Appendix H Description of Systems and Ranges

Environmental Impact Statement/

Overseas Environmental Impact Statement

Hawaii-California Training and Testing Activities

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APPENDIX H DESCRIPTION OF SYSTEMS AND RANGES

The Action Proponents have been conducting military readiness activities throughout the in-water areas around the Hawaiian Islands and off the coast of California for decades. The tempo and types of training and testing activities have fluctuated within the Hawaii-California Training and Testing (HCTT) Study Area (Study Area) due to changing requirements, the introduction of new technologies, the dynamic nature of international events, advances in warfighting doctrine and procedures, and force structure changes. Such developments have influenced the frequency, duration, intensity, and location of required training and testing.

H.1 DESCRIPTION OF SONAR, MUNITIONS, TARGETS, AND OTHER SYSTEMS EMPLOYED IN HAWAII-CALIFORNIA TRAINING AND TESTING EVENTS

The Navy uses a variety of sensors, platforms, weapons, and other devices, including ones used to ensure the safety of Sailors and Marines, to meet its mission. Training and testing with these systems may have the potential to introduce acoustic (sound) energy and expended materials into the environment. The environmental impact of these activities was analyzed in Chapter 3 (Affected Environment and Environmental Consequences) of this Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). This appendix presents and organizes sonar systems, munitions, targets, and other systems, including unmanned systems, in a manner intended to facilitate understanding of both the activities that use them and the analysis of their environmental effects, described in Chapter 3 (Affected Environment and Environmental Consequences) of this EIS/OEIS. The use of unmanned systems throughout all warfare areas has increased since the 2018 Hawaii-Southern California Training and Testing EIS/OEIS and is reflected in this EIS/OEIS. Because of the prevalence of unmanned systems use, the terms “aircraft” and “vessels” can also refer to their unmanned variants: unmanned aircraft systems (UASs), unmanned surface vessels (USVs), and unmanned underwater vehicles.

H.1.1 SONAR SYSTEMS AND OTHER ACOUSTIC SOURCES

Sonar. Sonar, originally an acronym for “SOund Navigation And Ranging,” is a technique that uses underwater sound to navigate, communicate, or detect underwater objects (the term sonar is also used for the equipment used to generate and receive sound). There are two basic types of sonar: active and passive.

Active sonar emits sound waves that travel through the water, reflect off objects, and return to a receiver. Sonar is used to determine the distance to an underwater object by calculating the speed of sound in water and the time for the sound wave to travel to the object and back. For example, active sonar systems are used to track targets or to aid in vessel navigation by identifying known ocean floor features. Some whales, dolphins, and bats use echolocation, a similar technique, to identify their surroundings and to locate prey.

Passive sonar uses listening equipment, such as underwater microphones (hydrophones) and receiving sensors on ships, submarines, aircraft, or autonomous vehicles, to pick up underwater sounds. The advantage of passive sonar is that it places no sound in the water, and thus does not reveal the location of the listening vessel. Passive sonar can indicate the presence, character, and direction noise-producing objects like ships and submarines; however, passive sonar is increasingly ineffective as modern submarines become quieter. Passive sonar has no potential acoustic impact on the environment, and therefore, is not discussed further or analyzed within this EIS/OEIS.

All sounds, including sonar, are categorized by frequency. For this EIS/OEIS, active sonar is categorized into four frequency ranges: low-frequency[1], mid-frequency, high-frequency, and very high-frequency.

- Low-frequency active sonar emits sounds at frequencies less than 1 kilohertz (kHz). Low-frequency active sonar is useful for detecting objects at great distances because low-frequency sounds do not dissipate as rapidly as higher frequency sounds.
- Mid-frequency active sonar emits sounds at frequencies from 1 to 10 kHz. Mid-frequency active sonar is the Navy's primary tool for detecting and identifying submarines. Active sonar in this frequency range provides a valuable combination of range and target accuracy.
- High-frequency active sonar emits sounds at frequencies greater than 10 kHz, up to 100 kHz. High-frequency sounds dissipate rapidly and have a small effective range; however, high-frequency sounds provide higher resolution of objects and are useful at detecting and identifying smaller objects such as sea mines.
- Very high-frequency sources are those that operate above 100 kHz but below 200 kHz[2].

Modern sonar technology includes a variety of sonar sensor and processing systems. In concept, the simplest active sonar emits sound waves, or "pings," sent out in multiple directions and the sound waves then reflect off of the target object in multiple directions (Figure H-1). The sonar source calculates the time it takes for reflected sound waves to return; this calculation determines the distance to the target object. More sophisticated active sonars emit a ping and then rapidly scan or listen to the sound waves in a specific area. This provides both distance to the target and directional information. Even more advanced sonars use multiple receivers to listen to echoes from several directions simultaneously and provide efficient detection of both direction and distance. It should be noted that active sonar is rarely used continuously throughout the listed activities. In addition, when sonar is in use, the sonar "pings" occur at intervals, referred to as a duty cycle, and the signals themselves are very short in duration. For example, a sonar that emits a 1-second ping every 10 seconds has a 10 percent duty cycle.

The Navy utilizes sonar systems and other acoustic sensors in support of a variety of mission requirements. Primary uses include detection of and defense against submarines (anti-submarine warfare) and mines (mine warfare), safe navigation and effective communications, and oceanographic surveys. Specific examples of how sonar systems are used for Navy activities are discussed in the following sections.

Activity tables in Section A.3 (Training Activities) and Section A.4 (Testing Activities) of Appendix A (Activity Descriptions) list sonar bin categories that include specific bins assessed for take of protected species under that activity. Bins are also discussed and defined in Section 3.0.3.3.1 (Acoustic Stressors) of this EIS/OEIS. Various activities may also use *de minimis* sound sources that are not expected to result in take of protected species.

[1] Surveillance Towed Array Sensor System Low-Frequency Active sonar, which may be used in the Study Area, is not among the sources analyzed in this document. The potential environmental impacts from use of Surveillance Towed Array Sensor System Low-Frequency Active sonar are analyzed in a separate National Environmental Policy Act document. SURTASS was considered in the analysis of cumulative impacts in this EIS/OEIS.

[2] Frequencies above 200 kHz are not categorized because they are above the hearing threshold of most marine species.

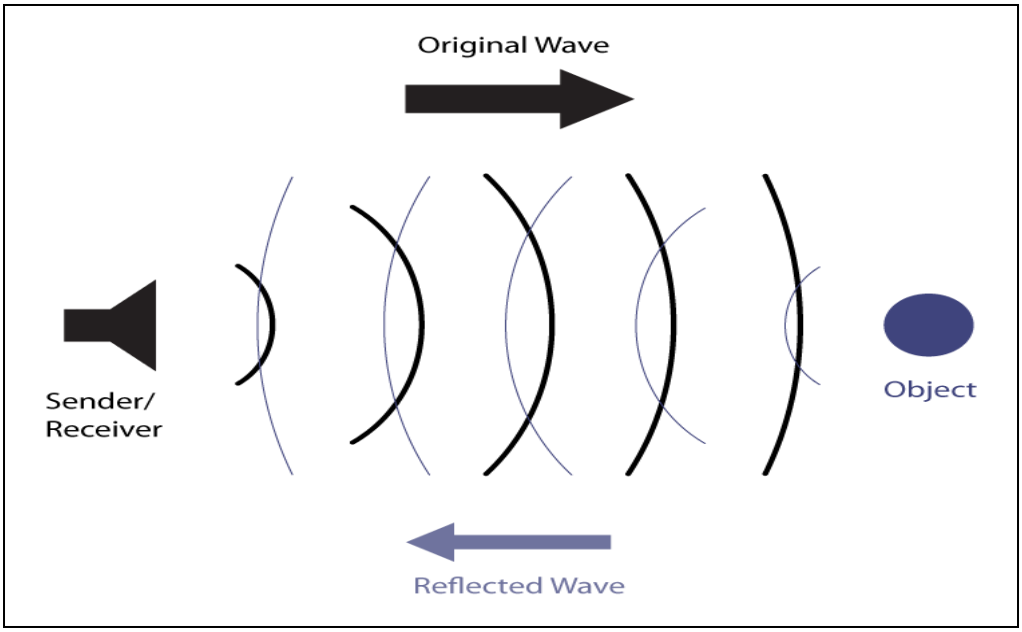


Figure H-1: Principle of an Active Sonar

Anti-Submarine Warfare. Systems used in anti-submarine warfare include sonars, torpedoes, and acoustic countermeasure devices. These systems are employed from a variety of platforms (surface ships, submarines, rotary-wing aircraft, fixed-wing aircraft, and unmanned vehicles). Surface ships conducting anti-submarine warfare are typically equipped with hull-mounted sonar (passive and active) for the detection of submarines (or submarine targets during training and testing events). Aircraft use dipping sonar or sonobuoys (passive and active) to locate submarines (or targets). Fixed-wing aircraft deploy both active and passive expendable sonobuoys to assist in detecting and tracking submarines (or targets). Submarines are equipped with hull-mounted sonars to detect, localize, and track other submarines and surface ships. Submarines primarily use passive sonar; active sonar is used mostly for navigation. There are also unmanned vehicles currently being developed to deploy anti-submarine warfare systems.

Anti-submarine warfare activities often use mid-frequency (1 to 10 kHz) active sonar, though low-frequency and high-frequency active sonar systems are also used for specialized purposes. Typical active sonar systems and acoustic sensors used during anti-submarine warfare sonar training and testing exercises include the following:

Surface Ship Sonar Systems: A variety of surface ships operate hull-mounted mid-frequency active sonar during training exercises and testing activities (Figure H-2). Typically, only cruisers and destroyers have surface ship sonar systems. Unmanned surface vessels can also include sonar systems, such as a towed sonar system.

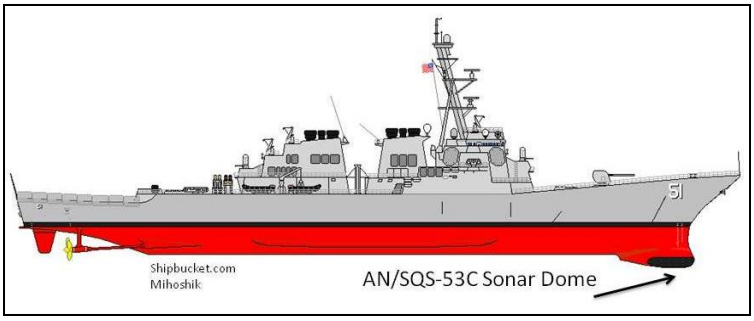


Figure H-2: Guided Missile Destroyer with an AN/SQS-53 Sonar

Submarine Sonar Systems: Submarines are equipped with hull-mounted mid-frequency and high-frequency active sonar (Figure H-3) used to detect and target enemy submarines and surface ships. A submarine's mission relies on its stealth; therefore, a submarine uses its active sonar sparingly because each sound emission gives away the submarine's location.

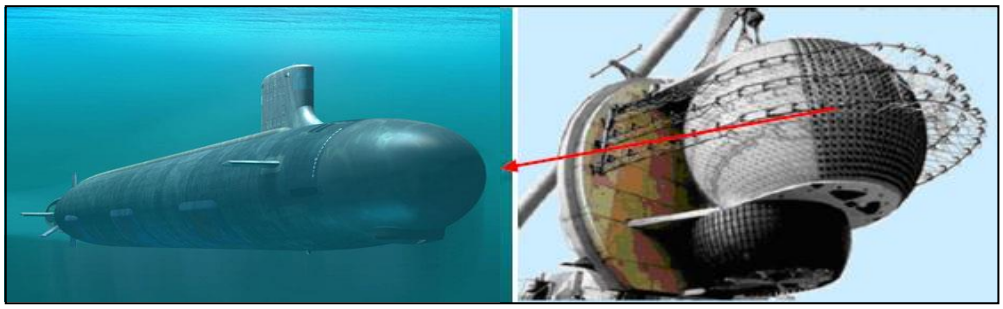


Figure H-3: Submarine AN/BQQ-10 Active Sonar Array

Aircraft Sonar Systems: Aircraft sonar systems include sonobuoys and dipping sonars.

- **Sonobuoys:** Active sonobuoys are expendable devices that contain a data transmitter and a hydrophone. The sounds collected by the sonobuoy are transmitted back to the operator (aboard ship or aircraft) for analysis. Sonobuoys allow for short and long-range detection of surface ships and submarines. These systems are deployed by ship or aircraft (Figure H-4).

Figure H-4: Loading a Sonobuoy in a P-8 Poseidon Aircraft

- **Dipping Sonars:** Dipping sonars are recoverable devices lowered into the water via cable from low-flying aircraft (Figure H-5). The sonar detects underwater targets and determines the distance and movement of the target relative to the position of the aircraft.

Figure H-5: Helicopter Deploys Dipping Sonar

Exercise Torpedoes: Some torpedoes used in training and testing activities may transmit active sonar signals. Surface ships, aircraft, and submarines primarily use torpedoes in anti-submarine warfare (Figure H-6). Recoverable, non-explosive torpedoes, categorized as either lightweight or heavyweight, are used during training and testing. Torpedoes operate autonomously, or in the case of heavyweight torpedoes, use a guidance system to operate the torpedo remotely through an attached wire (guidance wire). The autonomous guidance systems operate either passively (listening for sounds generated by the target) or actively (pinging to search for the target). Torpedo training in the Study Area is mostly simulated—solid masses that approximate the weight and shape of a torpedo are fired, rather than fully functional torpedoes. Testing in the Study Area mostly uses fully functional exercise torpedoes.

