsequent LOAs. The results from monitoring reports and other studies may be viewed at: *https://www.navymarinespeciesmonitoring.us.*

Proposed Reporting

In order to issue incidental take authorization for an activity, section 101(a)(5)(A) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring. Reports from individual monitoring events, results of analyses, publications, and periodic progress reports for specific monitoring projects will be posted to the Navy's Marine Species Monitoring web portal at: *https://www.navymarinespeciesmonitoring.us.*

There are several different reporting requirements for the Navy pursuant to the current regulations. All of these reporting requirements would be continued for the Navy under this proposed rule for the 7-year period.

Special Reporting for Geographic Mitigation Areas

The Action Proponents must report the total hours of MF1 surface ship hull-mounted mid-frequency active sonar used from November through May in the Hawaii Humpback Whale Special Reporting Mitigation Area in their annual training and testing activity reports. Special reporting for this area is designed to aid the Action Proponents and NMFS in continuing to analyze potential impacts of training and testing in the mitigation areas. In addition to the mitigation area-specific requirement, for all mitigation areas, should national security require the Action Proponents to exceed the activity restrictions in a given mitigation area, Action Proponent personnel must provide NMFS with advance notification and include the information (*e.g.,* sonar hours, explosives usage, or restricted area use) in its annual activity reports submitted to NMFS.

Notification of Injured, Live Stranded, or Dead Marine Mammals

The Action Proponents would consult the Notification and Reporting Plan, which sets out notification, reporting, and other requirements when injured, live stranded, or dead marine mammals are detected. The Notification and Reporting Plan is available for review at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities.*

Annual HCTT Study Area Marine Species Monitoring Report

The Action Proponents would submit an annual report of the HCTT Study Area marine species monitoring, which would be included in a Pacific-wide monitoring report, describing the implementation and results from the previous calendar year. Data collection methods will be standardized across range complexes and the HCTT Study Area to allow for comparison in different geographic locations. The draft report must be submitted to the Director of the Office of Protected Resources of NMFS annually as specified in the LOAs. NMFS will submit comments or questions on the report, if any, within 3 months of receipt. The report will be considered final after the Action Proponents have addressed NMFS' comments, or 3 months after submittal of the draft if NMFS does not provide comments on the draft report. The report would describe progress of knowledge made with respect to intermediate scientific objectives within the HCTT Study Area associated with the ICMP. Similar study questions would be treated together so that progress on each topic can be summarized across all Navy ranges. The report need not include analyses and content that do not provide direct assessment of cumulative progress on the monitoring plan study questions.

Annual HCTT Training and Testing Reports

In the event that the analyzed sound levels were exceeded, the Action Proponents would submit a preliminary report(s) detailing the exceedance within 21 days after the anniversary date of issuance of the LOAs. Regardless of whether analyzed sound levels were exceeded, the Navy would submit a detailed report (HCTT Annual Training Exercise Report and Testing Activity Report) and Coast Guard and Army would each submit a detailed report (HCTT Annual Training Exercise Report) to NMFS annually as specified in the LOAs. NMFS will submit comments or questions on the reports, if any, within 1 month of receipt. The reports will be considered final after the Action Proponents have addressed NMFS' comments, or 1 month after submittal of the drafts if NMFS does not provide comments on the draft reports. The annual report shall contain information on MTEs, ship shock trials, SINKEX events, and a summary of all sound sources used (total hours or quantity (per the LOA)) of each bin of sonar or other non-impulsive source; total annual number of each type of explosive exercises; and total annual expended/detonated rounds (*e.g.,* missiles, bombs, sonobuoys, *etc.*) for each explosive bin). The annual reports will also contain cumulative sonar and explosive use quantity from previous years' reports through the current year. Additionally, if there were any changes to the sound source allowance in the reporting year, or cumulatively, the reports would include a discussion of why the change was made and include analysis to support how the change did or did not affect the analysis in the 2024 HCTT Draft EIS/OEIS and MMPA final rule. The annual reports would also include the details regarding specific requirements associated with specific mitigation areas. The analysis in the detailed report would be based on the accumulation of data from the current year's report and data collected from previous annual reports. The detailed reports shall also contain special reporting for the Hawaii Humpback Whale Special Reporting Mitigation Area, as described in the LOAs.

The final annual reports at the conclusion of the authorization period (year 7) will also serve as the comprehensive close-out reports and include both the final year annual use compared to annual authorization as well as a cumulative 7-year annual use compared to 7-year authorization. NMFS must submit comments on the draft close-out report, if any, within 3 months of receipt. The reports will be considered final after the Action Proponents have addressed NMFS' comments, or 3 months after submittal of the drafts if NMFS does not provide comments.

Other Reporting and Coordination

The Action Proponents would continue to report and coordinate with NMFS for the following:

- Annual marine species monitoring technical review meetings that also include researchers and the Marine Mammal Commission; and
- Annual Adaptive Management meetings that also include the Marine Mammal Commission (and could occur in conjunction with the annual marine species monitoring technical review meetings).

Preliminary Analysis and Negligible Impact Determination

General Negligible Impact Analysis

Introduction

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.,* population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be taken by Level A harassment or Level B harassment (as presented in table 37, table 38, table 39, and table 40), NMFS considers other factors, such as the likely nature of any responses (*e.g.,* intensity, duration) and the context of any responses (*e.g.,* critical reproductive time or location, migration), as well as effects on habitat and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS' implementing regulations (54 FR 40338, September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.,* as reflected in the regulatory status of the species, population size and growth rate where known, other ongoing sources of human-caused mortality, and ambient noise levels).

In the Estimated Take of Marine Mammals section, we identified the subset of potential effects that would be expected to qualify as take under the MMPA both annually and over the 7-year period covered by this proposed rule, and then identified the maximum number of takes we believe could occur (mortality) or are reasonably expected to occur (harassment) based on the methods described. The impact that any given take will have is dependent on many case-specific factors that need to be considered in the negligible impact analysis (*e.g.,* the context of behavioral exposures such as duration or intensity of a disturbance, the health of impacted animals, the status of a species that incurs fitness-level impacts on individuals, *etc.*). For this proposed rule we evaluated the likely impacts of the enumerated maximum number of harassment takes that are proposed for authorization and reasonably expected to occur, in the context of the specific circumstances surrounding these predicted takes. We also include a specific assessment of M/SI takes that could occur, as well as consideration of the traits and statuses of the affected species and stocks. Last, we collectively evaluated this information, as well as other more taxa-specific information and mitigation measure effectiveness, in group-specific assessments that support our negligible impact conclusions for each stock or species. Because all of the Action Proponents' specified activities would occur within the ranges of the marine mammal stocks identified in the rule, all negligible impact analyses and determinations are at the stock level (*i.e.,* additional species-level determinations are not needed).

Harassment

The specified activities reflect representative levels of military readiness activities. The Description of the Proposed Activity section describes annual activities. There may be some flexibility in the exact number of hours, items, or detonations that may vary from year to year, but take totals would not exceed the maximum annual totals and 7-year totals indicated in table 37, table 38, table 39, and table 40. We base our analysis and negligible impact determination on the maximum number of takes that would be reasonably expected to occur annually and are proposed to be authorized, although, as stated before, the number of takes are only one part of the analysis, which includes extensive qualitative consideration of other contextual factors that influence the degree of impact of the takes on the affected individuals. To avoid repetition, we provide some general analysis immediately below that applies to all the species listed in table 37, table 38, table 39, and table 40, given that some of the anticipated effects of the Action Proponents' military readiness activities on marine mammals are expected to be relatively similar in nature. Below that, we provide additional information specific to mysticetes, odontocetes, and pinnipeds and, finally, break our analysis into species (and/or stocks), or groups of species (and the associated stocks) where relevant similarities exist, to provide more specific information related to the anticipated effects on individuals of a specific stock or where there is information about the status or structure of any species that would lead to a differing assessment of the effects on the species or stock. Organizing our analysis by grouping species or stocks that share common traits or that will respond similarly to effects of the Action Proponents' activities and then providing species- or stock-specific information allows us to avoid duplication while assuring that we have analyzed the effects of the specified activities on each affected species or stock.

The Action Proponents' harassment take request is based on one model for pile driving, a second model for land-based missile and target launches, and a third model (NAEMO) for all other acoustic stressors, which NMFS reviewed and concurs appropriately estimates the maximum amount of harassment that is reasonably likely to occur. As described in more detail above, NAEMO calculates sound energy propagation from sonar and other transducers, air guns, and explosives during military readiness activities; the sound or impulse received by animat dosimeters representing marine mammals distributed in the area around the modeled activity; and whether the sound or impulse energy received by a marine mammal exceeds the thresholds for effects. Assumptions in the Navy models intentionally err on the side of overestimation when there are unknowns. The effects of the specified activities are modeled as though they would occur regardless of proximity to marine mammals, meaning that no activity-based mitigation is considered (*e.g.,* no power down or shut down). However, the modeling does quantitatively consider the possibility that marine mammals would avoid continued or repeated sound exposures to some degree, based on a species' sensitivity to behavioral disturbance. NMFS provided input to, independently reviewed, and concurred with the Action Proponents on this process. The Action Proponents' analysis, which is described in detail in section 6 of the application, was used to quantify harassment takes for this proposed rule.

The Action Proponents and NMFS anticipate more severe effects from takes resulting from exposure to higher received levels (though this is in no way a strictly linear relationship for behavioral effects throughout species, individuals, or circumstances) and less severe effects from takes resulting from exposure to lower received levels. However, there is also growing evidence of the importance of distance in predicting marine mammal behavioral response to sound, *i.e.,* sounds of a similar level emanating from a more distant source have been shown to be less likely to elicit a response of equal magnitude (DeRuiter 2012). The estimated number of takes by Level A harassment and Level B harassment does not equate to the number of individual animals the Action Proponents expect to harass (which is lower), but rather to the instances of take (*i.e.,* exposures above the Level A harassment and Level B harassment threshold) that are anticipated to occur over the 7-year period. These instances may represent either brief exposures (*i.e.,* seconds or minutes) or, in some cases, longer durations of exposure within a day. In some cases, an animal that incurs a single take by AUD INJ or TTS may also experience a direct behavioral harassment from the same exposure. Some individuals may experience multiple instances of take (meaning over multiple days) over the course of the year, which means that the number of individuals taken is smaller than the total estimated takes. Generally speaking, the higher the number of takes as compared to the population abundance, the more repeated takes of individuals are likely, and the higher the actual percentage of individuals in the population that are likely taken at least once in a year. We look at this comparative metric (number of takes to population abundance) to give us a relative sense of where a larger portion of a species is being taken by the specified activities, where there is a likelihood that the same individuals are being taken across multiple days, and whether the number of days might be higher or more likely sequential. Where the number of instances of take is less than 100 percent of the abundance, and there is no information to specifically suggest that some subset of animals is known to congregate in an area in which activities are regularly occurring (*e.g.,* a small resident population, takes occurring in a known important area such as a BIA, or a large portion of the takes occurring in a certain region and season), the overall likelihood and number of repeated takes is generally considered low, as it could, on one extreme, mean that every take represents a separate individual in the population being taken on one day (a minimal impact to an individual) or, more likely, that some smaller number of individuals are taken on one day annually and some are taken on a few, not likely sequential, days annually, and of course some are not taken at all.

In the ocean, the use of sonar and other active acoustic sources is often transient and is unlikely to repeatedly expose the same individual animals within a short period, for example within one specific exercise. However, for some individuals of some species, repeated exposures across different activities could occur over the year, especially where events occur in generally the same area with more resident species. In short, for some species, we expect that the total anticipated takes represent exposures of a smaller number of individuals of which some would be exposed multiple times, but based on the nature of the specified activities and the movement patterns of marine mammals, it is unlikely that individuals from most stocks would be taken over more than a few days within a given year. This means that even where repeated takes of individuals are likely to occur, they are more likely to result from non-sequential exposures from different activities, and, even if sequential, individual animals are not predicted to be taken for more than several days in a row, at most. As described elsewhere, the nature of the majority of the exposures would be expected to be of a less severe nature, and based on the numbers, it is likely that any individual exposed multiple times is still only taken on a small percentage of the days of the year. The greater likelihood is that not every individual is taken, or perhaps a smaller subset is taken with a slightly higher average and larger variability of highs and lows, but still with no reason to think that, for most species or stocks, any individuals would be taken a significant portion of the days of the year.

Behavioral Response

The estimates calculated using the BRF do not differentiate between the different types of behavioral responses that qualify as Level B harassment. As described in the application, the Action Proponents identified, with NMFS' input, that moderate behavioral responses, as characterized in Southall *et al.* (2021), would be considered a take. The behavioral responses predicted by the BRFs are assumed to be moderate severity exposures (*e.g.,* altered migration paths or dive profiles, interrupted nursing, breeding or feeding, or avoidance) that may last for the duration of an exposure. The Action Proponents then compiled the available data indicating at what received levels and distances those responses have occurred, and used the indicated literature to build biphasic behavioral response curves and cut-off conditions that are used to predict how many instances of Level B behavioral harassment occur in a day (see the Criteria and Thresholds Technical Report). Take estimates alone do not provide information regarding the potential fitness or other biological consequences of the responses on the affected individuals. We therefore consider the available activity-specific, environmental, and species-specific information to determine the likely nature of the modeled behavioral responses and the potential fitness consequences for affected individuals.

Use of sonar and other transducers would typically be transient and temporary. The majority of acoustic effects to individual animals from sonar and other active sound sources during military readiness activities would be primarily from anti-submarine warfare events. It is important to note although anti-submarine warfare is one of the warfare areas of focus during MTEs, there are significant periods when active anti-submarine warfare sonars are not in use. Nevertheless, behavioral responses are assumed more likely to be significant during MTEs than during other anti-submarine warfare activities due to the duration (*i.e.,* multiple days), scale (*i.e.,* multiple sonar platforms), and use of high-power hull-mounted sonar in the MTEs. In other words, in the range of potential behavioral effects that might be expected as part of a response that qualifies as an instance of Level B behavioral harassment (which by nature of the way it is modeled/counted, occurs within 1 day), the less severe end might include exposure to comparatively lower levels of a sound, at a detectably greater distance from the animal, for a few or several minutes, and that could result in a behavioral response such as avoiding an area that an animal would otherwise have chosen to move through or feed in for some amount of time or breaking off one or a few feeding bouts. More severe effects could occur when the animal gets close enough to the source to receive a comparatively higher level, is exposed continuously to one source for a longer time, or is exposed intermittently to different sources throughout a day. Such effects might result in an animal having a more severe flight response and leaving a larger area for a day or more or potentially losing feeding opportunities for a day. However, such severe behavioral effects are expected to occur infrequently.

To help assess this, for sonar (LFAS/MFAS/HFAS) used in the HCTT Study Area, the Action Proponents provided information estimating the instances of take by Level B harassment by behavioral disturbance under each BRF that would occur within 6-dB increments (discussed below in the *Group and Species-Specific Analyses* section), and by distance in 5-km bins in section 2.3.3 of appendix A of the application. As mentioned above, all else being equal, an animal's exposure to a higher received level is more likely to result in a behavioral response that is more likely to lead to adverse effects, which could more likely accumulate to impacts on reproductive success or survivorship of the animal, but other contextual factors (*e.g.,* distance, duration of exposure, and behavioral state of the animals) are also important (Di Clemente *et al.,* 2018; Ellison *et al.,* 2012; Moore and Barlow, 2013; Southall *et al.,* 2019; Wensveen *et al.,* 2017, *etc.*). The majority of takes by Level B harassment are expected to be in the form of comparatively milder responses (*i.e.,* lower-level exposures that still qualify as take under the MMPA, but would likely be less severe along the continuum of responses that qualify as take) of a generally shorter duration. We anticipate more severe effects from takes when animals are exposed to higher received levels of sound or at closer proximity to the source. Because species belonging to taxa that share common characteristics are likely to respond and be affected in similar ways, these discussions are presented within each species group below in the *Group and Species-Specific Analyses* section. As noted previously in this proposed rule, behavioral response is likely highly variable between species, individuals within a species, and context of the exposure. Specifically, given a range of behavioral responses that may be classified as Level B harassment, to the degree that higher received levels of sound are expected to result in more severe behavioral responses, only a smaller percentage of the anticipated Level B harassment from the specified activities might result in more severe responses (see the *Group and Species-Specific Analyses* section below for more detailed information).

Physiological Stress Response

Some of the lower level physiological stress responses (*e.g.,* orientation or startle response, change in respiration, change in heart rate) discussed earlier would likely co-occur with the predicted harassments, although these responses are more difficult to detect and fewer data exist relating these responses to specific received levels of sound. Level B harassment takes, then, may have a stress-related physiological component as well; however, we would not expect the Action Proponents' generally short-term, intermittent, and (typically in the case of sonar) transitory activities to create conditions of long-term continuous noise leading to long-term physiological stress responses in marine mammals that could affect reproduction or survival.

Diel Cycle

Many animals perform vital functions, such as feeding, resting, traveling, and socializing on a diel cycle (24-hour cycle). Behavioral responses to noise exposure, when taking place in a biologically important context, such as disruption of critical life functions, displacement, or avoidance of important habitat, are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.,* 2007). Henderson *et al.* (2016) found that ongoing smaller scale events had little to no impact on foraging dives for Blainville's beaked whale, while multi-day training events may decrease foraging behavior for Blainville's beaked whale (Manzano-Roth *et al.,* 2016). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered severe unless it could directly affect reproduction or survival (Southall *et al.,* 2007). Note that there is a difference between multiple-day substantive behavioral responses and multiple-day anthropogenic activities. For example, just because an at-sea exercise lasts for multiple days does not necessarily mean that individual animals are either exposed to those exercises for multiple days or, further, exposed in a manner resulting in a sustained multiple day substantive behavioral response. Large multi-day Navy exercises, such as anti-submarine warfare activities, typically include vessels moving faster than while in transit (typically 10–15 kn (18.5–27.8 km/hr) or higher) and generally cover large areas that are relatively far from shore (typically more than 3 nmi (5.6 km) from shore) and in waters greater than 600 ft (182.9 m) deep. Marine mammals are moving as well, which would make it unlikely that the same animal could remain in the immediate vicinity of the ship for the entire duration of the exercise. Further, the Action Proponents do not necessarily operate active sonar the entire time during an exercise. While it is certainly possible that these sorts of exercises could overlap with individual marine mammals multiple days in a row at levels above those anticipated to result in a take, because of the factors mentioned above, it is considered unlikely for the majority of takes. However, it is also worth noting that the Action Proponents conduct many different types of noise-producing activities over the course of the year and it is likely that some marine mammals will be exposed to more than one activity and taken on multiple days, even if they are not sequential.

Durations of Navy activities utilizing tactical sonar sources and explosives vary and are fully described in chapter 2 of the 2024 HCTT Draft EIS/OEIS. Sonar used during anti-submarine warfare would impart the greatest amount of acoustic energy of any category of sonar and other transducers analyzed in the application and include hull-mounted, towed, line array, sonobuoy, helicopter dipping, and torpedo sonars. Most anti-submarine warfare sonars are MFAS (1–10 kHz); however, some sources may use higher or lower frequencies. Anti-submarine warfare training and testing activities using hull-mounted sonar proposed for the HCTT Study Area generally last for only a few hours. However, anti-submarine warfare testing activities range from several hours, to days, to more than 10 days for large integrated anti-submarine warfare MTEs (see table 2, table 3, and table 7). For these multi-day exercises there will typically be extended intervals of non-activity in between active sonar periods. Because of the need to train in a large variety of situations, the Navy conducts anti-submarine warfare activities in varying locations. Given the average length and dynamic nature of anti-submarine warfare activities (times of sonar use) and typical vessel speed, combined with the fact that the majority of the cetaceans would not likely remain in proximity to the sound source, it is unlikely that an animal would be exposed to LFAS/MFAS/HFAS at levels or durations likely to result in a substantive response that would then be carried on for more than one day or on successive days.

Most planned explosive events are instantaneous or scheduled to occur over a short duration (less than 2 hours) and the explosive component of these activities only lasts for minutes. Although explosive activities may sometimes be conducted in the same general areas repeatedly, because of their short duration and the fact that they are in the open ocean and animals can easily move away, it is similarly unlikely that animals would be exposed for long, continuous amounts of time, or demonstrate sustained behavioral responses. Although SINKEXs may last for up to 48 hours (4–8 hours typically, possibly 1–2 days), they are almost always completed in a single day and only a maximum of one event is planned annually for SOCAL and 2–3 annually in Hawaii (see table 3). They are stationary and conducted in deep, open water (where fewer marine mammals would typically be expected to be randomly encountered), and they have rigorous monitoring (see table 69) and shutdown procedures all of which make it unlikely that individuals would be exposed to the exercise for extended periods or on consecutive days, though some individuals may be exposed on multiple days.

Assessing the Number of Individuals Taken and the Likelihood of Repeated Takes

As described previously, Navy modeling uses the best available science to predict the instances of exposure above certain acoustic thresholds, which are equated, as appropriate, to harassment takes. As further noted, for active acoustics it is more challenging to parse out the number of individuals taken by Level B harassment and the number of times those individuals are taken from this larger number of instances, though factors such as movement ecology (*e.g.,* is the species resident and more likely to remain in closer proximity to ongoing activities, versus nomadic or migratory; Keen *et al.* (2021)) or whether there are known BIAs where animals are known to congregate can help inform this. One method that NMFS uses to help better understand the overall scope of the impacts is to compare these total instances of take against the abundance of that species (or stock if applicable). For example, if there are 100 harassment takes in a population of 100, one can assume either that every individual was exposed above acoustic thresholds once per year, or that some smaller number were exposed a few times per year, and a few were not exposed at all. Where the instances of take exceed 100 percent of the population, multiple takes of some individuals are predicted and expected to occur within a year. Generally speaking, the higher the number of takes as compared to the population abundance, the more multiple takes of individuals are likely, and the higher the actual percentage of individuals in the population that are likely taken at least once in a year. We look at this comparative metric to give us a relative sense of where larger portions of the species are being taken by the Action Proponents' activities and where there is a higher likelihood that the same individuals are being taken across multiple days and where that number of days might be higher. It also provides a relative picture of the scale of impacts on each species.

In the ocean, unlike a modeling simulation with static animals, the transient nature of sonar use makes it unlikely to repeatedly expose the same individual animals within a short period, for example, within one specific exercise. However, some repeated exposures across different activities could occur over the year with more resident species. In short, we expect the total anticipated takes represent exposures of a smaller number of individuals of which some could be exposed multiple times, but based on the nature of the Action Proponents' activities and the movement patterns of marine mammals, it is unlikely that any particular subset would be taken over more than several sequential days (with a few possible exceptions discussed in the species-specific conclusions). In other cases, such as activities that overlap habitat of small and resident populations, repeated exposures of the same individuals may be more likely given the likelihood that a smaller number of animals would routinely use the affected habitat.

When calculating the proportion of a population taken (*e.g.,* the number of takes divided by population abundance), which can also be helpful in estimating the number of days over which some individuals may be taken, it is important to choose an appropriate population estimate against which to make the comparison. Herein, NMFS considers two potential abundance estimates, the SARs and the NMSDD abundance estimates. The SARs, where available, provide the official population estimate for a given species or stock in U.S. waters in a given year. These estimates are typically generated from the most recent shipboard and/or aerial surveys conducted, and in some cases, the estimates show substantial year-to-year variability. When the stock is known to range well outside of U.S. Exclusive Economic Zone (EEZ) boundaries, population estimates based on surveys conducted only within the U.S. EEZ are known to be underestimates. The NMSDD-derived abundance estimates are abundances for within the boundaries described for the density database for the California and Hawaii Study Areas only and, therefore, differ from some SAR abundance estimates. For the California Study Area, the NMSDD abundances are based on the extent of the west coast density models, which include areas off the Baja California peninsula of Mexico to the south but are truncated to the north and west of the California portion of the Study Area as shown in the Density Technical Report. For some species, the NMSDD abundances are based on density models that extend up to the northern extent of the west coast U.S. EEZ, beyond the HCTT Study Area. These are noted in the table. In some instances, even this larger extent does not cover the full range of a species or stock. For the Hawaii Study Area, the NMSDD abundances are based on a buffer around the Hawaiian island chain. Thus, island-associated species are encompassed, but abundances of wider-ranging species may be underestimated.

The SAR and NMSDD abundance estimates can differ substantially because these estimates may be based on different methods and data sources. For example, the SARs only consider data from the past 8 year period, whereas the NMSDD considers a longer data history. Further, the SARs estimate the number of animals in a population but not spatial densities. NMSDD uses predictive density models to estimate species presence, even where sighting data is limited or lacking altogether. Each density model is limited to the variables and assumptions considered by the original data source provider. NMFS considered these factors and others described in the Density Technical Report when comparing the estimated takes to current population abundances for each species or stock.

In consideration of the factors described above, to estimate repeated impacts across large areas relative to species geographic distributions, comparing the impacts predicted in NAEMO to abundances predicted using the NMSDD models is usually preferable. By comparing estimated take to the NMSDD abundance estimates, impacts and abundance estimates are based on the same underlying assumptions about a species' presence. NMFS has compared the estimated take to the NMSDD abundance estimates herein for all stocks, with the exception of stocks where the abundance information fits into one of the following scenarios, in which case NMFS concluded that comparison to the SAR abundance estimate is more appropriate: (1) a species' or stocks' range extends beyond the U.S. EEZ and the SAR abundance estimate is greater than the NMSDD abundance. For highly migratory species (*e.g.,* large whales) or those whose geographic distribution extends beyond the boundaries of the HCTT Study Area (*e.g.,* Alaska stocks), comparisons to the SAR are appropriate. Many of the stocks present in the HCTT Study Area have ranges significantly larger than the HCTT Study Area, and that abundance is captured by the SAR. Therefore, comparing the estimated takes to an abundance, in this case the SAR abundance, which represents the total population, may be more appropriate than modeled abundances for only the HCTT Study Area; and (2) when the current minimum population estimate in the SAR is greater than the NMSDD abundance, regardless of whether the stock range extends beyond the EEZ. The NMSDD and SAR abundance estimates are both included in table 89, table 91, table 93, table 95, table 97, and table 99, and each table indicates which stock abundance estimate was selected for comparison to the take estimate for each species or stock.

Temporary Threshold Shift

NMFS and the Navy have estimated that all species of marine mammals may incur some level of TTS from active sonar. As mentioned previously, in general, TTS can last from a few minutes to days, be of varying degree, and occur across various frequency bandwidths, all of which determine the severity of the impacts on the affected individual, which can range from minor to more severe. Table 41 through table 51 indicate the number of takes by TTS that may be incurred by different species from exposure to active sonar, air guns, pile driving, and explosives. The TTS incurred by an animal is primarily characterized by three characteristics:

1. Frequency—Available data suggest that most TTS occurs in the frequency range of the source up to one octave higher than the source (with the maximum TTS at ½ octave above) (Finneran 2015; Southall *et al.,* 2019). The Navy's MF anti-submarine warfare sources, which are the highest power and most numerous sources and the ones that cause the most take by TTS, utilize the 1–10 kHz frequency band, which suggests that if TTS were to be

induced by any of these MF sources it would be in a frequency band somewhere between approximately 1 and 20 kHz, which is in the range of communication calls for many odontocetes, but below the range of the echolocation signals used for foraging. There are fewer hours of HF source use and the sounds would attenuate more quickly, plus they have lower source levels, but if an animal were to incur TTS from these sources, it would cover a higher frequency range (sources are between 10 and 100 kHz, which means that TTS could range up to the highest frequencies audible to VHF cetaceans, approaching 200 kHz), which could overlap with the range in which some odontocetes communicate or echolocate. However, HF systems are typically used less frequently and for shorter time periods than surface ship and aircraft MF systems, so TTS from HF sources is less likely than from MF sources. There are fewer LF sources and the majority are used in the more readily mitigated testing environment, and TTS from LF sources would most likely occur below 2 kHz, which is in the range where many mysticetes communicate and also where other auditory cues are located (waves, snapping shrimp, fish prey). Also of note, the majority of sonar sources from which TTS may be incurred occupy a narrow frequency band, which means that the TTS incurred would also be across a narrower band (*i.e.,* not affecting the majority of an animal's hearing range).

2. Degree of the shift (*i.e.,* by how many dB the sensitivity of the hearing is reduced)—Generally, both the degree of TTS and the duration of TTS will be greater if the marine mammal is exposed to a higher level of energy (which would occur when the peak SPL is higher or the duration is longer). The threshold for the onset of TTS was discussed previously in this proposed rule. An animal would have to approach closer to the source or remain in the vicinity of the sound source appreciably longer to increase the received SEL, which would be difficult considering the Lookouts and the nominal speed of an active sonar vessel (10–15 kn (18.5–27.8 km/hr)) and the relative motion between the sonar vessel and the animal. In the TTS studies discussed in the Potential Effects of Specified Activities on Marine Mammals and Their Habitat section, some using exposures of almost an hour in duration or up to 217 SEL, most of the TTS induced was 15 dB or less, though Finneran *et al.* (2007) induced 43 dB of TTS with a 64-second exposure to a 20 kHz source measured via auditory steady-state response (auditory evoked potential measurement). The SQS–53 (MFAS) hull-mounted sonar (MF1) nominally emits a short (*i.e.,* 1-second) ping typically every 50 seconds, incurring those levels of TTS due to this source is highly unlikely. Sources with higher duty cycles, such as MF1C (high duty cycle hull-mounted sonar) produce longer ranges to effects and contribute to auditory effects from this action. Since most hull-mounted sonar, such as the SQS–53, engaged in anti-submarine warfare training would be moving at between 10 and 15 kn (18.5 to 27.8 km/hr) and nominally pinging every 50 seconds, the vessel will have traveled a minimum distance of approximately 843.2 ft (257 m) during the time between those pings. For a Navy vessel moving at a nominal 10 kn (18.5 km/hr), it is unlikely a marine mammal would track with the ship and could maintain speed parallel to the ship to receive adequate energy over successive pings to suffer TTS. In general, there is a higher potential for TTS associated with sources with higher duty cycles, like continuous hull-mounted sonars, compared to those sources that are intermittent or have lower duty cycles (Kastelein *et al.,* 2015). Though high duty cycle or continuous hull-mounted sonars make up a small percentage of the Navy's overall MFAS activities.

In short, given the anticipated duration and levels of sound exposure, we would not expect marine mammals to incur more than relatively low levels of TTS in most cases for sonar exposure. To add context to this degree of TTS, individual marine mammals may regularly experience variations of 6 dB differences in hearing sensitivity in their lifetime (Finneran *et al.,* 2000; Finneran *et al.,* 2002; Schlundt *et al.,* 2000).

3. Duration of TTS (recovery time)—As discussed in the Potential Effects of Specified Activities on Marine Mammals and Their Habitat section, TTS laboratory studies using exposures of up to an hour in duration or up to 217 dB SEL, most individuals recovered within 1 day (or less, often in minutes) (Kastelein, 2020b). One study resulted in a recovery that took 4 days (Finneran *et al.,* 2015; Southall *et al.,* 2019). However, there is evidence that repeated exposures resulting in TTS could potentially lead to residual threshold shifts that persist for longer durations and can result in PTS (Reichmuth *et al.,* 2019).

Compared to laboratory studies, marine mammals are likely to experience lower SELs from sonar used in the HCTT Study Area due to movement of the source and animals, and because of the lower duty cycles typical of higher power sources (though some of the Navy MF1C sources have higher duty cycles). Therefore, TTS resulting from MFAS would likely be of lesser magnitude and duration compared to laboratory studies. Also, for the same reasons discussed in the Preliminary Analysis and Negligible Impact Determination—Diel Cycle section, and because of the short distance between the source and animals needed to reach high SELs, it is unlikely that animals would be exposed to the levels necessary to induce TTS in subsequent time periods such that hearing recovery is impeded. Additionally, though the frequency range of TTS that marine mammals might incur would overlap with some of the frequency ranges of their vocalization types, the frequency range of TTS from MFAS would not usually span the entire frequency range of one vocalization type, much less span all types of vocalizations or other critical auditory cues.

As a general point, the majority of the TTS takes are the result of exposure to hull-mounted MFAS, with fewer from explosives (broad-band lower frequency sources), and even fewer from LFAS or HFAS sources (narrower band). As described above, we expect the majority of these takes to be in the form of mild, short-term (minutes to hours), narrower band (only affecting a portion of the animal's hearing range) TTS. This means that for one to several times per year, for several minutes, maybe a few hours, or at most in limited circumstances a few days, a taken individual will have diminished hearing sensitivity (*i.e.,* more than natural variation, but nowhere near total deafness). More often than not, such an exposure would occur within a narrower mid- to higher frequency band that may overlap part (but not all) of a communication, echolocation, or predator range, but sometimes across a lower or broader bandwidth. The significance of TTS is also related to the auditory cues that are germane within the time period that the animal incurs the TTS. For example, if an odontocete has TTS at echolocation frequencies, but incurs it at night when it is resting and not feeding, it may not be as impactful. In short, the expected results of any one of these limited number of mild TTS occurrences could be that: (1) it does not overlap signals that are pertinent to that animal in the given time period; (2) it overlaps parts of signals that are important to the animal, but not in a manner that impairs interpretation; or (3) it reduces detectability of an important signal to a small degree for a short amount of time—in which case the animal may be aware and be able to compensate (but there may be slight energetic cost), or the animal may have some reduced opportunities (*e.g.,* to detect prey) or reduced capabilities to react with maximum effectiveness (*e.g.,* to detect a predator or navigate optimally). However, it is unlikely that individuals would experience repeated or high degree TTS overlapping in frequency and time with signals critical for behaviors that would impact overall fitness.

Auditory Masking or Communication Impairment

The ultimate potential impacts of masking on an individual (if it were to occur) are similar to those discussed for TTS, but an important difference is that masking only occurs during the time of the signal, versus TTS, which continues beyond the duration of the signal. Fundamentally, masking is referred to as a chronic effect because one of the key harmful components of masking is its duration—the fact that an animal would have reduced ability to hear or interpret critical cues becomes much more likely to cause a problem the longer it occurs. Also inherent in the concept of masking is the fact that the potential for the effect is only present during the times that the animal and the source are in close enough proximity for the effect to occur (and further, this time period would need to coincide with a time that the animal was utilizing sounds at the masked frequency). As our analysis has indicated, because of the relative movement of vessels and the sound sources primarily involved in this proposed rule, we do not expect the exposures with the potential for masking to be of a long duration.

Masking is fundamentally more of a concern at lower frequencies, because low frequency signals propagate significantly farther than higher frequencies and because they are more likely to overlap both the narrower LF calls of mysticetes, as well as many non-communication cues such as fish and invertebrate prey, and geologic sounds that inform navigation. Masking is also more of a concern from continuous sources (versus intermittent sonar signals) where there is no quiet time between pulses and detection and interpretation of auditory signals is likely more challenging. For these reasons, dense aggregations of, and long exposure to, continuous LF activity are much more of a concern for masking, whereas comparatively short-term exposure to the predominantly intermittent pulses of often narrow frequency range MFAS or HFAS, or explosions are not expected to result in a meaningful amount of masking. While the Action Proponents occasionally use LF and more continuous sources, it is not in the contemporaneous aggregate amounts that would be expected to accrue to degrees that would have the potential to affect reproductive success or survival. Additional detail is provided below.