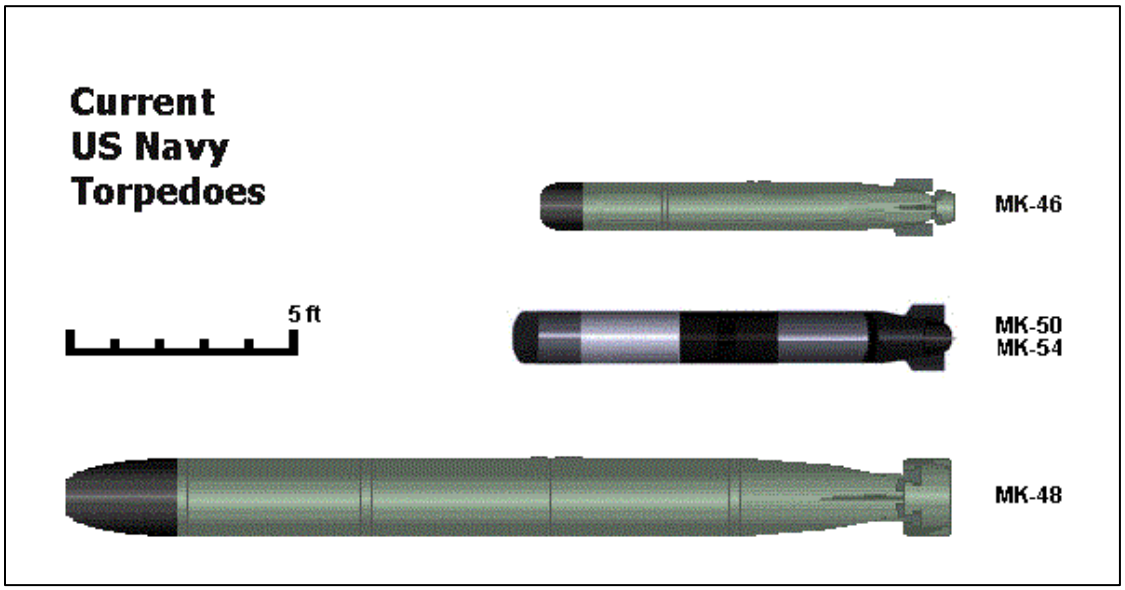


Figure H-6: Current United States Navy Torpedoes

Anti-Submarine Warfare Targets: Anti-submarine warfare training targets are autonomous undersea vehicles used to simulate target submarines (Figure H-7). The training targets are equipped with one or more of the following devices: (1) acoustic projectors emitting sounds to simulate submarine acoustic

signatures, (2) echo repeaters to simulate the characteristics of the echo of a sonar signal reflected from a submarine, and (3) magnetic sources that mimic those of a submarine.

Figure H-7: Anti-Submarine Warfare Target

Mine Warfare. Mine warfare training and testing activities use a variety of different sonar systems that are typically high frequency (greater than 10 kHz) and very high frequency (greater than 100 kHz). These sonar systems are used to detect, locate, and characterize moored and bottom mines (Figure H-8). The majority of mine warfare sonar sensors can be deployed by more than one platform (e.g., helicopter, unmanned underwater and surface vehicle, or surface ship) and may be interchangeable among platforms. Surface ships and submarines use sonar to detect mines and objects.

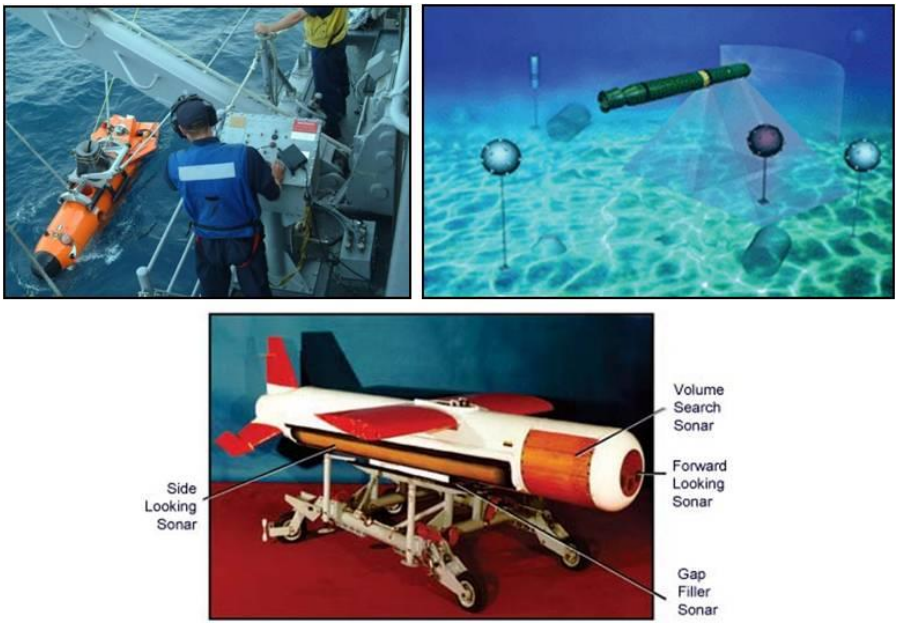


Figure H-8: Mine Warfare Systems
(Source: Graphic on upper right side from Lockheed Martin)

Safety, Navigation, Communications, and Oceanographic Systems. Naval ships, submarines, and unmanned surface and subsurface vehicles rely on equipment and instrumentation that use active sonar during both routine operations and training and testing events. Sonar systems are used to gauge water

depth, and detect and map objects, navigational hazards, and the ocean floor, and transmit communication signals.

Other Acoustic Systems. The Navy uses a variety of other acoustic sensors to protect ships anchored or at the pier, as well as shore facilities. These systems, both active and passive, detect potentially hostile swimmers, broadcast warnings to alert Navy divers of potential hazards, and gather information regarding ocean characteristics (ocean currents and wave measurements). They are generally stationary systems in Navy harbors and piers. Navy marine mammals (Atlantic bottlenose dolphins [*Tursiops truncatus*]) are also used to detect hostile swimmers around Navy facilities. A trained animal is deployed under behavioral control of a handler to find an intruding swimmer. Upon finding the "target" of the search, the animal returns to the boat and alerts the animal handlers, and the animals are given a localization marker or leg cuff that they attach to the intruder. Swimmers that have been marked with a leg cuff are reeled in by security support boat personnel via a line attached to the cuff. In addition, the Navy's research and acquisition community uses sensors for a variety of tests, including tracking during testing activities and collecting data for test analysis.

H.1.2 MUNITIONS

Most ordnance and munitions used during training and testing events fall into three basic categories: projectiles, missiles, and bombs. Ordnance can be further defined by their net explosive weight, which is a measure of defining the explosive force of a munition without the packaging, casings, bullets, etc. Net explosive weight is the trinitrotoluene (TNT) equivalent of energetic material, which is the standard measure of strength of bombs and other explosives. For example, a 2,000-pound (lb.) bomb may have anywhere from 600 to 1,000 lb. of net explosive weight.

Projectiles. Projectiles are fired during gunnery exercises and testing events from a variety of weapons, including pistols and rifles to large-caliber, turret-mounted guns on the decks of Navy ships and mounted gun systems from aircraft. Projectiles can be either high-explosive munitions (e.g., certain gun shells), or non-explosive practice munitions (e.g., rifle/pistol bullets). Explosive rounds can be fused to either explode on impact or in the air (i.e., just prior to impact). Projectiles are broken down into three basic categories in this EIS/OEIS:

- **Small-Caliber Projectiles:** These projectiles are up to and including .50-caliber (approximately 1/2 inch [in.] diameter). Small-caliber projectiles (e.g., bullets), are primarily fired from pistols, rifles, and machine guns (i.e., small arms) and mostly during training events for an individual Sailor to become and remain proficient (Figure H-9).

Figure H-9: Shipboard Small Arms Training

- **Medium-Caliber Projectiles:** These projectiles are larger than .50-caliber, but smaller than 57 millimeter (mm) (approximately 2-1/4 in. diameter). The most common size medium-caliber

projectiles are 20 mm, 25 mm, and 40 mm. Medium-caliber projectiles are fired from machine guns operated by one to two crewman and mounted on the deck of a ship, wing-mounted guns on aircraft, and fully automated guns mounted on ships for defense against missile attack (Figure H-10). Medium-caliber projectiles also include 40 mm grenades, which can be fired from hand-held grenade launchers or crew-served deck-mounted guns. Medium-caliber projectiles can be non-explosive practice munitions or high-explosive projectiles. High-explosive projectiles are usually fused to detonate on impact; however, advanced high-explosive projectiles can detonate based on time, distance, or proximity to a target.

Figure H-10: Shipboard Medium-Caliber Guns

- **Large-Caliber Projectiles:** These includes projectiles 57 mm and larger. The largest projectile currently in service has a 5 in. diameter. The most widely used large-caliber projectiles are 57 mm, and 5 in. (Figure H-11). The most common 5 in. projectile is approximately 26 in. long and weighs 70 lb. Large-caliber projectiles are fired exclusively from turret-mounted guns located on ship decks and can be used to fire on surface ships and boats, in defense against missiles and aircraft, and against land-based targets. Large-caliber projectiles can be non-explosive practice munitions or high-explosive munitions. High-explosive projectiles can detonate on impact or in the air.

Figure H-11: Shipboard Large-Caliber Gun and Projectiles

Missiles and Rockets. Missiles are rocket or jet-propelled munitions used to attack ships, aircraft, and land-based targets, as well as defend ships against other missiles. Guidance systems and advanced fusing technology ensure that missiles reliably impact on or detonate near their intended target.

Missiles are categorized according to their intended target, as described below, and can be further classified according to net explosive weight. Rockets are included within the category of missiles.

- **Air Missiles:** Air missiles are fired from ships and aircraft against enemy aircraft and incoming missiles (Figure H-12). Air missiles are configured to explode in the air near, or on impact with their intended target. Missiles are the primary ship-based defense against incoming missiles.

Figure H-12: Rolling Airframe Missile and Air-to-Air Missile

- **Surface Missiles:** Surface missiles are fired from aircraft, ships, and submarines against surface ships (Figure H-13). Surface missiles are typically configured to detonate on impact or just above the intended target.

Figure H-13: Surface Missile Fired from MH-60 Helicopter

- **Strike Missiles:** Strike missiles are fired from aircraft, ships, and submarines against land-based targets. Strike missiles are typically configured to detonate on impact or near their intended target. The AGM-88 High-Speed Anti-Radiation Missile, used to destroy enemy radar sites, is an example of a strike missile used during at-sea training, and is fired at a floating sea-borne target that replicates a land-based radar site.

Bombs. Bombs are unpowered munitions dropped from aircraft on land and water targets. The majority of bombs used during training and testing in the Study Area are non-explosive. However, explosive munitions are occasionally used for proficiency inspections and testing requirements. Bombs fall into two categories: general-purpose bombs and subscale practice bombs. Similar to missiles, bombs are further classified according to their net explosive weights.

- **General-Purpose Bombs:** General-purpose bombs consist of precision-guided and unguided full-scale bombs, ranging in size from 250 to 2,000 lb. (Figure H-14). Common bomb nomenclature used includes: MK 80 series, which is the Navy's standard model; Guided Bomb Units and Joint Direct Attack Munitions, which are precision guided (including laser guided) bombs; and the Joint Standoff weapon, which is a long-range "glider" precision weapon. General-purpose bombs can be either non-explosive practice munitions or high-explosive.

Figure H-14: F-35 Bomb Release and Loading General Purpose Bombs

- **Subscale Bombs:** Subscale bombs (Figure H-15) are non-explosive practice munitions containing a spotting (smoke) charge to aid in scoring the accuracy of hitting the target during training and testing activities. Common subscale bombs are 25 lb. and less and are steel-constructed. Laser guided training rounds are another variation of a subscale practice bomb. They weigh approximately 100 lb. and are cost-effective non-explosive weapons used in training aircrew in laser-guided weapons employment.

Figure H-15: Subscale Bombs for Training

Other Munitions. There are other munitions used in naval at-sea training and testing events that do not fit into one of the above categories, and are discussed below:

- **Demolition Charges:** Divers place explosive charges in the marine environment during some training and testing activities. These activities may include the use of timed charges, in which the charge is placed, a timer is started, and the charge detonates at the set time. Munitions of in up to, and sometimes exceeding, 60 lb. blocks of composition 4 (C-4) plastic explosive, with the necessary detonators and cords, are used to support mine neutralization, demolition, and other warfare activities. All demolition charges are further classified according to the net explosive weight of the charge.
- **Torpedoes:** Explosive torpedoes are required in some training and testing events. Torpedoes are described as either lightweight or heavyweight and are further categorized according to the net explosive weight.
- **Mines:** Naval mines are deposited and left in place until triggered by the approach of an enemy ship or are destroyed or removed. Naval mines can be laid by purpose-built minelayers, other ships, submarines, or airplanes.
- **Loitering Munitions:** UAS or USV weapons designed for remotely controlled or autonomous operation, with long dwell times and precision targeting. Loitering munitions are designed as non-recoverable unmanned vehicles with explosive charges built in that can be launched from land or at sea, typically by small boats or ships. During terminal phase, after a target has been identified, the loitering munition acts similarly to a bomb or missile to destroy or incapacitate its target.

H.1.3 TARGETS

Training and testing require an assortment of realistic and challenging targets. Targets vary from items as simple and ordinary as an empty steel drum used for small-caliber weapons training from the deck of a ship, to sophisticated, unmanned aerial drones used in air defense training. For this EIS/OEIS, targets are organized by warfare area.

Air Warfare Targets: Air warfare targets, tow target systems, and aerial targets, are used in training and testing events that involve detection, tracking, defending against, and attacking enemy missiles and aircraft. Aerial tow target systems include textile (nylon banner) and rigid (fiberglass shapes) towed targets used for gunnery events. Aerial targets include expendable rocket powered missiles and recoverable radio-controlled drones used for gunnery and missile exercises (Figure H-16, Figure H-17, and Figure H-18). Aerial targets and missiles are frequently launched from land; in the HCTT Study Area, launch sites are located at San Nicolas Island (SNI) and San Clemente Island (SCI) off the coast of Southern California (Figure H-19) and the Pacific Missile Range Facility (PMRF) on the island of Kauai in Hawaii (Figure H-20). Parachute flares are used as air-to-air missile targets. Manned high-performance aircraft may be used as targets—to test ship and aircraft defensive systems and procedures—without the actual firing of munitions.

Figure H-16: Deployment and Recovery of Air Warfare Targets

Figure H-17: BQM-177 (Aerial Target)

Figure H-18: LUU-2B/B Illuminating Flare (Aerial Target)

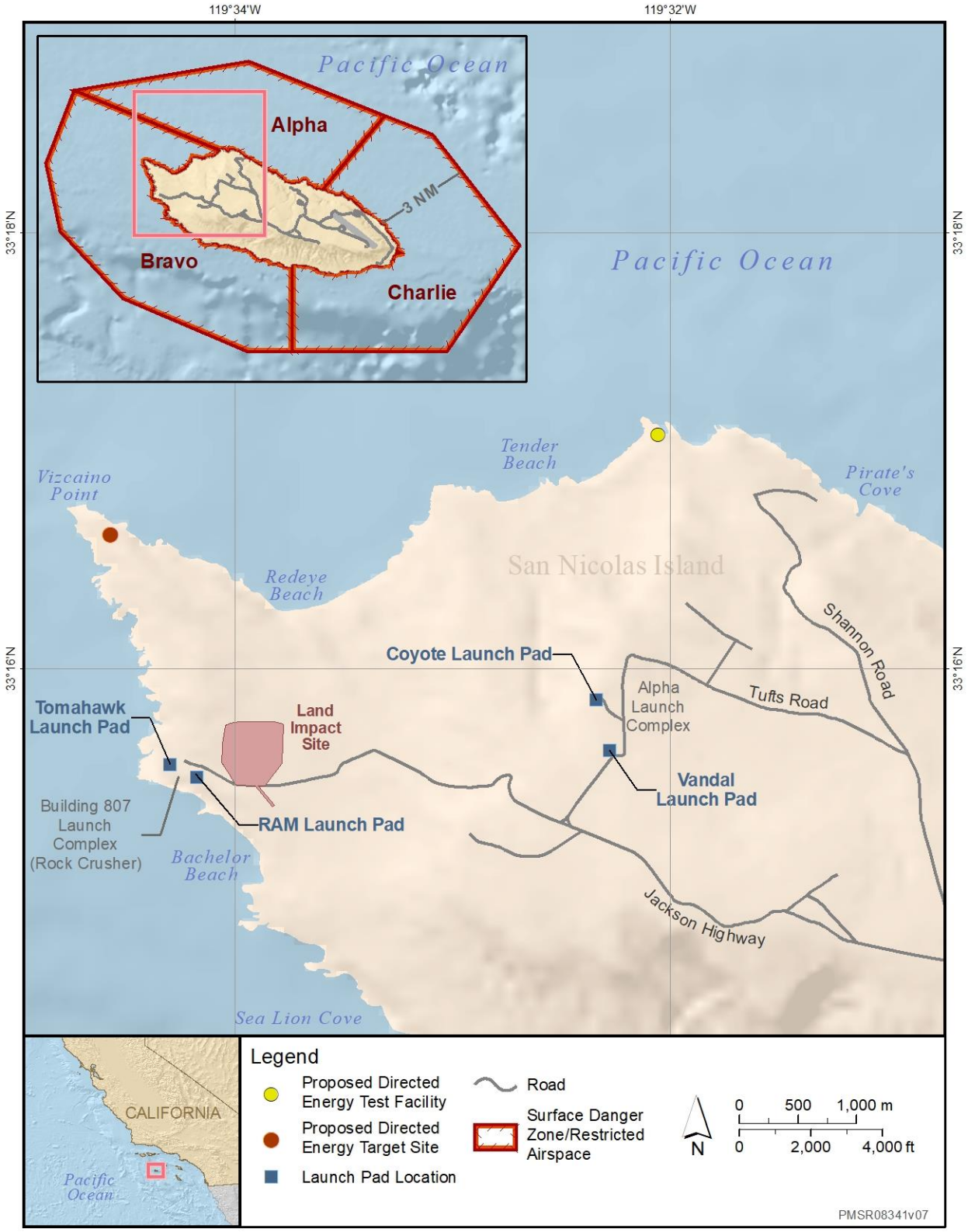


Figure H-19: San Nicolas Island Aerial Target and Missile Launch Sites

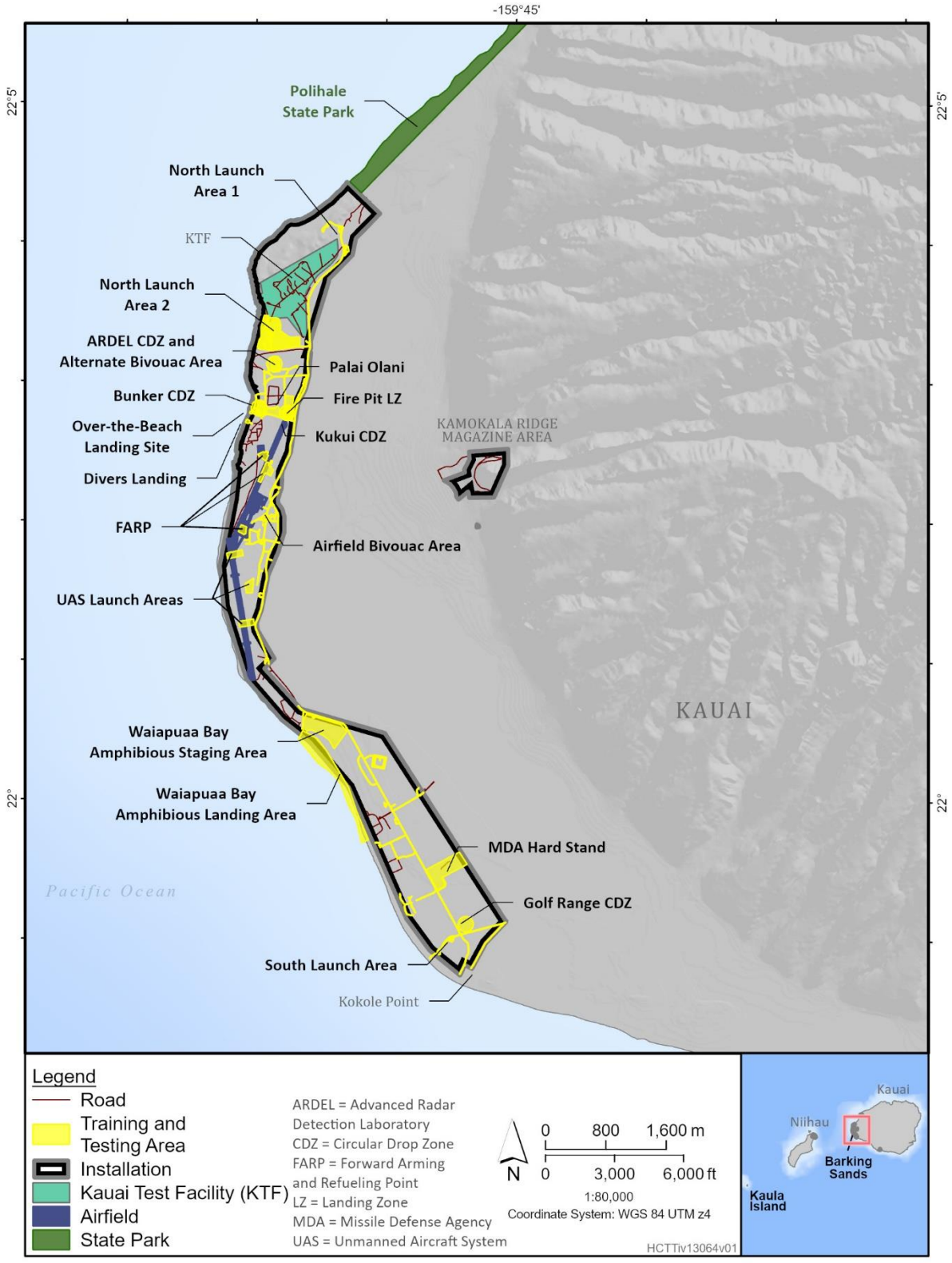


Figure H-20: Pacific Missile Range Facility Aerial Target and Missile Launch Sites

Surface Warfare Targets: Stationary and towed targets are used as surface warfare targets during gunnery events. Targets include floating steel drums, inflatable shapes or target balloons (e.g., Killer Tomato™) (Figure H-21), and towed sleds. Remote-controlled, high-speed targets, such as jet skis and motorboats, are also used (Figure H-22).

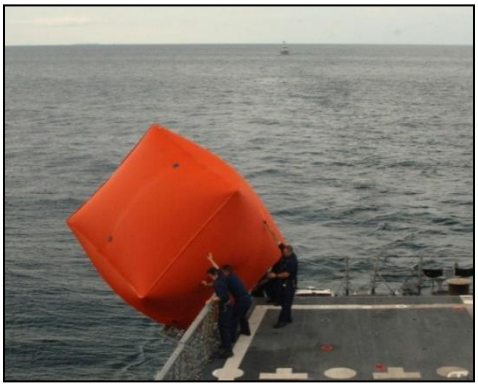


Figure H-21: Deploying a "Killer Tomato™" Floating Target

Figure H-22: Ship Deployable Surface Target and High-Speed Maneuverable Seaborne Target

Anti-Submarine Warfare Targets: Anti-submarine warfare uses multiple types of targets, including the following:

- **Submarines:** Submarines may act as tracking and detection targets during training and testing events.
- **Motorized Autonomous Targets:** Motorized autonomous targets simulate the acoustic and magnetic characteristics of a submarine, providing realism for exercises when a submarine is not available. These mobile targets resemble torpedoes, with some models designed for recovery and reuse, while other models are expendable.
- **Stationary Artificial Targets:** Stationary targets either resemble submarine hulls or are simulated systems with acoustic properties of enemy submarines. These targets either rest on the seafloor or are suspended at varying depths in the water column.

H.1.4 Defensive Countermeasures

Naval forces depend on effective defensive countermeasures to protect against missile and torpedo attack. Defensive countermeasures are devices designed to confuse, distract, and confound precision-guided munitions. Defensive countermeasures fall into five basic categories:

- **Chaff:** Chaff consists of reflective, aluminum-coated glass fibers used to obscure ships and aircraft from radar-guided systems. Chaff, which is stored in canisters, is either dispensed from aircraft or fired into the air from the decks of surface ships when an attack is imminent. The glass fibers create a radar cloud that masks the position of the ship or aircraft.
- **Flares:** Flares are pyrotechnic devices used to defend against heat-seeking missiles, where the missile seeks out the heat signature from the flare rather than the aircraft's engines. Similar to chaff, flares are also dispensed from aircraft and fired from ships.
- **Acoustic Countermeasures:** Acoustic countermeasures are used by surface ships and submarines to defend against torpedo attack (Figure H-23). Acoustic countermeasures are either released from ships and submarines or towed at a distance behind the ship.

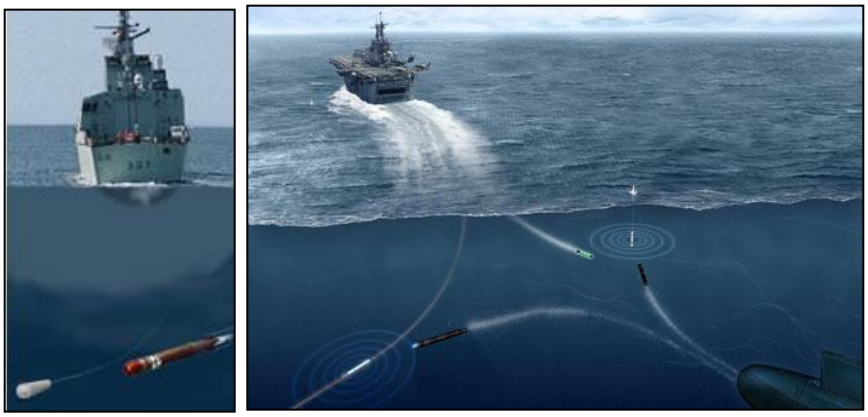


Figure H-23: Acoustic Countermeasures

- **Electromagnetic Countermeasures:** Electromagnetic countermeasures are used by surface ships and aircraft to defend against missile attacks. Electromagnetic countermeasures are also used in anti-submarine warfare activities.
- **Biodegradable Polymer:** Biodegradable polymer is a biodegradable vessel entanglement technology used to slow or stop specific maritime targets by entangling the propulsion mechanism.

H.1.5 MINE WARFARE

H.1.5.1 Training Mines

Training mines, also referred to as “mine shapes” or “mine countermeasure (MCM) targets,” are temporarily installed across mine warfare training areas in the Study Area. MCM targets contain no explosives but may contain instrumentation that can provide feedback during or after a training event. Training mines come in several shapes and sizes as shown in Figure H-24 and Figure H-25. Depending on the training objectives, specific MCM targets would be selected and placed at depths and locations appropriate to the training and the mine shape. See Section H.2 for locations of mine warfare training areas.

Figure H-24: Portfolio of Navy Training Mines

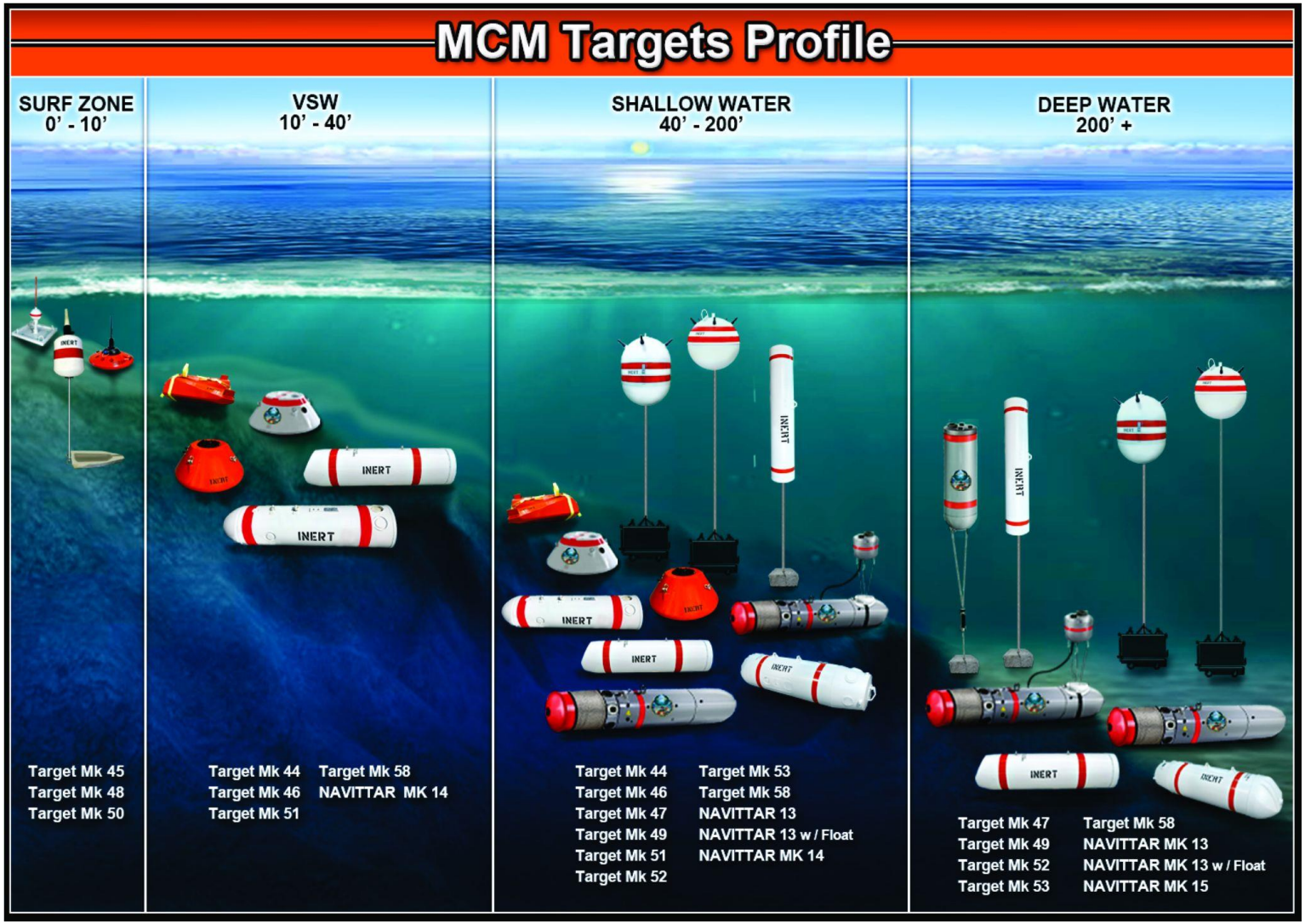


Figure H-25: Application (Location) of Navy Training Mines

H.1.5.2 Mine Warfare Systems

Mine warfare systems fall into two broad categories: mine detection and mine neutralization.