Standard hull-mounted MFAS typically pings every 50 seconds. Some hull-mounted anti-submarine sonars can also be used in an object detection mode known as ''Kingfisher'' mode (*e.g.,* used on vessels when transiting to and from port) where pulse length is shorter but pings are much closer together in both time and space since the vessel goes slower when operating in this mode, and during which an increased likelihood of masking in the vicinity of vessel could be expected. For the majority of other sources, the pulse length is significantly shorter than hull-mounted active sonar, on the order of several microseconds to tens of milliseconds. Some of the vocalizations that many marine mammals make are less than 1 second long, so, for example with hull-mounted sonar, there would be a 1 in 50 chance (only if the source was in close enough proximity for the sound to exceed the signal that is being detected) that a single vocalization might be masked by a ping. However, when vocalizations (or series of vocalizations) are longer than the 1 second pulse of hull-mounted sonar, or when the pulses are only several microseconds long, the majority of most animals' vocalizations would not be masked.

Most anti-submarine warfare sonars and countermeasures use MF frequencies and a few use LF and HF frequencies. Most of these sonar signals are limited in the temporal, frequency, and spatial domains. The duration of most individual sounds is short, lasting up to a few seconds each. A few systems operate with higher duty cycles or nearly continuously, but they typically use lower power, which means that an animal would have to be closer, or in the vicinity for a longer time, to be masked to the same degree as by a higher level source. Nevertheless, masking could occasionally occur at closer ranges to these high-duty cycle and continuous active sonar systems, but, as described previously, it would be expected to be of a short duration. While data are lacking on behavioral responses of marine mammals to continuously active sonars, mysticete species are known to habituate to novel and continuous sounds (Nowacek *et al.,* 2004), suggesting that they are likely to have similar responses to high-duty cycle sonars. Furthermore, most of these systems are hull-mounted on surface ships with the ships moving at least 10 kn (18.5 km/hr), and it is unlikely that the ship and the marine mammal would continue to move in the same direction and the marine mammal subjected to the same exposure due to that movement. Most anti-submarine warfare activities are geographically dispersed and last for only a few hours, often with intermittent sonar use even within this period. Most anti-submarine warfare sonars also have a narrow frequency band (typically less than one-third octave). These factors reduce the likelihood of sources causing significant masking. HF signals (above 10 kHz) attenuate more rapidly in the water due to absorption than do lower frequency signals, thus producing only a very small zone of potential masking. If masking or communication impairment were to occur briefly, it would more likely be in the frequency range of MFAS (the more powerful source), which overlaps with some odontocete vocalizations (but few mysticete vocalizations); however, it would likely not mask the entirety of any particular vocalization, communication series, or other critical auditory cue, because the signal length, frequency, and duty cycle of the MFAS/HFAS signal does not perfectly resemble the characteristics of any single marine mammal species' vocalizations.

Other sources used in the Action Proponents' training and testing that are not explicitly addressed above, many of either higher frequencies (meaning that the sounds generated attenuate even closer to the source) or used less frequently, would be expected to contribute to masking over far smaller areas and/or times. For the reasons described here, any limited masking that could potentially occur would be minor and short-term.

In conclusion, masking is more likely to occur in the presence of broadband, relatively continuous noise sources such as from vessels; however, the duration of temporal and spatial overlap with any individual animal and the spatially separated sources that the Action Proponents use would not be expected to result in more than short-term, low impact masking that would not affect reproduction or survival.

Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives

Table 41 through table 51 indicate the number of takes of each species by Level A harassment in the form of auditory injury resulting from exposure to active sonar and/or explosives is estimated to occur, and table 54 indicates the totals across all activities. The number of takes estimated to result from auditory injury annually from sonar, air guns, and explosives for each species/stock from all activities combined ranges from 0 to 1,235 (the 1,235 is for the CA/OR/WA stock of Dall's porpoise). Thirty-two stocks have the potential to incur non-auditory injury from explosives, and the number of individuals from any given stock from all activities combined ranges from 1 to 71 (the 71 is for the CA/OR/WA stock of short-beaked common dolphin). As described previously, the Navy's model likely overestimates the number of injurious takes to some degree. Nonetheless, these Level A harassment take numbers represent the maximum number of instances in which marine mammals would be reasonably expected to incur auditory and/or non-auditory injury, and we have analyzed them accordingly.

If a marine mammal is able to approach a surface vessel within the distance necessary to incur auditory injury in spite of the mitigation measures, the likely speed of the vessel (nominally 10–15 kn (18.5–27.8 km/hr)) and relative motion of the vessel would make it very difficult for the animal to remain in range long enough to accumulate enough energy to result in more than a mild case of auditory injury. As discussed previously in relation to TTS, the likely consequences to the health of an individual that incurs auditory injury can range from mild to more serious and is dependent upon the degree of auditory injury and the frequency band associated with auditory injury. The majority of any auditory injury incurred as a result of exposure to Navy sources would be expected to be in the 2–20 kHz range (resulting from the most powerful hull-mounted sonar) and could overlap a small portion of the communication frequency range of many odontocetes, whereas other marine mammal groups have communication calls at lower frequencies. Because of the broadband nature of explosives, auditory injury incurred from exposure to explosives would occur over a lower, but wider, frequency range. Permanent loss of some degree of hearing is a normal occurrence for older animals, and many animals are able to compensate for the shift, both in old age or at younger ages as the result of stressor exposure. While a small loss of hearing sensitivity may include some degree of energetic costs for compensating or may mean some small loss of opportunities or detection capabilities, at the expected scale it would be unlikely to impact behaviors, opportunities, or detection capabilities to a degree that would interfere with reproductive success or survival.

The Action Proponents implement mitigation measures (described in the Proposed Mitigation Measures section) during explosive activities, including delaying detonations when a marine mammal is observed in the mitigation zone. Nearly all explosive events would occur during daylight hours thereby improving the sightability of marine mammals and mitigation effectiveness. Observing for marine mammals during the explosive activities would include visual and passive acoustic detection methods (the latter when they are available and part of the activity) before the activity begins, in order to cover the mitigation zones that can range from 200 yd (183 m) to 2,500 yd (2,286 m) depending on the source (*e.g.,* explosive sonobuoy, explosive torpedo, explosive bombs), and 2.5 nmi (4.6 km) for sinking exercises (see table 60 through table 69).

The type and amount of take by Level A harassment are indicated for all species and species groups in table 89, table 91, table 93, table 95, table 97, and table 99. Generally speaking, non-auditory injuries from explosives could range from minor lung injuries (which is the most sensitive organ and first to be affected) that consist of some short-term reduction of health and fitness immediately following the injury that heals quickly and will not have any discernible long-term effects, up to more impactful permanent injuries across multiple organs that may cause health problems and negatively impact reproductive success (*i.e.,* increase the time between pregnancies or even render reproduction unlikely) but fall just short of a "serious injury" by virtue of the fact that the animal is not expected to die. Nonetheless, due to the Navy's mitigation and detection capabilities, we would not expect marine mammals to typically be exposed to a more severe blast located closer to the source—so the impacts likely would be less severe. In addition, most non-auditory injuries and mortalities or serious injuries are predicted for stocks with medium to large group sizes, mostly delphinids, which increases sightability. It is still difficult to evaluate how these injuries may or may not impact an animal's fitness; however, these effects are only seen in limited numbers (single digits for all but three stocks) and mostly in species of moderate, high, and very high abundances. In short, it is unlikely that any, much less all, of the limited number of injuries accrued to any one stock would result in reduced reproductive success of any individuals; even if a few injuries did result in reduced reproductive success of individuals, the status of the affected stocks are such that it would not be expected to adversely impact rates of reproduction (and auditory injury of the low severity anticipated here is not expected to affect the survival of any individual marine mammals).

Serious Injury and Mortality

NMFS is authorizing a very limited number of serious injuries or mortalities that could occur in the event of a vessel strike or as a result of marine mammal exposure to explosive detonations. We note here that the takes from potential vessel strikes or explosive exposures enumerated below could result in non-serious injury, but their worst potential outcome (*i.e.,* mortality) is analyzed for the purposes of the negligible impact determination.

The MMPA requires that PBR be estimated in SARs and that it be used in applications related to the management of take incidental to commercial fisheries (*i.e.,* the take reduction planning process described in section 118 of the MMPA and the determination of whether a stock is "strategic" as defined in section 3 of the MMPA). While nothing in the statute requires the application of PBR outside the management of commercial fisheries interactions with marine mammals, NMFS recognizes that as a quantitative metric, PBR may be useful as a consideration when evaluating the impacts of other human-caused activities on marine mammal stocks. Outside the commercial fishing context, and in consideration of all known human-caused mortality, PBR can help inform the potential effects of M/SI requested to be authorized under section 101(a)(5)(A) of the MMPA. As noted by NMFS and the U.S. FWS in our implementing regulations for the 1986 amendments to the MMPA (54 FR 40341, September 29, 1989), the Services consider many factors, when available, in making a negligible impact determination, including, but not limited to, the status of the species or stock relative to OSP (if known); whether the recruitment rate for the species or stock is increasing, decreasing, stable, or unknown; the size and distribution of the population; and existing impacts and environmental conditions. In this multi-factor analysis, PBR can be a useful indicator for when, and to what extent, the agency should take an especially close look at the circumstances associated with the potential mortality, along with any other factors that could influence annual rates of recruitment or survival.

Below we describe how PBR is considered in NMFS M/SI analysis. Please see the 2020 Northwest Training and Testing Final Rule (85 FR 72312, November 12, 2020) for a background discussion of PBR and how it was adopted for use authorizing incidental take under MMPA section 101(a)(5)(A) for specified activities such as the Action Proponent's training and testing in the HCTT Study Area.

When considering PBR during evaluation of effects of M/SI under MMPA section 101(a)(5)(A), we utilize a two-tiered analysis for each stock for which M/SI is proposed for authorization:

Tier 1: Compare the total human-caused average annual M/SI estimate from all sources, including the M/SI proposed for authorization from the specific activity, to PBR. If the total M/SI estimate is less than or equal to PBR, then the specific activity is considered to have a negligible impact on that stock. If the total M/SI estimate (including from the specific activity) exceeds PBR, conduct the Tier 2 analysis.

Tier 2: Evaluate the estimated M/SI from the specified activity relative to the stock's PBR. If the M/SI from the specified activity is less than or equal to 10 percent of PBR and other major sources of human-caused mortality have mitigation in place, then the individual specified activity is considered to have a negligible impact on that stock. If the estimate exceeds 10 percent of PBR, then, absent other mitigating factors, the specified activity could be considered likely to have a non-negligible impact on that stock and additional analysis is necessary.

Additional detail regarding the two tiers of the evaluation are provided below.

As indicated above, the goal of the Tier 1 assessment is to determine whether total annual human-caused mortality, including from the specified activity, would exceed PBR. To aid in the Tier 1 evaluation and get a clearer picture of the amount of annual M/SI that remains without exceeding PBR, for each species or stock, we first calculate a ''residual PBR,'' which equals PBR minus the ongoing annual human-caused M/SI (*i.e.,* Residual PBR = PBR − (annual M/SI estimate from the SAR + other M/SI authorized under section 101(a)(5)(A) of the MMPA). If the ongoing human-caused M/SI from other sources does not exceed PBR, then residual PBR is a positive number, and we consider how the proposed authorized incidental M/SI from the specified activities being evaluated compares to residual PBR using the Tier 1 framework in the following paragraph. If the ongoing anthropogenic mortality from other sources already exceeds PBR, then residual PBR is a negative number and we move to the Tier 2 discussion further below to consider the M/SI from the specific activities.

To reiterate, the Tier 1 analysis overview in the context of residual PBR, if the M/SI from the specified activity does not exceed PBR, the impacts of the authorized M/SI on the species or stock are generally considered to be negligible. As a simplifying analytical tool in the Tier 1 evaluation, we first consider whether the M/SI from the specified activities could cause incidental M/SI that is less than 10 percent of residual PBR, which we consider an ''insignificance threshold.'' If so, we consider M/SI from the specified activities to represent an insignificant incremental increase in ongoing anthropogenic M/SI for the marine mammal stock in question that alone will clearly not adversely affect annual rates of recruitment and survival and for which additional analysis or discussion of the anticipated M/SI is not required because the negligible impact standard clearly will not be exceeded on that basis alone.

When the M/SI from the specified activity is above the insignificance threshold in the Tier 1 evaluation, it does not indicate that the M/SI associated with the specified activities is necessarily approaching a level that would exceed negligible impact. Rather, it is used as a cue to look more closely if and when the M/SI for the specified activity approaches residual PBR, as it becomes increasingly necessary (the closer the M/SI from the specified activity is to 100 percent residual PBR) to carefully consider whether there are other factors that could affect reproduction or survival, such as take by Level A and/or Level B harassment that has been predicted to impact reproduction or survival of individuals, or other considerations such as information that illustrates high uncertainty involved in the calculation of PBR for some stocks. Recognizing that the impacts of harassment of any authorized incidental take (by Level A or Level B harassment from the specified activities) would not combine with the effects of the authorized M/SI to adversely affect the stock through effects on recruitment or survival, if the proposed authorized M/SI for the specified activity is less than residual PBR, the M/SI, alone, would be considered to have a negligible impact on the species or stock. If the proposed authorized M/SI is greater than residual PBR, then the assessment should proceed to Tier 2.

For the Tier 2 evaluation, recognizing that the total annual human-caused M/SI exceeds PBR, we consider whether the incremental effects of the proposed authorized M/SI for the specified activity, specifically, would be expected to result in a negligible impact on the affected species or stocks. For the Tier 2 assessment, consideration of other factors (positive or negative), including those described above (*e.g.,* the certainty in the data underlying PBR and the impacts of any harassment authorized for the specified activity), as well as the mitigation in place to reduce M/SI from other activities is especially important to assessing the impacts of the M/SI from the specified activity on the species or stock. PBR is a conservative metric and not sufficiently precise to serve as an absolute predictor of population effects upon which mortality caps would appropriately be based. For example, in some cases stock abundance (which is one of three key inputs into the PBR calculation) is underestimated because marine mammal survey data within the U.S. EEZ are used to calculate the abundance even when the stock range extends well beyond the U.S. EEZ. An underestimate of abundance could result in an underestimate of PBR. Alternatively, we sometimes may not have complete M/SI data beyond the U.S. EEZ to compare to PBR, which could result in an overestimate of residual PBR. The accuracy and certainty around the data that feed any PBR calculation, such as the abundance estimates, must be carefully considered to evaluate whether the calculated PBR accurately reflects the circumstances of the particular stock.

As referenced above, in some cases the ongoing human-caused mortality from activities other than those being evaluated already exceeds PBR and, therefore, residual PBR is negative. In these cases, any additional mortality, no matter how small, and no matter how small relative to the mortality caused by other human activities, would result in greater exceedance of PBR. PBR is helpful in informing the analysis of the effects of mortality on a species or stock because it is important from a biological perspective to be able to consider how the total mortality in a given year may affect the population. However, section 101(a)(5)(A) of the MMPA indicates that NMFS shall authorize the requested incidental take from a specified activity if we find that ''the total of such taking [*i.e.,* from the specified activity] will have a negligible impact on such species or stock.'' In other words, the task under the statute is to evaluate the impact of the applicant's anticipated take on the species or stock, not the impact of take by other entities. Neither the MMPA nor NMFS' implementing regulations call for consideration of other unrelated activities and their impacts on the species or stock.

Accordingly, we may find that the impacts of the taking from the specified activity may (alone) be negligible even when total human-caused mortality from all activities exceeds PBR (in the context of a particular species or stock). Specifically, where the authorized M/SI would be less than or equal to 10 percent of PBR and management measures are being taken to address M/SI from the other contributing activities (*i.e.,* other than the specified activities covered by the incidental take authorization under consideration), the impacts of the authorized M/SI would be considered negligible. In addition, we must also still determine that any impacts on the species or stock from other types of take (*i.e.,* harassment) caused by the applicant do not combine with the impacts from mortality or serious injury addressed here to result in adverse effects on the species or stock through effects on annual rates of recruitment or survival.

As noted above, while PBR is useful in informing the evaluation of the effects of M/SI in MMPA section 101(a)(5)(A) determinations, it is one consideration to be assessed in combination with other factors and is not determinative. For example, as explained above, the accuracy and certainty of the data used to calculate PBR for the species or stock must be considered. And we reiterate the considerations discussed above for why it is not appropriate to consider PBR an absolute cap in the application of this guidance. Accordingly, we use PBR as a trigger for concern while also considering other relevant factors to provide a reasonable and appropriate means of evaluating the effects of potential mortality on rates of recruitment and survival, while acknowledging that it is possible for total human-caused M/SI to exceed PBR (or for the M/SI from the specified activity to exceed 10 percent of PBR in the case where other human-caused mortality is exceeding PBR, as described in the last paragraph) by some small amount and still make a negligible impact determination under MMPA section 101(a)(5)(A).

We note that on June 17, 2020, NMFS finalized Procedure 02–204–02, Criteria for Determining Negligible Impact under MMPA section 101(a)(5)(E) (see *https://www.fisheries.noaa.gov/national/laws-policies/protected-resources-policy-directives*). The guidance explicitly notes the differences in the negligible impact determinations required under section 101(a)(5)(E), as compared to sections 101(a)(5)(A) and 101(a)(5)(D), and specifies that the procedure in that document is limited to how the agency conducts negligible impact analyses for commercial fisheries under section 101(a)(5)(E). In this proposed rule, NMFS has described its method for considering PBR to evaluate the effects of potential mortality in the negligible impact analysis. NMFS has reviewed the 2020 guidance and determined that our consideration of PBR in the evaluation of mortality as described above and in the proposed rule remains appropriate for use in the negligible impact analysis for the Action proponent's activities under section 101(a)(5)(A).

Our evaluation of the M/SI for each of the species and stocks for which mortality or serious injury could occur follows.

We first consider maximum potential incidental M/SI from the vessel strike analysis for the affected large whales (table 87) and from the Action Proponents' explosive detonations for the affected small cetaceans and pinnipeds (table 88) in consideration of NMFS' threshold for identifying insignificant M/SI take. By considering the maximum potential incidental M/SI in relation to PBR and ongoing sources of anthropogenic mortality, as described above, we begin our evaluation of whether the potential incremental addition of M/SI through vessel strikes and explosive detonations may affect the species' or stocks' annual rates of recruitment or survival. We also consider the interaction of those mortalities with incidental taking of that species or stock by harassment pursuant to the specified activity.

Based on the methods discussed previously, NMFS is proposing to authorize seven mortalities of large whales due to vessel strike over the course of the 7-year rule, five by the Navy and two by the Coast Guard (table 87). Across the 7-year duration of the rule, four takes by mortality (annual average of 0.57 takes) of fin whale (CA/OR/WA stock) could occur and are proposed for authorization; three takes by mortality (annual average of 0.43 takes) of gray whale (Eastern North Pacific stock) and humpback whale (Hawaii stock) could occur and are proposed for authorization; two takes by mortality (annual average of 0.29 takes) of blue whale (Eastern North Pacific stock), sei whale (Eastern North Pacific), and humpback whale (Mainland Mexico-CA/OR/WA and Central America/Southern Mexico-CA/OR/WA stocks (Mexico and Central America DPSs, respectively)) could occur and are proposed for authorization; one take by mortality (annual average of 0.14 takes) of the Hawaii stock of sperm whale could occur and is proposed for authorization. To calculate the annual average of M/SI by vessel strike, we divided the 7-year proposed take by serious injury or mortality by seven.

TABLE 87—SUMMARY INFORMATION RELATED TO MORTALITIES REQUESTED FOR VESSEL STRIKE, 2025–2032

Common name	Stock	Stock abundance	Total annual M/SI [a]	Fisheries interactions (Y/N); annual rate of M/SI from fisheries interactions	Annual M/SI due to vessel collision	NWTT authorized take (annual)	Potential biological removal (PBR)	Residual PBR (PBR minus annual M/SI)	Recent UME (Y/N); number of strandings, year declared (since 2014)	Annual proposed authorized take (Navy)	7-Year proposed authorized take (Navy)	Annual proposed authorized take (Coast Guard)	7-Year proposed authorized take (Coast Guard)	Total annual proposed authorized take	Total 7-year proposed authorized take
Blue whale	Eastern North Pacific *.	3,233	≥18.6	Y; ≥0.61	0.6	0	4.1	−14.5	N	0.14	1	0.14	1	0.29	2
Fin whale	California/Oregon/Washington *.	12,304	≥43.4	Y; ≥0.41	6.45	0.29	80	36.31	N	0.43	3	0.14	1	0.57	4
Humpback whale	Mainland Mexico—California-Oregon-Washington * [b].	3,741	22	Y; 11.4	2.6	0.29 b	43	20.71	N	0.14	1	0.14	1	0.29	2
Humpback whale	Central America/Southern Mexico—California-Oregon-Washington * [c].	1,603	14.9	Y; 8.1	6.45	0.29 c	3.5	−11.69	N	0.14	1	0.14	1	0.29	2
Sperm whale	Hawai'iHawai'i*	6,062	0	N; 0	UNK	0	18	18	N	0.14	1	0.00	0	0.14	1
Gray whale	Eastern North Pacific.	26,960	131	Y; 9.3	1.8	0.14	801	669.86	Y; 690; 2019	0.29	2	0.14	1	0.43	3
Humpback whale	Hawai'i [b]	11,278	27.09	Y; 8.39	5.4	0.29 b	127	99.62	Y; 52; 2015	0.29	2	0.14	1	0.43	3
Sei whale	Eastern North Pacific.	864	0	Unk	0	0	1.25	1.25	N	0.14	1	0.14	1	0.29	2

Note: Unk = Unknown. N/A = Not Applicable. NMFS is proposing to authorize seven takes by serious injury or mortality by vessel strike total across the 7-year duration of the proposed rule, five takes by the Navy and two takes by the Coast Guard.

* Stock abundance from NMSDD.

[a] This column represents the total number of incidents of M/SI that could potentially accrue to the specified species or stock as indicated in the SAR and includes M/SI from fisheries interactions and other sources.

[b] In 2022, the Central North Pacific stock of humpback whale was split into the Mainland Mexico-California-Oregon-Washington and Hawaii stocks. The 2020 NWTT final rule (85 FR 72312, November 12, 2020) authorized two takes of the Central North Pacific stock. Given the stock structure change, NMFS has assumed that the two strikes could occur to either the Mainland Mexico—CA/OR/WA stock or the Hawaii stock.

[c] The 2020 NWTT final rule (85 FR 72312, November 12, 2020) authorized two takes of the CA/OR/WA stock of humpback whale. Given the stock structure change, NMFS has assumed that the two strikes could occur to the Central America/Southern Mexico- CA/OR/WA stock.

The Action Proponents also requested a limited number of takes by M/SI from explosives. Across the 7-year duration of the rule, NMFS is proposing to authorize 107 takes by M/SI (annual average of 15.29 takes) of short-beaked common dolphin (CA/OR/WA stock), 27 takes by M/SI (annual average of 3.86 takes) of California sea lion (U.S. stock), 17 takes by M/SI (annual average of 2.43 takes) of long-beaked common dolphin (California stock), 7 takes by M/SI (annual average of 1 take) of harbor seal (California stock), 4 takes by M/SI (annual average of 0.57 takes) of short-finned pilot whale (CA/OR/WA stock), 2 takes by M/SI (annual average of 0.29 takes) of bottlenose dolphin (Hawaii pelagic stock), Pacific white-sided dolphin (CA/OR/WA stock), pantropical spotted dolphin (Baja California Peninsula Mexico population), and rough-toothed dolphin (Hawaii stock), and 1 take by M/SI (annual average of 0.14 takes) of bottlenose dolphin (Oʻahu stock), Northern right whale dolphin (CA/OR/WA stock), striped dolphin (CA/OR/WA stock), and Guadalupe fur seal (Mexico stock) (table 88). To calculate the annual average of M/SI from explosives, we divided the 7-year proposed take by serious injury or mortality by seven (table 88), the same method described for vessel strikes.

TABLE 88—SUMMARY INFORMATION RELATED TO HCTT SERIOUS INJURY OR MORTALITY FROM EXPLOSIVES

[2025–2032]

Species	Stock	Stock abundance	Total annual M/SI [a]	Fisheries interactions (Y/N); annual rate of M/SI from fisheries interactions	SWFSC authorized take (annual) [b]	NWTT authorized take (annual) [b]	PBR	Residual PBR (PBR minus annual M/SI) [c]	Recent UME (Y/N); number of strandings, year declared (since 2014)	Annual proposed take by serious injury or mortality (all action proponents) [d]	7-Year proposed take by serious injury or mortality (all action proponents)	Population trend
Short-finned pilot whale.	California/Oregon/ Washington.	836	1.2	Y; 1.2	0.40	0	4.5	2.90	N	0.57	4	Unk.
Bottlenose dolphin	Hawaii Pelagic *	25,120	0	N; 0	0	0	158	158	N	0.29	2	Unk.
Bottlenose dolphin	O'ahu *	113	Unk	Unk	0	0	1	Unk	N	0.14	1	Unk.
Long-beaked common dolphin.	California *	209,100	≥29.7	Y; ≥26.5	2.8	0	668	635.5	N	2.43	17	Unk.
Northern right whale dolphin.	California/Oregon/ Washington *.	68,935	≥6.6	Y; ≥6.6	2.20	0	163	154.20	N	0.14	1	Unk.
Pacific white-sided dolphin.	California/Oregon/ Washington *.	107,775	7	Y; 4	[c] 8.2	0	279	263.8	N	0.29	2	Unk.
Pantropical spotted dolphin.	Baja California Peninsula Mexico *.	70,889	Unk	Unk	0	0	Unk	Unk	N	0.29	2	Unk.
Rough-toothed dolphin	Hawaii *	106,193	3.2	Y; 3.2	0	0	511	507.8	N	0.29	2	Unk.
Short-beaked common dolphin.	California/Oregon/ Washington *.	1,049,117	≥30.5	Y; ≥30.5	2.8	0	8,889	8,856	N	15.29	107	Unk, possibly increasing.
Striped dolphin	California/Oregon/ Washington *.	160,551	≥4	Y; ≥4.0	2.8	0	225	218.2	N	0.14	1	Unk.
California sea lion	U.S.	257,606	>321	Y; ≥197	6	0	14,011	13,684	N	3.86	27	Stable.
Guadalupe fur seal	Mexico	63,850	≥10.0	Y; ≥7.2	0	0	1,959	1,949	Y; 715; 2015	0.14	1	Increasing.
Harbor seal	California	30,968	43	Y; 30	[d] 2.8	0	1,641	1,595	N	1	7	Decreasing.

Note: Unk = Unknown.
* Stock abundance from NMSDD.
[a] This column represents the total number of incidents of M/SI that could potentially accrue to the specified species or stock as indicated in the SAR and includes M/SI from fisheries interactions and other sources.
[b] These columns represents the annual authorized take by mortality in the 2021 LOA for Southwest Fisheries Science Center (SWFSC) Fisheries and Ecosystem Research Activities and the 2020 LOAs for U.S. Navy Northwest Training and Testing (NWTT) Study Area.
[c] The SWFSC final rule (86 FR 3840, January 15, 2021) authorizes 41 takes by M/SI of Pacific white-sided dolphin over the 5-year duration of the final rule (*i.e.,* 8.2 annually). These takes could be of multiple stocks; however, NMFS has conservatively assumed that all of the takes would occur to the CA/OR/WA stock.
[d] The SWFSC final rule (86 FR 3840, January 15, 2021) authorizes 14 takes by M/SI of harbor seals over the 5-year duration of the final rule (*i.e.,* 2.8 annually). These takes could be of multiple stocks; however, NMFS has conservatively assumed that all of the takes would occur to the California stock.

As described above, NMFS M/SI analysis includes two Tiers and our discussion is organized into sections that mirror that framework, as applicable. Specifically, we standardly first address stocks analyzed within Tier 1 (*i.e.,* those for which total known human-caused M/SI is below PBR (*i.e.,* the M/SI from the specified activity is below residual PBR)), considering those with proposed M/SI both below and above the insignificance threshold. Then, if applicable, we discuss stocks for which total mortality exceeds PBR in a Tier 2 analysis in which we compare the proposed M/SI of the specified activity alone against PBR and consider other factors as necessary. Of note, for some stocks total M/SI is not known, in which case a Tier 1 analysis is not possible and, therefore, we move directly to a Tier 2 analysis. In rare cases, PBR itself cannot be calculated, in which case we consider other known factors and/or surrogate stocks to inform the NID analysis.

Stocks With Total Average Annual Human-Caused M/SI Below PBR (Tier 1) and Proposed M/SI Is Below the Insignificance Threshold—

As noted above, for a species or stock with M/SI proposed for authorization less than 10 percent of residual PBR, we consider M/SI from the specified activities to represent a clearly insignificant incremental increase in ongoing anthropogenic M/SI that alone (*i.e.,* in the absence of any other take and barring any other unusual circumstances) will clearly not adversely affect annual rates of recruitment and survival. In this case, as shown in table 87 and table 88, the following species or stocks have potential or estimated take by M/SI from vessel strike and explosives, respectively, and proposed for authorization below their insignificance threshold: fin whale (CA/OR/WA stock); humpback whale (Mainland Mexico-CA/OR/WA and Hawaii stocks); gray whale (Eastern North Pacific stock); sperm whale (Hawaii stock); bottlenose dolphin (Hawaii pelagic stock); long-beaked common dolphin (California stock); northern right whale dolphin (CA/OR/WA stock); Pacific white-sided dolphin (CA/OR/WA stock); rough-toothed dolphin (Hawaii stock); short-beaked common dolphin (CA/OR/WA stock); striped dolphin (CA/OR/WA stock); California sea lion (U.S. stock); Guadalupe fur seal (Mexico stock); and harbor seal (California stock). For the stocks with authorized M/SI below the insignificance threshold, there are no other known factors, information, or unusual circumstances that indicate anticipated M/SI below the insignificance threshold could have adverse effects on annual rates of recruitment or survival and they are not discussed further.

Stocks With Total Average Annual Human-Caused M/SI Below PBR (Tier 1) and Proposed Authorized M/SI Is Above the Insignificance Threshold—

Sei Whale (Eastern North Pacific Stock)

For sei whales (Eastern North Pacific stock), PBR is currently set at 1.25. The total annual M/SI is 0, yielding a residual PBR of 1.25. NMFS is proposing to authorize one M/SI for the Navy and one for the Coast Guard over the 7-year duration of the rule (two total; indicated as 0.29 annually for the purposes of comparing to PBR and evaluating overall effects on annual rates of recruitment and survival), which leaves a PBR remainder of 0.96.

As described above, if the total M/SI estimate is less than or equal to PBR, which is the case here, then the specific activity is considered to have a negligible impact on that stock. Although the M/SI from take proposed here for the specified activity is above the insignificance threshold, as described above, that does not indicate that the M/SI associated with the specified activities is necessarily approaching a level that would exceed negligible impact. Rather, it is used as a cue to look more closely if and when the M/SI for the specified activity approaches residual PBR, as it becomes increasingly necessary (the closer the M/SI from the specified activity is to 100 percent residual PBR) to carefully consider whether there are other factors that could affect reproduction or survival. Here, the M/SI is not closely approaching residual PBR (PBR remainder is 0.96) and there are no other factors that would suggest that the authorized mortality (alone) would have more than a negligible impact on this stock.

As described previously, NMFS must also ensure that impacts by the applicant on the species or stock from other types of take (*i.e.,* harassment) do not combine with the impacts from mortality to adversely affect the species or stock via impacts on annual rates of recruitment or survival, which occurs further below in the *Group and Species-Specific Analyses* section.

Additionally of note, management measures are in place to address M/SI caused by other activities. The Channel Islands NMS staff coordinates, collects, and monitors whale sightings in and around the Vessel Speed Reduction (VSR) zones and the Channel Islands NMS region. The seasonally established Southern California VSR zone spans from Point Arguello to Dana Point, including the Traffic Separation Schemes in the Santa Barbara Channel and San Pedro Channel. Vessels transiting the area from May 1 through December 15, 2025 are recommended to exercise caution and voluntarily reduce speed to 10 kn (18.5 km per hour) or less. While the VSR zone is aimed at reducing risk of fatal vessel strike of blue, humpback, and fin whales, this measure is also anticipated to reduce risk to sei whales (note, this is an expanded timeframe from the Whale Advisory Zone discussed in the 2020 HSTT final rule, which spanned June through November, though the effective period could change in future years). Channel Island NMS observers collect information from aerial surveys conducted by NOAA, the U.S. Coast Guard, California Department of Fish and Game, and U.S. Navy chartered aircraft. Information on seasonal presence, movement, and general distribution patterns of large whales is shared with mariners, NMFS Office of Protected Resources, U.S. Coast Guard, California Department of Fish and Game, the Santa Barbara Museum of Natural History, the Marine Exchange of Southern California, and whale scientists. Real time and historical whale observation data collected from multiple sources can be viewed on the Point Blue Whale Database.

As stated in the 2023 SAR, the California swordfish drift gillnet fishery is the most likely U.S. fishery to interact with Eastern North Pacific sei whales, though there are zero estimated annual takes from this fishery given no observed entanglements from 1990–2021 across 9,246 observed fishing sets (Carretta *et al.* (2022)). NMFS established the Pacific Offshore Cetacean Take Reduction Team (POCTRT) in 1996 and prepared an associated Plan to reduce the risk of M/SI via fisheries interactions incidental to the California/Oregon thresher shark/swordfish drift gillnet fishery. In 1997, NMFS published final regulations formalizing the requirements of the Plan, including the use of pingers following several specific provisions and the employment of Skipper education workshops. While the POCTRT is still active, the fishery is expected to be phased out entirely by 2027 following passage of the Driftnet Modernization and Bycatch Reduction Act by the U.S. Congress in 2022. As such, within 2 years of the effective period of this proposed rule, NMFS does not anticipate mortality from this fishery.

Short-Finned Pilot Whale (CA/OR/WA Stock)

For the CA/OR/WA stock of short-finned pilot whale, PBR is currently set at 4.5, the total annual M/SI is estimated at 1.2, and the total annual authorized take from SWFSC Fisheries and Ecosystem Research Activities in the California Current is 0.4, yielding a residual PBR of 2.9. NMFS is proposing to authorize four M/SIs (U.S. Navy only) over the 7-year duration of the rule (indicated as 0.57 annually for the purposes of comparing to PBR and evaluating overall effects on annual rates of recruitment and survival), which leaves a PBR remainder of 2.33.

As described above, if the total M/SI estimate is less than or equal to PBR, which is the case here, then the specific activity is considered to have a negligible impact on that stock. Although the M/SI from take proposed here for the specified activity is above the insignificance threshold, as described above, that does not indicate that the M/SI associated with the specified activities is necessarily approaching a level that would exceed negligible impact. Rather, it is used as a cue to look more closely if and when the M/SI for the specified activity approaches residual PBR, as it becomes increasingly necessary (the closer the M/SI from the specified activity is to 100 percent residual PBR) to carefully consider whether there are other factors that could affect reproduction or survival. Here, the M/SI is not closely approaching residual PBR (PBR remainder is 2.33) and there are no other factors that would suggest that the authorized mortality (alone) would have more than a negligible impact on this stock.

As described previously, NMFS must also ensure that impacts by the applicant on the species or stock from other types of take (*i.e.,* harassment) do not combine with the impacts from mortality to adversely affect the species or stock via impacts on annual rates of recruitment or survival, which occurs further below in the *Group and Species-Specific Analyses* section.

As reported in the SAR, the total annual M/SI of this stock (1.2) is from the CA/OR thresher shark/swordfish drift gillnet fishery. NMFS established the POCTRT in 1996 and prepared an associated Plan to reduce the risk of M/SI via fisheries interactions incidental to the California/Oregon thresher shark/swordfish drift gillnet fishery. In 1997, NMFS published final regulations formalizing the requirements of the Plan, including the use of pingers following several specific provisions and the employment of Skipper education workshops. While the POCTRT is still active, the fishery is expected to be phased out entirely by 2027 following passage of the Driftnet Modernization and Bycatch Reduction Act by the U.S. Congress in 2022. As such, within 2 years of the effective period of this proposed rule, NMFS does not anticipate additional mortality from this fishery.

Stocks With Total Average Annual Human-Caused Mortality Above PBR (Tier 2)—

Blue Whale (Eastern North Pacific Stock)

For blue whales (Eastern North Pacific stock), PBR is currently set at 4.1 and the total annual M/SI is estimated at greater than or equal to 18.6, yielding a residual PBR of −14.5. NMFS is proposing to authorize one M/SI for the Navy and one for the Coast Guard over the 7-year duration of the rule (two total; indicated as 0.29 annually for the purposes of comparing to PBR and evaluating overall effects on annual rates of recruitment and survival), which leaves a PBR remainder of −14.79. However, given that the negligible impact determination is based on the assessment of take of the activity being analyzed, when total annual mortality from human activities is higher, but the impacts from the specific activity being analyzed are very small, NMFS may still find the incremental impact of the authorized take from a specified activity is negligible even if total human-caused mortality exceeds PBR. Specifically, for example, if the authorized mortality is less than 10 percent of PBR and management measures are being taken to address serious injuries and mortalities from the other activities causing mortality (*i.e.,* other than the specified activities covered by the incidental take authorization in consideration). When those considerations are applied here, the lethal take proposed for authorization (0.29 annually) of blue whales from the Eastern North Pacific stock is less than 10 percent of PBR (which is 4.1), and there are management measures in place to address M/SI from activities other than those the Action Proponents are conducting (as discussed below). Immediately below, we explain the information that supports our finding that the Action Proponents' M/SI proposed for authorization is not expected to result in more than a negligible impact on this stock. As described previously, NMFS must also ensure that impacts by the applicant on the species or stock from other types of take (*i.e.,* harassment) do not combine with the impacts from mortality to adversely affect the species or stock via impacts on annual rates of recruitment or survival, which occurs further below in the *Group and Species-Specific Analyses* section.

The 2018 draft SAR and the more recent SARs incorporate a method to estimate annual deaths by vessel strike utilizing an encounter theory model that combined species distribution models of whale density, vessel traffic characteristics, and whale movement patterns obtained from satellite-tagged animals in the region to estimate encounters that would result in mortality (Rockwood *et al.* 2017). The model predicts 18 annual mortalities of blue whales from vessel strikes, which, with the additional M/SI of 1.54 from fisheries interactions, results in the current estimate of residual PBR being −15.4. Although NMFS' Permits and Conservation Division in the Office of Protected Resources has independently reviewed the vessel strike model and its results and agrees that it is appropriate for estimating blue whale mortality by vessel strike on the U.S. West Coast, for analytical purposes we also note that if the historical method were used to predict vessel strike (*i.e.,* using observed mortality by vessel strike, or 0.6, instead of 18), then total human-caused mortality including the Action Proponents' potential take would not exceed PBR. We further note that the authors (Rockwood *et al.* 2017) do not suggest that vessel strike suddenly increased to 18 recently. In fact, the model is not specific to a year, but rather offers a generalized prediction of vessel strike off the U.S. West Coast. Therefore, if the Rockwood *et al.* (2017) model is an accurate representation of vessel strike, then similar levels of vessel strike have been occurring in past years as well. Put another way, if the model is correct, for some number of years total-human-caused mortality has been significantly underestimated and PBR has been similarly exceeded by a notable amount, and yet, the Eastern North Pacific stock of blue whales remains stable, nevertheless.

NMFS' 2023 SAR states that the current population trend is unknown, though there may be evidence of a population size increase since the 1990s. The SAR further cites to Monnahan *et al.* (2015), which used a population dynamics model to estimate that the Eastern North Pacific blue whale population was at 97 percent of carrying capacity in 2013 and to suggest that the observed lack of a population increase since the early 1990s was explained by density dependence, not impacts from vessel strike. This would mean that this stock of blue whales shows signs of stability and is not increasing in population size because the population size is at or nearing carrying capacity for its available habitat. In fact, we note that this population has maintained this status throughout the years that the Navy has consistently tested and trained at similar levels (with similar vessel traffic) in areas that overlap with blue whale occurrence, which would be another indicator of population stability.

Monnahan *et al.* (2015) modeled vessel numbers, vessel strikes, and the population of the Eastern North Pacific blue whale population from 1905 out to 2050 using a Bayesian framework to incorporate informative biological information and assign probability distributions to parameters and derived quantities of interest. The authors tested multiple scenarios with differing assumptions, incorporated uncertainty, and further tested the sensitivity of multiple variables. Their results indicated that there is no immediate threat (*i.e.,* through 2050) to the population from any of the scenarios tested, which included models with 10 and 35 strike mortalities per year. Broadly, the authors concluded that, unlike other blue whale stocks, the Eastern North Pacific blue whales have recovered from 70 years of whaling and are in no immediate threat from vessel strikes. They further noted that their conclusion conflicts with the depleted and strategic designation under the MMPA as well as PBR specifically.

As discussed, we also take into consideration management measures in place to address M/SI caused by other activities. The Channel Islands NMS staff coordinates, collects, and monitors whale sightings in and around the VSR zones and the Channel Islands NMS region. Redfern *et al.* (2013) note that the most risky area for blue whales is the Santa Barbara Channel, where shipping lanes intersect with common feeding areas. The seasonally established Southern California VSR zone spans from Point Arguello to Dana Point, including the Traffic Separation Schemes in the Santa Barbara Channel and San Pedro Channel. Vessels transiting the area from May 1 through December 15, 2025 are recommended to exercise caution and voluntarily reduce speed to 10 kn (18.5 km per hour) or less for blue, humpback, and fin whales. Channel Island NMS observers collect information from aerial surveys conducted by NOAA, the U.S. Coast Guard, California Department of Fish and Game, and U.S. Navy chartered aircraft. Information on seasonal presence, movement, and general distribution patterns of large whales is shared with mariners, NMFS Office of Protected Resources, U.S. Coast Guard, California Department of Fish and Game, the Santa Barbara Museum of Natural History, the Marine Exchange of Southern California, and whale scientists. Real time and historical whale observation data collected from multiple sources can be viewed on the Point Blue Whale Database. In addition to management measures for vessel strike, NMFS is in the process of developing a new Take Reduction Team to address the incidental M/SI of humpback and blue whales in several trap/pot fisheries along the West Coast of the U.S. The Team is expected to be in place by November 30, 2025. Additional information is available on NMFS' website at: *https://www.fisheries.noaa.gov/west-coast/marine-mammal-protection/west-coast-take-reduction-team*

The loss of a male would have far less, if any, effect on population rates and, absent any information suggesting that one sex is more likely to be struck than another, we can reasonably assume that there is a 50 percent chance that each of the two strikes proposed for authorization by this proposed rulemaking would be a male, thereby further decreasing the likelihood of impacts on the population rate. In situations like this where potential M/SI is fractional, consideration must be given to the lessened impacts anticipated due to the likely absence of M/SI in 5 or 6 of the 7 years and the fact that each of the strikes could be a male.

Lastly, we reiterate that PBR is a conservative metric and also not sufficiently precise to serve as an absolute predictor of population effects upon which mortality caps would appropriately be based. As noted above, Wade *et al.* (1998), authors of the paper from which the current PBR equation is derived, note that ''[e]stimating incidental mortality in 1 year to be greater than the PBR calculated from a single abundance survey does not prove the mortality will lead to depletion; it identifies a population worthy of careful future monitoring and possibly indicates that mortality-mitigation efforts should be initiated.'' The information included here indicates that the current population trend of this blue whale stock is unknown but likely approaching carrying capacity and has leveled off because of density-dependence, not human-caused mortality, in spite of what might be otherwise indicated from the calculated PBR. Further, potential M/SI proposed for authorization is below 10 percent of PBR and management actions are in place to minimize vessel strike from other vessel activity in one of the highest-risk areas for strikes. Based on the presence of the factors described above, we do not expect lethal take from Action Proponents' activities, alone, to adversely affect Eastern North Pacific blue whales through effects on annual rates of recruitment or survival. Nonetheless, the fact that total human-caused mortality exceeds PBR necessitates close attention to the remainder of the impacts (*i.e.,* harassment) on the Eastern North Pacific stock of blue whales from the Navy's activities to ensure that the total takes proposed for authorization have a negligible impact on the species or stock. Therefore, this information will be considered in combination with our assessment of the impacts of harassment takes proposed for authorization in the *Group and Species-Specific Analyses* section that follows.

Humpback Whale (Central America/Southern Mexico CA/OR/WA Stock)

For humpback whales (Central America/Southern Mexico CA/OR/WA stock), PBR is currently set at 3.5, the total annual M/SI is estimated at greater than or equal to 14.9, and the 2020 NWTT final rule authorizes 0.29 takes by mortality annually, yielding a residual PBR of −11.69. NMFS is proposing to authorize one M/SI for the Navy and one for the Coast Guard over the 7-year duration of the rule (two total; indicated as 0.29 annually for the purposes of comparing to PBR and evaluating overall effects on annual rates of recruitment and survival), which leaves a PBR remainder of −11.98.

However, given that the negligible impact determination is based on the assessment of take of the activity being analyzed, when total annual mortality from human activities is higher, but the impacts from the specific activity being analyzed are very small, NMFS may still find the incremental impact of the authorized take from a specified activity is negligible even if total human-caused mortality exceeds PBR. Specifically, for example, if the authorized mortality is less than 10 percent of PBR and management measures are being taken to address serious injuries and mortalities from the other activities causing mortality (*i.e.,* other than the specified activities covered by the incidental take authorization in consideration). When those considerations are applied here, the lethal take proposed for authorization (0.29 annually) of humpback whales from the Central America/Southern Mexico CA/OR/WA stock is less than 10 percent of PBR (which is 3.5), and there are management measures in place to address M/SI from activities other than those the Action Proponents are conducting (as discussed below). Immediately below, we explain the information that supports our finding that the Action Proponents' M/SI proposed for authorization is not expected to result in more than a negligible impact on this stock. As described previously, NMFS must also ensure that impacts by the applicant on the species or stock from other types of take (*i.e.,* harassment) do not combine with the impacts from mortality to adversely affect the species or stock via impacts on annual rates of recruitment or survival, which occurs further below in the *Group and Species-Specific Analyses* section.

The 2018 draft SAR and the more recent SARs rely on a new method to estimate annual deaths by vessel strike utilizing an encounter theory model that combined species distribution models of whale density, vessel traffic characteristics, and whale movement patterns obtained from satellite-tagged animals in the region to estimate encounters that would result in mortality (Rockwood *et al.* 2017). The model predicts 22 annual mortalities of humpback whales from vessel strikes, and the SAR attributes 6.45 of those strikes to the Central America/Southern Mexico-CA/OR/WA stock. With the additional M/SI of 8.1 from fisheries interactions, 0.35 from marine debris, recreational, and tribal fisheries, and 0.29 from vessel strike authorized in the NWTT final rule, results in the current estimate of residual PBR being −11.69. Although NMFS' Permits and Conservation Division in the Office of Protected Resources has independently reviewed the vessel strike model and its results and agrees that it is appropriate for estimating humpback whale mortality by vessel strike on the U.S. West Coast, for analytical purposes we also note that if the historical method were used to predict vessel strike (*i.e.,* using observed mortality by vessel strike, or 0.6, instead of 18), then total human-caused mortality including the Action Proponents' potential take would not exceed PBR. We further note that the authors (Rockwood *et al.* 2017) do not suggest that vessel strike suddenly increased to 22 recently. In fact, the model is not specific to a year, but rather offers a generalized prediction of vessel strike off the U.S. West Coast. Therefore, if the Rockwood *et al.* (2017) model is an accurate representation of vessel strike, then similar levels of vessel strike have been occurring in past years as well. Put another way, if the model is correct, for some number of years total-human-caused mortality has been significantly underestimated and PBR has been similarly exceeded by a notable amount, and yet, the Central America/Southern Mexico-CA/OR/WA stock of humpback whales is increasing nevertheless.

As discussed, we also take into consideration management measures in place to address M/SI caused by other activities. The Channel Islands NMS staff coordinates, collects, and monitors whale sightings in and around the VSR zones and the Channel Islands NMS region. The seasonally established Southern California VSR zone spans from Point Arguello to Dana Point, including the Traffic Separation Schemes in the Santa Barbara Channel and San Pedro Channel. Vessels transiting the area from May 1 through December 15, 2025 are recommended to exercise caution and voluntarily reduce speed to 10 kn (18.5 km per hour) or less for blue, humpback, and fin whales. Channel Island NMS observers collect information from aerial surveys conducted by NOAA, the U.S. Coast Guard, California Department of Fish and Game, and U.S. Navy chartered aircraft. Information on seasonal presence, movement, and general distribution patterns of large whales is shared with mariners, NMFS Office of Protected Resources, U.S. Coast Guard, California Department of Fish and Game, the Santa Barbara Museum of Natural History, the Marine Exchange of Southern California, and whale scientists. Real time and historical whale observation data collected from multiple sources can be viewed on the Point Blue Whale Database. In addition to management measures for vessel strike, NMFS is in the process of developing a new Take Reduction Team to address the incidental M/SI of humpback and blue whales in several trap/pot fisheries along the West Coast of the U.S. The Team is expected to be in place by November 30, 2025. Additional information is available on NMFS' website at: *https://www.fisheries.noaa.gov/west-coast/marine-mammal-protection/west-coast-take-reduction-team.*

The loss of a male would have far less, if any, effect on population rates and absent any information suggesting that one sex is more likely to be struck than another, we can reasonably assume that there is a 50 percent chance that each of the two strikes proposed for authorization by this proposed rulemaking would be a male, thereby further decreasing the likelihood of impacts on the population rate. In situations like this where potential M/SI is fractional, consideration must be given to the lessened impacts anticipated due to the likely absence of M/SI in 5 or 6 of the 7 years and the fact that each of the strikes could be a male.

Lastly, we reiterate that PBR is a conservative metric and also not sufficiently precise to serve as an absolute predictor of population effects upon which mortality caps would appropriately be based. As noted above, Wade *et al.* (1998), authors of the paper from which the current PBR equation is derived, note that ''[e]stimating incidental mortality in 1 year to be greater than the PBR calculated from a single abundance survey does not prove the mortality will lead to depletion; it identifies a population worthy of careful future monitoring and possibly indicates that mortality-mitigation efforts should be initiated.'' Further, potential M/SI proposed for authorization is below 10 percent of PBR and management actions are in place to minimize vessel strike from other vessel activity and efforts are underway to minimize M/SI from trap/pot fisheries along the U.S. West Coast. Based on the presence of the factors described above, we do not expect lethal take from Action Proponents' activities, alone, to adversely affect Central America/Southern Mexico-CA/OR/WA humpback whales through effects on annual rates of recruitment or survival. Nonetheless, the fact that total human-caused mortality exceeds PBR necessitates close attention to the remainder of the impacts (*i.e.,* harassment) on the Central America/Southern Mexico-CA/OR/WA stock of humpback whales from the Action Proponents' activities to ensure that the total takes proposed for authorization have a negligible impact on the species or stock. Therefore, this information will be considered in combination with our assessment of the impacts of harassment takes proposed for authorization in the *Group and Species-Specific Analyses* section that follows.

Stocks for Which Total Average Annual Mortality Is Not Known—

Bottlenose Dolphin (Oʻahu Stock)

For bottlenose dolphin (Oʻahu stock), PBR is currently set at 1. The total annual M/SI is unknown, and therefore a residual PBR cannot be calculated. NMFS is proposing to authorize one M/SI over the 7-year duration of the rule (indicated as 0.14 annually for the purposes of comparing to PBR and evaluating overall effects on annual rates of recruitment and survival).

Given that the negligible impact determination is based on the assessment of take of the activity being analyzed, even if total annual mortality from human activities is higher, but the impacts from the specific activity being analyzed are very small, NMFS may still find the incremental impact of the authorized take from a specified activity is to be negligible even if total human-caused mortality exceeds PBR. As such, the incremental impact of the authorized take from a specified activity may also be negligible where total annual M/SI is unknown. An unknown total annual M/SI is a cue to look more closely if and when the M/SI for the specified activity approaches PBR (*e.g.,* consider whether there are mitigation measures in place for other potential sources of M/SI), as it becomes increasingly necessary (the closer the M/SI from the specified activity is to PBR) to carefully consider whether there are other factors that could affect reproduction or survival. Here, the M/SI proposed for authorization is 0.14 annually, which does not closely approach PBR (PBR is 1.0), there are management measures in place to address M/SI from activities other than those the Action Proponents are conducting (as discussed below), and there are no other factors that would suggest that the authorized mortality (alone) would have more than a negligible impact on this stock. Immediately below, we explain the information that supports our finding that the Action Proponents' M/SI proposed for authorization is not expected to result in more than a negligible impact on this stock. As described previously, NMFS must also ensure that impacts by the applicant on the species or stock from other types of take (*i.e.,* harassment) do not combine with the impacts from mortality to adversely affect the species or stock via impacts on annual rates of recruitment or survival, which occurs further below in the *Group and Species-Specific Analyses* section.

As reported in the SAR, while information about fishery-related mortality is limited for this stock, Hawaii fisheries use gear types that cause mortality and serious injury to marine mammals in other U.S. fisheries, including gillnets and hook-and-line, and mortality reports indicate that nearshore fisheries are a risk for bottlenose dolphins in Hawaii. However, gillnetting around Maui and much of Oʻahu is banned by state regulation, and in areas where gillnetting is permitted, fishermen are required to monitor their gillnets for bycatch every 30 minutes.

In this case, 0.14 M/SI means one mortality in 1 of the 7 years and zero mortalities in 6 of those 7 years. Therefore, the Action Proponents would not be contributing to the total human-caused mortality at all in 6 of the 7, or 85.7 percent, of the years covered by this proposed rulemaking. That means that even if an Oʻahu bottlenose dolphin were to be lethally taken from explosives, in 6 of the 7 years, there could be no effect on annual rates of recruitment or survival from Navy-caused M/SI. Additionally, the loss of a male would have far less, if any, effect on population rates and absent any information suggesting that one sex is more likely to be struck than another, we can reasonably assume that there is a 50 percent chance that the single mortality proposed for authorization by this proposed rulemaking would be a male, thereby further decreasing the likelihood of impacts on the population rate. In situations like this where potential M/SI is fractional, consideration must be given to the lessened impacts anticipated due to the absence of M/SI in 6 of the 7 years and the fact that the single mortality could be a male. Lastly, we reiterate that PBR is a conservative metric and also not sufficiently precise to serve as an absolute predictor of population effects upon which mortality caps would appropriately be based. This is especially important given the minor difference between zero and one across the 7-year period covered by this proposed rulemaking, which is the smallest distinction possible when considering mortality. As noted above, Wade *et al.* (1998), authors of the paper from which the current PBR equation is derived, note that ''[e]stimating incidental mortality in 1 year to be greater than the PBR calculated from a single abundance survey does not prove the mortality will lead to depletion; it identifies a population worthy of careful future monitoring and possibly indicates that mortality-mitigation efforts should be initiated.'' Further, management actions are in place that minimize fishery interactions. Based on the presence of the factors described above, we do not expect lethal take from the Action Proponents' activities, alone, to adversely affect Oʻahu bottlenose dolphins through effects on annual rates of recruitment or survival. Nonetheless, the fact that total human-caused mortality is unknown, and PBR is low, necessitates close attention to the remainder of the impacts (*i.e.,* harassment) on the Oʻahu stock of bottlenose dolphins from the Action Proponents' activities to ensure that the total takes proposed for authorization have a negligible impact on the species or stock. Therefore, this information will be considered in combination with our assessment of the impacts of authorized harassment takes in the *Group and Species-Specific Analyses* section that follows.

Stocks for Which PBR Is Unknown—

Pantropical Spotted Dolphin (Baja California Peninsula Mexico Population)

The Baja California Peninsula Mexico population of pantropical spotted dolphins are not a NMFS-managed stock, and therefore, PBR and annual M/SI metrics are not available. NMFS is proposing to authorize two M/SIs over the 7-year duration of the rule (indicated as 0.29 annually for the purposes of evaluating overall effects on annual rates of recruitment and survival).

Immediately below, we explain the information that supports our finding that the Action Proponents' M/SI proposed for authorization is not expected to result in more than a negligible impact on this stock. As described previously, NMFS must also ensure that impacts by the applicant on the species or stock from other types of take (*i.e.,* harassment) do not combine with the impacts from mortality to adversely affect the species or stock via impacts on annual rates of recruitment or survival, which occurs further below in the *Group and Species-Specific Analyses* section.

Given that this is not a NMFS-managed stock, some metrics are not available for this population, including PBR. PBR values are calculated by NMFS as the level of annual removal from a stock that will allow that stock to equilibrate within OSP at least 95 percent of the time, and is the product of factors relating to the minimum population estimate of the stock (N_{min}), the productivity rate of the stock at a small population size, and a recovery factor. The productivity rate is estimated as one-half of the estimated or theoretical maximum rate of population growth for the stock if it were small. In this case, NMFS estimates the productivity rate to be one half the default maximum net growth rate for cetaceans (one half of 4 percent). Recovery factors range from 0.1 to 1, with smaller factors applied to more at-risk species. Given the unknowns of this population NMFS used 0.1. N_{min} is not available, and therefore, NMFS relies on the NMSDD abundance estimate of 70,889 to estimate PBR. As such, using the NMSDD abundance estimate, PBR is estimated to be 141.78 (70,889 × (0.5 × 4 percent) × (0.1). (Of note, if PBR was calculating using an estimated N_{min} of half of the NMSDD abundance estimate (35,445), PBR would be 70.89.)

Given that the negligible impact determination is based on the assessment of take of the activity being analyzed, even if total annual mortality from human activities is higher, but the impacts from the specific activity being analyzed are very small, NMFS may still find the incremental impact of the authorized take from a specified activity is to be negligible even if total human-caused mortality exceeds PBR. As such, the incremental impact of the authorized take from a specified activity may also be negligible where total annual M/SI is unknown. An unknown total annual M/SI is a cue to look more closely if and when the M/SI for the specified activity approaches PBR (*e.g.,* consider whether there are mitigation measures in place for other potential sources of M/SI), as it becomes increasingly necessary (the closer the M/SI from the specified activity is to PBR) to carefully consider whether there are other factors that could affect reproduction or survival. Here, the M/SI proposed for authorization is 0.29 annually, which does not closely approach our PBR estimate above (PBR is estimated as 141.78, potentially as low as 70.89), and there are no other factors that would suggest that the authorized mortality (alone) would have more than a negligible impact on this stock. Immediately below, we explain the information that supports our finding that the Action Proponents' M/SI proposed for authorization is not expected to result in more than a negligible impact on this stock. As described previously, NMFS must also ensure that impacts by the applicant on the species or stock from other types of take (*i.e.,* harassment) do not combine with the impacts from mortality to adversely affect the species or stock via impacts on annual rates of recruitment or survival, which occurs further below in the *Group and Species-Specific Analyses* section.

The loss of a male would have far less, if any, effect on population rates and absent any information suggesting that one sex is more likely to be struck than another, we can reasonably assume that there is a 50 percent chance that any single mortality proposed for authorization by this proposed rulemaking would be a male, thereby further decreasing the likelihood of impacts on the population rate. In situations like this where potential M/SI is fractional, consideration must be given to the lessened impacts anticipated due to the absence of M/SI in 5 or 6 of the 7 years and the fact that any single mortality could be a male.

Based on the presence of the factors described above, we do not expect lethal take from the Action Proponents' activities, alone, to adversely affect the Baja California Peninsula Mexico population of pantropical spotted dolphins through effects on annual rates of recruitment or survival. Nonetheless, the fact that total human-caused mortality is unknown necessitates close attention to the remainder of the impacts (*i.e.,* harassment) on the Baja California Peninsula Mexico population of pantropical spotted dolphins from the Action Proponents' activities to ensure that the total takes proposed for authorization have a negligible impact on the species or stock. Therefore, this information will be considered in combination with our assessment of the impacts of authorized harassment takes in the *Group and Species-Specific Analyses* section that follows.

Group and Species-Specific Analyses

In this section, we build on the general analysis that applies to all marine mammals in the HCTT Study Area from the previous sections. We first include information and analysis that applies to mysticetes or, separately, odontocetes or pinnipeds, and then within those three sections, more specific information that applies to smaller groups, where applicable, and the affected species or stocks. The specific authorized take numbers are also included in the analyses below, and so here we provide some additional context and discussion regarding how we consider the authorized take numbers in those analyses.

The maximum amount and type of incidental take of marine mammals reasonably likely to occur and therefore proposed to be authorized from exposures to sonar and other active acoustic sources and explosions during the 7-year activity period are shown in table 37, table 38, table 39, and table 40, and the subset attributable to ship shock trials is included in table 49.

In the discussions below, the estimated takes by Level B harassment represent instances of take, not the number of individuals taken (the much lower and less frequent Level A harassment takes are far more likely to be associated with separate individuals), and in some cases individuals may be taken more than one time. As part of our evaluation of the magnitude and severity of impacts to marine mammal individuals and the species, and specifically in an effort to better understand the degree to which the modeled and estimated takes likely represent repeated takes of the individuals of a given species/stock, we consider the total annual numbers of take by harassment (auditory injury, non-auditory injury, TTS, and behavioral disturbance) for species or stocks as compared to their associated abundance estimates—specifically, take numbers higher than the stock abundance clearly indicate that some number of individuals are being taken on more than one day in the year, and broadly higher or lower ratios of take to abundance may reasonably be considered to equate to higher or lower likelihood of repeated takes, respectively, other potentially influencing factors being equal. In addition to the mathematical consideration of estimated take compared to abundance, we also consider other factors or circumstances that may influence the likelihood of repeated takes, where known, such as circumstances where activities resulting in take are focused in an area and time (*e.g.,* instrumented ranges or a homeport, or long-duration activities such as MTEs) and/or where the same individual marine mammals are known to congregate over longer periods of time (*e.g.,* pinnipeds at a haulout, mysticetes in a known foraging area, or resident odontocetes with smaller home ranges). Similarly, and all else being equal, estimated takes that are largely focused in one region and/or season (see table 89, table 91, table 93, table 95, table 97, and table 99) may indicate a higher likelihood of repeated takes of the same individuals.

Occasional, milder behavioral responses are unlikely to cause long-term consequences for individual animals or populations, and even if some smaller subset of the takes are in the form of a longer (several hours or a day) and more severe response, if they are not expected to be repeated over a comparatively longer duration of sequential days, impacts to individual fitness are not anticipated. Nearly all studies and experts agree that infrequent exposures of a single day or less are unlikely to impact an individual's overall energy budget (Farmer *et al.,* 2018b; Harris *et al.,* 2018; King *et al.,* 2015; NAS, 2017; New *et al.,* 2014; Southall *et al.,* 2007; Villegas-Amtmann *et al.,* 2015; Hoekendijk *et al.,* 2018; Wisniewska *et al.,* 2018; Czapanskiy *et al.,* 2021; Pirotta, 2022). Generally speaking, and in the case of most species impacted by the proposed activities, in the cases where some number of individuals may reasonably be expected to be taken on more than one day within a year, that number of days would be comparatively small and also with no reason to expect that those takes would occur on sequential days. In the rarer cases of species where individuals might be expected to be taken on a comparatively higher number of days of the year and there are reasons to think that these days might be sequential or clumped together, the likely impacts of this situation are discussed explicitly in the species discussions.

To assist in understanding what this analysis means, we clarify a few issues related to estimated takes and the analysis here. An individual that incurs AUD INJ or TTS may sometimes, for example, also be subject to behavioral disturbance at the same time. As described above in this section, the degree of auditory injury, and the degree and duration of TTS, expected to be incurred from the Navy's activities are not expected to impact marine mammals such that their reproduction or survival could be affected. Similarly, data do not suggest that a single instance in which an animal accrues auditory injury or TTS and is also subjected to behavioral disturbance would result in impacts to reproduction or survival. Alternately, we recognize that if an individual is subjected to behavioral disturbance repeatedly for a longer duration and on consecutive days, effects could accrue to the point that reproductive success is impacted. Accordingly, in analyzing the number of takes and the likelihood of repeated and sequential takes, we consider the total takes, not just the takes by Level B harassment by behavioral disturbance, so that individuals potentially exposed to both threshold shift and behavioral disturbance are appropriately considered. The number of takes by Level A harassment by auditory injury are so low (and zero in some cases) compared to abundance numbers that it is considered highly unlikely that any individual would be taken at those levels more than once.

Use of sonar and other transducers would typically be transient and temporary. The majority of acoustic effects to most marine mammal stocks from sonar and other active sound sources during the specified military readiness activities would be primarily from anti-submarine warfare events. On the less severe end, exposure to comparatively lower levels of sound at a detectably greater distance from the animal, for a few or several minutes, could result in a behavioral response such as avoiding an area that an animal would otherwise have moved through or fed in, or breaking off one or a few feeding bouts. More severe behavioral effects could occur when an animal gets close enough to the source to receive a comparatively higher level of sound, is exposed continuously to one source for a longer time or is exposed intermittently to different sources throughout a day. Such effects might result in an animal having a more severe flight response and leaving a larger area for a day or more or potentially losing feeding opportunities for a day. However, such severe behavioral effects are expected to occur infrequently. In addition to the proximity to the source, the type of activity and the season and location during which an animal is exposed can inform the impacts. These factors, including the numbers and types of effects that are estimated in areas known to be biologically important for certain species are discussed in the group and species-specific sections, below.

As described in the Proposed Mitigation Measures section, this proposed rule includes mitigation measures that would reduce the probability and/or severity of impacts expected to result from acute exposure to acoustic sources or explosives, vessel strike, and impacts to marine mammal habitat. Specifically, the Action Proponents would use a combination of delayed starts, powerdowns, and shutdowns to avoid mortality or serious injury, minimize the likelihood or severity of AUD INJ or non-auditory injury, and reduce instances of TTS or more severe behavioral disturbance caused by acoustic sources or explosives. The Action Proponents would also implement multiple time/area restrictions that would reduce take of marine mammals in areas or at times where they are known to engage in important behaviors, such as calving, where the disruption of those behaviors would have a higher probability of resulting in impacts on reproduction or survival of individuals that could lead to population-level impacts.

These time/area restrictions include a Hawaii Island Marine Mammal Mitigation Area, a Hawaii 4-Islands Marine Mammal Mitigation Area, Northern California Large Whale Mitigation Area, Central California Large Whale Mitigation Area, Southern California Blue Whale Mitigation Area, California Large Whale Real-Time Notification Mitigation Area, and San Nicolas Island Pinniped Haulout Mitigation Area as well as Hawaii Humpback Whale Awareness Messages and California Large Whale Awareness Messages. The Southern California Blue Whale Mitigation Area is discussed in the blue whale section below. However, it is important to note that measures in that area, while developed to protect blue whales, would also benefit other marine mammals in those areas. Therefore, they are discussed here also.

Within the Hawaii Island Marine Mammal Mitigation Area, the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar or 20 hours of helicopter dipping sonar (a mid-frequency active sonar source) annually and must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets). Mitigation in this area is designed to reduce exposure of numerous small and resident marine mammal populations (including Blainville's beaked whales, bottlenose dolphins, goose-beaked whales, dwarf sperm whales, false killer whales, melon-headed whales, pantropical spotted dolphins, pygmy killer whales, rough-toothed dolphins, short-finned pilot whales, and spinner dolphins), humpback whales within important seasonal reproductive habitat, and Hawaiian monk seals within critical habitat, to levels of sound that have the potential to cause injurious or behavioral impacts.

Within the Hawaii 4-Islands Marine Mammal Mitigation Area, from November 15–April 15, the Action Proponents must not use MF1 surface ship hull-mounted mid-frequency active sonar. The Action Proponents must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets) within the mitigation area (year-round). This mitigation would prevent exposure of humpback whales in high-density seasonal reproductive habitats (*e.g.,* north of Maui and Molokaʻi), Main Hawaiian Islands insular false killer whales in high seasonal occurrence areas, and numerous small and resident marine mammal populations that occur year-round (including bottlenose dolphins, pantropical spotted dolphins, and spinner dolphins, and Hawaiian monk seals) to explosives that have the potential to cause injury, mortality, or behavioral disturbance, and would minimize exposure of humpback whales in high-density seasonal reproductive habitats (*e.g.,* north of Maui and Molokaʻi) and Main Hawaiian Islands insular false killer whales in high seasonal occurrence areas to levels of sound that have the potential to cause injurious or behavioral impacts.

Within the Northern California Large Whale Mitigation Area, Central California Large Whale Mitigation Area, and Southern California Blue Whale Mitigation Area, from June 1–October 31, the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar (excluding normal maintenance and systems checks) total during training and testing within these three areas. This measure would reduce exposure of blue whales, fin whales, gray whales, and humpback whales in important seasonal foraging, migratory, and calving habitats to levels of sound that have the potential to cause injurious or behavioral impacts. Additionally, during the same June 1–October 31 period, within the portion of the mitigation area off San Diego, the Action Proponents must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets) during large-caliber (≥57 mm (2.24 inch)) gunnery, torpedo, bombing, and missile (including 2.75-inch (7 cm) rockets) training and testing. This measure would reduce exposure of large whales within important seasonal foraging habitats to explosives that have the potential to cause injury, mortality, or behavioral disturbance.

Within the California Large Whale Real-Time Notification Mitigation Area, the Action Proponents would issue real-time notifications to alert Action Proponent vessels operating in the vicinity of large whale aggregations (four or more whales) sighted within 1 nmi (1.9 km) of an Action Proponent vessel within an area of the Southern California Range Complex (between 32–33 degrees North and 117.2–119.5 degrees West). Lookouts must use the information from the real-time notifications to inform their visual observations of applicable mitigation zones. The real-time notification area encompasses the locations of recent (2009, 2021, 2023) vessel strikes, and historic strikes where precise latitude and longitude were known.

Within the San Nicolas Island Pinniped Haulout Mitigation Area, Navy personnel must implement multiple measures that would minimize in-air launch noise and physical disturbance to pinnipeds hauled out on beaches, as well as to continue assessing baseline pinniped distribution/abundance and potential changes in pinniped use of these beaches after launch events.

Last, the Hawaii Humpback Whale Awareness Messages and California Large Whale Awareness Messages would alert applicable assets (and their Lookouts) transiting and training or testing in the Hawaii Range Complex or on the U.S. West Coast to the possible presence of concentrations of large whales during certain periods of the year. Lookouts must use that knowledge to help inform their visual observations during military readiness activities that involve vessel movements, active sonar, in-water explosives (including underwater explosives and explosives deployed against surface targets), or the deployment of non-explosive ordnance against surface targets in the mitigation area. These messages would minimize potential large whale vessel interactions and exposure to acoustic, explosive, and physical disturbance and strike stressors that have the potential to cause mortality, injury, or behavioral disturbance during reproductive seasons, foraging and migration seasons, and to resident whales.

In addition to the nature and context of the disturbance, including whether take occurs in a known BIA, species-specific factors affect the severity of impacts to individual animals and population consequences of disturbance. Keen *et al.* (2021) identifies three population consequences of disturbance themes: life history traits, environmental conditions, and disturbance source characteristics. Life history traits considered in Keen *et al.* (2021) include movement ecology (whether animals are resident, nomadic, or migratory), reproductive strategy (capital breeders, income breeders, or mixed), body size (based on size and life stage), and pace of life (slow or fast).

Regarding movement ecology, resident animals that have small home ranges relative to the size and duration of an impact zone would have a higher risk of repeated exposures to an ongoing activity. Animals that are nomadic over a larger range may have less predictable risk of repeated exposure. For resident and nomadic populations, overlap of a stressor with feeding or reproduction depends more on time of year rather than location in their habitat range. In contrast, migratory animals may have higher or reduced potential for exposure during feeding and reproduction based on both location, time of the year, and duration of an activity. The risk of repeated exposure during individual events may be lower during migration as animals maintain directed transit through an area.