Mine Detection Systems. Mine detection systems are used to locate, classify, and map suspected mines. Once located, the mines can either be neutralized or avoided. These systems are specialized to either locate mines on the surface, in the water column, or on the seafloor.

- **Towed or Hull-Mounted Mine Detection Systems:** These detection systems use acoustic and laser or video sensors to locate and classify suspect mines. Ships and unmanned vehicles are used for towed systems, which can rapidly assess large areas (Figure H-26).

Figure H-26: Towed Mine Detection System

- **Airborne Laser Mine Detection Systems:** Airborne laser detection systems work in concert with neutralization systems. The detection system initially locates mines, and a neutralization system is then used to relocate and neutralize the mine (Figure H-27).

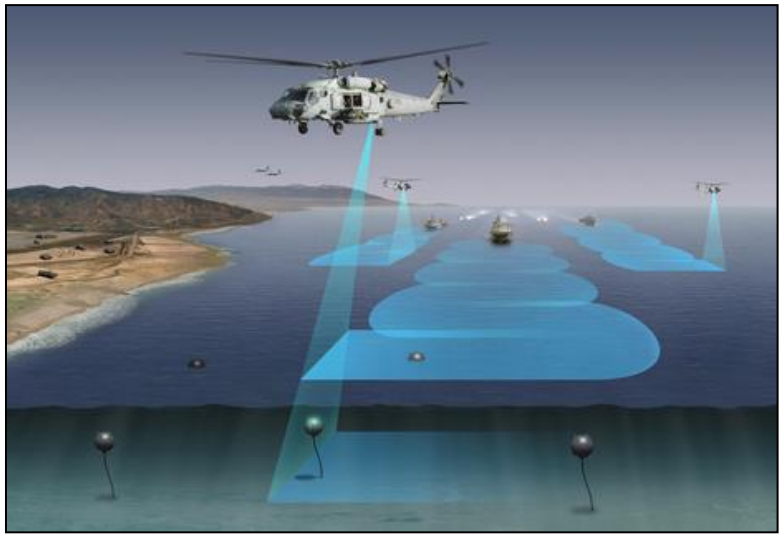


Figure H-27: AN/AES-1 Airborne Laser Mine Detection System

- **Unmanned/Remotely Operated Vehicles:** These vehicles use acoustic and video or lasers to locate and classify mines. Unmanned/remotely operated vehicles provide unique mine warfare capabilities in nearshore littoral areas, surf zones, ports, and channels.
- **Marine Mammal System:** Navy personnel and Navy marine mammals work together to detect specified underwater objects. The Navy deploys trained bottlenose dolphins as part of the marine mammal minehunting and object recovery system.
- **Dipping Mine Detection Systems:** Mine-hunting dipping sonar systems are deployed from helicopters and use high frequency sonar for the detection and classification of bottom and moored mines.

Mine Neutralization and Countermining Systems. These systems disrupt, disable, or detonate mines to clear ports and shipping lanes, as well as littoral, surf, and beach areas in support of naval amphibious operations. Mine neutralization systems can clear individual mines or a large number of mines quickly.

- **Towed Influence Mine Sweep Systems:** These systems use towed equipment that mimic a particular ship's magnetic and acoustic signature triggering the mine and causing it to explode (Figure H-28).

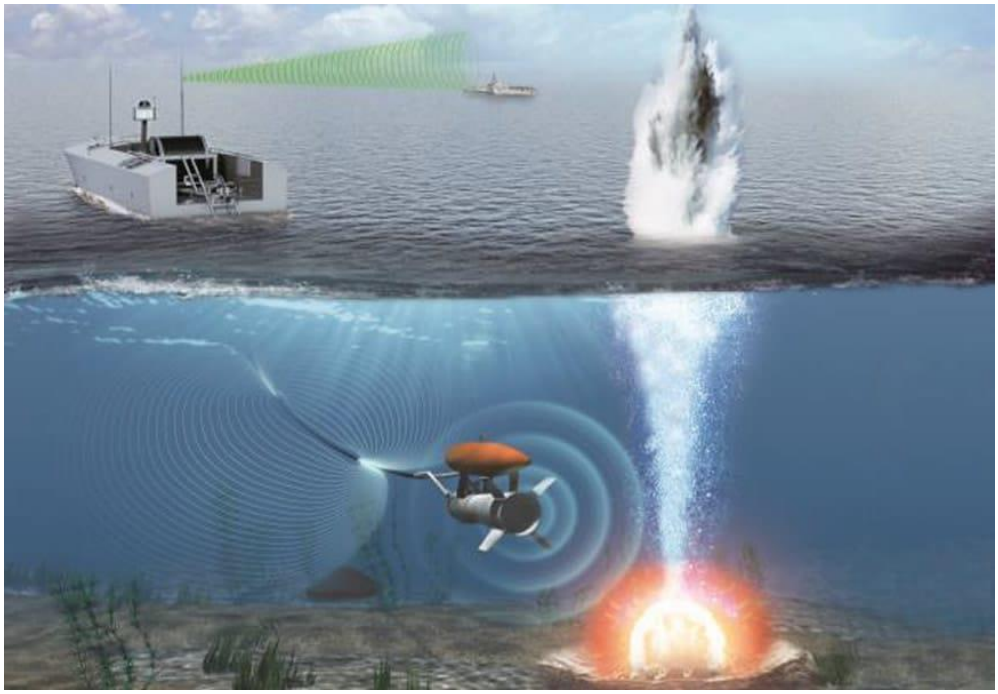


Figure H-28: U.S. Navy Unmanned Influence Sweep Minehunting System

- **Towed Mechanical Mine Sweeping Systems:** These systems tow a sweep wire to snag the line that attaches a moored mine to its anchor and then uses a series of cables and cutters to sever those lines. Once these lines are cut, the mines float to the surface where explosive ordnance personnel can neutralize the mines.
- **Unmanned/Remotely Operated Mine Neutralization Systems:** Surface ship and aircraft operate these systems, which place explosive charges near or directly against mines to destroy the mine (Figure H-29).

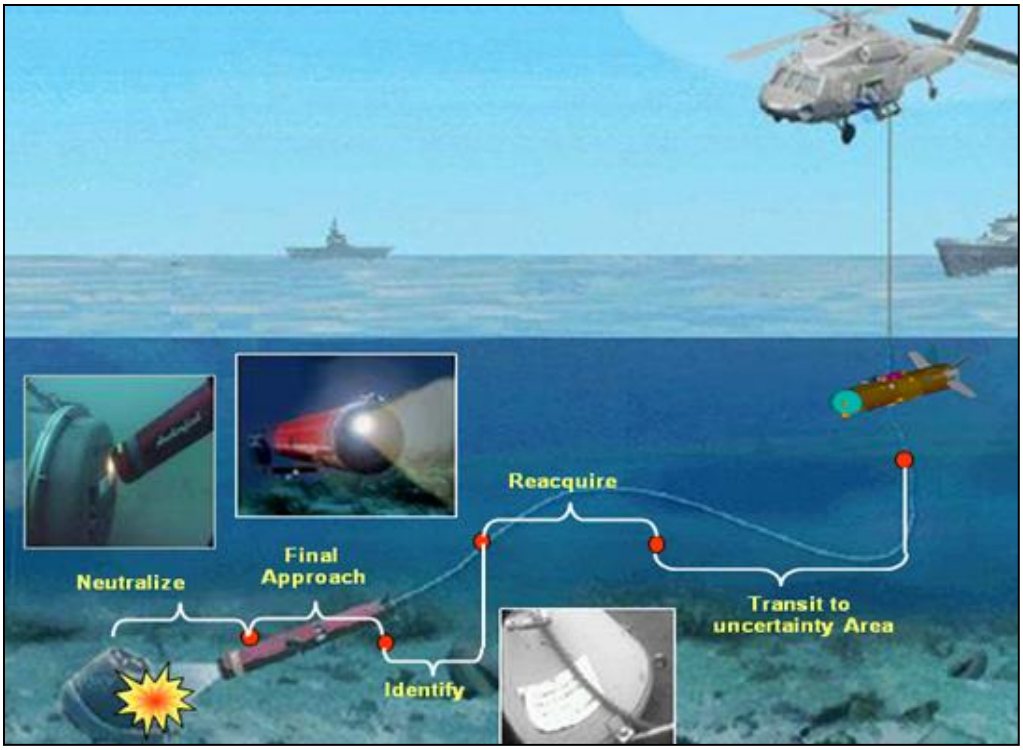


Figure H-29: Airborne Mine Neutralization System

- **Projectiles:** Small- and medium-caliber projectiles fired from surface ships or aircraft are used to neutralize floating and near-surface mines.
- **Diver Emplaced Explosive Charges:** Operating from small craft, divers place explosive charges, which may use time delay fusing, near or on mines to destroy the mine or disrupt its ability to function.
- **Other Systems:** Mat weave (charges laid in a pattern) are placed by Explosive Ordnance Personnel to destroy barriers or obstacles designed to block amphibious vehicle access to beach areas. Time delay fuses may be used on or near the mat weave. The Mine-Clearing Line Charge is a rocket-projected device used to create a breach in minefields. Many charges are connected on a line to be projected onto a minefield and then exploded, detonating buried mines.

H.1.6 Military Expended Materials

Navy training and testing events may introduce or expend various items, such as non-explosive munitions and targets, into the marine environment as a direct result of using these items for their intended purpose. In addition to the items described below, some accessory materials—related to the carriage or release of these items—may be released. These materials, referred to as military expended materials, are not recovered, and potentially result in environmental impacts. These impacts are analyzed in detail in Chapter 3 (Affected Environment and Environmental Consequences) of this EIS/OEIS. This section includes descriptions of a representative sample of military expended materials. A more comprehensive discussion can be found in Chapter 3 (Affected Environment and Environmental Consequences).

Military expended materials analyzed in this document include the following:

- **Sonobuoys:** Sonobuoys consist of decelerators/parachutes, wires, and the sonobuoys themselves.
- **Bathythermographs:** Bathythermographs as used by the Navy are similar to sonobuoys in that they consist of decelerators/parachutes, wires, and the buoy themselves. In the case of bathythermographs, the buoys are used to measure temperature information of the water column and transmit that information to the platform (usually a ship or aircraft) that deployed the bathythermograph.
- **Torpedo Launch Accessories:** Torpedoes are usually recovered; however, materials such as decelerators/parachutes used with air-dropped torpedoes, guidance wire used with submarine-launched torpedoes, and ballast weights are expended. Explosive filled torpedoes expend torpedo fragments.
- **Projectiles and Bombs:** Non-explosive projectiles, non-explosive bombs, or fragments from explosive projectiles and bombs are expended during training and testing exercises. These items are primarily constructed of lead (most small-caliber projectiles) or steel (medium- and large-caliber projectiles and all bombs).
- **Blank Ammunition:** Blank ammunition is used in some training activities when the sound or flash of gunfire adds to the realism of the training activity, but safety of personnel or nearby civilians is critical. Blank ammunition contains gunpowder, but no projectile is sent downrange upon firing the weapon. Casings are expended as a result of firing blank ammunition.
- **Missiles, Rockets, and Loitering Munitions:** Non-explosive missiles and missile fragments from explosive missiles are expended during training and testing events. Propellant, and any explosive material involved, is consumed during firing/detonation. Some missiles include a wire, which is also expended. Rockets are similar to missiles and both non-explosive and fragments may be expended.
- **Countermeasures:** Countermeasures (acoustic, chaff, flares, biodegradable polymer) are expended as a result of training exercises, with the exception of towed acoustic countermeasures. Chaff activities also include an expended canister, end caps, and pistons. Flares expend only end caps and pistons.
- **Targets:** Some targets are designed to be expended; other targets, such as aerial drones and remote-controlled boats, are recovered for re-use. Targets struck with ordnance will result in target fragments.

H.2 STUDY AREA DESCRIPTION

The HCTT EIS/OEIS Study Area (Study Area) consists primarily of the Hawaii Study Area, the California Study Area, and the Transit Corridor connecting the two (Figure H-30). When compared to the Study Area analyzed in the 2018 Hawaii-Southern California Training and Testing EIS/OEIS (Phase III), the geographic boundary of the Hawaii Study Area is unchanged, but the California Study Area has been expanded.

H.2.1 THE HAWAII STUDY AREA

The Hawaii Study Area shown in Figure H-31 is comprised of the Hawaii Range Complex and the Temporary Operating Area (TOA).

H.2.1.1 The Hawaii Range Complex

Nearly all the training and testing activities in the Hawaii Study Area take place within the Hawaii Range Complex (Figure H-32), the area that immediately surrounds the island chain from Hawaii to Kauai (Figure H-33 through Figure H-35). The Hawaii Range Complex consists of 115,000 square nautical miles (NM^2) of special use airspace (Table H-1) and 235,000 NM^2 of sea and undersea space, including 1,100 NM^2 of instrumented underwater ranges at the PMRF. Within the Hawaii Range Complex are areas where specific training and testing activities occur, generally centered around the islands of Kauai, Oahu, and Maui.

H.2.1.1.1 Pacific Missile Range Facility Training and Testing Areas

See Table H-2 and Figure H-33 for descriptions of training and testing areas around Kauai.

H.2.1.1.2 Training and Testing Areas Around Oahu

See Table H-3 and Figure H-34 for descriptions of training and testing areas around Oahu.

H.2.1.1.3 Training and Testing Areas Around Maui

See Figure H-35 for descriptions of training and testing areas around Maui.

H.2.1.2 The Temporary Operating Area

The TOA, extending north and west from the island of Kauai and comprising over 2 million NM^2 of air and sea space, is used for Research, Development, Test & Evaluation activities such as missile testing by PMRF. For safety purposes, PMRF requests use of the airspace within the TOA from the Federal Aviation Administration (FAA) during times of missile defense testing. During testing, PMRF will control the airspace and the FAA will temporarily restrict an area of airspace within the TOA (typically not the entire area) until testing is complete. Due to the range and speed of weapons and missiles, this large area is required to ensure a safety area in which debris or expended materials could fall with minimal risk of damage or injury to humans. Training in the TOA can include live missile firing associated with ballistic missile defense exercises, and during vessel transits.

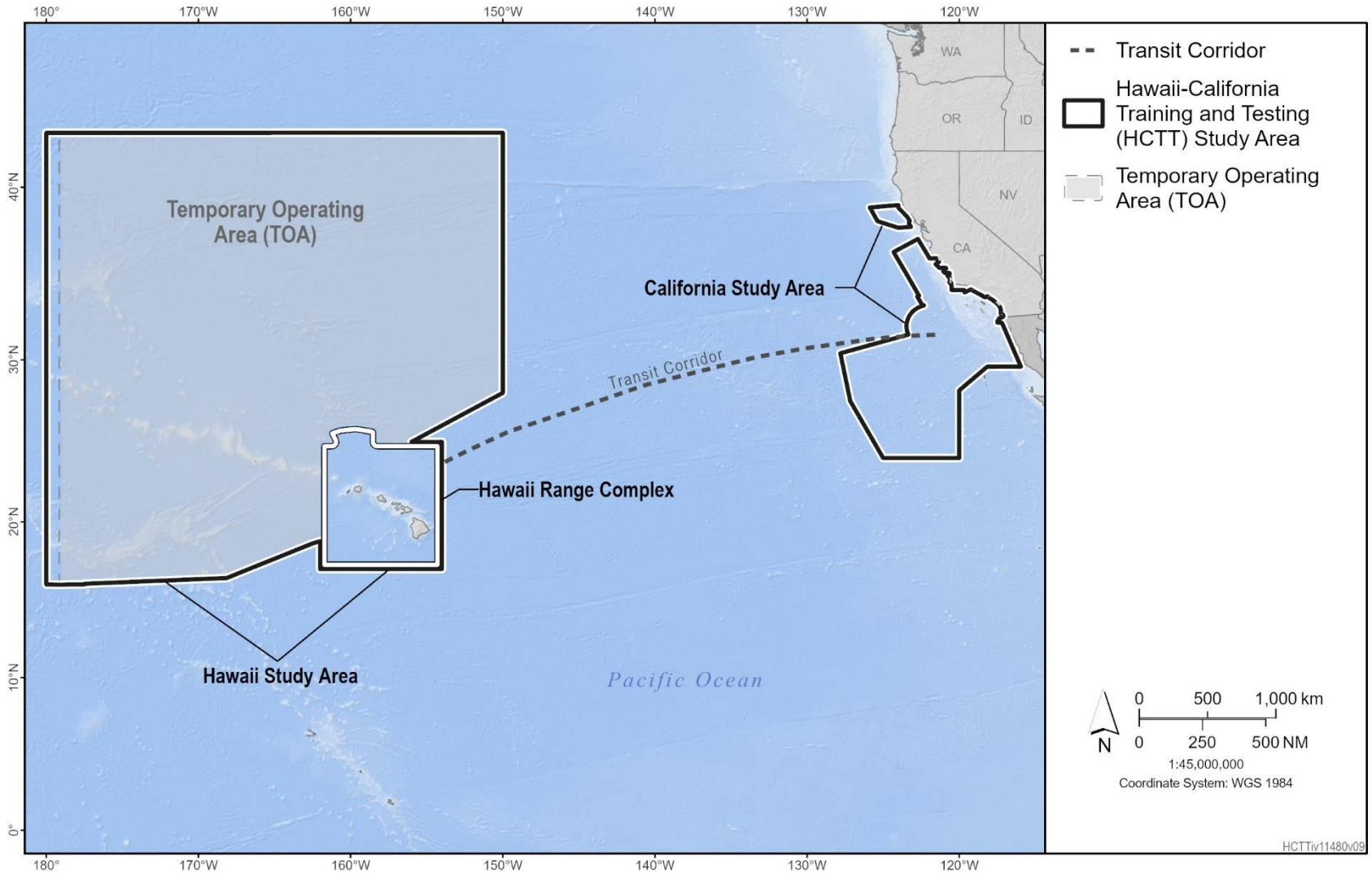


Figure H-30: The Hawaii-California Training and Testing Study Area

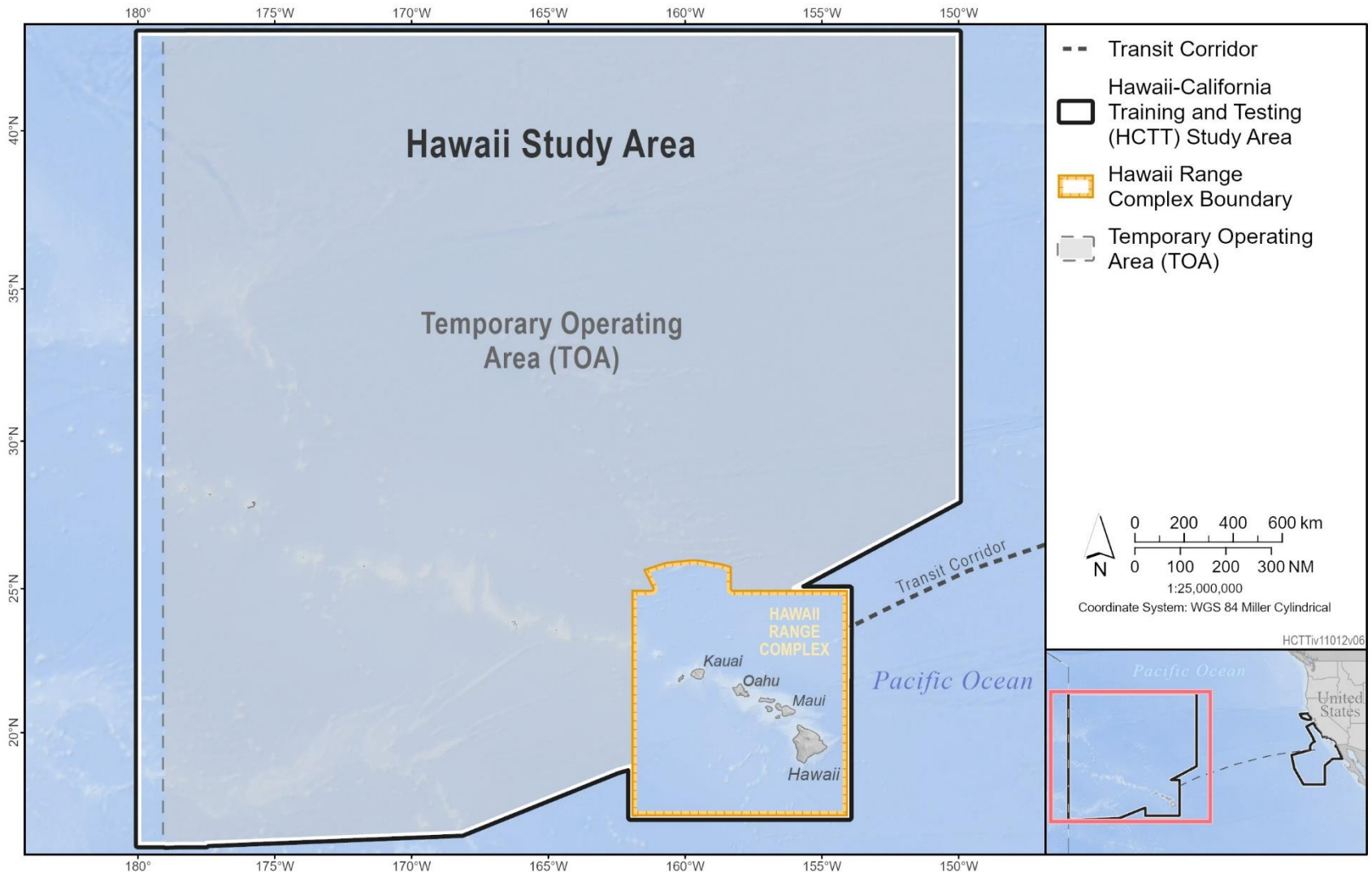


Figure H-31: The Hawaii Study Area

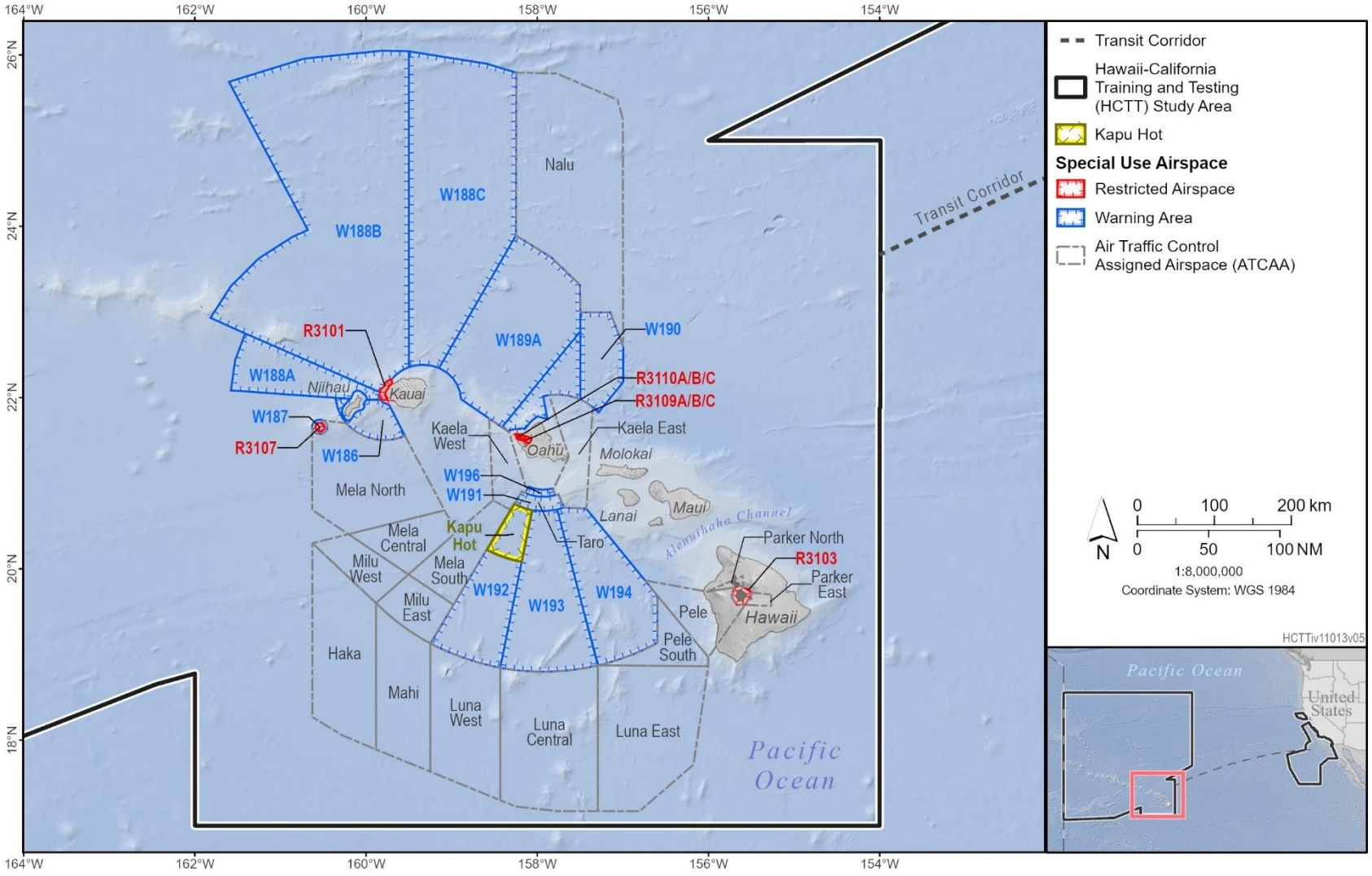


Figure H-32: Hawaii Range Complex

Table H-1: Hawaii Range Complex Airspace Descriptions

Area Name	Area Description
Northern Warning Areas	
W-188 Rainbow, W-189, W-190	The Northern Warning Areas lie north of Oahu. These areas are available from the surface to an unlimited altitude and are used for surface and air operations.
Southern Warning Areas	
W-192, W-193, W-194	The Southern Warning Areas are located south of Oahu. Available from the surface to an unlimited altitude and are used for surface and air operations.
W-191	W-191, located directly south of Oahu, is available from the surface to 3,000 feet (ft.) for air and surface operations.
W-196	W-196 is used only for surface and helicopter operations. The airspace extends from the surface to 2,000 ft. and is not available to fixed-wing aircraft.
Kapu Hot	Kapu Hot, located within W-192, is the primary live-fire range in the Hawaii Range Complex. Kapu Hot has a standing Local Notice to Mariners for the conduct of live-fire operations.
Air Traffic Control Assigned Airspace (ATCAA)	
Nene	Nene is the only ATCAA associated with the Northern Warning Areas. It is typically activated for use during Hawaii Air National Guard intercept training.
Pali	Pali is a roughly 40-nautical-mile (NM) circular area over Oahu, from 25,000 ft. to an unlimited altitude, although it is normally not available below 28,000 ft. Pali is used by high-altitude aircraft transiting between the Northern and Southern Warning Areas.
Taro	Taro overlies W-191, sharing the same borders and, when available, extending its airspace from 3,000 ft. to 16,000 ft. This airspace allows aircraft to remain in controlled airspace while testing above W-191's 3000-ft. ceiling.
Quint	Quint is located 45 nm southwest of Honolulu, with available airspace from flight level (FL) 250 to an unlimited altitude, although it is usually not available below FL 280.
Mela North, Mela Central, Mela South	The Mela ATCAAs connect the western border of W-192 with the southern border of W-186 (Pacific Missile Range Facility [PMRF]). They are available from the floor of controlled airspace (1,200 ft) to an unlimited altitude, except for Mela North, which has a ceiling of 15,000 ft.
Pele and Pele South	Pele provides a transit corridor from W-194 and Lono East into R-3103 airspace over Pohakuloa Training Area on Hawaii. When activated, Pele extends from 16,000 ft. to FL 290.
Milu (East & West), Haka, Mahi, Luna (West, Central, & East)	These ATCAAs are used along with the southern special use airspace (SUA) for air and surface operations. When activated, each area extends from 5,500 ft. to unlimited.
Nalu	Nalu is used along with the northern SUA for air and surface operations. When activated, the airspace extends from 5,500 ft. to FL 290.