Reproduction is energetically expensive for female marine mammals, and reproductive strategy can influence an animal's sensitivity to disturbance. Mysticetes and phocids are capital breeders. Capital breeders rely on their capital, or energy stores, to migrate, maintain pregnancy, and nurse a calf. Capital breeders would be more resilient to short-term foraging disruption due to their reliance on built-up energy reserves, but are vulnerable to prolonged foraging impacts during gestation. Otariids and most odontocetes are income breeders, which rely on some level of income, or regular foraging, to give birth and nurse a calf. Income breeders would be more sensitive to the consequences of disturbances that impact foraging during lactation. Some species exhibit traits of both, such as beaked whales.

Smaller animals require more food intake per unit body mass than large animals. They must consume food on a regular basis and are likely to be non-migratory and income breeders. The smallest odontocetes, the porpoises, must maintain high metabolisms to maintain thermoregulation and cannot rely on blubber stores for long periods of time, whereas larger odontocetes can more easily thermoregulate. The larger size of other odontocetes is an adaptation for deep diving that allows them to access high quality mesopelagic and bathypelagic prey. Both small and large odontocetes have lower foraging efficiency than the large whales. The filter-feeding large whales (*i.e.,* mysticetes) consume most of their food within several months of the year and rely on extensive lipid reserves for the remainder of the year. The metabolism of mysticetes allows for fasting while seeking prey patches during foraging season and prolonged periods of fasting outside of foraging season (Goldbogen *et al.,* 2023). Their energy stores support capital breeding and long migrations. The effect of a temporary feeding disturbance is likely to have inconsequential impacts to a mysticete, but may be consequential for small cetaceans. Despite their relatively smaller size, amphibious pinnipeds have lower thermoregulatory requirements because they spend a portion of time on land. For purposes of this assessment, marine mammals were generally categorized as small (less than 10 ft (3.05 m)), medium (10–30 ft (3.05–9.1 m)), or large (more than 30 ft (9.1 m)) based on length.

Populations with a fast pace of life are characterized by early age of maturity, high birth rates, and short life spans, whereas populations with a slow pace of life are characterized by later age of maturity, low birth rates, and long life spans. The consequences of disturbance in these populations differ. Although reproduction in populations with a fast pace of life are more sensitive to foraging disruption, these populations are quick to recover. Reproduction in populations with a slow pace of life is resilient to foraging disruption, but late maturity and low birth rates mean that long-term impacts to breeding adults have a longer-term effect on population growth rates. Pace of life was categorized for each species in this analysis by comparing age at sexual maturity, birth rate interval, life span, body size, and feeding and reproductive strategy.

Southall *et al.* (2023) also identified factors that inform a population's vulnerability. The authors describe a framework to assess risk to populations from specific industry impact scenarios at different locations or times of year. While this approach may not be suitable for many military readiness activities, for which alternate spatial or seasonal scenarios are not usually feasible, the concepts considered in that framework's population vulnerability assessment are useful in this analysis, including population status (endangered or threatened), population trend (decreasing, stable, or increasing), population size, and chronic exposure to other anthropogenic or environmental stressors (*e.g.,* fisheries interactions, pollution, *etc.*). These factors are also considered when assessing the overall vulnerability of a stock to repeated effects from acoustic and explosive stressors.

In consideration of the factors outlined above, if impacts to individuals increase in magnitude or severity such that repeated and sequential higher severity impacts occur (the probability of this goes up for an individual the higher total number of takes it has) or the total number of moderate to more severe impacts increases substantially, especially if occurring across sequential days, then it becomes more likely that the aggregate effects could potentially interfere with feeding enough to reduce energy budgets in a manner that could impact reproductive success via longer cow-calf intervals, terminated pregnancies, or calf mortality. It is important to note that these impacts only accrue to females, which only comprise approximately 50 percent of the population. Based on energetic models, it takes energetic impacts of a significantly greater magnitude to cause the death of an adult marine mammal, and females will always terminate a pregnancy or stop lactating before allowing their health to deteriorate. Also, the death of an adult female has significantly more impact on population growth rates than reductions in reproductive success, while the death of an adult male has very little effect on population growth rates. However, as previously explained, such severe impacts from the specified activities would be very infrequent and not considered likely to occur at all for most species and stocks. We note that the negligible impact analysis is inherently a two-tiered assessment that first evaluates the anticipated impacts of the activities on marine mammals individuals, and then if impacts are expected to reproduction or survival of any individuals further evaluates the effects of those individual impacts on rates of reproduction and survival of the species or stock, in the context of the status of the species or stock. The analyses below in some cases address species collectively if they occupy the same functional hearing group (*i.e.,* very-low, low, high, and very high-frequency cetaceans), share similar life history strategies, and/or are known to behaviorally respond similarly to acoustic stressors. Because some of these groups or species share characteristics that inform the impact analysis similarly, it would be duplicative to repeat the same analysis for each species. In addition, similar species typically have the same hearing capabilities and behaviorally respond in the same manner.

Thus, our analysis below considers the effects of the specified activities on each affected species or stock even where discussion is organized by functional hearing group and/or information is evaluated at the group level. Where there are meaningful differences between a species or stock that would further differentiate the analysis, they are either described within the section or the discussion for those species or stocks is included as a separate part of each section. Specifically, we first give broad descriptions of the mysticete, odontocete, and pinniped groups and then differentiate into further groups as appropriate below.

Mysticetes

This section builds on the broader discussion above and brings together the discussion of the different types and amounts of take that different stocks will incur, the applicable mitigation for each stock, and the status and life history of the stocks to support the negligible impact determinations for each stock. We have already described above why we believe the incremental addition of the limited number of low-level auditory injury takes will not have any meaningful effect towards inhibiting reproduction or survival. We have also described in this section above the unlikelihood of any masking or habitat impacts having effects that would impact the reproduction or survival of any of the individual marine mammals affected by the Action Proponents' activities. For mysticetes, there is no predicted non-auditory injury from explosives for any stocks except the CA/OR/WA stock of fin whale and the Mainland Mexico-CA/OR/WA stock of humpback whale. Regarding the severity of individual takes by Level B harassment by behavioral disturbance for mysticetes, the majority of these responses are anticipated to occur at received levels below 172 dB, and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Much of the discussion below focuses on the behavioral effects and the mitigation measures that reduce the probability or severity of effects in biologically important areas or other habitat. Because there are multiple stock-specific factors in relation to the status of the species, as well as mortality take due to vessel strike for several stocks, at the end of the section we break out stock-specific findings.

In table 89 below for mysticetes, we indicate the total annual mortality, Level A harassment, and Level B harassment, and a number indicating the instances of total take as a percentage of abundance.

In table 90 below, we indicate the status, life history traits, important habitats, and threats that inform our analysis of the potential impacts of the estimated take on the affected mysticete stocks.

TABLE 89—ANNUAL ESTIMATED TAKE BY LEVEL B HARASSMENT, LEVEL A HARASSMENT, AND MORTALITY AND RELATED INFORMATION FOR MYSTICETES IN THE HCTT STUDY AREA

Marine mammal species	Stock	NMFS stock abundance	NMSDD abundance	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	Maximum annual take	Maximum annual harassment as percentage of stock abundance	Season(s) with 50 percent of take or greater	Region(s) with 40 percent of take or greater
Gray Whale	Eastern North Pacific.	26,960	10,863	16,711	167	0.43	16,878	63	Cold (99 percent).	SOCAL (98 percent).
Gray Whale	Western North Pacific.	290	110	169	2	0	171	59	Cold (100 percent).	SOCAL (97 percent).
Blue Whale	Central North Pacific.	133	170	92	1	0	93	55	Cold (70 percent).	HRC (95 percent).
Blue Whale	Eastern North Pacific.	1,898	3,233	4,571	27	0.29	4,598	142	Warm (56 percent).	SOCAL (87 percent).
Bryde's Whale	Eastern Tropical Pacific.	UNK	69	322	5	0	327	474	Cold (56 percent).	SOCAL (89 percent).
Bryde's Whale	Hawaii	791	766	409	3	0	412	52	Cold (57 percent).	HRC (93 percent).
Fin Whale	Hawaii	203	226	86	1	0	87	38	Cold (75 percent).	HRC (97 percent).
Fin Whale	California/Oregon/Washington.	11,065	12,304	13,501	55	0.57	13,557	110	Warm (70 percent).	SOCAL (52 percent).
Humpback Whale.	Central America/Southern Mexico—California-Oregon-Washington.	1,496	1,603	1,888	19	0.29	1,907	119	Cold (71 percent).	SOCAL (56 percent).
Humpback Whale.	Mainland Mexico—California-Oregon-Washington.	3,477	3,741	4,449	44	0.29	4,493	120	Cold (71 percent).	SOCAL (58 percent).
Humpback Whale.	Hawaii	11,278	9,806	3,034	24	0.43	3,058	27	Cold (99 percent).	HRC (98 percent).
Minke Whale	Hawaii	438	509	296	3	0	299	59	Cold (70 percent).	HRC (96 percent).
Minke Whale	California/Oregon/Washington.	915	1,342	2,993	32	0	3,025	225	N/A	SOCAL (75 percent).
Sei Whale	Hawaii	391	452	253	2	0	255	56	Cold (69 percent).	HRC (95 percent).
Sei Whale	Eastern North Pacific.	864	155	302	3	0.29	305	35	Cold (58 percent).	SOCAL (72 percent).

Note: N/A = Not Applicable, UNK = Unknown. NMSDD abundances are averages only within the U.S. EEZ.
* Indicates which abundance estimate was used to calculate the maximum annual take as a percentage of abundance, either the NMFS SARs (Carretta *et al.,* 2024; Young, 2024) or the NMSDD (table 2.4–1 in appendix A of the application). Please refer to the Mysticetes section for details on which abundance estimate was selected.

TABLE 90—LIFE HISTORY TRAITS, IMPORTANT HABITAT, AND THREATS TO DOLPHINS IN THE HCTT STUDY AREA

Marine mammal species	Stock	ESA status	MMPA status	Movement ecology	Body size	Reproductive strategy	Pace of life	Chronic risk factors	UME, oil spill, other	ESA-designated critical habitat	BIAs II for Hawaii (Kratofil *et al.*, 2023) and West Coast (Calambokidis *et al.*, 2024)	Population trend	PBR	Annual mortality/serious injury (from other human activities)
Gray Whale	Eastern North Pacific.	Not listed	Not depleted, not strategic.	Migratory	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise, subsistence hunting.	No	No	Yes: F–BIA Parent and Core; M–BIA Parent and Child; R–BIA.	Increasing	801	131
Gray Whale	Western North Pacific.	Endangered	Depleted, Strategic.	Migratory	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise, subsistence hunting.	No	No	No	Unk	0.12	UNK
Blue Whale	Central North Pacific.	Endangered	Depleted, Strategic.	Migratory	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise.	No	No	No	Unk	0.1	0
Blue Whale	Eastern North Pacific.	Endangered	Depleted, Strategic.	Migratory	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise.	No	No	Yes: F–BIA Parent and Core.	Unk, possibly increasing.	4.1	≥18.6

Bryde's Whale.	Eastern Tropical Pacific.	Not listed	Not depleted, not strategic.	Unknown, likely migratory.	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise.	No	No	No	Unk	UND	UNK
Bryde's Whale.	Hawaii	Not listed	Not depleted, not strategic.	Unknown, likely migratory.	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise.	No	No	No	Unk	6.2	0
Fin Whale	Hawaii	Endangered	Depleted, Strategic.	Migratory	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise.	No	No	No	Unk	0.2	0
Fin Whale	California/Oregon/Washington.	Endangered	Depleted, Strategic.	Migratory-resident (SOCAL).	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise.	No	No	Yes: F–BIA Parent and Core.	Unk	80	≥43.4
Humpback Whale.	Central America/Southern Mexico—California-Oregon-Washington.	Endangered	Depleted, Strategic.	Migratory	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise.	No	Yes	Yes: F–BIA Parent and Core.	Increasing	3.5	14.9

TABLE 90—LIFE HISTORY TRAITS, IMPORTANT HABITAT, AND THREATS TO DOLPHINS IN THE HCTT STUDY AREA—Continued

Marine mammal species	Stock	ESA status	MMPA status	Movement ecology	Body size	Reproductive strategy	Pace of life	Chronic risk factors	UME, oil spill, other	ESA-designated critical habitat	BIAs II for Hawaii (Kratofil *et al.*, 2023) and West Coast (Calambokidis *et al.*, 2024)	Population trend	PBR	Annual mortality/serious injury (from other human activities)
Humpback Whale.	Mainland Mexico—California-Oregon-Washington.	Threatened ...	Depleted, Strategic.	Migratory ..	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise.	No	Yes	Yes: F–BIA Parent and Core.	Unk	43	22
Humpback Whale.	Hawaii	Not listed	Not depleted, not strategic.	Migratory ..	Large	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise.	No	No	Yes: R–BIA MHI and MHI-Core Parent and Child.	Unk	127	27.09
Minke Whale	Hawaii	Not listed	Not depleted, not strategic.	Migratory ..	Med-Large.	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance.	No	No	No	Unk	2.1	0
Minke Whale	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Migratory-resident.	Med-Large.	Capital	Slow	Vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance.	No	No	No	Unk	4.1	≥0.19
Sei Whale	Hawaii	Endangered ..	Depleted, Strategic.	Migratory ..	Large	Capital	Slow	Vessel strikes, fisheries interactions, ocean noise.	No	No	No	Unk	0.4	0.2

Sei Whale	Eastern North Pacific.	Endangered ..	Depleted, Strategic.	Migratory ..	Large	Capital	Slow	Vessel strikes, fisheries interactions, ocean noise.	No	No	No	Unk	1.25	UNK

Note: N/A = Not Applicable, UND = Undetermined, Unk = Unknown.

Gray Whale (Eastern North Pacific and Western North Pacific Stocks)—

Gray whales from the Eastern North Pacific stock are not listed under the ESA and are not considered as depleted or strategic under the MMPA, while gray whales from the Western North Pacific stock are listed as endangered under the ESA and depleted and strategic under the MMPA. Both stocks are migratory and most likely to be in the California Study Area during their migrations from winter to spring within 10 km (5.4 nmi) of the coast. Some gray whales transit further offshore in Southern California when making straight line transits south of Point Conception to and from Mexico. Gray whales face several chronic anthropogenic and non-anthropogenic risk factors, including vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, ocean noise, and subsistence hunting, among others.

The current stock abundance estimate of the Eastern North Pacific stock of gray whale is 26,960 animals and for the Western North Pacific stock is 290 animals. There are no UMEs or other factors that cause particular concern for these stocks. As described in the Description of Marine Mammals and Their Habitat in the Area of the Specified Activities section, the HCTT Study Area overlaps eight BIAs for the Eastern North Pacific stock, including three feeding, four migratory, and one reproductive for the nearshore migratory corridor used by cow/calf pairs. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment are 167 and 16,711, respectively. As indicated, the rule also allows for up to three takes by serious injury or mortality over the course of the 7-year rule, the impacts of which are discussed above in the Serious Injury and Mortality section.

There are no known biologically important areas for the Western North Pacific stock of gray whale in the HCTT Study Area, though the Western North Pacific stock may use the same migratory areas as the Eastern North Pacific stock while migrating to wintering areas in Mexico (Calambokidis *et al.,* 2024). As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment are 2 and 169, respectively. No mortality is anticipated or proposed for authorization, nor is any non-auditory injury. The total take allowable across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration (from minutes to, at most, several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with gray whale communication or other important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 172 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Gray whales are large-bodied capital breeders with a slow pace of life and are therefore generally less susceptible to impacts from shorter duration foraging disruptions. Further, as described in the *Group and Species-Specific Analyses* section above and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat.

As described above, in addition to evaluating the anticipated impacts of the single instances of take, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In this case, given the number of takes by harassment as compared to the stock/species abundance (see table 89), and the fact that a portion of the takes of the Eastern North Pacific occur in BIAs, it is likely that some portion of the individuals taken are taken repeatedly over a limited number of days. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas, and the fact that many result from transient activities conducted at sea, it is unlikely that repeated takes would occur either in numbers across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals is likely to be impacted.

Given the magnitude and severity of the impacts discussed above to the Western North Pacific stock (considering annual take maxima and the total across 7 years) and their habitat, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are unlikely to result in impacts on the reproduction or survival of any individuals and, thereby, unlikely to affect annual rates of recruitment or survival. For the Eastern North Pacific stock, as analyzed and described in the Serious Injury and Mortality section, given the status of the stock and in consideration of other ongoing anthropogenic mortality (fisheries interactions, vessel strike), the M/SI proposed for authorization (three over the course of the 7-year rule, or 0.43 annually) would not, alone, nor in combination with the impacts of the take by harassment discussed above (which is not expected to impact the reproduction or survival of any individuals), be expected to adversely affect rates of recruitment and survival for any of this stock. For these reasons, we have determined that the total take (considering annual maxima and across 7 years) anticipated and proposed for authorization would have a negligible impact on the Eastern North Pacific and Western North Pacific stocks of gray whale.

Blue Whale (Central North Pacific and Eastern North Pacific Stocks)—

Blue whales are listed as endangered under the ESA and as both depleted and strategic under the MMPA. Both stocks of blue whales are migratory populations that can occur near the coast, over the continental shelf, and in oceanic waters. Blue whales face several chronic anthropogenic and non-anthropogenic risk factors, including vessel strike, fisheries interactions, habitat degradation, pollution, vessel disturbance, and ocean noise, among others.

The Navy's NMSDD estimates the Central North Pacific stock abundance as 170, and the Eastern North Pacific stock abundance as 3,233. The Central North Pacific stock's primary range is outside of the HCTT Study Area. There are no UMEs or other factors that cause particular concern for this stock, and there are no known biologically important areas for the Central North Pacific stock of blue whales in the HCTT Study Area. This stock migrates from their feeding grounds in the Gulf of Alaska to Hawaii in winter. While they occur in the Hawaii Study Area, they are not sighted frequently or year-round. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 1 and 92, respectively. No mortality is anticipated or proposed for authorization, nor is any non-auditory injury. The total take allowable across all 7 years of the rule is indicated in table 54.

For the Eastern North Pacific stock, there are no UMEs or other factors that cause additional concern for this stock. As described in the Description of Marine Mammals and Their Habitat in the Area of the Specified Activities section, the HCTT Study Area overlaps a feeding BIA for the Eastern North Pacific stock (Calambokidis *et al.,* 2024). The Eastern North Pacific stock of blue whales is a migratory population that can occur near the coast, over the continental shelf, and in deep oceanic waters from the northern Gulf of Alaska to the eastern tropical Pacific. This stock forages in their hierarchical feeding BIAs off California in warmer months (June-November). In recent years, the Eastern North Pacific stock has been reported to spend more time (averaging over 8 months) on feeding grounds in the Southern California Bight. The highest densities of blue whales are predicted along nearshore southern California where most impacts would occur, so blue whales may be impacted while foraging in the designated BIAs. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A Harassment and Level B harassment is 27 and 4,571, respectively. As indicated, the rule also allows for up to two takes by serious injury or mortality over the course of the 7-year rule, the impacts of which are discussed above in the Serious Injury and Mortality section. The total take allowable across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration (from minutes to, at most, several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with blue whale communication or other important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 172 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Blue whales are large-bodied capital breeders with a slow pace of life, and are therefore generally less susceptible to impacts from shorter duration foraging disruptions. Further, as described in the *Group and Species-Specific Analyses* section above and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In this case, for the Central North Pacific stock, given the lower number of takes by harassment as compared to the stock/species abundance (see table 89), their migratory movement pattern, and the absence of take concentrated in areas in which animals are known to congregate, it is unlikely that any individual blue whales from the Central North Pacific stock would be taken on more than a limited number of days within a year and, therefore, the anticipated behavioral disturbance is not expected to affect reproduction or survival. For the Eastern North Pacific stock, given the number of takes by harassment as compared to the stock/species abundance (see table 89) and the fact that a portion of the takes occur in BIAs, it is likely that some portion of the individuals taken are taken repeatedly over a limited number of days. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas (*i.e.,* not concentrated within a specific region and season), and the fact that many result from transient activities conducted at sea, it is unlikely that repeated takes would occur either in numbers or clumped across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals is likely to be impacted.

Given the magnitude and severity of the impacts discussed above to the Central North Pacific stock of blue whales (considering annual take maxima and the total across 7 years) and their habitat, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For the Eastern North Pacific stock, as analyzed and described in the Serious Injury and Mortality section, given the status of the stock, and in consideration of other ongoing anthropogenic mortality (fisheries interactions, vessel strike), the M/SI proposed for authorization (two over the course of the 7-year rule, or 0.29 annually) would not, alone, nor in combination with the impacts of the take by harassment discussed above (which is not expected to impact the reproduction or survival of any individuals), be expected to adversely affect rates of recruitment and survival for any of this stock. For these reasons, we have determined that the total take (considering annual maxima and across 7 years) anticipated and proposed for authorization would have a negligible impact on the Eastern North Pacific and Central North Pacific stocks of blue whale.

Bryde's Whale (Eastern Tropical Pacific and Hawaii Stocks)—

Little is known about the movements of Bryde's whales in the Study Area, but seasonal shifts in their distribution occur toward and away from the equator in winter and summer. Therefore, both populations of Bryde's whales are at least somewhat migratory populations that travel within their tropical and subtropical ranges year-round. There are no known biologically important areas for Bryde's whales in the HCTT Study Area. Bryde's whales face several chronic anthropogenic and non-anthropogenic risk factors, including vessel strike, fisheries interactions, habitat degradation, pollution, vessel disturbance, and ocean noise, among others.

Bryde's whales in the Eastern Tropical Pacific have not been designated as a stock under the MMPA, are not ESA-listed, and there is no current reported population trend. The Navy's NMSDD estimates the Eastern Tropical Pacific Bryde's whale is 69 animals. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 5 and 322, respectively. No mortality is anticipated or proposed for authorization, nor is any non-auditory injury. The total take allowable across all 7 years of the rule is indicated in table 54.

The Hawaii stock of Bryde's whale is not listed as threatened or endangered under the ESA and is not considered depleted or strategic under the MMPA. The current stock abundance estimate of the Hawaii stock of Bryde's whale is 791 animals. The stock's primary range extends outside of the HCTT Study Area. There are no UMEs or other factors that cause particular concern for this stock. Bryde's whales are the only baleen whale found in Hawaiian waters year-round, and the only mysticete in Hawaii that does not undergo predictable north-south seasonal migrations. However, Bryde's whales occur mostly in offshore waters of the North Pacific. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 3 and 409, respectively. No mortality is anticipated or proposed for authorization, nor is any non-auditory injury. The total take allowable across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration (from minutes to, at most, several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with Bryde's whale communication or other important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 172 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Bryde's whales are large-bodied capital breeders with a slow pace of life, and are therefore generally less susceptible to impacts from shorter duration foraging disruptions. Further, as described in the *Group and Species-Specific Analyses* section above and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts to the Hawaii stock through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In this case, given the number of takes by harassment as compared to the stock/species abundance (see table 89), it is likely that some portion of the individuals taken from the Eastern Tropical Pacific stock are taken repeatedly over a moderate number of days. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas, and the fact that many result from transient activities conducted at sea, it is unlikely that repeated takes would occur either in numbers or clumped across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals is likely to be impacted. For the Hawaii stock, given the lower number of takes by harassment as compared to the stock/species abundance (see table 89), their migratory movement pattern, and the absence of take concentrated in areas in which animals are known to congregate, it is unlikely that any individual Bryde's whales from the Hawaii stock would be taken on more than a limited number of days within a year and, therefore, the anticipated behavioral disturbance is not expected to affect reproduction or survival.

Given the magnitude and severity of the impacts discussed above to Bryde's whales in the Eastern Tropical Pacific (considering annual take maxima and the total across 7 years) and their habitat, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take anticipated and proposed for authorization would have a negligible impact on the Eastern Tropical Pacific and Hawaii stocks of Bryde's whale.

Fin Whale (Hawaii and CA/OR/WA Stocks)—

Fin whales are listed as endangered under the ESA and depleted and strategic under the MMPA. Fin whales have higher abundances in temperate and polar waters, and are not frequently seen in warm, tropical waters. Fin whales face several chronic anthropogenic and non-anthropogenic risk factors, including vessel strike, fisheries interactions, habitat degradation, pollution, vessel disturbance, and ocean noise, among others.

The Navy's NMSDD estimates the abundance of the Hawaii stock of fin whale is 226 and the CA/OR/WA stock of fin whale is 12,304. There are no UMEs or other factors that cause particular concern for these stocks, and there are no known biologically important areas for the Hawaii stock of fin whale in the HCTT Study Area. The Hawaii stock of fin whales are not sighted frequently or year-round, and likely only migrate to the Hawaii portion of the HCTT Study Area during fall and winter. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A Harassment and Level B harassment is 1 and 86, respectively. No mortality is anticipated or proposed for authorization, nor is any non-auditory injury. The total take allowable across all 7 years of the rule is indicated in table 54.

For the CA/OR/WA stock, as described in the Description of Marine Mammals and Their Habitat in the Area of the Specified Activities section, the HCTT Study Area overlaps a feeding BIA (Parent and Child) for this stock (Calambokidis *et al.,* 2024). This stock of fin whales is a migratory-resident population that travels along the entire U.S. west coast and may be present throughout the year in southern and central California. There are generally higher densities farther offshore in the summer and fall, and closer to shore in winter and spring. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A Harassment and Level B harassment is 55 and 13,501, respectively. The rule allows for a limited number of takes by non-auditory injury (1 animal). As indicated, the rule also allows for up to four takes by serious injury or mortality over the course of the 7-year rule, the impacts of which are discussed above in the Serious Injury and Mortality section. The total take allowable across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration (from minutes to, at most, several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with fin whale communication and other important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness. The rule also allows for a limited number of takes by non-auditory injury (*i.e.,* 1 animal) for this stock. As described above in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section, given the limited number of potential exposures and the anticipated effectiveness of the mitigation measures in minimizing the pressure levels to which any individuals are exposed, these non-auditory injuries are unlikely to be of a nature or level that would impact reproduction or survival.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 172 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Fin whales are large-bodied capital breeders with a slow pace of life and are therefore generally less susceptible to impacts from shorter duration foraging disruptions. Further, as described in the *Group and Species-Specific Analyses* section above and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In this case, given the number of takes by harassment as compared to the stock/species abundance (see table 89) and the fact that a portion of the takes occur in BIAs for the CA/OR/WA stock, it is likely that some portion of the individuals of each stock are taken repeatedly over a limited number of days. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas, and the fact that many result from transient activities conducted at sea, it is unlikely that repeated takes would occur either in numbers or clumped across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals is likely to be impacted.

Fin whales have the largest hierarchal feeding BIAs spanning the coast of California from June to November, which overlap more with PMSR and SOCAL compared to NOCAL, as the core BIAs are generally farther offshore in northern California. Impacts would be attributable to various activities in summer and fall (warm season), with most impacts occurring in southern California year-round. However, this stock is migratory and Navy activities are not anticipated to overlap a large portion of the BIAs, leaving large areas of important foraging habitat available.

Given the magnitude and severity of the impacts discussed above to the Hawaii stock of fin whales (considering annual take maxima and the total across 7 years) and their habitat, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are unlikely to result in impacts on the reproduction or survival of any individuals and, thereby, unlikely to affect annual rates of recruitment or survival. For the CA/OR/WA stock, as analyzed and described in the Serious Injury and Mortality section, given the status of the stock and in consideration of other ongoing anthropogenic mortality (fisheries interactions, vessel strike), the M/SI proposed for authorization (three over the course of the 7-year rule, or 0.57 annually) would not, alone, nor in combination with the impacts of the take by harassment discussed above (which is not expected to impact the reproduction or survival of any individuals), be expected to adversely affect rates of recruitment and survival for any of this stock. For these reasons, we have determined that the total take (considering annual maxima and across 7 years) anticipated and proposed for authorization would have a negligible impact on the CA/OR/WA and Hawaii stocks of fin whale.

Humpback Whale (Central America/Southern Mexico—CA/OR/WA, Mainland Mexico—CA/OR/WA, and Hawaii Stocks)—

Humpback whales occur throughout the HCTT Study Area, and the two stocks (Central America/Southern Mexico—CA/OR/WA and Mainland Mexico—CA/OR/WA) found in the California portion of the Study Area most abundant in shelf and slope waters which are areas of high productivity and often sighted near shore, while also frequently moving through deep offshore waters during migration. In the Hawaii portion of the Study Area, the Hawaii of humpback whales occur seasonally in nearshore waters surrounding the main Hawaiian Islands during breeding season (typically December through May). The HCTT Study Area overlaps ESA-designated critical habitat for the endangered Central America DPS and the Mexico DPS of humpback whales along the west coast (86 FR 21082, April 21, 2021), as described in the Description of Marine Mammals in the Area of Specified Activities section. There are no UMEs or other factors that cause particular concern for these stocks. The HCTT Study Area overlaps a feeding BIA (Parent and Core) for the two stocks found in California (Calambokidis *et al.,* 2024), and a reproductive BIA (Parent and Child) for the Hawaii stock (Kratofil *et al.,* 2023). Humpback whales face several anthropogenic and non-anthropogenic risk factors, including vessel strikes, fisheries interactions, habitat degradation, pollution, vessel disturbance, and ocean noise, among others.

The Central America/Southern Mexico—CA/OR/WA stock (Central America DPS) of humpback whale is listed as endangered under the ESA and as both depleted and strategic under the MMPA. The Navy's NMSDD estimates this stock size is 1,603. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 19 and 1,888, respectively. As indicated, the rule also allows for up to two takes by serious injury or mortality over the course of the 7-year rule, the impacts of which are discussed above in the Serious Injury and Mortality section.

The Mainland Mexico—CA/OR/WA stock (part of the Mexico DPS) of humpback whale is listed as threatened under the ESA and as both depleted and strategic under the MMPA. The Navy's NMSDD estimates this stock size is 3,741. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 44 and 4,449 respectively. The rule allows for a limited number of takes by non-auditory injury (*i.e.,* 1 animal). As described above, given the limited number of potential exposures and the anticipated effectiveness of the mitigation measures in minimizing the pressure levels to which any individuals are exposed, these injuries are unlikely to impact reproduction or survival. As indicated, the rule also allows for up to two takes by serious injury or mortality over the course of the 7-year rule, the impacts of which are discussed above in the Serious Injury and Mortality section.

The Hawaii stock of humpback whale is not listed as endangered under the ESA and as neither depleted nor strategic under the MMPA. The current stock abundance estimate of the Hawaii stock (Hawaii DPS) is 11,278. The stock's primary range extends outside of the HCTT Study Area. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 24 and 3,034, respectively. As indicated, the rule also allows for up to three takes by serious injury or mortality over the course of the 7-year rule, the impacts of which are discussed above in the Serious Injury and Mortality section. The total take allowable for each stock across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration (from minutes to, at most, several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with humpback whale communication or other important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness. The rule also allows for one take by non-auditory injury for the Mainland Mexico-CA/OR/WA stock. As described above, given the limited number of potential exposures and the anticipated effectiveness of the mitigation measures in minimizing the pressure levels to which any individuals are exposed, this non-auditory injury is unlikely to be of a nature or level that would impact reproduction or survival.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 172 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Humpback whales are large-bodied capital breeders with a slow pace of life and are therefore generally less susceptible to impacts from shorter duration foraging disruptions. Further, as described in the *Group and Species-Specific Analyses* section above and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat. In particular, for the Mainland Mexico-CA/OR/WA stock, this proposed rulemaking includes the Northern California Large Whale Mitigation Area and Central California Large Whale Mitigation Area. Within this area from June 1-October 31, the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar (excluding normal maintenance and systems checks) total during training and testing within the combination of this mitigation area, the Central California Large Whale Mitigation Area, and the Southern California Blue Whale Mitigation Area. These restrictions would reduce exposure of humpback whales in important seasonal foraging, migratory, and calving habitats to levels of sound that have the potential to cause injurious or behavioral impacts.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In this case, for the Mainland Mexico-CA/OR/WA and Central America/Southern Mexico-CA/OR/WA stocks, given the number of takes by harassment as compared to the stock/species abundance (see table 89) and the fact that a portion of the takes of both stocks occur in BIAs, it is likely that some portion of the individuals taken are taken repeatedly over a limited number of days. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas, and the fact that many result from transient activities conducted at sea, it is unlikely that repeated takes would occur either in numbers or clumped across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals is likely to be impacted. Further, these stocks are migratory, and although some impacts to these stocks would occur in critical habitat and BIAs important for foraging off the coast of California, there are large areas available outside of the Study Area that contain high-quality foraging habitat for both stocks. Further, the majority of impacts to these stocks are anticipated to occur during the cold season, a portion of which (December to February) the BIAs for feeding are not considered to be active.

For the Hawaii stock, given the lower number of takes by harassment as compared to the stock/species abundance (see table 89), their migratory movement pattern, and the absence of take concentrated in areas in which animals are known to congregate, it is unlikely that any individual humpback whales from the Hawaii stock would be taken on more than a limited number of days within a year and, therefore, the anticipated behavioral disturbance is not expected to affect reproduction or survival.

For all three stocks, as described in the Serious Injury and Mortality section, given the status of the stocks, and in consideration of other ongoing anthropogenic mortality, the amount of allowed M/SI take proposed here would not, alone, nor in combination with the impacts of the take by harassment discussed above (which is not expected to impact the reproduction or survival of any individuals), be expected to adversely affect rates of recruitment and survival. For these reasons, we have determined that the total take (considering annual maxima and across 7 years) anticipated and proposed for authorization would have a negligible impact on the Central America/Southern Mexico-CA/OR/WA, Mainland Mexico-CA/OR/WA, and Hawaii stocks of humpback whales.

Minke Whale (Hawaii and CA/OR/WA Stocks)—

Minke whales in the HCTT Study Area are not listed as threatened or endangered under the ESA, and neither the Hawaii stock nor the CA/OR/WA stock are considered depleted or strategic under the MMPA. There are no UMEs or other factors that cause particular concern for either stock and there are no known biologically important areas for minke whales in the HCTT Study Area. Minke whales face several chronic anthropogenic and non-anthropogenic risk factors, including vessel strike, fisheries interactions, habitat degradation, pollution, vessel disturbance, and disease, among others.

The Navy's NMSDD estimates the abundance of the Hawaii stock of minke whale is 509 animals and the CA/OR/WA stock of minke whale is 1,342 animals. The stock's primary range extends outside of the HCTT Study Area. The Hawaii stock generally congregates in Hawaiian water in the colder months (fall to spring) and migrates to more productive areas in winter. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 3 and 296, respectively. The CA/OR/WA stock can be found year-round in southern California, generally congregating in nearshore waters over the continental shelf off California, and has low variability in annual distribution patterns. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 32 and 2,993, respectively. No mortality is anticipated or proposed for authorization for either stock, nor is any non-auditory injury. The total take allowable across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration, and mostly not in a frequency band that would be expected to interfere with minke whale communication or other important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 172 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Minke whales are medium-to-large-bodied capital breeders with a slow pace of life and are therefore generally less susceptible to impacts from shorter duration foraging disruptions. Further, as described in the *Group and Species-Specific Analyses* section above and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In this case, for the Hawaii stock, given the lower number of takes by harassment as compared to the stock/species abundance (see table 89), their migratory movement pattern, and the absence of take concentrated in areas in which animals are known to congregate, it is unlikely that any individual minke whales from the Hawaii stock would be taken on more than a limited number of days within a year and, therefore, the anticipated behavioral disturbance is not expected to affect reproduction or survival. For the CA/OR/WA stock, given the number of takes by harassment as compared to the stock/species abundance (see table 89), it is likely that some portion of the individuals taken are taken repeatedly over a limited to moderate number of days. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas, and the fact that many result from transient activities conducted at sea, it is unlikely that repeated takes would occur either in numbers or clumped across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals is likely to be impacted.