Area Name	Area Description
Kaela (West & East)	Situated to the west and east of Oahu, these ATCAAs are used only during Rim of the Pacific exercises to facilitate movement between the North and South sections of the Hawaii Range Complex. When activated, the airspace extends from FL 250 to FL 290.
Kaula	
R-3107, W-187	Kaula is a 0.5 NM by 0.7 NM island surrounded by a 3 NM radius restricted area (R-3107), and a 5 NM radius warning area (W-187). Both R-3107 and W-187 extend from surface to 18,000 ft.

Table H-2: PMRF Training and Testing Area Descriptions

Area Name	Area Description
Barking Sands Tactical Underwater Range (BARSTUR)	BARSTUR is an instrumented underwater range that provides approximately 120 square nautical miles (NM^2) of underwater tracking of participants and targets.
Barking Sands Underwater Range Expansion (BSURE)	BSURE extends BARSTUR to the north, providing an additional 900 NM^2 of underwater tracking capability.
W-186, W-188	W-186 is warning airspace that extends from surface to 9,000 feet, and W-188 extends from surface to unlimited.
R-3101	R-3101 is restricted airspace that extends from surface to unlimited and provides necessary airspace to support training and Research, Development, Test, and Evaluation operations at Pacific Missile Range Facility.
Kingfisher Training Minefield	Kingfisher Training Minefield has historically provided training to surface warfare units in mine detection and avoidance. The range consisted of mine-like shapes moored to the ocean bottom by cables, but there are currently no permanent shapes in place. Placement of temporary mine training shapes would occur if this capability becomes needed.
Waiapuaa Beach	Waiapuaa Beach provides nearshore underwater space for mine detection training using divers, unmanned underwater vehicles (UUVs), remotely operated vehicles (ROVs), Airborne Laser Mine Detection Systems (ALMDS), Airborne Mine Neutralization System (AMNS) (non-explosive only). Airspace is laser certified. No permanent shapes are installed in this area.
PMRF Training Area	The PMRF Training Area provides nearshore underwater space for mine detection training using divers, UUVs, ROVs, ALMDS, AMNS (non-explosive only). No permanent shapes are installed in this area.

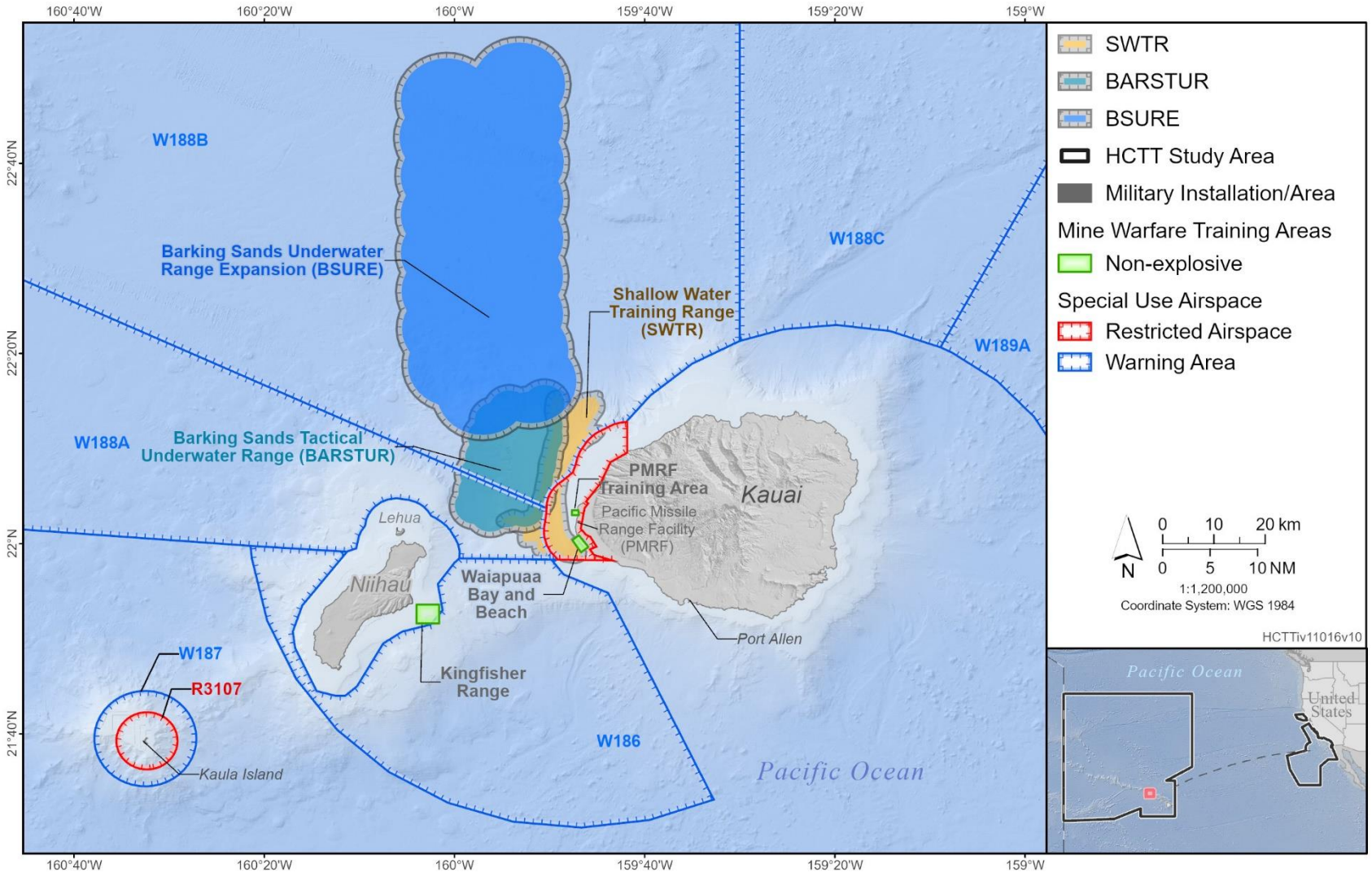


Figure H-33: Training and Testing Areas Around Kauai

Table H-3: Training and Testing Area Descriptions Around Oahu

Area Name	Area Description
Barbers Point Harbor to Lighthouse Training Area	The Barbers Point Harbor to Lighthouse Training Area provides nearshore underwater space for mine detection training and Civilian Port Defense training which includes the use of unmanned underwater vehicles (UUVs), remotely operated vehicles (ROVs), Airborne Mine Neutralization System (AMNS) and divers. No permanent shapes would be installed.
Barbers Point Underwater Range	The Barbers Point Underwater Range provides nearshore water space for mine neutralization training and underwater mine countermeasure raise, tow, beach, and exploitation.
Bellows Beach	Bellows Beach provides an amphibious landing site and nearshore water space for mine detection training using UUVs and ROVs, including airborne mine countermeasure training.
Ewa Training Minefield	The Ewa Training Minefield is an ocean area extending from Ewa Beach approximately 2 nautical miles (NM) toward Barbers Point, and out to sea approximately 4 NM. The area supports mine neutralization training, which includes UUV, ROV, divers, AMNS (explosive), and underwater mine countermeasure raise, tow, beach, and exploitation. No permanent shapes are installed in this area.
Fleet Operational Readiness Accuracy Check Site (FORACS)	The FORACS range is an approximately 5 NM by 5 NM ocean area just offshore of the southwestern coast of Oahu, near Nanakuli, and includes the Surface Ship Radiated Noise Measurement System. The electronic equipment at this site provides sensor accuracy checks and calibrations for sonar, radar, navigation, electronic counter measures, and other ship systems.
Kaneohe Bay	Training mines could be placed in Kaneohe Bay, providing mine detection training which includes the use of divers, UUVs, and ROVs. Includes civilian port defense, transit through Kaneohe Bay, and underwater mine countermeasure raise, tow, beach, and exploitation training.
Lima Landing	Explosive Ordnance Disposal divers conduct in-water explosives and demolition training at Lima Landing.
Marine Corps Base Hawaii	Small-scale amphibious training is conducted along the coastal areas of the base.
Marine Corps Training Area Bellows (MCTAB)	Amphibious training is conducted at MCTAB.
Naval Defense Sea Area	Located outside the mouth of Pearl Harbor, the Naval Defense Sea Area provides a shallow-water ocean area clear from non-military vessel traffic. Temporary mine shapes could be placed for training involving divers, UUVs, and ROVs conducting civilian port defense and underwater mine countermeasure raise, tow, beach, and exploitation training.
Pearl Harbor Naval Shipyard	Located within Pearl Harbor, where some activities like pierside sonar testing can occur.
Pearl Peninsula	Navy personnel conduct training involving small explosive charges at Victor pier on the south end of Pearl Peninsula, inside Pearl Harbor.

Area Name	Area Description
Puuloa Underwater Range	The Puuloa Underwater Range is a 1-square nautical mile area in the open ocean outside and to the west of the entrance to Pearl Harbor. Explosives training for divers, UUVs, and ROVs occurs here, with explosive charges up to 20 pounds net explosive weight. Could include underwater mine countermeasure raise, tow, beach, and exploitation training.
Shipboard Electronic Systems Evaluation Facility (SESEF)	The SESEF range, located off Barbers Point on Oahu, provides state-of-the-art test and evaluation of combat systems that radiate or receive electromagnetic energy. Ships operate and maneuver in this area as necessary to remain within electronic signal reception range of an associated shore facility.
Wave Energy Test Site (WETS)	At WETS, the Navy tests marine energy devices such as wave energy converters and conducts environmental monitoring of systems under test. The area has been expanded to test distribution of power to allow for autonomous system charging and testing.

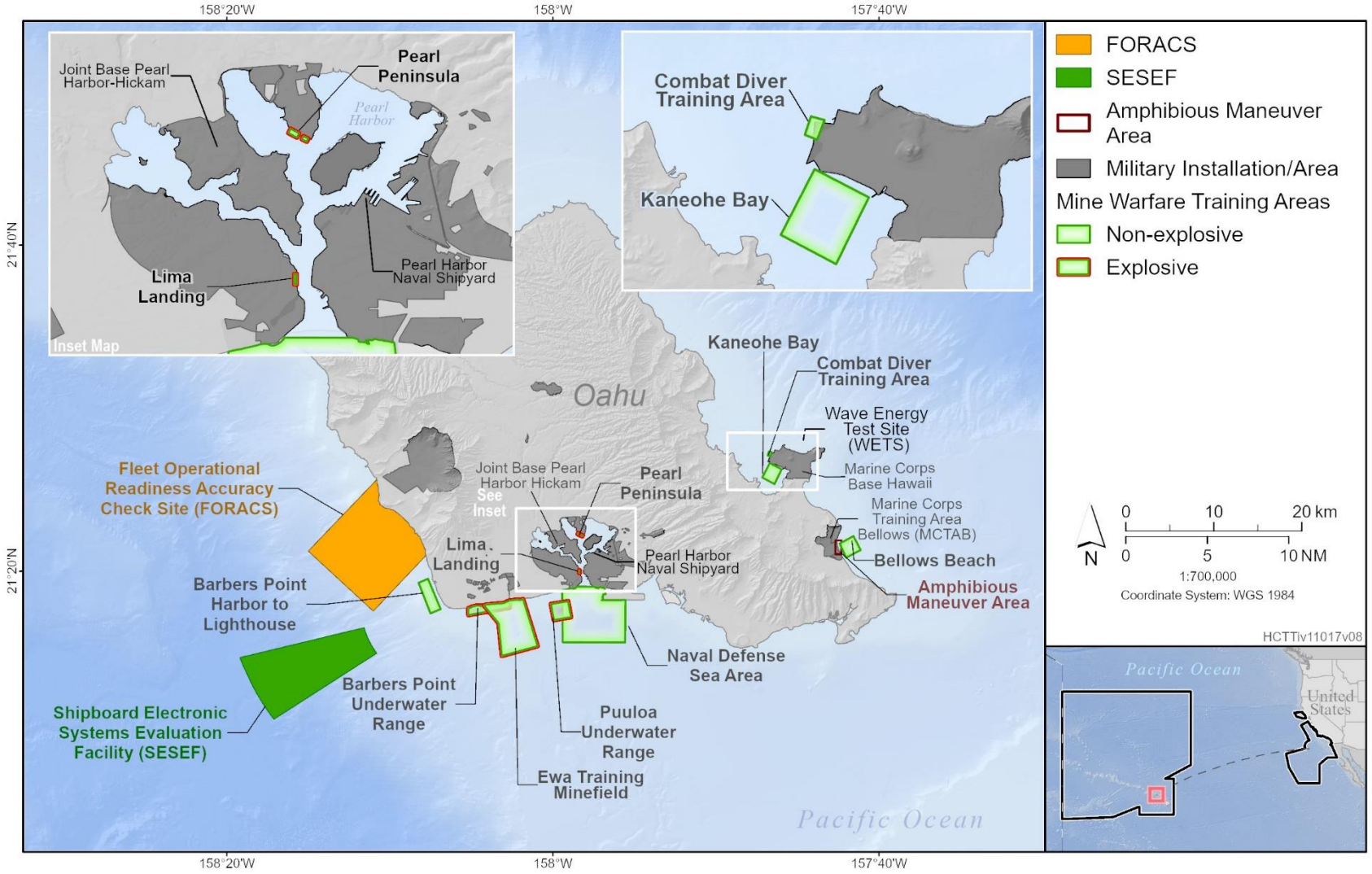


Figure H-34: Training and Testing Areas Around Oahu

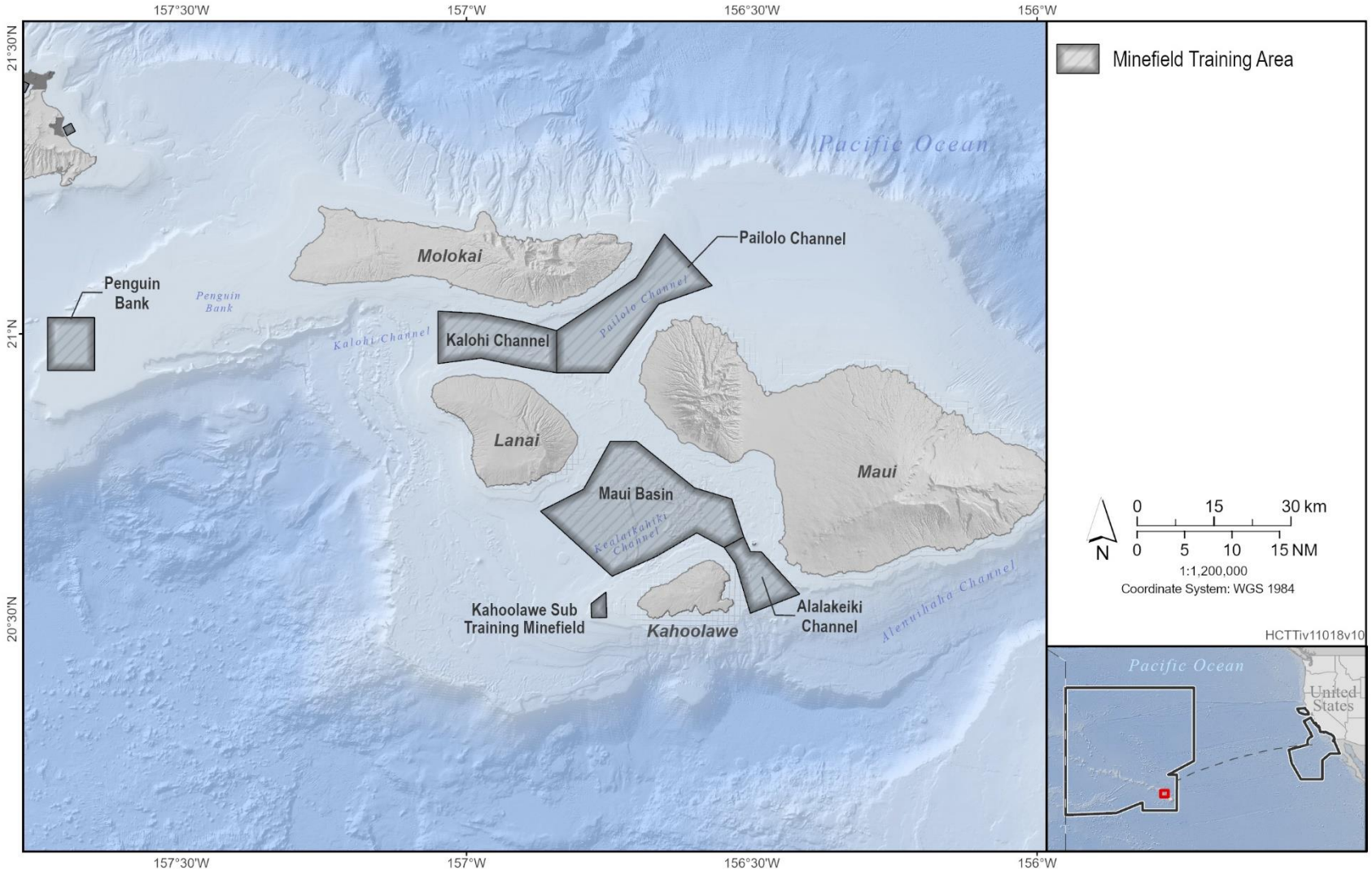


Figure H-35: Training and Testing Areas Around Maui

H.2.2 THE CALIFORNIA STUDY AREA

The California portion of the Study Area, referred to as the California Study Area (Figure H-36), is comprised of the Southern California (SOCAL) Range Complex, the Silver Strand Training Complex (SSTC), the Point Mugu Sea Range (PMSR), and the Northern California (NOCAL) Range Complex.

H.2.2.1 The Southern California Range Complex

The two primary components of the SOCAL Range Complex (Table H-4 and Figure H-37) are the ocean Operating Areas and the special use airspace. The airspace in the SOCAL Range Complex was originally developed to support a previous generation of aircraft, weapons and tactics. Today, the SOCAL Range Complex is still used as the tactical cornerstone for training and certifying all deploying Strike Groups in the Pacific. However, due to current airspace configuration constraints, the air and sea space no longer meets naval aviation training requirements conducted off the coast of Southern California. In addition, test parameters of a specific proposed testing activity require an area southwest of PMSR and north of the current SOCAL Range Complex boundary. Therefore, the Navy is proposing to expand the Study Area of the SOCAL Range Complex as depicted in Figure H-38. With the new extensions the proposed Study Area would encompass 217,000 NM^2 of sea space and 210,000 NM^2 of special use airspace. In addition, sea space in northwestern portion of the extension has been designated to facilitate testing activities by the Office of Naval Research (ONR). Testing activities conducted by ONR are described in Appendix A (Activity Descriptions). The various air and sea ranges associated with SCI are shown in Table H-5 and Figure H-39. The SOCAL Range Complex includes instrumented underwater training ranges, mine training ranges, laser training ranges, and access to the seaside of Naval Base Point Loma. The Study Area also extends to the pierside locations at Naval Base Point Loma and Naval Base San Diego.

The SOCAL Range Complex includes the SCI Range Complex, an integrated set of training areas and ranges located on and adjacent to SCI.

H.2.2.2 The Silver Strand Training Complex

The SSTC is an integrated set of training areas (Table H-6) located on and adjacent to the Silver Strand, a narrow, sandy isthmus separating the San Diego Bay from the Pacific Ocean. It is divided into two non-contiguous areas: SSTC-North and SSTC-South (Figure H-40). Training activities occur on the seaside of the Silver Strand and in San Diego Bay (bayside).

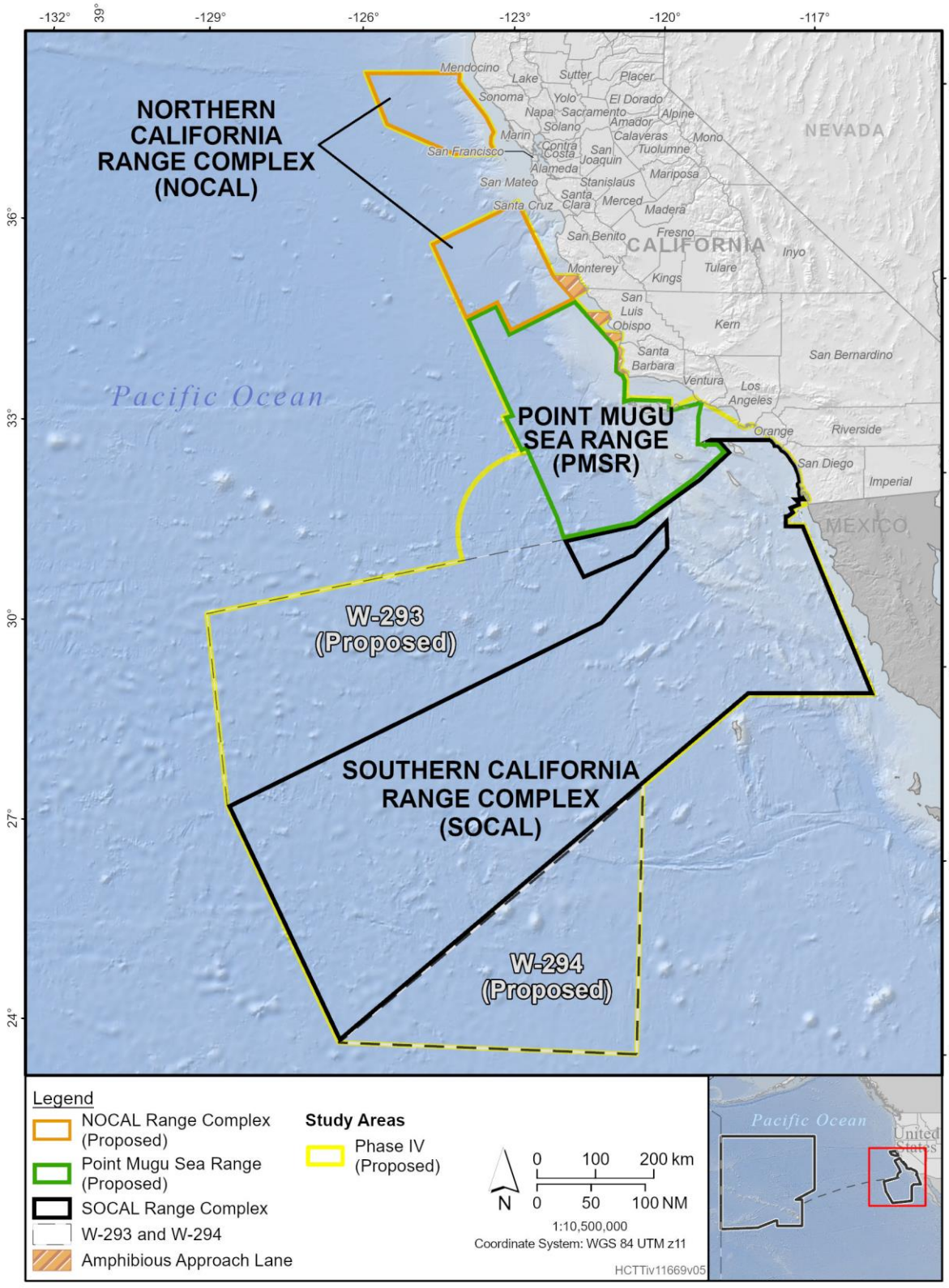


Figure H-36: The California Study Area

Table H-4: Southern California Range Complex Area Descriptions

Area Name	Area Description
Advanced Research Projects Agency (ARPA) Training Minefield	Located west of the La Jolla area of San Diego within the ENETA, the ARPA Training Minefield extends from the ocean bottom to the surface. Mine detection and avoidance exercises are conducted. Ordnance use is not permitted.
Airborne Mine Countermeasure (AMCM) Training Range	The AMCM Training Range, located off the coast of Imperial Beach, CA, is used for mine countermeasure training and aerial minesweeping. Underwater explosives up to 3.5 pounds net explosive weight may be authorized.
Camp Pendleton Amphibious Assault Area (CPAAA)	CPAAA is an open ocean area located approximately 40 nautical miles northwest of Naval Base Coronado (NBC), used for amphibious operations (Figure H-37). Ordnance use is not permitted.
Camp Pendleton Amphibious Vehicle Training Area (CPAVA)	CPAVA is an ocean area adjacent to the shoreline of Camp Pendleton used for amphibious operations and associated training.
Encinitas Electronic Training Area (ENETA)	The ENETA extends from the ocean bottom up to 700 feet (ft.) mean sea level (MSL) (Figure H-37). Exercises conducted include Fleet training and testing. Ordnance use is not permitted.
Fleet Training Area (FLETA) HOT	FLETA HOT is an open ocean area that extends from the ocean bottom to 80,000 ft. (Figure H-37). The area is used for hazardous operations, primarily surface-to-surface, surface-to-air, and air-to-air ordnance. Types of exercises conducted include Anti-Air Warfare, anti-submarine warfare (ASW), Naval Special Warfare, underway training, and Independent Steaming Exercises in which ships conduct onboard training, separate from other units. Ordnance use is permitted.
Helicopter Offshore Training Area (HCOTA)	Located in the ocean area off San Diego, the Helicopter Offshore Training Area is divided into "dipping areas" and extends from the surface to 700 ft. MSL. This area is designed for search and rescue and ASW training for helicopters with dipping sonar. Ordnance use is not permitted.
Imperial Beach Mine Training Range	The Imperial Beach Minefield is a concurrent use mine training range located off the coast of Imperial Beach, CA. It extends from the seafloor to the surface and is primarily used for mine detection, identification, and neutralization of bottom and tethered mine shapes.
Navy Test Area	Located offshore near Naval Base Point Loma, the Navy Test Area is a nearshore area used for in-water testing.
Ocean Beach Mine Training Area	Located approximately four miles west of the Ocean Beach and Point Loma area of San Diego, the Ocean Beach Mine Training Area is utilized for shallow water mine detection training and testing.
Shallow Water Training Ranges (SWTRs)	Tanner Bank SWTR and San Clemente Island SWTR are planned training ranges that will be instrumented with underwater hydrophones. This range would be used to evaluate the performance of aircraft, ships, and submarines conducting ASW training.
Tanner Bank Minefield	Located in the Tanner and Cortes Banks areas, the Tanner Bank Minefield is utilized for shallow water mine detection training and testing. Mine warfare training in this area has expanded beyond the boundaries depicted in Figure H-37, but remains contained within the proposed Tanner Bank SWTR.
Transit Lane	W-291 includes seven transit lanes that extend from the surface to 80,000 ft. MSL and provides Beaver a 5 nautical mile-wide corridor to transit users to and from the Operating Areas in the southern portion of the SOCAL Range Complex.
Warning Area (W-291)	W-291 encompasses 113,000 square nautical miles located off of the Southern California coastline, extending from the ocean surface to 80,000 ft. above MSL. W-291 supports aviation training and Research, Development, Test, and Evaluation conducted by all aircraft in the Navy and Marine Corps inventories. Ordnance use is permitted.