Given the magnitude and severity of the impacts discussed above to the CA/OR/WA and Hawaii stocks of minke whale (considering annual take maxima and the total across 7 years) and their habitat, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take by harassment anticipated and proposed for authorization would have a negligible impact on the Hawaii and CA/OR/WA stocks of minke whales.

Sei Whale (Hawaii and Eastern North Pacific Stocks)—

Sei whales are listed as endangered under the ESA and as both depleted and strategic under the MMPA. Sei whales generally have higher abundances in the cold and deep water of the open ocean. There are no UMEs or other factors that cause particular concern for either stock, and there are no known biologically important areas for sei whales in the HCTT Study Area. Sei whales face several chronic anthropogenic and non-anthropogenic risk factors, including vessel strike, fisheries interactions, and ocean noise, among others.

The Navy's NMSDD estimates the abundance of the Hawaii stock is 452 and the Eastern North Pacific stock is 864 animals. The Hawaii stock's primary range is outside of the HCTT Study Area. This stock is migratory and not frequently detected in Hawaii, traveling from their cold subpolar latitudes to Hawaii in the winter, where they are more likely to be on the Hawaii Range Complex in the cold season. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 2 and 253, respectively. No mortality of the Hawaii stock is anticipated or proposed for authorization, nor is any non-auditory injury.

The Eastern North Pacific stock occurs year-round in deep offshore waters of California and is likely to occur in the Transit Corridor of the HCTT Study Area. The Eastern North Pacific stock seasonally migrates, though to a lesser extent compared to other large whales. As shown in table 89, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 3 and 302, respectively. As indicated, the rule also allows for up to two takes by serious injury or mortality over the course of the 7-year rule, the impacts of which are discussed above in the Serious Injury and Mortality section. The total take allowable across all 7 years of the rule for both stocks is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration (from minutes to, at most, several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with sei whale communication or other important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 172 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Sei whales are large-bodied capital breeders with a slow pace of life and are therefore generally less susceptible to impacts from shorter duration foraging disruptions. Further, as described in the *Group and Species-Specific Analyses* section above and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In this case, given the lower number of takes by harassment as compared to the stock/species abundance (see table 89), their migratory movement pattern, and the absence of take concentrated in areas in which animals are known to congregate, it is unlikely that any individual from either stock would be taken on more than a limited number of days within a year and, therefore, the anticipated behavioral disturbance is not expected to affect reproduction or survival.

Given the magnitude and severity of the impacts discussed above to the Hawaii stock of sei whales (considering annual take maxima and the total across 7 years) and their habitat, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For the CA/OR/WA stock, as analyzed and described in the Serious Injury and Mortality section above, given the status of the stock, the M/SI proposed for authorization for CA/OR/WA sei whales (two over the course of the 7-year rule, or 0.29 annually) would not, alone, be expected to adversely affect the stock through rates of recruitment or survival. Given the magnitude and severity of the take by harassment discussed above and any anticipated habitat impacts, and in consideration of the required mitigation measures and other information presented, the take by harassment proposed for authorization is unlikely to result in impacts on the reproduction or survival of any individuals and, thereby, unlikely to affect annual rates of recruitment or survival either alone or in combination with the M/SI proposed for authorization. For these reasons, we have determined that the take by harassment anticipated and proposed for authorization would have a negligible impact on the Hawaii and CA/OR/WA stocks of sei whales.

Odontocetes

This section builds on the broader discussion above and brings together the discussion of the different types and amounts of take that different stocks will incur, the applicable mitigation for each stock, and the status and life history of the stocks to support the negligible impact determinations for each stock. We have already described above why we believe the incremental addition of the limited number of low-level auditory injury takes will not have any meaningful effect towards inhibiting reproduction or survival. We have also described above in this section the unlikelihood of any masking or habitat impacts having effects that would impact the reproduction or survival of any of the individual marine mammals affected by the Action Proponents' activities. Some odontocete stocks have predicted non-auditory injury from explosives, discussed further below. Regarding the severity of individual takes by Level B harassment by behavioral disturbance for odontocetes, the majority of these responses are anticipated to occur at received levels below 178 dB for most odontocete species and below 154 dB for sensitive species (*i.e.,* beaked whales and harbor porpoises, for which a lower behavioral disturbance threshold is applied), and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Much of the discussion below focuses on the behavioral effects and the mitigation measures that reduce the probability or severity of effects in biologically important areas or other habitats. Because there are multiple stock-specific factors in relation to the status of the species, as well as mortality take for several stocks, at the end of the section we break out stock- or group-specific findings.

In table 91 (sperm whales, dwarf sperm whales, and pygmy sperm whales), table 93 (beaked whales), table 95 (dolphins and small whales), table 97 (porpoises), and table 99 (pinnipeds) below, we indicate the total annual mortality, Level A harassment, and Level B harassment, and a number indicating the instances of total take as a percentage of abundance.

In table 92 (sperm whales, dwarf sperm whales, and pygmy sperm whales), table 94 (beaked whales), table 96 (dolphins and small whales), table 98 (porpoises), and table 100 (pinnipeds), below, we indicate the status, life history traits, important habitats, and threats that inform our analysis of the potential impacts of the estimated take on the affected odontocete stocks.

TABLE 91—ANNUAL ESTIMATED TAKE BY LEVEL B HARASSMENT, LEVEL A HARASSMENT, AND MORTALITY AND RELATED INFORMATION FOR PACIFIC STOCKS OF SPERM WHALE, DWARF SPERM WHALE, AND PYGMY SPERM WHALE IN THE HCTT STUDY

Marine mammal species	Stock	NMFS stock abundance	NMSDD abundance	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	Maximum annual take	Maximum annual harassment as percentage of stock abundance	Season(s) with 50 percent of take or greater	Region(s) with 40 percent of take or greater
Sperm Whale	Hawaii	5,707	6,062	1,649	1	0.14	1,650	27	Cold (55 percent).	HRC (94 percent).
Sperm Whale	California/Oregon/Washington.	2,606	4,549	3,891	3	0	3,894	86	Cold (55 percent).	SOCAL (70 percent).
Dwarf Sperm Whale.	Hawaii	UNK	43,246	45,224	915	0	46,139	107	Cold (54 percent).	HRC (93 percent).
Dwarf Sperm Whale.	California/Oregon/Washington.	UNK	2,462	5,664	94	0	5,758	234	Cold (57 percent).	SOCAL (75 percent).
Pygmy Sperm Whale.	Hawaii	42,083	48,589	45,787	936	0	46,723	96	Cold (54 percent).	HRC (93 percent).
Pygmy Sperm Whale.	California/Oregon/Washington.	4,111	2,462	5,615	107	0	5,722	139	Cold (59 percent).	SOCAL (74 percent).

Note: N/A = Not Applicable, UNK = Unknown. NMSDD abundances are averages only within the U.S. EEZ.

* Indicates which abundance estimate was used to calculate the maximum annual take as a percentage of abundance, either the NMFS SARs (Carretta *et al.,* 2024; Young, 2024) or the NMSDD (table 2.4–1 in appendix A of the application). Please refer to the Odontocetes section for details on which abundance estimate was selected.

TABLE 92—LIFE HISTORY TRAITS, IMPORTANT HABITAT, AND THREATS TO SPERM WHALE, DWARF SPERM WHALE, AND PYGMY SPERM WHALE IN THE HCTT STUDY AREA

Marine mammal species	Stock	ESA status	MMPA status	Movement ecology	Body size	Reproductive strategy	Pace of life	Chronic risk factors	UME, oil spill, other	ESA-designated critical habitat	BIAs II for Hawaii (Kratofil *et al.*, 2023) and West Coast (Calambokidis *et al.*, 2024)	Population trend	PBR	Annual mortality/serious injury (from other human activities)
Sperm Whale.	Hawaii	Endangered	Depleted, Strategic.	Resident-migratory.	Large	Income	Slow	Vessel strikes, fisheries interactions, ocean noise, marine debris, disease.	No	No	No	Unk	18	0
Sperm Whale.	California/Oregon/Washington.	Endangered	Depleted, Strategic.	Migratory-resident.	Large	Income	Slow	Vessel strikes, fisheries interactions, ocean noise, marine debris, disease.	No	No	No	Stable	4	0.52
Dwarf Sperm Whale.	Hawaii	Not listed	Not depleted, not strategic.	Migratory, nomadic, resident.	Small-Med	Income	Fast	Fisheries interactions, marine debris, ocean noise.	No	No	Yes: S–BIA Parent and Child HI-Core.	Unk	UND	0
Dwarf Sperm Whale.	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Migratory, nomadic, resident.	Small-Med	Income	Fast	Fisheries interactions, marine debris, ocean noise.	No	No	No	Unk	UND	0
Pygmy Sperm Whale.	Hawaii	Not listed	Not depleted, not strategic.	Migratory, nomadic, resident.	Small-Med	Income	Fast	Fisheries interactions, marine debris, ocean noise.	No	No	Yes: S–BIA O MN HI.	Unk	257	0
Pygmy Sperm Whale.	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Migratory, nomadic, resident.	Small-Med	Income	Fast	Fisheries interactions, marine debris, ocean noise.	No	No	No	Unk	19.2	0

Note: N/A = Not Applicable, UND = Undetermined, Unk = Unknown.

Sperm Whales, Dwarf Sperm Whales, and Pygmy Sperm Whales—

Sperm Whale (Hawaii and CA/OR/WA Stocks)

Sperm whales are listed as endangered under the ESA and are considered depleted and strategic under the MMPA. The Navy's NMSDD estimate for the Hawaii stock is 6,062 animals and for the CA/OR/WA stock is 4,549 animals. There are no UMEs or other factors that cause particular concern for these stocks, and there are no known biologically important areas for the sperm whales in the HCTT Study Area. Sperm whales generally have higher abundances in deep water and areas of high productivity and are somewhat migratory, but their movement ecology is demographically dependent. The Hawaii stock is residential and occurs in Hawaiian waters year-round, while the CA/OR/WA stock is somewhat migratory, with some individuals leaving warm waters in summer to travel north to their arctic feeding grounds and returning south in the fall and winter. Sperm whales face several chronic anthropogenic and non-anthropogenic risk factors, including vessel strike, fisheries interactions, pollution, ocean noise, and disease, among others.

As shown in table 91, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B harassment is 1 (Hawaii stock) and 3 (CA/OR/WA stock), and 1,649 (Hawaii stock) to 3,891 (CA/OR/WA stock), respectively. As indicated, the rule also allows for up to one take by serious injury or mortality of Hawaii sperm whales over the course of the 7-year rule, the impacts of which are discussed above in the Serious Injury and Mortality section. The total take allowable for each stock across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration (from minutes to, at most, several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with sperm whale communication or other important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 178 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Sperm whales are large-bodied income breeders with a slow pace of life and are likely more resilient to missed foraging opportunities due to acoustic disturbance than smaller odontocetes. However, they may be more susceptible to impacts due to lost foraging opportunities during reproduction, especially if they occur during lactation (Farmer *et al.,* 2018b). Further, as described in the *Group and Species-Specific Analyses* section above and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. For both stocks of sperm whales, given the lower number of takes by harassment as compared to the stock/species abundance (see table 91), and the absence of take concentrated in areas in which animals are known to congregate, it is unlikely that any individual sperm whales would be taken on more than a limited number of days within a year and, therefore, the anticipated behavioral disturbance is not expected to affect reproduction or survival.

Given the magnitude and severity of the impacts discussed above to sperm whales (considering annual take maxima and the total across 7 years) and their habitat, and in consideration of the required mitigation measures and other information presented, the proposed take by harassment is not expected to impact the reproduction or survival of any individuals nor, as described previously, is the mortality proposed for authorization expected to adversely affect the species or stock. For these reasons, we have determined that the take anticipated and proposed for authorization would have a negligible impact on the Hawaii and CA/OR/WA stocks of sperm whale.

Dwarf Sperm Whale (Hawaii and CA/OR/WA Stocks) and Pygmy Sperm Whale (Hawaii and CA/OR/WA Stocks)

Neither dwarf sperm whales nor pygmy sperm whales are listed under the ESA, and none of the stocks are considered depleted or strategic under the MMPA. The current stock abundance of the CA/OR/WA stock of pygmy sperm whale is 4,111 animals, and the stock abundances from Navy's NMSDD are 2,426 (CA/OR/WA stock of dwarf sperm whale), 43,246 (Hawaii stock of dwarf sperm whale), and 48,589 (Hawaii stock of pygmy sperm whale). There are no UMEs or other factors that cause particular concern for these stocks. As described in the Description of Marine Mammals and Their Habitat in the Area of the Specified Activities section, the HCTT Study Area overlaps two known BIAs for small and resident populations of the Hawaii stocks of dwarf and pygmy sperm whale. Dwarf and pygmy sperm whales face several chronic anthropogenic and non-anthropogenic risk factors, including fisheries interactions, marine debris, and ocean noise, among others.

As shown in table 91, the maximum annual allowable instances of take under this proposed rule by Level A Harassment and Level B harassment is: 915 and 45,224 for the Hawaii stock of dwarf sperm whale, respectively; 94 and 5,664 for the CA/OR/WA stock of dwarf sperm whale, respectively; 936 and 45,787 for the Hawaii stock of pygmy sperm whale, respectively; and 107 and 5,615 for the CA/OR/WA stock of pygmy sperm whale, respectively. No mortality is anticipated or proposed for authorization. The rule allows for a limited number of takes by non-auditory injury (one each for the Hawaii stocks of dwarf and pygmy sperm whales). As described above, given the limited number of potential exposures and the anticipated effectiveness of the mitigation measures in minimizing the pressure levels to which any individuals are exposed, these injuries are unlikely to impact reproduction or survival. The total take allowable across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration (from minutes to, at most, several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with dwarf and pygmy sperm whale communication, overlap more than a relatively narrow portion of the vocalization range of any single species or stock, or preclude detection or interpretation of important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness. The rule also allows for a limited number of takes by non-auditory injury (one per stock) for the Hawaii stocks of dwarf and pygmy sperm whales. As described above in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section, given the limited number of potential exposures and the anticipated effectiveness of the mitigation measures in minimizing the pressure levels to which any individuals are exposed, these non-auditory injuries are unlikely to be of a nature or level that would impact reproduction or survival for either of the Hawaii stocks of dwarf and pygmy sperm whales.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 178 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Dwarf and pygmy sperm whales are small-to-medium-bodied income breeders with a fast pace of life. They are generally more sensitive to missed foraging opportunities than larger odontocetes, especially during lactation, but would be quick to recover given their fast pace of life. Further, as described in the *Group and Species-Specific Analyses* section above and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat. In particular, this proposed rulemaking includes a Hawaii Island Marine Mammal Mitigation Area, within which the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar or 20 hours of helicopter dipping sonar (a mid-frequency active sonar source) annually and must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets). These restrictions would reduce exposure of numerous small and resident marine mammal populations, including dwarf and pygmy sperm whales, to levels of sound from sonar or explosives that have the potential to cause injury or mortality, thereby reducing the likelihood of those effects and, further, minimizing the severity of behavioral disturbance.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In this case, given the number of takes by harassment as compared to the stock/species abundance (see table 91) and the fact that a portion of the takes occur in BIAs for the Hawaii stocks, it is likely that some portion of the individuals taken are taken repeatedly over a limited to moderate number of days. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas, and the fact that many result from transient activities conducted at sea, it is unlikely that repeated takes would occur either in numbers or clumped across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals is likely to be impacted.

Given the magnitude and severity of the impacts discussed above to dwarf and pygmy sperm whale stocks in the HCTT Study Area (considering annual take maxima and the total across 7 years) and their habitats, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take anticipated and proposed for authorization would have a negligible impact on the Hawaii and CA/OR/WA stocks of dwarf and pygmy sperm whales.

Beaked Whales—

This section builds on the broader odontocete discussion above (*i.e.,* that information applies to beaked whales as well), and brings together the discussion of the different types and amounts of take that different beaked whale species and stocks will likely incur, any additional applicable mitigation, and the status of the species and stocks to support the negligible impact determinations for each species or stock.

TABLE 93—ANNUAL ESTIMATED TAKE BY LEVEL B HARASSMENT, LEVEL A HARASSMENT, AND MORTALITY AND RELATED INFORMATION FOR BEAKED WHALES IN THE HCTT STUDY AREA

Marine mammal species	Stock	NMFS stock abundance	NMSDD abundance	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	Maximum annual take	Maximum annual harassmen as percentage of stock abundance	Season(s) with 50 percent of take or greater	Region(s) with 40 percent of take or greater
Baird's Beaked Whale.	California/Oregon/Washington.	1,363	871	10,174	0	0	10,174	746	Cold (54 percent).	SOCAL (58 percent).
Blainville's Beaked Whale.	Hawaii	1,132	1,300	7,542	0	0	7,542	580	Cold (55 percent).	HRC (94 percent).
Goose-Beaked Whale.	Hawaii	4,431	5,116	30,359	0	0	30,359	593	Cold (55 percent).	HRC (94 percent).
Goose-Beaked Whale.	California/Oregon/Washington.	5,454	13,531	166,816	2	0	166,818	1233	Cold (54 percent).	SOCAL (82 percent).

TABLE 93—ANNUAL ESTIMATED TAKE BY LEVEL B HARASSMENT, LEVEL A HARASSMENT, AND MORTALITY AND RELATED INFORMATION FOR BEAKED WHALES IN THE HCTT STUDY AREA—Continued

Marine mammal species	Stock	NMFS stock abundance	NMSDD abundance	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	Maximum annual take	Maximum annual harassmen as percentage of stock abundance	Season(s) with 50 percent of take or greater	Region(s) with 40 percent of take or greater
Longman's Beaked Whale.	Hawaii	2,550	2,940	18,316	1	0	18,317	623	Cold (56 percent).	HRC (94 percent).
Mesoplodont Beaked Whale.	California/Oregon/Washington.	3,044	7,534	92,839	2	0	92,841	1232	Cold (55 percent).	SOCAL (76 percent).

Note: N/A = Not Applicable, UNK = Unknown. NMSDD abundances are averages only within the U.S. EEZ.

* Indicates which abundance estimate was used to calculate the maximum annual take as a percentage of abundance, either the NMFS SARs (Carretta *et al.,* 2024; Young, 2024) or the NMSDD (table 2.4–1 in appendix A of the application). Please refer to the Odontocetes section for details on which abundance estimate was selected.

TABLE 94—LIFE HISTORY TRAITS, IMPORTANT HABITAT, AND THREATS TO BEAKED WHALES IN THE HCTT STUDY AREA

Marine mammal species	Stock	ESA status	MMPA status	Movement ecology	Body size	Reproductive strategy	Pace of life	Chronic risk factors	UME, oil spill, other	ESA-designated critical habitat	BIAs II for Hawaii (Kratofil *et al.*, 2023) and West Coast (Calambokidis *et al.*, 2024)	Population trend	PBR	Annual mortality/serious injury (from other human activities)
Baird's Beaked Whale.	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Nomadic, resident.	Large	Mixed	Slow	Fisheries interactions, ocean noise.	No	No	No	Stable, possibly increasing.	8.9	≥0.2
Blainville's Beaked Whale.	Hawaii	Not listed	Not depleted, not strategic.	Nomadic, resident.	Med	Mixed	Med	Fisheries interactions, ocean noise.	No	No	Yes: S–BIA Parent and Child O MN HI.	Unk	5.6	0
Goose-Beaked Whale.	Hawaii	Not listed	Not depleted, not strategic.	Nomadic, resident.	Med	Mixed	Med	Fisheries interactions, ocean noise.	No	No	Yes: S–BIA Parent and Child HI-Core.	Unk	32	0
Goose-Beaked Whale.	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Nomadic, resident.	Med	Mixed	Med	Fisheries interactions, ocean noise.	No	No	No	Unk	42	<0.1
Longman's Beaked Whale.	Hawaii	Not listed	Not depleted, not strategic.	Nomadic-resident.	Med	Mixed	Med	Fisheries interactions, ocean noise.	No	No	No	Unk	15	0
Mesoplodont Beaked Whale.	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Resident-nomadic.	Med	Mixed	Med	Fisheries interactions, ocean noise.	No	No	No	Unk, possibly increasing.	20	0.1

Note: N/A = Not Applicable, Unk = Unknown.

These stocks are not listed as endangered or threatened under the ESA, and they are not considered depleted or strategic under the MMPA. The stock abundance estimates range from 1,300 (Hawaii stock of Blainville's beaked whale, NMSDD) to 13,531 (CA/OR/WA stock of goose-beaked whale, NMSDD). There are no UMEs or other factors that cause particular concern for these stocks in the HCTT Study Area. As described in the Description of Marine Mammals and Their Habitat in the Area of the Specified Activities section, the HCTT Study Area overlaps two known biologically important areas for small and resident populations for the Hawaii stocks of Blainville's and goose-beaked whales. Beaked whales face several chronic anthropogenic and non-anthropogenic risk factors, including fisheries interactions, and ocean noise, among others.

As shown in table 93, the maximum annual allowable instances of take under this proposed rule by Level A harassment and Level B Harassment range from 0 to 2, and 7,542 and 166,816, respectively. No mortality is anticipated or proposed for authorization, nor is any non-auditory injury. The total take allowable across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration (from minutes to, at most, several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with echolocation, overlap more than a relatively narrow portion of the vocalization range of any single species or stock, or preclude detection or interpretation of important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness on the CA/OR/WA stocks of goose- and mesoplodont beaked whales and the Hawaii stock of Longman's beaked whales.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 154 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Beaked whales are medium-to-large-bodied odontocetes with a medium pace of life and likely moderately resilient to missed foraging opportunities due to acoustic disturbance. They are mixed breeders (*i.e.,* behaviorally income breeders), and they demonstrate capital breeding strategies during gestation and lactation (Keen *et al.,* 2021), so they may be more vulnerable to prolonged loss of foraging opportunities during gestation. Further, as described in the *Group and Species-Specific Analyses* section above and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat. In particular, this proposed rulemaking includes a Hawaii Island Marine Mammal Mitigation Area, within which the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar or 20 hours of helicopter dipping sonar (a mid-frequency active sonar source) annually and must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets). These restrictions would reduce exposure of numerous small and resident marine mammal populations, including the Hawaii stocks of Blainville's and goose-beaked whales, to levels of sound from sonar or explosives that have the potential to cause injury or mortality, thereby reducing the likelihood of those effects and, further, minimizing the severity of behavioral disturbance.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In this case, given the number of takes by harassment as compared to the stock/species abundance (see table 93), it is likely that some portion of the individuals taken are taken repeatedly over a moderate number of days. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas, and the fact that many result from transient activities conducted at sea, it is unlikely that repeated takes would occur clumped across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals is likely to be impacted.

Given the magnitude and severity of the impacts discussed above to beaked whale stock/species (considering annual take maxima and the total across 7 years) and their habitat, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are not expected to result in impacts on the reproduction or survival of any individuals, much less affect annual rates of recruitment or survival. For these reasons, we have determined that the take anticipated and proposed for authorization would have a negligible impact on the CA/OR/WA stocks of Baird's, goose-, and mesoplodont beaked whales, and the Hawaii stocks of Blainville's, goose-, and Longman's beaked whale stocks.

Dolphins and Small Whales—

Of the 39 stocks of dolphins and small whales (Delphinidae) for which incidental take is proposed for authorization (see table 95), one is listed as endangered under the ESA and depleted and strategic under the MMPA: the Main Hawaiian Islands Insular stock of false killer whale. While not ESA-listed, the Hawaii Pelagic stock of false killer whale is considered strategic under the MMPA. As shown in table 95 and table 96, these delphinids vary in stock abundance, body size, and movement ecology from, for example, the small-bodied, nomadic CA/OR/WA stock of short-beaked common dolphin with NMSDD abundance estimate of 1,049,117, to the medium-sized small and resident Main Hawaiian Islands Insular stock of false killer whale with an estimated abundance of 138. The HCTT Study Area overlaps ESA-designated critical habitat for the Main Hawaiian Islands Insular stock of false killer whale (83 FR 35062, July 24, 2018), as well as BIAs for the following small and resident populations: false killer whale (Main Hawaiian Islands Insular and Northwest Hawaiian Islands stocks), melon-headed whale (Hawaiian Islands and Kohala Resident stocks), short-finned pilot whale (Hawaii stock), bottlenose dolphin (Maui Nui, Hawaii Island, Kauaʻi/Niʻihau, and Oʻahu stocks), pantropical spotted dolphins (Maui Nui, Hawaii Island, and Oʻahu stocks), rough-toothed dolphin (Hawaii stock), and spinner dolphin (Hawaii Island, Kauaʻi/Niʻihau, and Oʻahu/4

Islands Region stocks). These areas are described in the Description of Marine Mammals and Their Habitat in the Area of Specified Activities section. Delphinids face a number of chronic anthropogenic and non-anthropogenic risk factors including fishery interactions, biotoxins, chemical contaminants, illegal feeding/harassment, ocean noise, oil spills and energy exploration, vessel strikes, and swim with dolphin programs, the impacts of which vary depending whether the stock is more coastal (*e.g.,* swim with dolphin programs occur mostly with coastally-distributed spinner dolphins), more or less deep-diving (*e.g.,* entanglement more common in deep divers like pygmy killer whales and pilot whales), and other behavioral differences (*e.g.,* vessels strikes more concern for killer whales). There are no known UMEs or other factors that cause particular concern for these stocks.

TABLE 95—ANNUAL ESTIMATED TAKE BY LEVEL B HARASSMENT, LEVEL A HARASSMENT, AND MORTALITY AND RELATED INFORMATION FOR DOLPHINS IN THE HCTT STUDY AREA

Marine mammal species	Stock	NMFS stock abundance	NMSDD abundance	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	Maximum annual take	Maximum annual harassment as percentage of stock abundance	Season(s) with 50 percent of take or greater	Region(s) with 40 percent of take or greater	Greatest degree any individual expected to be taken repeatedly across multiple days
False Killer Whale	Main Hawaiian Islands Insular.	138	98	169	0	0	169	122	Warm (53 percent), Cold (46 percent).	HRC (100 percent).	Limited number of days.
False Killer Whale	Northwest Hawaiian Islands.	477	477	191	0	0	191	40	Cold (68 percent).	HRC (100 percent).	Limited number of days.
False Killer Whale	Hawaii Pelagic	5,528	2,400	1,670	1	0	1,671	30	Cold (52 percent).	HRC (95 percent).	Zero to limited number of days.
False Killer Whale	Baja California Peninsula Mexico.	N/A	1,990	2,537	2	0	2,539	128	Cold (58 percent).	SOCAL (100 percent).	Limited number of days.
Killer Whale	Hawaii	161	198	127	0	0	127	64	Cold (51 percent).	HRC (95 percent).	Zero to limited number of days.
Killer Whale	Eastern North Pacific Offshore.	300	155	1,023	4	0	1,027	342	Cold (61 percent).	SOCAL (88 percent).	Limited to moderate number of days.
Killer Whale	West Coast Transient	349	26	55	0	0	55	16	Warm (56 percent).	NOCAL (58 percent).	Zero to limited number of days.
Melon-Headed Whale	Hawaiian Islands	40,647	46,949	31,456	13	0	31,469	67	Cold (53 percent).	HRC (96 percent).	Limited number of days.
Melon-Headed Whale	Kohala Resident (Hawaii)	UNK	447	56	0	0	56	13	Warm (77 percent).	HRC (100 percent).	Zero to limited number of days.
Pygmy Killer Whale	Hawaii	10,328	11,928	8,895	3	0	8,898	75	N/A	HRC (95 percent).	Zero to limited number of days.
Pygmy Killer Whale	California—Baja California Peninsula Mexico.	N/A	874	795	0	0	795	91	Warm (100 percent).	SOCAL (84 percent).	Zero to limited number of days.
Short-Finned Pilot Whale	Hawaii	19,242	23,117	17,304	7	0	17,311	75	Cold (53 percent).	HRC (97 percent).	Limited number of days.
Short-Finned Pilot Whale	California/Oregon/Washington.	836	831	4,279	11	0.57	4,291	513	Cold (60 percent).	SOCAL (85 percent).	Moderate number of days.
Bottlenose Dolphin	Maui Nui	64	65	326	0	0	326	502	N/A	HRC (100 percent).	Moderate number of days.
Bottlenose Dolphin	Hawaii Island	136	138	9	0	0	9	7	Cold (80 percent).	HRC (100 percent).	Zero to limited number of days.
Bottlenose Dolphin	Hawaii Pelagic	24,669	25,120	43,313	25	0.29	43,338	173	Cold (52 percent).	HRC (100 percent).	Limited number of days.
Bottlenose Dolphin	Kaua'i/Ni'ihau	112	113	1,460	0	0	1,460	1,292	Cold (59 percent).	HRC (100 percent).	High number of days.
Bottlenose Dolphin	O'ahu	112	113	7,232	6	0.14	7,238	6,405	Cold (54 percent).	HRC (100 percent).	High number of days.
Bottlenose Dolphin	California Coastal	453	182	1,350	7	0	1,357	300	Cold (60 percent).	SOCAL (98 percent).	Limited to moderate number of days.
Bottlenose Dolphin	California/Oregon/Washington Offshore.	3,477	42,395	28,058	15	0	28,073	66	Warm (65 percent).	SOCAL (93 percent).	Zero to limited number of days.
Fraser's Dolphin	Hawaii	40,960	47,288	35,480	8	0	35,488	75	Cold 51 percent).	HRC (97 percent).	Zero to limited number of days.
Long-Beaked Common Dolphin.	California	83,379	209,100	296,878	152	2.43	297,032	142	Warm (54 percent).	SOCAL (82 percent).	Limited number of days.
Northern Right Whale Dolphin.	California/Oregon/Washington.	29,285	68,935	45,514	21	0.14	45,535	66	Cold (75 percent).	NOCAL (41 percent).	Zero to limited number of days.
Pacific White-Sided Dolphin.	California/Oregon/Washington.	34,999	107,775	69,210	42	0.29	69,252	64	Cold (59 percent).	SOCAL (53 percent).	Zero to limited number of days.
Pantropical Spotted Dolphin.	Maui Nui	UNK	2,674	2,373	4	0	2,377	89	N/A	HRC (100 percent).	Limited number of days.
Pantropical Spotted Dolphin.	Hawaii Island	UNK	8,674	6,024	7	0	6,031	70	Warm (51 percent).	HRC (100 percent).	Limited number of days.

TABLE 95—ANNUAL ESTIMATED TAKE BY LEVEL B HARASSMENT, LEVEL A HARASSMENT, AND MORTALITY AND RELATED INFORMATION FOR DOLPHINS IN THE HCTT STUDY AREA—Continued

Marine mammal species	Stock	NMFS stock abundance	NMSDD abundance	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	Maximum annual take	Maximum annual harassment as percentage of stock abundance	Season(s) with 50 percent of take or greater	Region(s) with 40 percent of take or greater	Greatest degree any individual expected to be taken repeatedly across multiple days
Pantropical Spotted Dolphin.	Hawaii Pelagic	67,313	62,395	44,390	19	0	44,409	71	Cold (55 percent).	HRC (97 percent).	Zero to limited number of days.
Pantropical Spotted Dolphin.	O'ahu	UNK	1,491	6,426	6	0	6,432	431	Warm (51 percent).	HRC (100 percent).	Moderate number of days.
Pantropical Spotted Dolphin.	Baja California Peninsula Mexico.	N/A	70,889	97,626	47	0.29	97,673	138	Cold (55 percent).	SOCAL (100 percent).	Limited number of days.
Risso's Dolphin	Hawaii	6,979	8,649	6,558	4	0	6,562	76	N/A	HRC (95 percent).	Zero to limited number of days.
Risso's Dolphin	California/Oregon/Washington.	6,336	19,357	43,833	21	0	43,854	227	Cold (54 percent).	SOCAL (87 percent).	Limited to moderate number of days.
Rough-Toothed Dolphin	Hawaii	83,915	106,193	96,873	36	0.29	96,909	91	Cold (53 percent).	HRC (97 percent).	Limited number of days.
Short-Beaked Common Dolphin.	California/Oregon/Washington.	1,056,308	1,049,117	2,169,554	877	15.29	2,170,446	207	Warm (53 percent).	SOCAL (82 percent).	Limited to moderate number of days.
Spinner Dolphin	Hawaii Pelagic	N/A	6,807	4,544	2	0	4,546	67	Cold (54 percent).	HRC (95 percent).	Zero to limited number of days.
Spinner Dolphin	Hawaii Island	665	670	110	1	0	111	17	Warm (60 percent).	HRC (100 percent).	Zero to limited number of days.
Spinner Dolphin	Kaua'i/Ni'ihau	N/A	606	4,446	2	0	4,448	734	Cold (65 percent).	HRC (100 percent).	Moderate number of days.
Spinner Dolphin	O'ahu/4 Islands Region	N/A	355	1,201	1	0	1,202	339	Warm (63 percent).	HRC (100 percent).	Limited to moderate number of days.
Striped Dolphin	Hawaii Pelagic	64,343	68,909	37,782	12	0	37,794	55	Cold (53 percent).	HRC (95 percent).	Zero to limited number of days.
Striped Dolphin	California/Oregon/Washington.	29,988	160,551	133,399	44	0.14	133,443	83	Warm (55 percent).	SOCAL (87 percent).	Zero to limited number of days.

Note: N/A = Not Applicable, UNK = Unknown. NMSDD abundances are averages only within the U.S. EEZ.
* Indicates which abundance estimate was used to calculate the maximum annual take as a percentage of abundance, either the NMFS SARs (Carretta *et al.,* 2024; Young, 2024) or the NMSDD (table 2.4–1 in appendix A of the application). Please refer to the Odontocetes section for details on which abundance estimate was selected.

TABLE 96—LIFE HISTORY TRAITS, IMPORTANT HABITAT, AND THREATS TO DOLPHINS IN THE HCTT STUDY AREA

Marine mammal species	Stock	ESA status	MMPA status	Movement ecology	Body size	Reproductive strategy	Pace of life	Chronic risk factors	UME, oil spill, other	ESA-designated critical habitat	BIAs II for Hawaii (Kratofil *et al.,* 2023) and West Coast (Calambokidis *et al.,* 2024)	Population trend	PBR	Annual mortality/serious injury (from other human activities)
False Killer Whale.	Main Hawaiian Islands Insular.	Endangered	Depleted, Strategic.	Resident-nomadic.	Med	Income	Med	Fisheries interactions, contaminants.	No	Yes	Yes: S–BIA Parent and Child MHI-Core.	Decreasing	0.3	0.1
False Killer Whale.	Northwest Hawaiian Islands.	Not listed	Not depleted, not strategic.	Resident, nomadic.	Med	Income	Med	Fisheries interactions, contaminants.	No	No	Yes: S–BIA	Unk	1.43	0.16

False Killer Whale.	Hawaii Pelagic	Not listed	Not depleted, Strategic.	Nomadic	Med	Income	Med	Fisheries interactions, contaminants.	No	No	No	Unk	36	47
False Killer Whale.	Baja California Peninsula Mexico.	N/A	N/A	Unk	Med	Income	Med	Fisheries interactions, contaminants.	No	No	No	Unk		
Killer Whale	Hawaii	Not listed	Not depleted, not strategic.	Nomadic	Large	Income	Slow	Fisheries interactions.	No	No	No	Unk	0.8	0
Killer Whale	Eastern North Pacific Offshore.	Not listed	Not depleted, not strategic.	Nomadic	Large	Income	Slow	Fisheries interactions, vessel strikes, ocean noise.	No	No	No	Stable	2.8	0
Killer Whale	West Coast Transient.	Not listed	Not depleted, not strategic.	Nomadic	Large	Income	Slow	Fisheries interactions, vessel strikes, ocean noise.	No	No	No	Unk	3.5	0.4
Melon-Headed Whale.	Hawaiian Islands.	Not listed	Not depleted, not strategic.	Resident-nomadic.	Small	Income	Med	Fisheries interactions, ocean noise.	No	No	Yes: S–BIA	Unk	233	0
Melon-Headed Whale.	Kohala Resident (Hawaii).	Not listed	Not depleted, not strategic.	Resident	Small	Income	Med	Fisheries interactions, ocean noise.	No	No	Yes: S–BIA	Unk	UND	0
Pygmy Killer Whale.	Hawaii	Not listed	Not depleted, not strategic.	Resident, nomadic.	Small	Income	Med	Fisheries interactions, ocean noise.	No	No	No	Unk	59	0
Pygmy Killer Whale.	California—Baja California Peninsula Mexico.	N/A	N/A	Unk	Small	Income	Med	Fisheries interactions, ocean noise.	No	No	No	Unk		
Short-Finned Pilot Whale.	Hawaii	Not listed	Not depleted, not strategic.	Nomadic	Med	Income	Slow	Fisheries interactions.	No	No	Yes: S–BIA Parent and Child MHI-Western community, Central community, Eastern community.	Unk	159	0.2
Short-Finned Pilot Whale.	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Nomadic	Med	Income	Slow	Fisheries interactions.	No	No	No	Unk	4.5	1.2
Bottlenose Dolphin.	Maui Nui	Not listed	Not depleted, not strategic.	Resident	Small-Med.	Income	Med	Entanglement	No	No	Yes: S–BIA Parent and Child.	Unk	0.6	UNK
Bottlenose Dolphin.	Hawaii Island	Not listed	Not depleted, not strategic.	Resident	Small-Med.	Income	Med	Fisheries interactions.	No	No	Yes: S–BIA	Unk	1	>0.2

TABLE 96—LIFE HISTORY TRAITS, IMPORTANT HABITAT, AND THREATS TO DOLPHINS IN THE HCTT STUDY AREA—Continued

Marine mammal species	Stock	ESA status	MMPA status	Movement ecology	Body size	Reproductive strategy	Pace of life	Chronic risk factors	UME, oil spill, other	ESA-designated critical habitat	BIAs II for Hawaii (Kratofil *et al.*, 2023) and West Coast (Calambokidis *et al.*, 2024)	Population trend	PBR	Annual mortality/serious injury (from other human activities)
Bottlenose Dolphin.	Hawaii Pelagic	Not listed	Not depleted, not strategic.	Nomadic	Small-Med.	Income	Med	Fisheries interactions.	No	No	No	Unk	158	0
Bottlenose Dolphin.	Kaua'i/Ni'ihau	Not listed	Not depleted, not strategic.	Resident	Small-Med.	Income	Med	Fisheries interactions.	No	No	Yes: S–BIA Parent and Child.	Unk	0.9	UNK
Bottlenose Dolphin.	O'ahu	Not listed	Not depleted, not strategic.	Resident	Small-Med.	Income	Med	Entanglement	No	No	Yes: S–BIA Parent and Child.	Unk	1	UNK
Bottlenose Dolphin.	California Coastal.	Not listed	Not depleted, not strategic.	Nomadic	Small-Med.	Income	Med	Biotoxins, chemical contaminants, fisheries interactions, habitat alteration, illegal feeding and harassment, ocean noise, oil spills and energy exploration, vessel strikes.	No	No	No	Stable, possibly increasing.	2.7	≥2.0
Bottlenose Dolphin.	California/Oregon/Washington Offshore.	Not listed	Not depleted, not strategic.	Nomadic	Small-Med.	Income	Med	Fisheries interactions.	No	No	No	Unk	19.7	≥0.82
Fraser's Dolphin	Hawaii	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Fast	Fisheries interactions.	No	No	No	Unk	241	0
Long-Beaked Common Dolphin.	California	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Med	Fisheries interactions, exposure to underwater detonations in coastal waters.	No	No	No	Unk	668	≥29.7
Northern Right Whale Dolphin.	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Med	Fisheries interactions.	No	No	No	Unk	163	≥6.6

Pacific White-Sided Dolphin.	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Med	Entanglement, fisheries interactions.	No	No	No	Unk	279	7
Pantropical Spotted Dolphin.	Maui Nui	Not listed	Not depleted, not strategic.	Resident	Small	Income	Med	Fisheries interactions.	No	No	Yes: S–BIA Parent and Child.	Unk	UND	UNK
Pantropical Spotted Dolphin.	Hawaii Island	Not listed	Not depleted, not strategic.	Resident	Small	Income	Med	Fisheries interactions.	No	No	Yes: S–BIA Parent and Child.	Unk	UND	UNK
Pantropical Spotted Dolphin.	Hawaii Pelagic	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Med	Fisheries interactions.	No	No	No	Unk	538	0
Pantropical Spotted Dolphin.	O'ahu	Not listed	Not depleted, not strategic.	Resident	Small	Income	Med	Fisheries interactions.	No	No	Yes: S–BIA Parent and Child.	Unk	UND	UNK
Pantropical Spotted Dolphin.	Baja California Peninsula Mexico.	N/A	N/A	Nomadic	Small	Income	Med	Fisheries interactions.	No	No	No	Unk	UNK	UNK
Risso's Dolphin	Hawaii	Not listed	Not depleted, not strategic.	Nomadic	Small-Med.	Income	Med	Fisheries interactions.	No	No	No	Unk	53	0
Risso's Dolphin	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Nomadic	Small-Med.	Income	Med	Fisheries interactions.	No	No	No	Unk	46	≥3.7
Rough-Toothed Dolphin.	Hawaii	Not listed	Not depleted, not strategic.	Resident, nomadic.	Small	Income	Med	Fisheries interactions.	No	No	Yes: S–BIA MNHI, Parent and Child KN O.	Unk	511	3.2
Short-Beaked Common Dolphin.	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Med	Fisheries interactions, exposure to underwater detonations in coastal waters.	No	No	No	Unk, possibly increasing.	8,889	≥30.5
Spinner Dolphin	Hawaii Pelagic	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Fast	Fisheries interactions, ocean noise.	No	No	No	Unk	UND	0
Spinner Dolphin	Hawaii Island	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Fast	Swim with the dolphin programs, ocean noise, fisheries interactions.	No	No	Yes: S–BIA	Unk	6.2	≥1.0

TABLE 96—LIFE HISTORY TRAITS, IMPORTANT HABITAT, AND THREATS TO DOLPHINS IN THE HCTT STUDY AREA—Continued

Marine mammal species	Stock	ESA status	MMPA status	Movement ecology	Body size	Reproductive strategy	Pace of life	Chronic risk factors	UME, oil spill, other	ESA-designated critical habitat	BIAs II for Hawaii (Kratofil *et al.,* 2023) and West Coast (Calambokidis *et al.,* 2024)	Population trend	PBR	Annual mortality/serious injury (from other human activities)
Spinner Dolphin	Kaua'i/Ni'ihau	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Fast	Swim with the dolphin programs, ocean noise, fisheries interactions.	No	No	Yes: S–BIA	Unk	UND	UNK
Spinner Dolphin	O'ahu/4 Islands Region.	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Fast	Swim with the dolphin programs, ocean noise, fisheries interactions.	No	No	Yes: S–BIA	Unk	UND	≥0.4
Striped Dolphin	Hawaii Pelagic	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Med	Fisheries interactions.	No	No	No	Unk	511	0
Striped Dolphin	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Med	Fisheries interactions.	No	No	No	Unk	225	≥4

Note: N/A = Not Applicable, UND = Undetermined, Unk = Unknown.

As shown in table 95, the maximum annual allowable instances of take by Level B harassment for delphinid stocks ranges from 9 (Hawaii Island stock of bottlenose dolphin) to 2,169,554 for the CA/OR/WA stock of short-beaked common dolphin, with 14 stocks below 2,000, five stocks above 70,000, and the remainder between 2,000 and 70,000. Take by Level A harassment is 0 for 9 of the 39 stocks, between 1 and 15 for 20 stocks, and above 15 for 10 stocks. As indicated, the rule also allows for take by M/SI for 10 stocks (the CA/OR/WA stocks of short-finned pilot whale, northern right whale dolphin, Pacific white-sided dolphin, short-beaked common dolphin, and striped dolphin; the Hawaii Pelagic and Oʻahu stocks of bottlenose dolphin; the California stock of long-beaked common dolphin; the Baja California Peninsula Mexico population of pantropical spotted dolphin; and the Hawaii stock of rough-toothed dolphin), the impacts of which are discussed above in the Serious Injury and Mortality section. The total take allowable across all 7 years of the rule is indicated in table 54.

All delphinid stocks are expected to incur some number of takes in the form of TTS. As described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, these temporary hearing impacts are expected to be lower-level, of short duration (from minutes to at most several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with delphinid echolocation, overlap more than a relatively narrow portion of the vocalization range of any single species or stock, or preclude detection or interpretation of important low-frequency cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. About three-quarters of the affected delphinid stocks will incur some number of takes by AUD INJ, over half of those stocks will incur take in the single digits, with only two stocks exceeding 45 (long- and short-beaked common dolphin). For reasons similar to those discussed for TTS, while auditory injury impacts last longer, given the anticipated effectiveness of mitigation measures and the likelihood that individuals are expected to avoid higher levels associated with more severe impacts, the lower anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to affect the fitness of any individuals. Two stocks are projected to incur notably higher numbers of take by AUD INJ (128 for the California stock of long-beaked common dolphin and 806 for the CA/OR/WA stock of short-beaked common dolphin) and while the conclusions above are still applicable, it is further worth noting that these two stocks have relatively large abundances and limited annual mortality as compared to PBR. The rule also allows for a limited number of takes by non-auditory injury (*i.e.,* 1–71) for 19 stocks (less than 5 takes for all stocks except for the California stock of long-beaked common dolphin and the CA/OR/WA stock of short-beaked common dolphin). As described above in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section, given the limited number of potential exposures and the anticipated effectiveness of the mitigation measures in minimizing the pressure levels to which any individuals are exposed, these non-auditory injuries are unlikely to be of a nature or level that would impact reproduction or survival, with the exception of long- and short-beaked common dolphins.

Due to the larger number of long- and short-beaked common dolphin individuals predicted to be exposed annually to levels associated with non-auditory injury (24 and 71, respectively), it is more likely that some subset of these individuals could potentially be injured in a manner that would result in them foregoing reproduction for a year (up to 4 long-beaked and 13 short-beaked common dolphins). A year of foregone reproduction for a male is generally meaningless to population rates unless the animal ultimately dies. M/SI have been modeled for this activity separately, and NMFS does not anticipate that these non-auditory injuries would result in mortality, for young or adults. Neither stock is considered depleted or strategic. While the population trends of these stocks are not known (though the SAR notes that the CA/OR/WA stock of short-beaked common dolphin is possibly increasing), they are not considered depleted or strategic, and total annual mortality is well below PBR for each stock. Importantly, the increase in a calving interval by a year would have far less of an impact on a population rate than a mortality would and, accordingly, the number of instances of foregone reproduction predicted here would not be expected to adversely affect this stock through effects on annual rates of recruitment or survival.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 178 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Delphinids are income breeders with a medium pace of life, meaning that while they can be sensitive to the consequences of disturbances that impact foraging during lactation, from a population standpoint, they can be moderately quick to recover. Further, as described in the *Group and Species-Specific Analyses* section (and the Proposed Mitigation Measures section), mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in higher value habitat.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In the case of over half of the delphinid stocks (see the ''Greatest degree any individual expected to be taken repeatedly across multiple days'' column in table 95), given the low number of takes by harassment as compared to the stock/species abundance alone, and also in consideration of their nomadic movement pattern and whether take is concentrated in areas in which animals are known to congregate, it is unlikely that these individual delphinids would be taken on more than a limited number of days within a year and, therefore, the anticipated behavioral disturbance is not expected to affect reproduction or survival. In the case of the rest of the stocks, given the number of takes by harassment as compared to the stock/species abundance, it is likely that some portion of the individuals taken are taken repeatedly over a small to moderate number of days (as indicated in the ''Greatest degree any individual expected to be taken repeatedly across multiple days'' column in table 95), with two stocks (Kauaʻi/Niʻihau and Oʻahu stocks of bottlenose dolphins) likely to be taken over a high number of days. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas, and the fact that many result from transient activities conducted at sea, for all stocks except Kauaʻi/Niʻihau and Oʻahu stocks of bottlenose dolphins (addressed below), it is unlikely that the anticipated small to moderate number of repeated takes for a given individual would occur clumped across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals are likely to be impacted. Further, many of these stocks are nomadic and, apart from the small resident populations, there are no known foraging areas or other areas within which delphinids are known to congregate for important behaviors, and for most stocks, the takes are not concentrated within a specific region and season.

Regarding the magnitude of repeated takes for the Kauaʻi/Niʻihau and Oʻahu stocks of bottlenose dolphins, given the number of takes by harassment as compared to the stock/species abundance and the small resident populations, it is more likely that some number of individuals would experience a comparatively higher number of repeated takes over a potentially fair number of sequential days. Due to the higher number of repeated takes focused within the stocks' limited ranges, it is thereby more likely that a portion of the individuals (approximately 50 percent of which would be female) could be repeatedly interrupted during foraging in a manner and amount such that impacts to the energy budgets of a limited number of females (from either losing feeding opportunities or expending considerable energy moving away from sound sources or finding alternative feeding options) could cause them to forego reproduction for a year (noting that bottlenose dolphin calving intervals are typically 3 or more years). Energetic impacts to males are generally meaningless to population rates unless they cause death, and it takes extreme energy deficits beyond what would ever be likely to result from these activities to cause the death of an adult marine mammal, male or female. The population trends of these stocks are unknown, and neither are considered depleted or strategic. Importantly, the increase in a calving interval by a year would have far less of an impact on a population rate than a mortality would and, accordingly, a limited number of instances of foregone reproduction would not be expected to adversely affect these stocks through effects on annual rates of recruitment or survival (noting also that no mortality is predicted or authorized for the Kauaʻi/Niʻihau stock, and 0.14 annual mortality is authorized for the Oʻahu stock). Further, of note, use of in-water explosives (including underwater explosives and explosives deployed against surface targets) is prohibited within the Hawaii 4-Islands Marine Mammal Mitigation Area. This measure would be prevent exposure of these stocks to explosives that have the potential to cause injury, mortality or behavioral disturbance within that area. Further, within the same area, mitigation from November 15 to April 15 prohibiting use of MF1 surface ship hull-mounted mid-frequency active sonar would reduce exposure of these stocks to levels of sound that have the potential to cause injurious or behavioral impacts.

Given the magnitude and severity of the take by harassment discussed above and any anticipated habitat impacts, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are unlikely to result in impacts on the reproduction or survival of any individuals of delphinid stocks, with the exception of the 10 stocks for which takes by M/SI are predicted and the 1 stock for which an increased calving interval could potentially occur. Regarding the Kauaʻi/Niʻihau and Oʻahu stocks of bottlenose dolphins, as described above, we do not anticipate the relatively limited number of individuals that might be taken over repeated days within the year in a manner that results in a year of foregone reproduction to adversely affect the stock through effects on rates of recruitment or survival, given the status of the stocks. Regarding the CA/OR/WA stock of short-finned pilot whale, Hawaii Pelagic and Oʻahu stocks of bottlenose dolphin, California stock of long-beaked common dolphin, CA/OR/WA stock of Northern right whale dolphin, CA/OR/WA stock of Pacific white-sided dolphin, Baja California Peninsula Mexico population of pantropical spotted dolphin, Hawaii stock of rough-toothed dolphin, CA/OR/WA stock of short-beaked common dolphin, and CA/OR/WA stock of striped dolphin, as described in the Serious Injury and Mortality section, given the status of the stocks and in consideration of other ongoing anthropogenic mortality (where known), the amount of allowed M/SI take proposed here would not alone, nor in combination with the impacts of the take by harassment discussed above (which are not expected to impact the reproduction or survival of any individuals for those stocks), be expected to adversely affect rates of recruitment and survival. For these reasons, we have determined that the total take (considering annual maxima and across 7 years) anticipated and proposed for authorization would have a negligible impact on all delphinid species and stocks.

Porpoises—

Neither Dall's porpoise nor harbor porpoise are listed as endangered or threatened under the ESA, and none of the porpoise stocks are considered depleted or strategic under the MMPA. The Navy's NMSDD estimate for the CA/OR/WA stock of Dall's porpoise is 61,840, and the stock abundances of harbor porpoises range from 3,885 (Navy's NMSDD) to 15,303 (SAR). There are no UMEs or other factors that cause particular concern for this stock. As described in the Description of Marine Mammals and Their Habitat in the Area of the Specified Activities section, the HCTT Study Area overlaps two small and resident population BIAs for the Monterey Bay and Morro Bay stocks of harbor porpoise (Calambokidis *et al.,* 2015). There is no ESA-designated critical habitat for Dall's or harbor porpoise as neither species is ESA-listed. Dall's porpoises can be found from Baja California, Mexico, to the northern Bering Sea. They shift their distribution southward during cooler-water periods on both interannual and seasonal time scales. They primarily congregate in shelf and slope waters and decrease substantially in waters warmer than 17°C (63 °F). Harbor porpoises generally have higher abundances in shallow waters (less than 200 m (656 ft)) and near shore, but they sometimes move into deeper offshore waters. However, this species has no overlap with nearshore or offshore areas in the SOCAL Range Complex (*e.g.,* San Diego, SOAR) or the southern nearshore portions of PMSR (*e.g.,* Port Hueneme). Dall's and harbor porpoises face several chronic anthropogenic and non-anthropogenic risk factors, including fishing gear, fisheries interactions, and ocean noise (including acoustic deterrent devices or ''seal bombs'' in the case of harbor porpoises), among others.

TABLE 97—ANNUAL ESTIMATED TAKE BY LEVEL B HARASSMENT, LEVEL A HARASSMENT, AND MORTALITY AND RELATED INFORMATION FOR PORPOISES IN THE HCTT STUDY AREA

Marine mammal species	Stock	NMFS stock abundance	NMSDD abundance	Maximum annual level B harassment	Maximum annual level A harassment	Maximum annual mortality	Maximum annual take	Maximum annual harassment as percentage of stock abundance	Season(s) with 50 percent of take or greater	Region(s) with 40 percent of take or greater
Dall's Porpoise	California/Oregon/Washington.	16,498	61,840	59,619	1,237	0	60,856	98	Cold (82 percent)	SOCAL (48 percent)
Harbor Porpoise	Monterey Bay	3,760	4,530	2,179	0	0	2,179	48	Cold (71 percent)	NOCAL (100 percent)
Harbor Porpoise	Morro Bay	4,191	3,885	4,373	88	0	4,461	115	Cold (74 percent)	PMSR (99 percent)
Harbor Porpoise	Northern California/Southern Oregon.	15,303	1,961	481	0	0	481	3	Cold (68 percent)	NOCAL (100 percent)
Harbor Porpoise	San Francisco/Russian River.	7,777	9,974	9,960	26	0	9,986	100	Cold (61 percent)	NOCAL (100 percent)

Note: N/A = Not Applicable, UNK = Unknown. NMSDD abundances are averages only within the U.S. EEZ.

* Indicates which abundance estimate was used to calculate the maximum annual take as a percentage of abundance, either the NMFS SARs (Carretta *et al.*, 2024; Young, 2024) or the NMSDD (table 2.4–1 in appendix A of the application). Please refer to the Odontocetes section for details on which abundance estimate was selected.

TABLE 98—LIFE HISTORY TRAITS, IMPORTANT HABITAT, AND THREATS TO PORPOISES IN THE HCTT STUDY AREA

Marine Mammal Species	Stock	ESA Status	MMPA Status	Movement Ecology	Body Size	Reproductive Strategy	Pace of Life	Chronic Risk Factors	UME, Oil Spill, Other	ESA-Designated Critical Habitat	BIAs II for Hawaii (Kratofil *et al.*, 2023) and West Coast (Calambokidis *et al.*, 2024)	Population Trend	PBR	Annual Mortality/Serious Injury (from other human activities)
Dall's Porpoise.	California/Oregon/Washington.	Not listed	Not depleted, not strategic.	Nomadic	Small	Income	Fast	Fishing gear fisheries interactions.	No	No	No	Unk	99	≥0.66
Harbor Porpoise.	Monterey Bay	Not listed	Not depleted, not strategic.	Resident	Small	Income	Fast	Fisheries interactions, ocean noise (including acoustic deterrent devices or "seal bombs").	No	No	Yes: S–BIA	Increasing	35	≥0.2
Harbor Porpoise.	Morro Bay	Not listed	Not depleted, not strategic.	Resident	Small	Income	Fast	Fisheries interactions, ocean noise (including acoustic deterrent devices or "seal bombs").	No	No	Yes: S–BIA	Increasing	65	0
Harbor Porpoise.	Northern California/Southern Oregon.	Not listed	Not depleted, not strategic.	Resident	Small	Income	Fast	Fisheries interactions, ocean noise (including acoustic deterrent devices or "seal bombs").	No	No	No	Unk	195	0
Harbor Porpoise.	San Francisco/Russian River.	Not listed	Not depleted, not strategic.	Resident	Small	Income	Fast	Fisheries interactions, ocean noise (including acoustic deterrent devices or "seal bombs").	No	No	No	Stable	73	≥0.4

Note: N/A = Not Applicable, UND = Undetermined, Unk = Unknown.

As shown in table 97, the maximum annual allowable instances of take of Dall's porpoise under this proposed rule by Level A harassment and Level B harassment is 1,237 and 59,619, respectively, while the maximum allowable take of harbor porpoise by Level A harassment and Level B harassment is 88 (Morro Bay stock) and 9,960 (San Francisco/Russian River stock), respectively. No mortality is anticipated or proposed for authorization. The rule allows for a limited number of takes by non-auditory injury (two for Dall's porpoise, one for the Morro Bay stock of harbor porpoise). As described above, given the limited number of potential exposures and the anticipated effectiveness of the mitigation measures in minimizing the pressure levels to which any individuals are exposed, these injuries are unlikely to impact reproduction or survival. The total take allowable across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as VHF cetaceans, Dall's and harbor porpoises are more susceptible to auditory impacts in mid- to high frequencies and from explosives than other species. As described in the Temporary Threshold Shift section above, any takes in the form of TTS are expected to be lower-level, of short duration (even the longest recovering in less than a day), and mostly not in a frequency band that would be expected to interfere with porpoise communication or other important auditory cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness. The rule also allows for a limited number of takes by non-auditory injury for Dall's porpoise and the Morro Bay stock of harbor porpoise (two and one, respectively). As described above in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section, given the limited number of potential exposures and the anticipated effectiveness of the mitigation measures in minimizing the pressure levels to which any individuals are exposed, these non-auditory injuries are unlikely to be of a nature or level that would impact reproduction or survival for these stocks.

Harbor porpoises are more susceptible to behavioral disturbance than other species. They are highly sensitive to many sound sources and generally demonstrate strong avoidance of most types of acoustic stressors. The information currently available regarding harbor porpoises suggests a very low threshold level of response for both captive (Kastelein *et al.,* 2000; Kastelein *et al.,* 2005) and wild (Johnston, 2002) animals. Southall *et al.* (2007) concluded that harbor porpoises are likely sensitive to a wide range of anthropogenic sounds at low received levels (approximately 90 to 120 dB). Research and observations of harbor porpoises for other locations show that this species is wary of human activity and will display profound avoidance behavior for anthropogenic sound sources in many situations at levels down to 120 dB re: 1 μPa (Southall *et al.,* 2007). Harbor porpoises routinely avoid and swim away from large, motorized vessels (Barlow 1988; Evans *et al.,* 1994; Palka and Hammond, 2001; Polacheck and Thorpe, 1990). Accordingly, and as described in the Estimated Take of Marine Mammals section, the threshold for behavioral disturbance is lower for harbor porpoises, and the number of estimated takes is higher, with many occurring at lower received levels than other taxa. Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 154 dB SPL and last from a few minutes to a few hours, at most. Associated responses would likely include avoidance, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours and not likely to exceed 24 hours.

As small odontocetes and income breeders with a fast pace of life, Dall's and harbor porpoises are less resilient to missed foraging opportunities than larger odontocetes. Although reproduction in populations with a fast pace of life are more sensitive to foraging disruption, these populations are quick to recover. Further, as described in the *Group and Species-Specific Analyses* section and the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. In this case, for the Monterey Bay and Morro Bay stocks of harbor porpoise, given the number of takes by harassment as compared to the stock/species abundance (see table 97) and the small resident populations, it is likely that some portion of the individuals taken are taken repeatedly over a limited number of days. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas, and the fact that many result from transient activities conducted at sea, it is unlikely that repeated takes would occur either in numbers or clumped across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals is likely to be impacted.

Given the magnitude and severity of the impacts discussed above to Dall's porpoises and harbor porpoises (considering annual take maxima and the total across 7 years) and their habitat, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are unlikely to result in impacts on the reproduction or survival of any individuals and, thereby, unlikely to affect annual rates of recruitment or survival. For these reasons, we have determined that the take by harassment anticipated and proposed for authorization would have a negligible impact on Dall's porpoise and all four stocks of harbor porpoises.

Pinnipeds

This section builds on the broader discussion above and brings together the discussion of the different types and amounts of take that different pinniped stocks will incur, the applicable mitigation for each stock, and the status and life history of the stocks to support the negligible impact determinations for each. We have already described above why we believe the incremental addition of the moderate number of low-level auditory injury takes will not have any meaningful effect towards inhibiting reproduction or survival. We have also described above in this section the unlikelihood of any masking or habitat impacts having effects that would impact the reproduction or survival of any of the individual marine mammals affected by the Action Proponents' activities. Regarding the severity of individual takes by Level B harassment by behavioral disturbance for pinnipeds, the majority of these responses are anticipated to occur at received levels below 172 dB, and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours.

In table 99 below for pinnipeds, we indicate the total annual mortality, Level A harassment, and Level B harassment, and a number indicating the instances of total take as a percentage of abundance. In table 100 below, we indicate the status, life history traits, important habitats, and threats that inform our analysis of the potential impacts of the estimated take on the affected pinniped stocks.

TABLE 99—ANNUAL ESTIMATED TAKE BY LEVEL B HARASSMENT, LEVEL A HARASSMENT, AND MORTALITY AND RELATED INFORMATION FOR PINNIPEDS IN THE HCTT STUDY AREA

Marine mammal species	Stock	NMFS stock abundance	NMSDD abundance	Maximum annual Level B harassment	Maximum annual Level A harassment	Maximum annual mortality	Maximum annual take	Maximum annual harassment as percentage of stock abundance	Season(s) with 50 percent of take or greater	Region(s) with 40 percent of take or greater
California Sea Lion.	U.S	257,606	199,121	1,899,749	723	3.86	1,900,476	738	Cold (53 percent).	SOCAL (74 percent).
Guadalupe Fur Seal.	Mexico	63,850	48,780	347,553	54	0.14	347,607	544	N/A	SOCAL (82 percent).
Northern Fur Seal.	Eastern Pacific	612,765	89,110	33,195	12	0	33,207	5	Cold (86 percent).	NOCAL (47 percent), PMSR (53 percent).
Northern Fur Seal.	California	19,634	14,115	22,098	10	0	22,108	113	Cold (58 percent).	PMSR (71 percent).
Steller Sea Lion	Eastern	36,308	3,181	999	3	0	1,002	3	Cold (56 percent).	NOCAL (48 percent), SOCAL (49 percent).
Harbor Seal	California	30,968	13,343	71,463	261	1.00	71,725	232	N/A	SOCAL (92 percent).
Hawaiian Monk Seal.	Hawaii	1,605	967	1,104	6	0	1,110	69	Cold (54 percent).	HRC (99 percent).
Northern Elephant Seal.	California Breeding.	194,907	49,526	118,514	111	0	118,625	61	Cold (62 percent).	SOCAL (57 percent).

Note: N/A = Not Applicable, UNK = Unknown. NMSDD abundances are averages only within the U.S. EEZ.

* Indicates which abundance estimate was used to calculate the maximum annual take as a percentage of abundance, either the NMFS SARs (Carretta *et al.,* 2024; Young, 2024) or the NMSDD (table 2.4–1 in appendix A of the application). Please refer to the Pinnipeds section for details on which abundance estimate was selected.

TABLE 100—LIFE HISTORY TRAITS, IMPORTANT HABITAT, AND THREATS TO PINNIPEDS IN THE HCTT STUDY AREA

Marine mammal species	Stock	ESA status	MMPA status	Movement ecology	Body size	Reproductive strategy	Pace of life	Chronic risk factors	UME, oil spill, other	ESA-designated critical habitat	BIAs II for Hawaii (Kratofil *et al.*, 2023) and West Coast (Calambokidis *et al.*, 2024)	Population trend	PBR	Annual mortality/serious injury (from other human activities)
California Sea Lion.	U.S	Not listed	Not depleted, not strategic.	Resident-migratory.	Small	Income	Fast	Fisheries interactions, power plant entrainment, illegal harassment, habitat degradation, vessel strike, chemical contaminants.	No	No	No	Stable	14,011	>321
Guadalupe Fur Seal.	Mexico	Threatened	Depleted, Strategic.	Migratory	Small	Income	Fast	Fisheries interactions, intentional illegal killing/harassment.	No	No	No	Increasing	1,959	≥10.0
Northern Fur Seal.	Eastern Pacific.	Not listed	Depleted, Strategic.	Migratory	Small	Income	Fast	Fisheries interactions, intentional killing/harassment, chemical contaminants.	No	No	No	Decreasing	11,151	296
Northern Fur Seal.	California	Not listed	Not depleted, not strategic.	Resident	Small	Income	Fast	Fisheries interactions.	No	No	No	Variable	527	≥1.2
Steller Sea Lion.	Eastern	Not listed	Not depleted, not strategic.	Resident	Small	Income	Fast	Fisheries interactions, harassment/.	No	No	No	Increasing	2,178	93.2
Harbor Seal.	California	Not listed	Not depleted, not strategic.	Resident	Small	Capital	Fast	Disturbance at rookeries, commercial aquaculture, illegal intentional killing, chemical contaminants.	No	No	No	Decreasing	1,641	43
Hawaiian Monk Seal.	Hawaii	Endangered	Depleted, Strategic.	Resident	Small	Capital	Fast	Fisheries interactions, illegal harassment, habitat degradation.	No	Yes	No	Increasing	5.3	≥4.8
Northern Elephant Seal.	California Breeding.	Not listed	Not depleted, not strategic.	Migratory	Small-Med.	Capital	Fast	Fisheries interactions, illegal harassment, chemical contaminants.	No	No	No	Increasing	5,328	11.2

Note: N/A = Not Applicable, UND = Undetermined, Unk = Unknown.

The Hawaiian monk seal (a NMFS Species in the Spotlight) and Guadalupe fur seal are listed as endangered and threatened, respectively, under the ESA and are considered depleted and strategic under the MMPA. Northern fur seals are not listed as endangered or threatened under the ESA, but the Eastern Pacific stock is considered depleted and strategic under the MMPA. The remaining pinniped stocks for which incidental take is proposed for authorization (see table 99) are neither ESA-listed nor considered depleted or strategic under the MMPA.

As shown in table 99 and table 100, these pinnipeds vary in stock abundance and movement ecology from, for example, the resident Hawaii stock of Hawaiian monk seal with an estimated abundance of 1,605 animals to the migratory Eastern Pacific stock of Northern fur seal with an estimated abundance of 612,765 animals. The HCTT Study Area overlaps the Hawaiian monk seal ESA-designated critical habitat (51 FR 16047, April 30, 1986; 53 FR 18988, May 26, 1988; 80 FR 50925, August 21, 2015), as described in the Description of Marine Mammals in the Area of Specified Activities section, and there are no known BIAs for pinnipeds that overlap the HCTT Study Area. There are no UMEs or other factors that cause additional concern for these stocks. Pinnipeds face a number of chronic anthropogenic and non-anthropogenic risk factors including fisheries interactions, illegal harassment, habitat degradation, disease, intentional killing/harassment, chemical contaminants, power plant entrainment, vessel strike, harmful algal blooms, commercial aquaculture, and harassment/disturbance at rookeries.

As shown in table 99, the maximum annual allowable instances of take by Level B harassment for pinnipeds ranges from 999 (Eastern stock of Steller sea lion) to 1,899,749 (U.S. stock of California sea lion), with 3 stocks below 23,000, 5 stocks above 23,000, and California sea lion being the only stock over 348,000. Take by Level A harassment is at or below 12 for four stocks, and above 12 for four stocks. As described above, given the limited number of potential exposures and the anticipated effectiveness of the mitigation measures in minimizing the pressure levels to which any individuals are exposed, these injuries are unlikely to impact reproduction or survival. No mortality is anticipated or proposed for authorization for any pinniped stocks except the U.S. stock of California sea lion, Mexico stock of Guadalupe fur seal, and California stock of harbor seal. For those three stocks, the rule also allows for up to 27, 1, and 7 takes by serious injury or mortality, respectively, over the course of the 7-year rule, the impacts of which are discussed above in the Serious Injury and Mortality section. The total take proposed for authorization across all 7 years of the rule is indicated in table 54.

Regarding the potential takes associated with auditory impairment, as described in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section above, any takes in the form of TTS are expected to be lower-level, of short duration (from minutes to, at most, several hours or less than a day), and mostly not in a frequency band that would be expected to interfere with pinniped communication or other important auditory cues. Any associated lost opportunities or capabilities individuals might experience as a result of TTS would not be at a level or duration that would be expected to impact reproductive success or survival. For similar reasons, while auditory injury impacts last longer, the low anticipated levels of AUD INJ that could be reasonably expected to result from these activities are unlikely to have any effect on fitness.

The rule also allows for a limited number of takes by non-auditory injury (1 to 57) for 7 of the 8 stocks (less than five takes for all stocks except for the U.S. stock of California sea lion and California stock of harbor seal). As described above in the Auditory Injury from Sonar Acoustic Sources and Explosives and Non-Auditory Injury from Explosives section, given the limited number of potential exposures and the anticipated effectiveness of the mitigation measures in minimizing the pressure levels to which any individuals are exposed, these non-auditory injuries are unlikely to be of a nature or level that would impact reproduction or survival of these stocks, with the exception of the U.S. stock of California sea lion and California stock of harbor seal.

Due to the larger number of California sea lion and California stock of harbor seal individuals predicted to be exposed annually to levels associated with non-auditory injury (57 and 7, respectively), it is more likely that some subset of these individuals could potentially be injured in a manner that would result in them foregoing reproduction for a year (up to 10 California sea lions and 1 harbor seal). A year of foregone reproduction for a male is generally meaningless to population rates unless the animal ultimately dies. M/SI have been modeled for this activity separately, and NMFS does not anticipate that these non-auditory injuries would result in mortality, for young or adults. The U.S. stock of California sea lion is considered stable. While the population trend of the California stock of harbor seal is decreasing, neither of these stocks are considered depleted or strategic, and total annual mortality is well below PBR for both stocks. Importantly, the increase in a pupping interval by a year would have far less of an impact on a population rate than a mortality would and, accordingly, the number of instances of foregone reproduction predicted here would not be expected to adversely affect this stock through effects on annual rates of recruitment or survival.

Regarding the likely severity of any single instance of take by behavioral disturbance, as described above, the majority of the predicted exposures are expected to be below 172 dB SPL and last from a few minutes to a few hours, at most, with associated responses most likely in the form of moving away from the source, foraging interruptions, vocalization changes, or disruption of other social behaviors, lasting from a few minutes to several hours. Pinnipeds are small-bodied (or small to medium-bodied) income breeders with a fast pace of life but have a relatively lower energy requirement for their body size, which may moderate any impact due to foraging disruption. Further, as described in the *Group and Species-Specific Analyses* section above and in the Proposed Mitigation Measures section, mitigation measures are expected to further reduce the potential severity of impacts through real-time operational measures that minimize higher level/longer duration exposures and time/area measures that reduce impacts in high value habitat. In particular, this proposed rulemaking includes a Hawaii Island Marine Mammal Mitigation Area and a Hawaii 4-Islands Marine Mammal Mitigation Area which would reduce exposure of Hawaiian monk seals to levels of sound that have the potential to cause injury or behavioral impacts, including within a portion of Hawaiian monk seal critical habitat.

As described above, in addition to evaluating the anticipated impacts of the single instances of takes, it is important to understand the degree to which individual marine mammals may be disturbed repeatedly across multiple days of the year. Given the number of takes by harassment as compared to the stock/species abundance alone (see table 99), and also in consideration of their movement pattern and whether take is concentrated in areas in which animals are known to congregate, it is unlikely that these individual pinnipeds would be taken on more than a limited number of days within a year (with the exception of California sea lion for which some individuals may be taken on a limited to moderate number of days within a year) and, therefore, the anticipated behavioral disturbance is not expected to affect reproduction or survival. However, given the variety of activity types that contribute to take across separate exercises conducted at different times and in different areas, and the fact that many result from transient activities conducted at sea, it is unlikely that repeated takes would occur either in numbers or clumped across sequential days in a manner likely to impact foraging success and energetics or other behaviors such that reproduction or survival of any individuals is likely to be impacted. Further, many of these stocks are migratory and apart from the small resident populations, there are no known foraging areas or other areas within which animals are known to congregate for important behaviors, and for most stocks, the predicted takes are not concentrated within a specific region and season.

Given the magnitude and severity of the take by harassment discussed above and any anticipated habitat impacts, and in consideration of the required mitigation measures and other information presented, the Action Proponents' activities are unlikely to result in impacts on the reproduction or survival of any individuals of pinniped stocks, with the exception of the three stocks for which takes by M/SI are predicted and the two stocks for which an increased pupping interval could potentially occur. Regarding the U.S. stock of California sea lion and California stock of harbor seal, as described above, we do not anticipate the relatively limited number of individuals that might be taken by non-auditory injury in a manner that results in a year of foregone reproduction to adversely affect the stock through effects on rates of recruitment or survival, given the status of the stocks. Regarding the U.S. stock of California sea lion, Mexico stock of Guadalupe fur seal, and California stock of harbor seal, as described in the Serious Injury and Mortality section, given the status of the stocks and in consideration of other ongoing anthropogenic mortality, the amount of allowed M/SI take proposed here would not alone, nor in combination with the impacts of the take by harassment discussed above (which are not expected to impact the reproduction or survival of any individuals for those stocks), be expected to adversely affect rates of recruitment and survival. For these reasons, we have determined that the total take (considering annual maxima and across 7 years) anticipated and proposed for authorization would have a negligible impact on all pinniped species and stocks.

Preliminary Determination

Based on the analysis contained herein of the likely effects of the specified activities on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total marine mammal take from the specified activity will have a negligible impact on all affected marine mammal species or stocks.

Unmitigable Adverse Impact Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has 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.

Classification

Endangered Species Act

There are 10 marine mammal species under NMFS jurisdiction that are listed as endangered or threatened under the ESA with confirmed or possible occurrence in the HCTT Study Area: blue whale, fin whale, gray whale, humpback whale, sei whale, sperm whale, killer whale, false killer whale, Guadalupe fur seal, and Hawaiian monk seal. The humpback whale (86 FR 21082, April 21, 2021), killer whale (71 FR 69054, November 29, 2006; revised August 2, 2021 (86 FR 41668)), false killer whale (83 FR 35062, July 24, 2018), and Hawaiian monk seal (51 FR 16047, April 30, 1986; revised in 1988 (53 FR 18988, May 26, 1988) and in 2015 (80 FR 50925, August 21, 2015)) have critical habitat designated under the ESA in the HCTT Study Area.

The Action Proponents will consult with NMFS pursuant to section 7 of the ESA for the HCTT Study Area activities. NMFS will also consult internally on the issuance of the regulations and three LOAs under section 101(a)(5)(A) of the MMPA.

National Marine Sanctuaries Act

The Action Proponents and NMFS will work with NOAA's Office of National Marine Sanctuaries to fulfill our responsibilities under the National Marine Sanctuaries Act as warranted and will complete any NMSA requirements prior to a determination on the issuance of the final rule and LOAs.

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216–6A, NMFS must review its proposed actions with respect to potential impacts on the human environment. Accordingly, NMFS plans to adopt the 2024 HCTT Draft EIS/OEIS for the HCTT Study Area, provided our independent evaluation of the document finds that it includes adequate information analyzing the effects on the human environment of issuing regulations and LOAs under the MMPA. NMFS is a cooperating agency on the 2024 HCTT Draft EIS/OEIS and has worked extensively with the Navy in developing the document. The 2024 HCTT Draft EIS/OEIS was made available for public comment at: *https://www.nepa.navy.mil/hctteis/,* which also provides additional information about the NEPA process, from December 13, 2024, to February 11, 2025. We will review all comments prior to concluding our NEPA process and making a final decision on the MMPA rulemaking and request for LOAs.

We will review all comments submitted in response to this notice prior to concluding our NEPA process or making a final decision on the MMPA rule and request for LOAs.

Executive Order 12866

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

Executive Order 14192

This proposed rule is not an Executive Order 14192 regulatory action because this rule is not significant under Executive Order 12866.

Regulatory Flexibility Act

Pursuant to the Regulatory Flexibility Act (RFA), 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 Regulatory Flexibility Act (RFA) requires Federal agencies 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. The Action Proponents are the only entities that would be affected by this proposed rulemaking, and the Action Proponents are not a small governmental jurisdiction, small organization, or small business, as defined by the RFA. Any requirements imposed by an LOA issued pursuant to these regulations, and any monitoring or reporting requirements imposed by these regulations, would be applicable only to the Action Proponents. 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 only the Action Proponents and not any small entities, NMFS concludes that the action would not result in a significant economic impact on a substantial number of small entities. As a result, an initial regulatory flexibility analysis is not required and none has been prepared.

List of Subjects in 50 CFR Part 218

Administrative practice and procedure, Endangered and threatened species, Fish, Fisheries, Marine mammals, Penalties, Reporting and recordkeeping requirements, Transportation, Wildlife.

Dated: July 10, 2025.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For reasons set forth in the preamble, NMFS proposes to amend 50 CFR part 218 as follows:

PART 218—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS

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

Authority: 16 U.S.C. 1361 *et seq.*

■ 2. Revise subpart H of part 218 to read as follows:

Subpart H—Taking and Importing Marine Mammals; Military Readiness Activities in the Hawaii-California Training and Testing Study Area

Sec.

Subpart H—Taking and Importing Marine Mammals; Military Readiness Activities in the Hawaii-California Training and Testing Study Area

§ 218.70 Specified activity and geographical region.

(a) Regulations in this subpart apply only to the U.S. Navy (including the U.S. Marine Corps; Navy), U.S. Coast Guard (Coast Guard), and U.S. Army (collectively referred to as the ''Action Proponents'') for the taking of marine mammals that occurs in the area described in paragraph (b) of this section and that occurs incidental to the activities listed in paragraph (c) of this section. Requirements imposed on the Action Proponents must be implemented by those persons they authorize or funds to conduct activities on their behalf.

(b) The taking of marine mammals by the Action Proponents under this subpart may be authorized in Letters of Authorization (LOAs) only if it occurs within the Hawaii-California Training and Testing (HCTT) Study Area. The HCTT Study Area includes areas in the north-central Pacific Ocean, from California west to Hawaii and the International Date Line, and including the Hawaii Range Complex (HRC), Southern California (SOCAL) Range Complex, Point Mugu Sea Range (PMSR), Silver Strand Training Complex, and the Northern California (NOCAL) Range Complex. Figure 1 to this paragraph (b) shows the location of the HCTT Study Area.

(c) The taking of marine mammals by the Action Proponents is only authorized if it occurs incidental to the Action Proponents conducting military readiness activities, including the following:

(1) Amphibious warfare;

(2) Anti-submarine warfare;

(3) Expeditionary warfare;

(4) Mine warfare;

(5) Surface warfare;

(6) Vessel evaluation;

(7) Unmanned systems;

(8) Acoustic and oceanographic science and technology;

(9) Vessel movement;

(10) Land-based launches; and

(11) Other training and testing activities.

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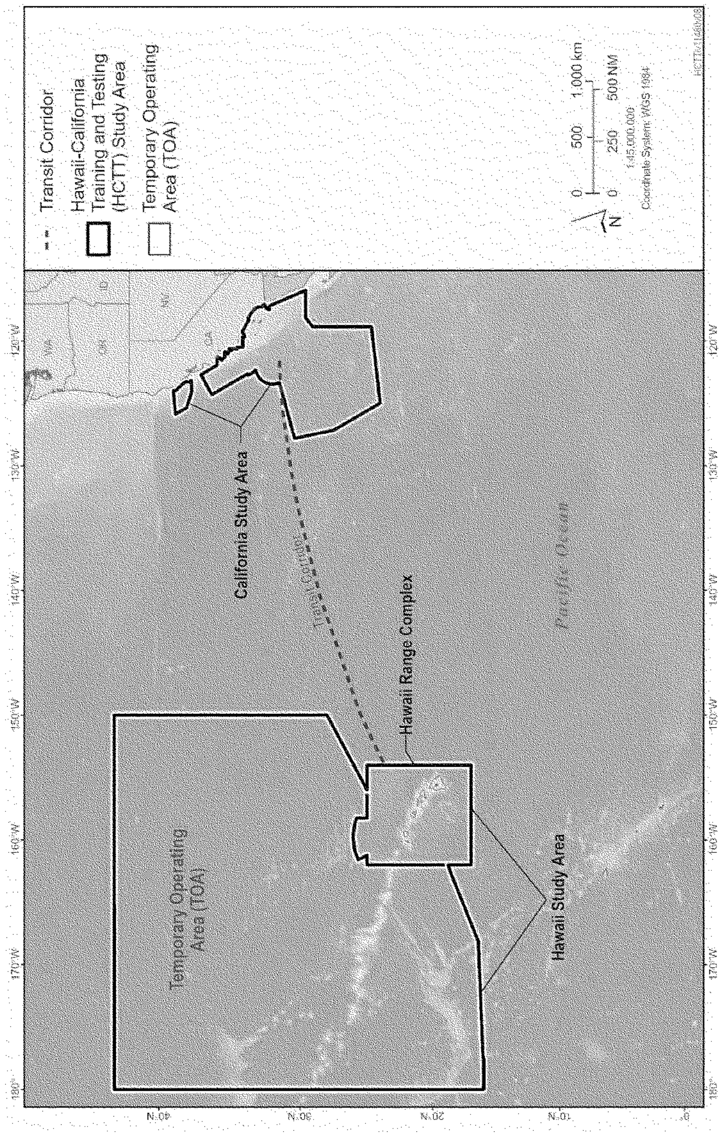
Figure 1 to Paragraph (b)—HCTT Study Area



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§ 218.71 Effective dates.

Regulations in this subpart are effective from December 21, 2025, through December 20, 2032.

§ 218.72 Permissible methods of taking.

(a) Under LOAs issued pursuant to §§ 216.106 of this chapter and this subpart, the Holder of the LOA (hereinafter ''Action Proponent'') may incidentally, but not intentionally, take marine mammals within the area described in § 218.70(b) by Level A harassment and Level B harassment associated with the use of active sonar and other acoustic sources and explosives, as well as serious injury or mortality associated with vessel strikes and explosives, provided the activity is in compliance with all terms, conditions, and requirements of this subpart and the applicable LOAs.

(b) The incidental take of marine mammals by the activities listed in § 218.70(c) is limited to the following species:

TABLE 1 TO PARAGRAPH (b)

Species	Stock
Gray whale	Eastern North Pacific.
Gray whale	Western North Pacific.
Blue whale	Central North Pacific.
Blue whale	Eastern North Pacific.
Bryde's whale	Eastern Tropical Pacific.
Bryde's whale	Hawaii.
Fin whale	Hawaii.
Fin whale	California/Oregon/Washington.
Humpback whale	Central America/Southern Mexico-California-Oregon-Washington.
Humpback whale	Mainland Mexico-California-Oregon-Washington.

TABLE 1 TO PARAGRAPH (b)—Continued

Species	Stock
Humpback whale	Hawaii.
Minke whale	Hawaii.
Minke whale	California/Oregon/Washington.
Sei whale	Hawaii.
Sei whale	Eastern North Pacific.
Sperm whale	Hawaii.
Sperm whale	California/Oregon/Washington.
Dwarf sperm whale	Hawaii.
Dwarf sperm whale	California/Oregon/Washington.
Pygmy sperm whale	Hawaii.
Pygmy sperm whale	California/Oregon/Washington.
Baird's beaked whale	California/Oregon/Washington.
Blainville's beaked whale	Hawaii.
Goose-beaked whale	Hawaii.
Goose-beaked whale	California/Oregon/Washington.
Longman's beaked whale	Hawaii.
Mesoplodont beaked whale	California/Oregon/Washington.
False killer whale	Main Hawaiian Islands Insular.
False killer whale	Northwest Hawaiian Islands.
False killer whale	Hawaii Pelagic.
False killer whale	Baja California Peninsula Mexico population.
Killer whale	Hawaii.
Killer whale	Eastern North Pacific Offshore.
Killer whale	West Coast Transient.
Melon-headed whale	Hawaiian Islands.
Melon-headed whale	Kohala Resident (Hawaii).
Pygmy killer whale	Hawaii.
Pygmy killer whale	California-Baja California Peninsula Mexico population.
Short-finned pilot whale	Hawaii.
Short-finned pilot whale	California/Oregon/Washington.
Bottlenose dolphin	Maui Nui.
Bottlenose dolphin	Hawaii Island.
Bottlenose dolphin	Hawaii Pelagic.
Bottlenose dolphin	Kauaʻi/Niʻihau.
Bottlenose dolphin	Oʻahu.
Bottlenose dolphin	California Coastal.
Bottlenose dolphin	California/Oregon/Washington Offshore.
Fraser's dolphin	Hawaii.
Long-beaked common dolphin	California.
Northern right whale dolphin	California/Oregon/Washington.
Pacific white-sided dolphin	California/Oregon/Washington.
Pantropical spotted dolphin	Maui Nui.
Pantropical spotted dolphin	Hawaii Island.
Pantropical spotted dolphin	Hawaii Pelagic.
Pantropical spotted dolphin	Oʻahu.
Pantropical spotted dolphin	Baja California Peninsula Mexico population.
Risso's dolphin	Hawaii.
Risso's dolphin	California/Oregon/Washington.
Rough-toothed dolphin	Hawaii.
Short-beaked common dolphin	California/Oregon/Washington.
Spinner dolphin	Hawaii Pelagic.
Spinner dolphin	Hawaii Island.
Spinner dolphin	Kauaʻi/Niʻihau.
Spinner dolphin	Oʻahu/4 Islands Region.
Striped dolphin	Hawaii Pelagic.
Striped dolphin	California/Oregon/Washington.
Dall's porpoise	California/Oregon/Washington.
Harbor porpoise	Monterey Bay.
Harbor porpoise	Morro Bay.
Harbor porpoise	Northern California/Southern Oregon.
Harbor porpoise	San Francisco/Russian River.
California sea lion	U.S.
Guadalupe fur seal	Mexico.
Northern fur seal	Eastern Pacific.
Northern fur seal	California.
Steller sea lion	Eastern.
Harbor seal	California.
Hawaiian monk seal	Hawaii.
Northern elephant seal	California Breeding.

§ 218.73 Prohibitions.

(a) Except incidental take described in § 218.72 and authorized by a LOA issued under this subpart, it shall be unlawful for any person to do the following in connection with the activities described in this subpart:

(1) Violate, or fail to comply with, the terms, conditions, and requirements of this subpart or a LOA issued under §§ 216.106 and this subpart;

(2) Take any marine mammal not specified in § 218.72(b);

(3) Take any marine mammal specified in § 218.72(b) in any manner other than as specified in the LOAs; or

(4) Take a marine mammal specified in § 218.72(b) after NMFS determines such taking results in more than a negligible impact on the species or stock of such marine mammal.

(b) [Reserved]

§ 218.74 Mitigation requirements.

(a) When conducting the activities identified in § 218.70(c), the mitigation measures contained in this section and any LOA issued under this subpart must be implemented by Action Proponent personnel or contractors who are trained according to the requirements in the LOA. If Action Proponent contractors are serving in a role similar to Action Proponent personnel, Action Proponent contractors must follow the mitigation applicable to Action Proponent personnel. These mitigation measures include, but are not limited to:

(1) *Activity-based mitigation.* Activity-based mitigation is mitigation that the Action Proponents must implement whenever and wherever an applicable military readiness activity takes place within the HCTT Study Area. The Action Proponents must implement the mitigation described in paragraphs (a)(1)(i) through (a)(1)(xxii) of this section, except as provided in paragraph (a)(1)(xxiii).

(i) *Active acoustic sources with power down and shut down capabilities.* For active acoustic sources with power down and shutdown capabilities (low-frequency active sonar ≥200 dB, mid-frequency active sonar sources that are hull mounted on a surface ship (including surfaced submarines), and broadband and other active acoustic sources >200 dB):

(A) *Mitigation zones and requirements.* During use of active acoustic sources with power down and shutdown capabilities, the following mitigation zone requirements apply:

(*1*) At 1,000 yd (914.4 m) from a marine mammal, Action Proponent personnel must power down active acoustic sources by 6 decibels (dB) total.

(*2*) At 500 yd (457.2 m) from a marine mammal, Action Proponent personnel must power down active acoustic sources by an additional 4 dB (10 dB total).

(*3*) At 200 yd (182.9 m) from a marine mammal, Action Proponent personnel must shut down active acoustic sources.

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout in or on one of the following: aircraft; pierside, moored, or anchored vessel; underway vessel with space/crew restrictions (including small boats); or underway vessel already participating in the event that is escorting (and has positive control over sources used, deployed, or towed by) an unmanned platform.

(*2*) Two Lookouts on an underway vessel without space or crew restrictions.

(*3*) Lookouts must use information from passive acoustic detections to inform visual observations when passive acoustic devices are already being used in the event.

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of using active acoustic sources (*e.g.,* while maneuvering on station).

(*2*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals during use of active acoustic sources.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing or powering up active sonar transmission). The wait period for this activity is 30 minutes for activities conducted from vessels and for activities conducted by aircraft that are not fuel constrained and 10 minutes for activities involving aircraft that are fuel constrained (*e.g.,* rotary-wing aircraft, fighter aircraft).

(ii) *Active acoustic sources with shut down capabilities only (no power down capability).* For active acoustic sources with shut down capabilities only (no power down capability) (low-frequency active sonar <200 dB, mid-frequency active sonar sources that are not hull mounted on a surface ship (*e.g.,* dipping sonar, towed arrays), high-frequency active sonar, air guns, and broadband and other active acoustic sources <200 dB):

(A) *Mitigation zones and requirements.* During use of active acoustic sources with shut down capabilities only, the following mitigation zone requirements apply:

(*1*) At 200 yd (182.9 m) from a marine mammal, Action Proponent personnel must shut down active acoustic sources.

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout in or on one of the following: aircraft; pierside, moored, or anchored vessel; underway vessel with space/crew restrictions (including small boats); or underway vessel already participating in the event that is escorting (and has positive control over sources used, deployed, or towed by) an unmanned platform.

(*2*) Two Lookouts on an underway vessel without space or crew restrictions.

(*3*) Lookouts must use information from passive acoustic detections to inform visual observations when passive acoustic devices are already being used in the event.

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of using active acoustic sources (*e.g.,* while maneuvering on station).

(*2*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals during use of active acoustic sources.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing or powering up active sonar transmission). The wait period for this activity is 30 minutes for activities conducted from vessels and for activities conducted by aircraft that are not fuel constrained and 10 minutes for activities involving aircraft that are fuel constrained (*e.g.,* rotary-wing aircraft, fighter aircraft).

(iii) *Pile driving and extraction.* For pile driving and extraction:

(A) *Mitigation zones and requirements.* During vibratory and impact pile driving and extraction, the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease pile driving or extraction if a marine mammal is sighted within 5 yd (4.6 m) of a pile being driven or extracted.

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout in or on one of the following: shore, pier, or small boat.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation for 15 minutes prior to the initial start of pile driving or pile extraction.

(*2*) Action Proponent personnel must observe the mitigation zone for marine mammals during pile driving or extraction.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing vibratory or impact pile driving or extraction). The wait period for this activity is 15 minutes.

(iv) *Weapons firing noise.* For weapons firing noise:

(A) *Mitigation zones and requirements.* During explosive and non-explosive large-caliber (57 mm and larger) gunnery firing noise (surface-to-surface and surface-to-air), the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease weapons firing if a marine mammal is sighted within 30 degrees on either side of the firing line out to 70 yd (64 m) from the gun muzzle (cease fire).

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout on a vessel.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of large-caliber gun firing (*e.g.,* during target deployment).

(*2*) Action Proponent personnel must observe the mitigation zone for marine mammals during large-caliber gun firing.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing explosive and non-explosive large-caliber gunnery firing noise (surface-to-surface and surface-to-air)). The wait period for this activity is 30 minutes.

(v) *Explosive bombs.* For explosive bombs:

(A) *Mitigation zones and requirements.* During the use of explosive bombs of any net explosive weight (NEW), the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease explosive bomb use if a marine mammal is sighted within 2,500 yd (2,286 m) from the intended target.

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout in an aircraft.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of bomb delivery (*e.g.,* when arriving on station).

(*2*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals during bomb delivery. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(*3*) After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing use of explosive bombs of any NEW). The wait period for this activity is 10 minutes.

(vi) *Explosive gunnery.* For explosive gunnery:

(A) *Mitigation zones and requirements.* During air-to-surface medium-caliber (larger than 50 caliber and less than 57 mm), surface-to-surface medium-caliber, and surface-to-surface large-caliber explosive gunnery, the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease air-to-surface medium-caliber use if a marine mammal is sighted within 200 yd (182.9 m) of the intended impact location.

(*2*) Action Proponent personnel must cease surface-to-surface medium-caliber use if a marine mammal is sighted within 600 yd (548.6 m) of the intended impact location.

(*3*) Action Proponent personnel must cease surface-to-surface large-caliber use if a marine mammal is sighted within 1,000 yd (914.4 m) of the intended impact location.

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout on a vessel or in an aircraft.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of gun firing (*e.g.,* while maneuvering on station).

(*2*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals during gunnery fire. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(*3*) After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing air-to-surface medium-caliber, surface-to-surface medium-caliber, surface-to-surface large-caliber explosive gunnery). The wait period for this activity is 30 minutes for activities conducted from vessels and for activities conducted by aircraft that are not fuel constrained and 10 minutes for activities involving aircraft that are fuel constrained (*e.g.,* rotary-wing aircraft, fighter aircraft).

(vii) *Explosive underwater demolition multiple charge—mat weave and obstacle loading.* For explosive underwater demolition multiple charge—mat weave and obstacle loading:

(A) *Mitigation zones and requirements.* During the use of explosive underwater demolition multiple charge—mat weave and obstacle loading of any NEW, the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease explosive underwater demolition multiple charge—mat weave and obstacle loading if a marine mammal is sighted within 700 yd (640 m) of the detonation site.

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) Two Lookouts, one on a small boat and one on shore from an elevated platform.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) The Lookout positioned on a small boat must observe the mitigation zone for marine mammals and floating vegetation for 30 minutes prior to the first detonation.

(*2*) The Lookout positioned on shore must use binoculars to observe for marine mammals for 10 minutes prior to the first detonation.

(*3*) Action Proponent personnel must observe the mitigation zone for marine mammals during detonations. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(*4*) After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing use of explosive underwater demolition multiple charge—mat weave and obstacle loading of any NEW). The wait period for this activity is 10 minutes (determined by the Lookout on shore).

(viii) *Explosive mine countermeasure and neutralization (no divers).* For explosive mine countermeasure and neutralization (no divers):

(A) *Mitigation zones and requirements.* During explosive mine countermeasure and neutralization using 0.1–5 pound (lb) (0.05–2.3 kilogram (kg)) NEW and >5 lb (2.3 kg) NEW, the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease 0.1–5 lb (0.05–2.3 kg) NEW use if a marine mammal is sighted within 600 yd (548.6 m) from the detonation site.

(*2*) Action Proponent personnel must cease >5 lb (2.3 kg) NEW use if a marine mammal is sighted within 2,100 yd (1,920.2 m) from the detonation site.

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout on a vessel or in an aircraft during 0.1–5 lb (0.05–2.3 kg) NEW use.

(*2*) Two Lookouts, one on a small boat and one in an aircraft during >5 lb (2.3 kg) NEW use.

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of detonations (*e.g.,* while maneuvering on station; typically, 10 or 30 minutes depending on fuel constraints).

(*2*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals, concentrations of seabirds, and individual foraging seabirds (in the water and not on shore) during detonations or fuse initiation. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(*3*) After the event, when practical, Action Proponent personnel must observe the detonation vicinity for 10 or 30 minutes (depending on fuel constraints) for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing explosive mine countermeasure and neutralization using 0.1–5 pound (lb) (0.05–2.3 kilogram (kg)) NEW and >5 lb (2.3 kg) NEW). The wait period for this activity is 30 minutes for activities conducted from vessels and for activities conducted by aircraft that are not fuel constrained and 10 minutes for activities involving aircraft that are fuel constrained (*e.g.,* rotary-wing aircraft, fighter aircraft).

(ix) *Explosive mine neutralization (with divers).* For explosive mine neutralization (with divers):

(A) *Mitigation zones and requirements.* During explosive mine neutralization (with divers) using 0.1–20 lb (0.05–9.1 kg) NEW (positive control), 0.1–29 lb (0.05–13.2 kg) NEW (time-delay), and >20–60 lb (9.1–27.2 kg) NEW (positive control), the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease 0.1–20 lb (0.05–9.1 kg) NEW (positive control) use if a marine mammal is sighted within 500 yd (457.2 m) of the detonation site (cease fire).

(*2*) Action Proponent personnel must cease 0.1–29 lb (0.05–13.2 kg) NEW (time-delay) and >20–60 lb (9.1–27.2 kg) NEW (positive control) use if a marine mammal is sighted within 1,000 yd (914.4 m) of the detonation site (cease fire).

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) Lookouts in two small boats (one Lookout per boat), or one small boat and one rotary-wing aircraft (with one Lookout each), and one Lookout on shore for shallow-water events during 0.1–20 lb (0.05–9.1 kg) NEW (positive control) use.

(*2*) Four Lookouts in two small boats (two Lookouts per boat) and one additional Lookout in an aircraft if used in the event during 0.1–29 lb (0.05–13.2 kg) NEW (time-delay) and >20–60 lb (9.1–27.2 kg) NEW (positive control) use.

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Time-delay devices must be set not to exceed 10 minutes.

(*2*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of detonations or fuse initiation for positive control events (*e.g.,* while maneuvering on station) or for 30 minutes prior for time-delay events.

(*3*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals, concentrations of seabirds, and individual foraging seabirds (in the water and not on shore) during detonations or fuse initiation. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(*4*) When practical based on mission, safety, and environmental conditions:

(*i*) Boats must observe from the mitigation zone radius mid-point.

(*ii*) When two boats are used, boats must observe from opposite sides of the mine location.

(*iii*) Platforms must travel a circular pattern around the mine location.

(*iv*) Boats must have one Lookout observe inward toward the mine location and one Lookout observe outward toward the mitigation zone perimeter.

(*v*) Divers must be part of the Lookout Team.

(*5*) After the event, when practical, Action Proponent personnel must observe the detonation vicinity for 30 minutes for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing explosive mine neutralization (with divers) using 0.1–20 lb (0.05–9.1 kg) NEW (positive control), 0.1–29 lb (0.05–13.2 kg) NEW (time-delay), and >20–60 lb (9.1–27.2 kg) NEW (positive control)). The wait period for this activity is 30 minutes for activities conducted from vessels and for activities conducted by aircraft that are not fuel constrained and 10 minutes for activities involving aircraft that are fuel constrained (*e.g.,* rotary-wing aircraft, fighter aircraft).

(x) *Explosive missiles and rockets.* For explosive missiles and rockets:

(A) *Mitigation zones and requirements.* During the use of explosive missiles and rockets using 0.6–20 lb (0.3–9.1 kg) NEW (air-to-surface) and >20–500 lb (9.1–226.8 kg) NEW (air-to-surface), the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease 0.6–20 lb (0.3–9.1 kg) NEW (air-to-surface) use if a marine mammal is sighted within 900 yd (823 m) of the intended impact location (cease fire).

(*2*) Action Proponent personnel must cease >20–500 lb (9.1–226.8 kg) NEW (air-to-surface) use if a marine mammal is sighted within 2,000 yd (1,828.8 m) of the intended impact location (cease fire).

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout in an aircraft.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of missile or rocket delivery (*e.g.,* during a fly-over of the mitigation zone).

(*2*) Action Proponent personnel must observe the applicable mitigation zone for marine mammals during missile or rocket delivery. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(*3*) After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing use of explosive missiles and rockets using 0.6–20 lb (0.3–9.1 kg) NEW (air-to-surface) and >20–500 lb (9.1–226.8 kg) NEW (air-to-surface)). The wait period for this activity is 30 minutes for activities conducted by aircraft that are not fuel constrained and 10 minutes for activities involving aircraft that are fuel constrained (*e.g.,* rotary-wing aircraft, fighter aircraft).

(xi) *Explosive sonobuoys and research-based sub-surface explosives.* For explosive sonobuoys and research-based sub-surface explosives:

(A) *Mitigation zones and requirements.* During the use of explosive sonobuoys and research-based sub-surface explosives using any NEW of sonobuoys and 0.1–5 lb (0.05–2.3 kg) NEW for other types of sub-surface explosives used in research applications, the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease use of explosive sonobuoys and research-based sub-surface explosives using any NEW of sonobuoys and 0.1–5 lb (0.05–2.3 kg) NEW for other types of sub-surface explosives used in research applications if a marine mammal is sighted within 600 yd (548.6 m) of the device or detonation sites (cease fire).

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout on a small boat or in an aircraft.

(*2*) Conduct passive acoustic monitoring for marine mammals; use information from detections to assist visual observations.

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of detonations (*e.g.,* during sonobuoy deployment, which typically lasts 20–30 minutes).

(*2*) Action Proponent personnel must observe the mitigation zone for marine mammals during detonations. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(*3*) After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing use of explosive sonobuoys and research-based sub-surface explosives using any NEW of sonobuoys and 0.1–5 lb (0.05–2.3 kg) NEW for other types of sub-surface explosives used in research applications). The wait period for this activity is 30 minutes for activities conducted from vessels and for activities conducted by aircraft that are not fuel constrained and 10 minutes for activities involving aircraft that are fuel constrained (*e.g.,* rotary-wing aircraft, fighter aircraft).

(xii) *Explosive torpedoes.* For explosive torpedoes:

(A) *Mitigation zones and requirements.* During the use of explosive torpedoes of any NEW, the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease use of explosive torpedoes of any NEW if a marine mammal is sighted within 2,100 yd (1,920.2 m) of the intended impact location.

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout in an aircraft.

(*2*) Conduct passive acoustic monitoring for marine mammals; use information from detections to assist visual observations.

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals, floating vegetation, and jellyfish aggregations immediately prior to the initial start of detonations (*e.g.,* during target deployment).

(*2*) Action Proponent personnel must observe the mitigation zone for marine mammals and jellyfish aggregations during torpedo launches. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(*3*) After the event, when practical, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing use of explosive torpedoes of any NEW). The wait period for this activity is 30 minutes for activities conducted from vessels and for activities conducted by aircraft that are not fuel constrained and 10 minutes for activities involving aircraft that are fuel constrained (*e.g.,* rotary-wing aircraft, fighter aircraft).

(xiii) *Ship shock trials.* For ship shock trials:

(A) *Mitigation zones and requirements.* During ship shock trials using any NEW, the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease ship shock trials of any NEW if a marine mammal is sighted within 3.5 nmi (6.5 km) of the target ship hull (cease fire).

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) On the day of the event, 10 observers (Lookouts and third-party observers combined), spread between aircraft or multiple vessels as specified in the event-specific mitigation plan.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must develop a detailed, event-specific monitoring and mitigation plan in the year prior to the event and provide it to NMFS for review.

(*2*) Beginning at first light on days of detonation, until the moment of detonation (as allowed by safety measures) Action Proponent personnel must observe the mitigation zone for marine mammals, floating vegetation, jellyfish aggregations, large schools of fish, and flocks of seabirds. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(*3*) If any injured or dead marine mammals are observed after an individual detonation, Action Proponent personnel must follow established incident reporting procedures and halt any remaining detonations until Action Proponent personnel can consult with NMFS and review or adapt the event-specific mitigation plan, if necessary.

(*4*) During the 2 days following the event (minimum) and up to 7 days following the event (maximum), and as specified in the event-specific mitigation plan, Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing ship shock trials). The wait period for this activity is 30 minutes.

(xiv) *Sinking Exercises.* For Sinking Exercises (SINKEX):

(A) *Mitigation zones and requirements.* During SINKEX using any NEW, the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease SINKEX of any NEW if a marine mammal is sighted within 2.5 nmi (4.6 km) of the target ship hull (cease fire).

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) Two Lookouts, one on a vessel and one in an aircraft.

(*2*) Conduct passive acoustic monitoring for marine mammals; use information from detections to assist visual observations.

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) During aerial observations for 90 minutes prior to the initial start of weapon firing, Action Proponent personnel must observe the mitigation zone for marine mammals, floating vegetation, and jellyfish aggregations.

(*2*) From the vessel during weapon firing, and from the aircraft and vessel immediately after planned or unplanned breaks in weapon firing of more than 2 hours, Action Proponent personnel must observe the mitigation zone for marine mammals. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(*3*) Action Proponent personnel must observe the detonation vicinity for injured or dead marine mammals for 2 hours after sinking the vessel or until sunset, whichever comes first. If any injured or dead marine mammals are observed, Action Proponent personnel must follow established incident reporting procedures.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing SINKEX). The wait period for this activity is 30 minutes.

(xv) *Non-explosive aerial-deployed mines and bombs.* For non-explosive aerial-deployed mines and bombs:

(A) *Mitigation zones and requirements.* During the use of non-explosive aerial-deployed mines and non-explosive bombs, the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease using non-explosive aerial-deployed mines and non-explosive bombs if a marine mammal is sighted within 1,000 yd (914.4 m) of the intended target (cease fire).

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout in an aircraft.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the initial start of mine or bomb delivery (*e.g.,* when arriving on station).

(*2*) Action Proponent personnel must observe the mitigation zone for marine mammals during mine or bomb delivery. If a marine mammal is visibly injured or killed as a result of detonation, explosives use in the event must be suspended immediately.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing use of non-explosive aerial-deployed mines and non-explosive bombs). The wait period for this activity is 10 minutes.

(xvi) *Non-explosive gunnery.* For non-explosive gunnery:

(A) *Mitigation zones and requirements.* During the use of non-explosive surface-to-surface large-caliber ordnance, non-explosive surface-to-surface and air-to-surface medium-caliber ordnance, and non-explosive surface-to-surface and air-to-surface small-caliber ordnance, the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease non-explosive surface-to-surface large-caliber ordnance, non-explosive surface-to-surface and air-to-surface medium-caliber ordnance, and non-explosive surface-to-surface and air-to-surface small-caliber ordnance use if a marine mammal is sighted within 200 yd (182.9 m) of the intended impact location (cease fire).

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout on a vessel or in an aircraft.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the start of gun firing (*e.g.,* while maneuvering on station).

(*2*) Action Proponent personnel must observe the mitigation zone for marine mammals during gunnery firing.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing use of non-explosive surface-to-surface large-caliber ordnance, non-explosive surface-to-surface and air-to-surface medium-caliber ordnance, and non-explosive surface-to-surface and air-to-surface small-caliber ordnance). The wait period for this activity is 30 minutes for activities conducted from vessels and for activities conducted by aircraft that are not fuel constrained and 10 minutes for activities involving aircraft that are fuel constrained (*e.g.,* rotary-wing aircraft, fighter aircraft).

(xvii) *Non-explosive missiles and rockets.* For non-explosive missiles and rockets:

(A) *Mitigation zones and requirements.* During the use of non-explosive missiles and rockets (air-to-surface), the following mitigation zone requirements apply:

(*1*) Action Proponent personnel must cease non-explosive missile and rocket (air-to-surface) use if a marine mammal is sighted within 900 yd (823 m) of the intended impact location.

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout in an aircraft.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals and floating vegetation immediately prior to the start of missile or rocket delivery (*e.g.,* during a fly-over of the mitigation zone).

(*2*) Action Proponent personnel must observe the mitigation zone for marine mammals during missile or rocket delivery.

(D) *Commencement or recommencement conditions.* Action Proponent personnel must ensure one of the commencement or recommencement conditions in § 218.74(a)(1)(xxii) is met prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing use of non-explosive missiles and rockets (air-to-surface)). The wait period for this activity is 30 minutes for activities conducted by aircraft that are not fuel constrained and 10 minutes for activities involving aircraft that are fuel constrained (*e.g.,* rotary-wing aircraft, fighter aircraft).

(xviii) *Manned surface vessels.* For manned surface vessels:

(A) *Mitigation zones and requirements.* During the use of manned surface vessels, including surfaced submarines, the following mitigation zone requirements apply:

(*1*) Underway manned surface vessels must maneuver themselves (which may include reducing speed) to maintain the following distances as mission and circumstances allow:

(*i*) 500 yd (457.2 m) from whales.

(*ii*) 200 yd (182.9 m) from other marine mammals.

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One or more Lookouts on manned underway surface vessels in accordance with the most recent navigation safety instruction.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals immediately prior to manned surface vessels getting underway and while underway.

(*2*) [Reserved]

(xix) *Unmanned vehicles.* For unmanned vehicles:

(A) *Mitigation zones and requirements.* During the use of unmanned surface vehicles and unmanned underwater vehicles already being escorted (and operated under positive control) by a manned surface support vessel, the following mitigation zone requirements apply:

(*1*) A surface support vessel that is already participating in the event, and has positive control over the unmanned vehicle, must maneuver the unmanned vehicle (which may include reducing its speed) to ensure it maintains the following distances as mission and circumstances allow:

(*i*) 500 yd (457.2 m) from whales.

(*ii*) 200 yd (182.9 m) from other marine mammals.

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout on a surface support vessel that is already participating in the event, and has positive control over the unmanned vehicle.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals immediately prior to unmanned vehicles getting underway and while underway.

(*2*) [Reserved]

(xx) *Towed in-water devices.* For towed in-water devices:

(A) *Mitigation zones and requirements.* During the use of in-water devices towed by an aircraft, a manned surface vessel, or an Unmanned Surface Vehicle or Unmanned Underwater

Vehicle already being escorted (and operated under positive control) by a manned surface vessel, the following mitigation zone requirements apply:

(*1*) Manned towing platforms, or surface support vessels already participating in the event that have positive control over an unmanned vehicle that is towing an in-water device, must maneuver itself or the unmanned vehicle (which may include reducing speed) to ensure towed in-water devices maintain the following distances as mission and circumstances allow:

(*i*) 250 yd (228.6 m) from marine mammals.

(*ii*) [Reserved]

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout on the manned towing vessel or aircraft, or on a surface support vessel that is already participating in the event and has positive control over an unmanned vehicle that is towing an in-water device.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals immediately prior to and while in-water devices are being towed.

(*2*) [Reserved]

(xxi) *Net deployment.* For net deployment:

(A) *Mitigation zones and requirements.* During net deployment for testing of an Unmanned Underwater Vehicle, the following mitigation zone requirements apply:

(*1*) If a marine mammal is sighted within 500 yd (457.2 m) of the deployment location, the support vessel will:

(*i*) Delay deployment of nets until the mitigation zone has been clear for 15 minutes.

(*ii*) Recover nets if they are deployed.

(*2*) [Reserved]

(B) *Lookout requirements.* The following Lookout requirements apply:

(*1*) One Lookout on the support vessel.

(*2*) [Reserved]

(C) *Mitigation zone observation.* Action Proponent personnel must observe the mitigation zones in accordance with the following:

(*1*) Action Proponent personnel must observe the mitigation zone for marine mammals for 15 minutes prior to the deployment of nets and while nets are deployed.

(*2*) Nets must be deployed during daylight hours only.

(xxii) *Commencement or recommencement conditions.* Action Proponents must not commence or recommence an activity after a marine mammal is observed within a relevant mitigation zone until one of the following conditions has been met:

(A) *Observed exiting.* A Lookout observes the animal exiting the mitigation zone;

(B) *Concluded to have exited.* A Lookout concludes that the animal has exited the mitigation zone based on its observed course, speed, and movement relative to the mitigation zone;

(C) *Clear from additional sightings.* A Lookout affirms the mitigation zone has been clear from additional sightings for the activity-specific wait period; or

(D) *Platform or target transit.* For mobile events, the platform or target has transited a distance equal to double the mitigation zone size beyond the location of the last sighting.

(xxiii) *Exceptions to activity-based mitigation for acoustic and explosive stressors and non-explosive ordnance.* Activity-based mitigation for acoustic and explosive stressors and non-explosive ordnance will not apply to:

(A) Acoustic sources not operated under positive control (*e.g.,* moored oceanographic sources);

(B) Acoustic sources used for safety of navigation (*e.g.,* fathometers);

(C) Acoustic sources used or deployed by aircraft operating at high altitudes (*e.g.,* bombs deployed from high altitude (since personnel cannot effectively observe the surface of the water));

(D) Acoustic sources used, deployed, or towed by unmanned platforms except when escort vessels are already participating in the event and have positive control over the source;

(E) Acoustic sources used by submerged submarines (*e.g.,* sonar (since they cannot conduct visual observation));

(F) De minimis acoustic sources (*e.g.,* those >200 kHz);

(G) Vessel-based, unmanned vehicle-based, or towed in-water acoustic sources when marine mammals (*e.g.,* dolphins) are determined to be intentionally swimming at the bow or alongside or directly behind the vessel, vehicle, or device (*e.g.,* to bow-ride or wake-ride);

(H) Explosives deployed by aircraft operating at high altitudes;

(I) Explosives deployed by submerged submarines, except for explosive torpedoes;

(J) Explosives deployed against aerial targets;

(K) Explosives during vessel-launched or shore-launched missile or rocket events;

(L) Explosives used at or below the de minimis threshold;

(M) Explosives deployed by unmanned platforms except when escort vessels are already participating in the event and have positive control over the explosive;

(N) Non-explosive ordnance deployed by aircraft operating at high altitudes;

(O) Non-explosive ordnance deployed against aerial targets and land-based targets;

(P) Non-explosive ordnance deployed during vessel- or shore-launched missile or rocket events; and

(Q) Non-explosive ordnance deployed by unmanned platforms except when escort vessels are already participating in the event and have positive control over ordnance deployment.

(xxiv) *Exceptions to activity-based mitigation for physical disturbance and strike stressors.* Activity-based mitigation for physical disturbance and strike stressors will not be implemented:

(A) By submerged submarines;

(B) By unmanned vehicles except when escort vessels are already participating in the event and have positive control over the unmanned vehicle movements;

(C) When marine mammals (*e.g.,* dolphins) are determined to be intentionally swimming at the bow, alongside the vessel or vehicle, or directly behind the vessel or vehicle (*e.g.,* to bow-ride or wake-ride);

(D) When pinnipeds are hauled out on man-made navigational structures, port structures, and vessels;

(E) By manned surface vessels and towed in-water devices actively participating in cable laying during Modernization & Sustainment of Ranges activities; and

(F) When impractical based on mission requirements (*e.g.,* during certain aspects of amphibious exercises).

(2) *Geographic mitigation areas.* The Action Proponents must implement the geographic mitigation requirements described in paragraphs (a)(2)(i) through (a)(2)(xi) of this section.

(i) *Hawaii Island marine mammal mitigation area.* Figure 1 to this paragraph (a)(2) shows the location of the mitigation areas. Within the Hawaii Island marine mammal mitigation area, the following requirements apply (year-round):

(A) *Surface ship hull-mounted mid-frequency active sonar.* The Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar or 20 hours of helicopter dipping sonar (a mid-frequency active sonar source) annually within the mitigation area.

(B) *In-water explosives.* The Action Proponents must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets) within the mitigation area.

(ii) *Hawaii 4-Islands marine mammal mitigation area.* Figure 1 to this paragraph (a)(2) shows the location of the mitigation areas. Within the Hawaii 4-Islands marine mammal mitigation area, the following requirements apply:

(A) *Surface ship hull-mounted mid-frequency active sonar.* From November 15–April 15, the Action Proponents must not use MF1 surface ship hull-mounted mid-frequency active sonar within the mitigation area.

(B) *In-water explosives.* The Action Proponents must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets) within the mitigation area (year-round).

(iii) *Hawaii humpback whale special reporting mitigation area.* Figure 1 to this paragraph (a)(2) shows the location of the mitigation areas. Within the Hawaii humpback whale special reporting mitigation area, the following requirements apply:

(A) *Surface ship hull-mounted mid-frequency active sonar.* The Action Proponents must report the total hours of MF1 surface ship hull-mounted mid-frequency active sonar used from November through May in the mitigation area in their training and testing activity reports submitted to NMFS.

(B) [Reserved]

(iv) *Hawaii humpback whale awareness notification mitigation area.* Figure 1 to this paragraph (a)(2) shows the location of the mitigation areas. Within the Hawaii humpback whale awareness notification mitigation area, the following requirements apply:

(A) *Hawaii humpback whale awareness notification mitigation area notifications.* The Action Proponents must broadcast awareness notification messages to alert applicable assets (and their Lookouts) transiting and training or testing in the Hawaii Range Complex to the possible presence of concentrations of humpback whales from November through May.

(B) *Visual observations.* Lookouts must use that knowledge to help inform their visual observations during military readiness activities that involve vessel movements, active sonar, in-water explosives (including underwater explosives and explosives deployed against surface targets), or the deployment of non-explosive ordnance against surface targets in the mitigation area.

(v) *Northern California large whale mitigation area.* Figure 2 to this paragraph (a)(2) shows the location of the mitigation areas. Within the Northern California large whale mitigation area, the following requirements apply:

(A) *Surface ship hull-mounted mid-frequency active sonar.* From June 1–October 31, the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar (excluding normal maintenance and systems checks) total during training and testing within the combination of this mitigation area, the Central California Large Whale Mitigation Area, and the Southern California Blue Whale Mitigation Area.

(B) [Reserved]

(vi) *Central California large whale mitigation area.* Figure 2 to this paragraph (a)(2) shows the location of the mitigation areas. Within the Central California large whale mitigation area, the following requirements apply:

(A) *Surface ship hull-mounted mid-frequency active sonar.* From June 1–October 31, the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar (excluding normal maintenance and systems checks) total during training and testing within the combination of this mitigation area, the Northern California Large Whale Mitigation Area, and the Southern California Blue Whale Mitigation Area.

(B) [Reserved]

(vii) *Southern California blue whale mitigation area.* Figure 2 to this paragraph (a)(2) shows the location of the mitigation areas. Within the Southern California blue whale mitigation area, the following requirements apply:

(A) *Surface ship hull-mounted mid-frequency active sonar.* From June 1–October 31, the Action Proponents must not use more than 300 hours of MF1 surface ship hull-mounted mid-frequency active sonar (excluding normal maintenance and systems checks) total during training and testing within the combination of this mitigation area, the Northern California Large Whale Mitigation Area, and the Central California Large Whale Mitigation Area.

(B) *In-water explosives.* From June 1–October 31, the Action Proponents must not detonate in-water explosives (including underwater explosives and explosives deployed against surface targets) during large-caliber gunnery, torpedo, bombing, and missile (including 2.75-inch rockets) training and testing.

(viii) *California large whale awareness messages.* Figure 2 to this paragraph (a)(2) shows the location of the mitigation areas. For California large whale awareness messages, the following requirements apply:

(A) *California large whale awareness messages.* The Action Proponents must broadcast awareness messages to alert applicable assets (and their Lookouts) transiting and training or testing off the U.S. West Coast to the possible presence of concentrations of large whales, including gray whales (November–March), fin whales (November–May), and mixed concentrations of blue, humpback, and fin whales that may occur based on predicted oceanographic conditions for a given year (*e.g.,* May–November, April–November).

(B) [Reserved]

(ix) *California large whale real-time notification mitigation area.* Figure 2 to this paragraph (a)(2) shows the location of the mitigation areas. Within the California large whale real-time notification mitigation area, the following requirements apply:

(A) *California large whale real-time notification mitigation area notifications.* The Action Proponents will issue real-time notifications to alert Action Proponent vessels operating in the vicinity of large whale aggregations (four or more whales) sighted within 1 nmi (1.9 km) of an Action Proponent vessel within an area of the Southern California Range Complex (between 32–33 degrees North and 117.2–119.5 degrees West).

(B) [Reserved]

(x) *San Nicolas Island pinniped haulout mitigation area.* Figure 2 to this paragraph (a)(2) shows the location of the mitigation areas. Within the San Nicolas Island pinniped haulout mitigation area, the following requirements apply:

(A) *Haulouts.* Navy personnel must not enter pinniped haulout or rookery areas. Personnel may be adjacent to pinniped haulouts and rookery prior to and following a launch for monitoring purposes.

(B) *Missile and target use.* Missiles and targets must not cross over pinniped haulout areas at altitudes less than 305 m (1,000 ft), except in emergencies or for real-time security incidents. For unmanned aircraft systems (UAS), the following minimum altitudes will be maintained over pinniped haulout areas and rookeries: Class 0–2 UAS will maintain a minimum altitude of 300 ft; Class 3 UAS will maintain a minimum altitude of

500 ft; Class 4 or 5 UAS will not be flown below 1,000 ft.

(C) *Number of events.* The Navy may not conduct more than 40 launch events annually and 10 launch events at night annually.

(D) *Scheduling.* Launch events must be scheduled to avoid the peak pinniped pupping seasons (from January through July) to the maximum extent practicable.

(E) *Monitoring plan.* The Navy must implement a monitoring plan using video and acoustic monitoring of up to three pinniped haulout areas and rookeries during launch events that include missiles or targets that have not been previously monitored for at least three launch events.

(F) *Review of launch procedure.* The Navy must review the launch procedure and monitoring methods, in cooperation with NMFS, if any incidents of injury or mortality of a pinniped are discovered during post-launch surveys, or if surveys indicate possible effects to the distribution, size, or productivity of the affected pinniped populations as a result of the specified activities. If necessary, appropriate changes will be made through modification to the LOA prior to conducting the next launch of the same vehicle.

(xi) *National security requirement.* Should national security require the Action Proponents to exceed a requirement(s) in paragraphs (a)(2)(i) through (a)(2)(x) of this section, Action Proponent personnel must provide NMFS with advance notification and include the information (*e.g.,* sonar hours, explosives usage) in its annual activity reports submitted to NMFS.

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Figure 1 to Paragraph (a)(2)—Geographic Mitigation Areas for Marine Mammals in the Hawaii Study Area

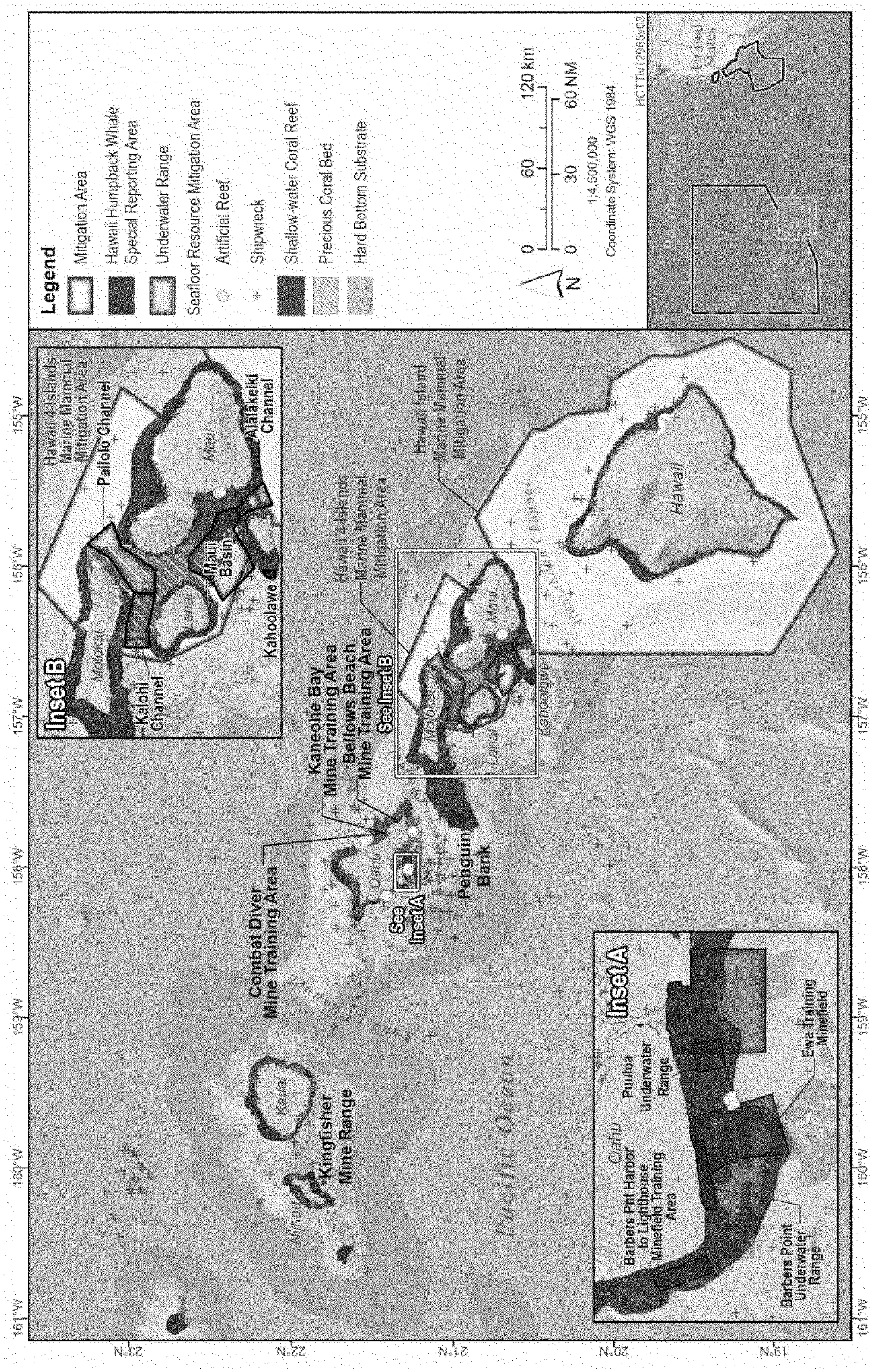
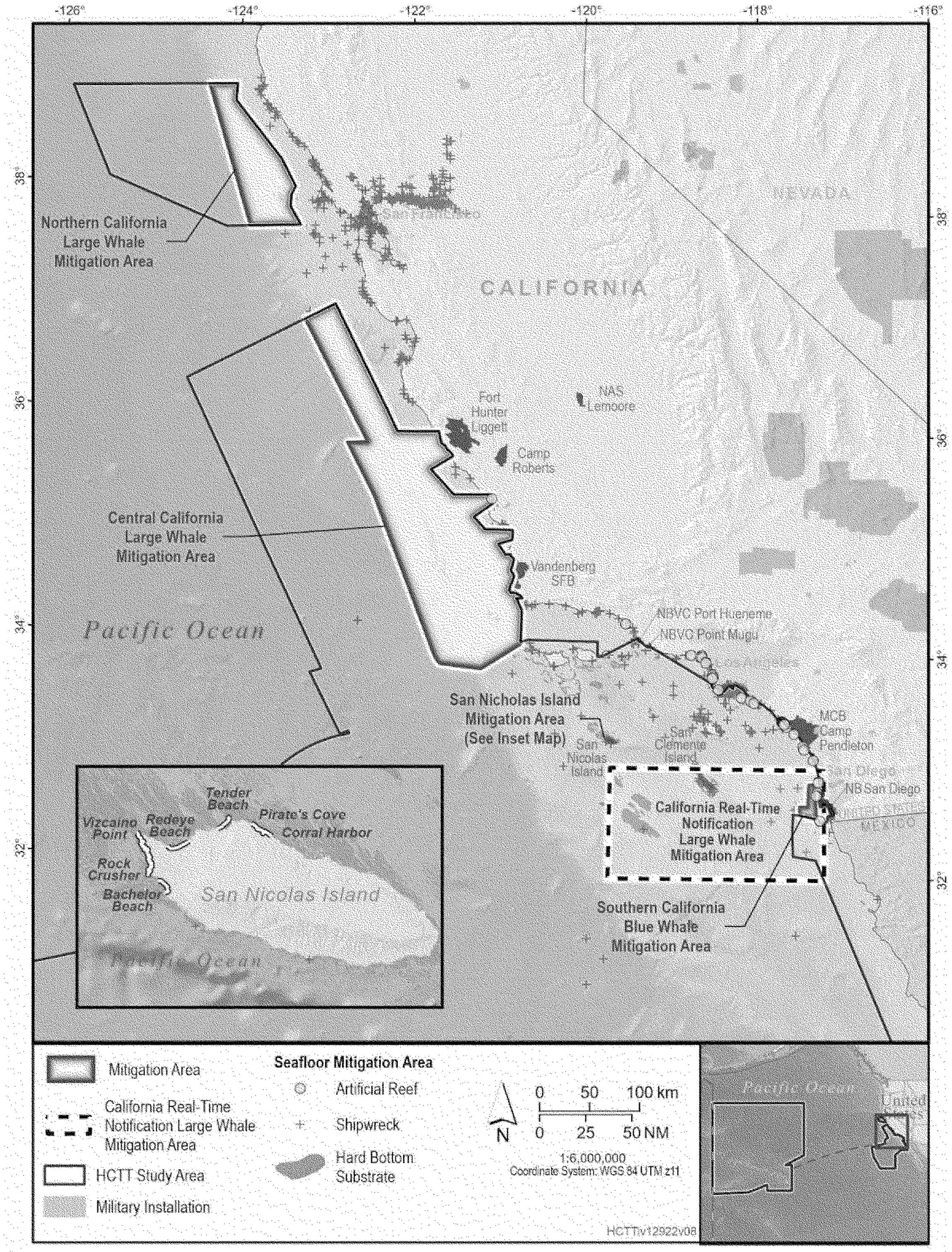


Figure 2 to Paragraph (a)(2)—Geographic Mitigation Areas for Marine Mammals in the California Study Area



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(b) [Reserved]

§ 218.75 Requirements for monitoring and reporting.

The Action Proponents must implement the following monitoring and reporting requirements when conducting the specified activities:

(a) *Notification of take.* If the Action Proponent reasonably believes that the specified activity identified in § 218.70 resulted in the mortality or serious injury of any marine mammals, or in any Level A harassment or Level B harassment of marine mammals not identified in this subpart, then the Action Proponent shall notify NMFS immediately or as soon as operational security considerations allow.

(b) *Monitoring and reporting under the LOAs.* The Action Proponents must conduct all monitoring and reporting required under the LOAs.

(c) *Notification of injured, live stranded, or dead marine mammals.* Action Proponent personnel must abide by the Notification and Reporting Plan, which sets out notification, reporting, and other requirements when dead, injured, or live stranded marine mammals are detected. The Notification and Reporting Plan is available at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities.*

(d) *Annual HCTT Study Area marine species monitoring report.* The Action Proponents must submit an annual HCTT Study Area marine species monitoring report describing the implementation and results from the previous calendar year. Data collection methods will be standardized across range complexes and the HCTT Study Area to allow for comparison in different geographic locations. The draft report must be submitted to the Director, Office of Protected Resources, NMFS, annually. NMFS will submit comments or questions on the report, if any, within 3 months of receipt. The report will be considered final after the Action Proponents have addressed NMFS' comments, or 3 months after submittal of the draft if NMFS does not provide comments on the draft report. The report must describe progress of knowledge made with respect to intermediate scientific objectives within the HCTT Study Area associated with the Integrated Comprehensive Monitoring Program (ICMP). Similar study questions must be treated together so that progress on each topic can be summarized across all Navy ranges. The report need not include analyses and content that do not provide direct assessment of cumulative progress on the monitoring plan study questions.

(e) *Quick look reports.* In the event that the sound levels analyzed in promulgation of these regulations were exceeded within a given reporting year, the Action Proponents must submit a preliminary report(s) detailing the exceedance within 21 days after the anniversary date of issuance of the LOAs.

(f) *Annual HCTT Training and Testing Reports.* Regardless of whether analyzed sound levels were exceeded, the Navy must submit a detailed report (HCTT Annual Training Exercise Report and Testing Activity Report) and the Coast Guard and Army must each submit a detailed report (HCTT Annual Training Exercise Report) to the Director, Office of Protected Resources, NMFS annually. NMFS will submit comments or questions on the reports, if any, within 1 month of receipt. The reports will be considered final after the Action Proponents have addressed NMFS' comments, or 1 month after submittal of the drafts if NMFS does not provide comments on the draft reports. The annual reports must contain a summary of all sound sources used (total hours or quantity (per the LOAs) of each bin of sonar or other non-impulsive source; total annual number of each type of explosive exercises; and total annual expended/detonated rounds (missiles, bombs, sonobuoys, *etc.*) for each explosive bin). The annual reports must also contain cumulative sonar and explosive use quantity from previous years' reports through the current year. Additionally, if there were any changes to the sound source allowance in the reporting year, or cumulatively, the reports would include a discussion of why the change was made and include analysis to support how the change did or did not affect the analysis in the 2024 HCTT Draft EIS/OEIS and MMPA final rule. The annual reports must also include the details regarding specific requirements associated with the mitigation areas listed in paragraph (f)(4) of this section. The analysis in the detailed report must be based on the accumulation of data from the current year's report and data collected from previous annual reports. The detailed reports shall also contain special reporting for the Hawaii Humpback Whale Special Reporting Mitigation Area, as described in the LOAs. The final annual/close-out reports at the conclusion of the authorization period (year 7) will also serve as the comprehensive close-out reports and include both the final year annual incidental take compared to annual authorized incidental take as well as a cumulative 7-year incidental take compared to 7-year authorized incidental take. The HCTT Annual Training and Testing Reports must include the specific information described in the LOAs.

(1) *MTEs.* This section of the report must contain the following information for MTEs completed that year in the HCTT Study Area.

(i) *Exercise information (for each MTE).* For exercise information (for each MTE):

(A) Exercise designator.

(B) Date that exercise began and ended.

(C) Location.

(D) Number and types of active sonar sources used in the exercise.

(E) Number and types of passive acoustic sources used in exercise.

(F) Number and types of vessels, aircraft, and other platforms participating in each exercise.

(G) Total hours of all active sonar source operation.

(H) Total hours of each active sonar source bin.

(I) Wave height (high, low, and average) during exercise.

(ii) *Individual marine mammal sighting information for each sighting in each exercise where mitigation was implemented.* For individual marine mammal sighting information for each sighting in each exercise where mitigation was implemented:

(A) Date, time, and location of sighting.

(B) Species (if not possible, indication of whale/dolphin/pinniped).

(C) Number of individuals.

(D) Initial Detection Sensor (*e.g.,* passive sonar, Lookout).

(E) Indication of specific type of platform observation was made from (including, for example, what type of surface vessel or testing platform).

(F) Length of time observers maintained visual contact with marine mammal.

(G) Sea state.

(H) Visibility.

(I) Sound source in use at the time of sighting.

(J) Indication of whether animal was less than 200 yd (182.9 m), 200 to 500 yd (182.9 to 457.2 m), 500 to 1,000 yd (457.2 m to 914.4 m), 1,000 to 2,000 yd (914.4 m to 1,828.8 m), or greater than 2,000 yd (1,828.8 m) from sonar source.

(K) Whether operation of sonar sensor was delayed, or sonar was powered or shut down, and the length of the delay.

(L) If source in use was hull-mounted, true bearing of animal from the vessel, true direction of vessel's travel, and estimation of animal's motion relative to vessel (opening, closing, parallel).

(M) Lookouts must report, in plain language and without trying to categorize in any way, the observed behavior of the animal(s) (such as animal closing to bow ride, paralleling course/speed, floating on surface and not swimming, *etc.*) and if any calves were present.

(iii) *An evaluation (based on data gathered during all of the MTEs) of the effectiveness of mitigation measures designed to minimize the received level to which marine mammals may be exposed.* For an evaluation (based on data gathered during all of the MTEs) of the effectiveness of mitigation measures designed to minimize the received level to which marine mammals may be exposed:

(A) This evaluation must identify the specific observations that support any conclusions the Navy reaches about the effectiveness of the mitigation.

(B) [Reserved]

(2) *Sinking Exercises.* This section of the report must include the following information for each SINKEX completed that year in the HCTT Study Area:

(i) *Exercise information.* For exercise information:

(A) Location.

(B) Date and time exercise began and ended.

(C) Total hours of observation by Lookouts before, during, and after exercise.

(D) Total number and types of explosive source bins detonated.

(E) Number and types of passive acoustic sources used in exercise.

(F) Total hours of passive acoustic search time.

(G) Number and types of vessels, aircraft, and other platforms participating in exercise.

(H) Wave height in feet (high, low, and average) during exercise.

(I) Narrative description of sensors and platforms utilized for marine mammal detection and timeline illustrating how marine mammal detection was conducted.

(ii) *Individual marine mammal observation (by Action Proponent Lookouts) information for each sighting where mitigation was implemented.* For individual marine mammal observation (by Action Proponent Lookouts) information for each sighting where mitigation was implemented:

(A) Date/Time/Location of sighting.

(B) Species (if not possible, indicate whale, dolphin, or pinniped).

(C) Number of individuals.

(D) Initial detection sensor (*e.g.,* sonar or Lookout).

(E) Length of time observers maintained visual contact with marine mammal.

(F) Sea state.

(G) Visibility.

(H) Whether sighting was before, during, or after detonations/exercise, and how many minutes before or after.

(I) Distance of marine mammal from actual detonations (or target spot if not yet detonated): Less than 200 yd (182.9 m), 200 to 500 yd (182.9 to 457.2 m), 500 to 1,000 yd (457.2 m to 914.4 m), 1,000 to 2,000 yd (914.4 m to 1,828.8 m), or greater than 2,000 yd (1,828.8 m).

(J) Lookouts must report the observed behavior of the animal(s) in plain language and without trying to categorize in any way (such as animal closing to bow ride, paralleling course/speed, floating on surface and not swimming *etc.*), including speed and direction and if any calves were present.

(K) The report must indicate whether explosive detonations were delayed, ceased, modified, or not modified due to marine mammal presence and for how long.

(L) If observation occurred while explosives were detonating in the water, indicate munition type in use at time of marine mammal detection.

(3) *Summary of sources used.* This section of the report must include the following information summarized from the authorized sound sources used in all training and testing events:

(i) *Totals for sonar or other acoustic source bins.* Total annual hours or quantity (per the LOA) of each bin of sonar or other acoustic sources (*e.g.,* pile driving and air gun activities); and

(ii) *Total for explosive bins.* Total annual expended/detonated ordnance (missiles, bombs, sonobuoys, *etc.*) for each explosive bin.

(4) *Special Reporting for Geographic Mitigation Areas.* This section of the report must contain the following information for activities conducted in geographic mitigation areas in the HCTT Study Area:

(i) *Hawaii Humpback Whale Special Reporting Mitigation Area.* The Action Proponents must report the total hours of MF1 surface ship hull-mounted mid-frequency active sonar used from November through May in the mitigation area.

(ii) *National security requirement.* If an Action Proponent(s) invokes the national security requirement described in § 218.74 (a)(2)(xi), the Action Proponent personnel must include information about the event in its Annual HCTT Training and Testing Report.

(g) *MTE sonar exercise notification.* The Action Proponents must submit to NMFS (contact as specified in the LOAs) an electronic report within 15 calendar days after the completion of any MTE indicating:

(1) *Location.* Location of the exercise;

(2) *Dates.* Beginning and end dates of the exercise; and

(3) *Type.* Type of exercise.

§ 218.76 Letters of Authorization.

(a) To incidentally take marine mammals pursuant to this subpart, the Action Proponents must apply for and obtain LOAs.

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

(c) In the event of projected changes to the activity or to mitigation, monitoring, or reporting measures (excluding changes made pursuant to the adaptive management provision of § 218.77(c)(1)) required by an LOA, the Action Proponent must apply for and obtain a modification of the LOA as described in § 218.77.

(d) Each LOA will set forth:

(1) Permissible methods of incidental taking;

(2) Geographic areas for incidental taking;

(3) Means of effecting the least practicable adverse impact (*i.e.,* mitigation) on the species and stocks of marine mammals and their habitat; and

(4) Requirements for monitoring and reporting.

(e) Issuance of the LOA(s) must be based on a determination that the level of taking is consistent with the findings made for the total taking allowable under the regulations of this subpart.

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

§ 218.77 Modifications of Letters of Authorization.

(a) An LOA issued under §§ 216.106 of this chapter and 218.76 for the activity identified in § 218.70(c) shall be modified, upon request by the LOA Holder, provided that:

(1) The specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for the regulations in this subpart (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 LOAs under this subpart were implemented.

(b) For LOA modification requests by the applicants that include changes to the activity or to the mitigation, monitoring, or reporting measures (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section), the LOA should be modified provided that:

(1) NMFS determines that the change(s) to the activity or the mitigation, monitoring or reporting do not change the findings made for the regulations and do not result in more than a minor change in the total estimated number of takes (or distribution by species or stock or years), and

(2) NMFS may publish a notice of proposed modified LOA in the **Federal Register**, including the associated analysis of the change, and solicit public comment before issuing the LOA.

(c) An LOA issued under §§ 216.106 and 218.76 of this chapter for the activities identified in § 218.70(c) may be modified by NMFS Office of Protected Resources under the following circumstances:

(1) After consulting with the Action Proponents regarding the practicability of the modifications, through adaptive management, NMFS may modify (including remove, revise or add to) the existing mitigation, monitoring, or reporting measures if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring measures set forth in this subpart.

(i) Possible sources of data that could contribute to the decision to modify the mitigation, monitoring, or reporting measures in an LOA include, but are not limited to:

(A) Results from the Action Proponents' monitoring report and annual exercise reports from the previous year(s);

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

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

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

(2) If the NMFS Office of Protected Resources determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in LOAs issued pursuant to §§ 216.106 of this chapter and 218.76, a 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.

§§ 218.78–218.79 [Reserved]

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