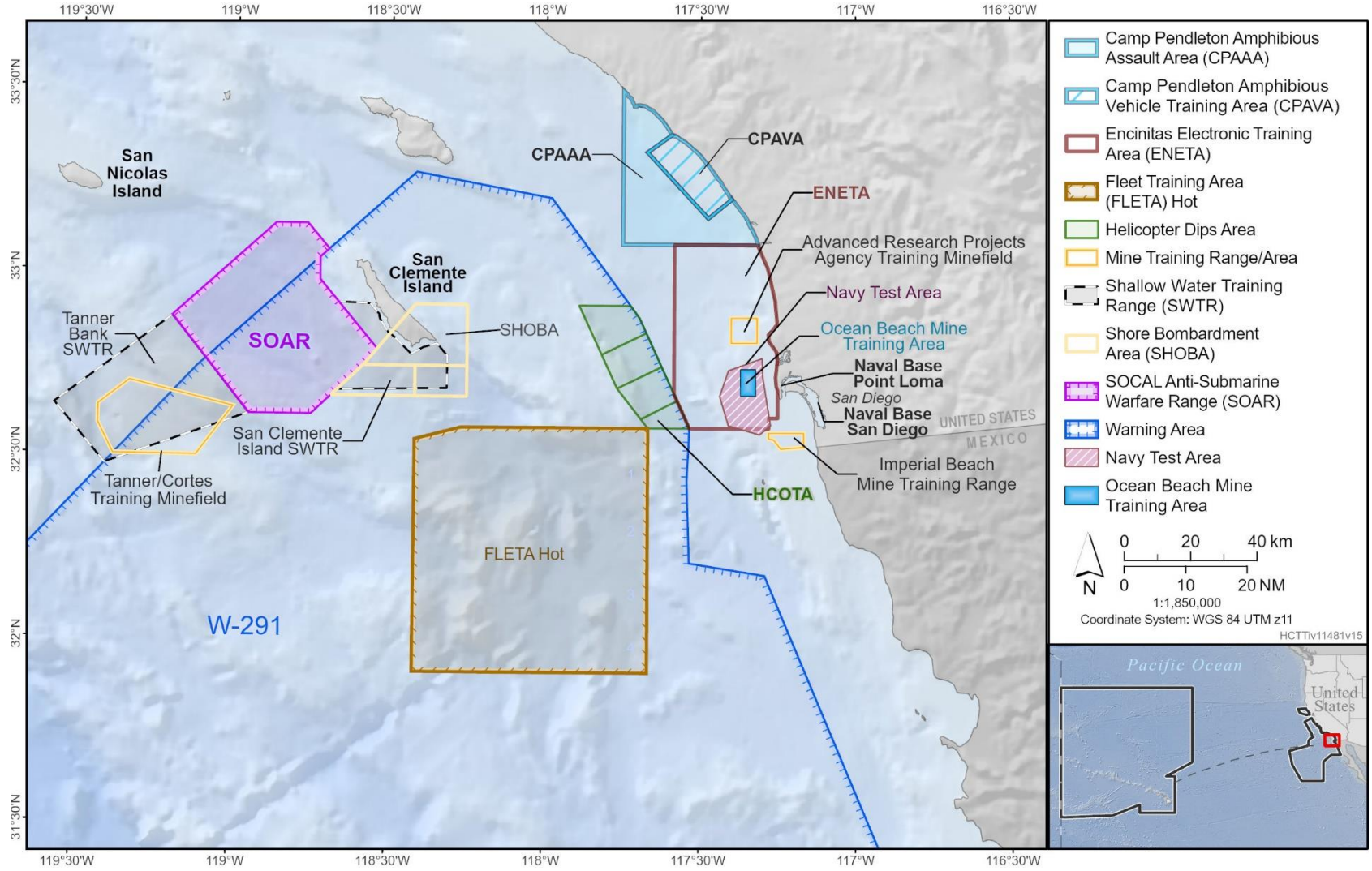


Figure H-37: Southern California Range Complex

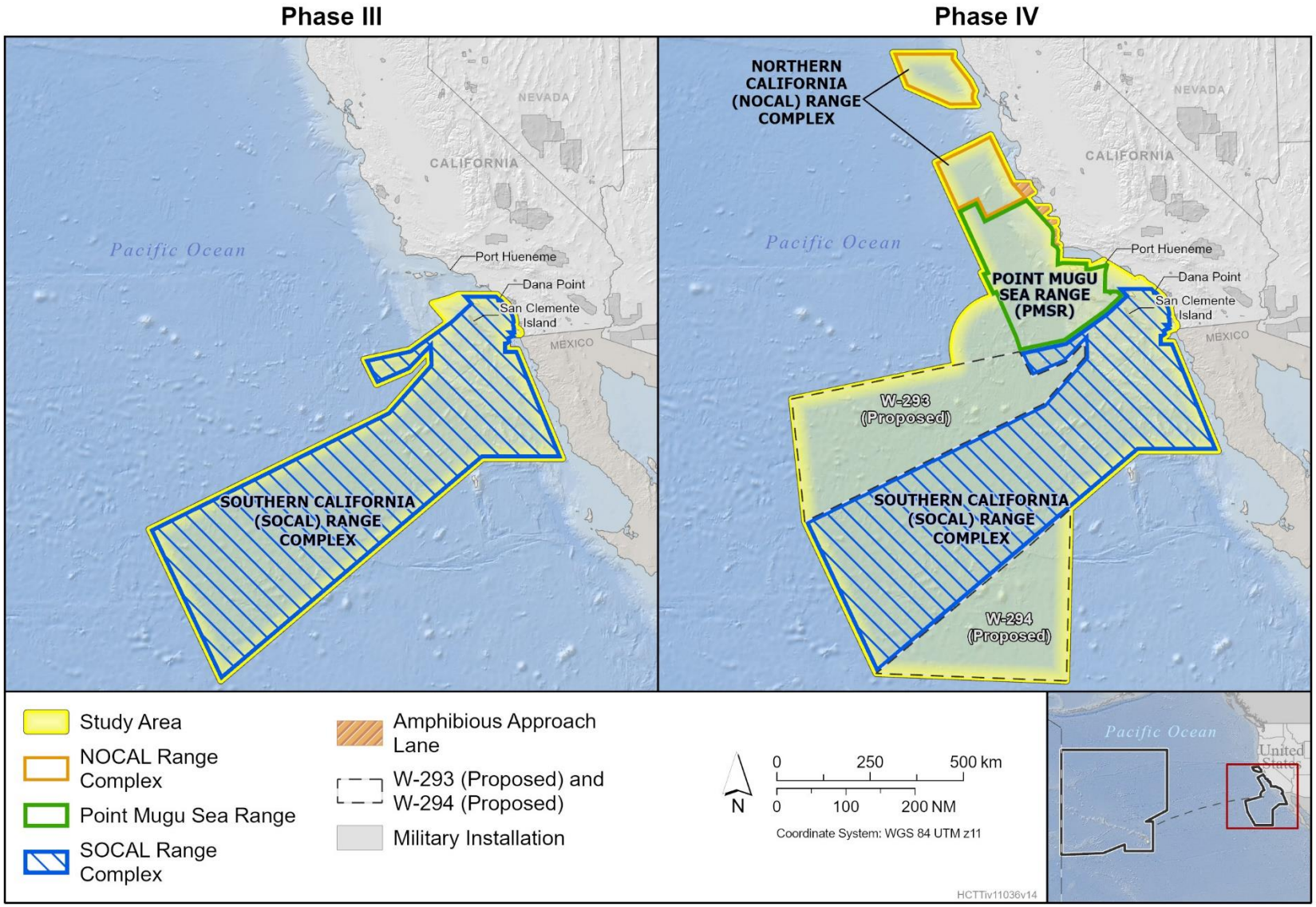


Figure H-38: Proposed Southern California Range Complex Expansion

Table H-5: San Clemente Island Offshore Training and Testing Area Descriptions

Area Name	Area Description
Mine Training Range (MTR)	Two MTRs and two mine laying areas are established in the nearshore areas of San Clemente Island (SCI). MTR-1 is the Castle Rock Mining Range off the northwestern coast of the island. MTR-2 is the Eel Point Mining Range off the midpoint of the southwestern side. These ranges are used for training of aircrews in offensive mine laying by delivery of inert mine shapes (no explosives) from aircraft. Underwater detonations up to 300 pounds (lb.) net explosive weight (NEW) are authorized.
Pyramid Cove Mine Training Range	This mine training range is located south of SCI and is used primarily for mine countermeasures training, mine detection, and neutralization of bottom and moored mine shapes. It includes a semi-permanent target minefield primarily for mine detection training using ALMDS. This range also includes the former China Point Mining Range, off the southwestern point of the island, and the Pyramid Head Mining Range, off the island's southeastern tip, to support training of aircrews in offensive aerial mine laying by delivery of live and inert mine shapes.
Shallow Water Training Ranges (SWTRs)	The SWTR is a range that currently supports anti-submarine warfare (ASW), mine warfare, and surface warfare (SUW) training. The Tanner Bank SWTR SCI SWTR are planned areas within the current SWTR and nearshore SCI where future underwater hydrophone instrumentation will be installed to support the evaluation of aircraft, ship, and submarine performance during ASW training.
Shore Bombardment Area (SHOBA) Impact Areas	SHOBA is the only eastern Pacific Fleet range that supports naval surface fire support training using on-the-ground spotters and surveyed targets. The southern one-third of SCI contains Impact Areas I and II, which comprise the onshore portion of SHOBA. (The offshore component provides designated locations [fire support areas] for firing ships to maneuver.) The main training activities that occur in SHOBA are naval gun firing, artillery, air-to-ground strikes (bombs, missiles, rockets, and gunnery), and air-to-surface maritime strikes (missiles, rockets, and gunnery). A variety of munitions, both live and inert, are expended in SHOBA. Naval special warfare operations also occur in this area.
Southern California Anti-Submarine Warfare Range (SOAR)	SOAR is located offshore to the west of SCI. The underwater tracking range covers over 670 NM^2, and consists of seven subareas. The range has the capability of providing three-dimensional underwater tracking of submarines, practice weapons, and targets with a set of 84 acoustic sensors (hydrophones) located on the seafloor. Communication with submarines is possible through use of an underwater telephone capability. SOAR supports various ASW and SUW training scenarios that involve air, surface, and subsurface units.
Tanner/Cortes Training Minefield	Located in the Tanner and Cortes Banks areas, the Tanner/Cortes Training Minefield is utilized for shallow water mine detection training and testing.
Training Areas and Ranges (TARs)	TARs are littoral operating areas that support demolition, over-the-beach, and tactical ingress and egress training for NSW and amphibious units. TAR-2 and TAR-3 provide underwater demolition areas where explosives up to 500 lb. NEW may be used.
Warning Area (W-291)	W-291 encompasses 113,000 square nautical miles (NM^2) located off of the Southern California coastline, extending from the ocean surface to 80,000 feet above mean sea level. W-291 supports aviation training and Research, Development, Test and Evaluation conducted by all aircraft in the Navy and Marine Corps inventories. Ordnance use is permitted.

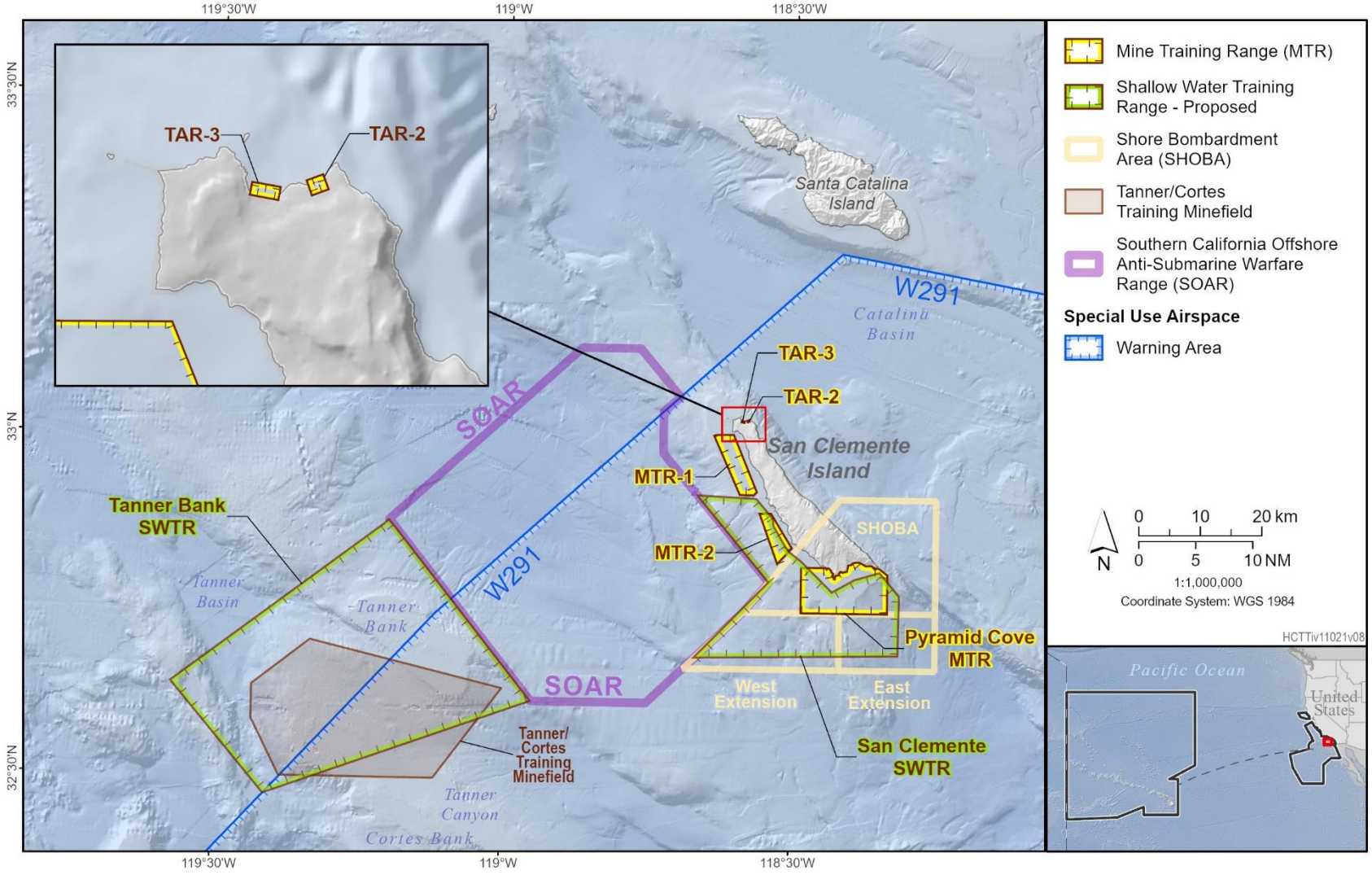
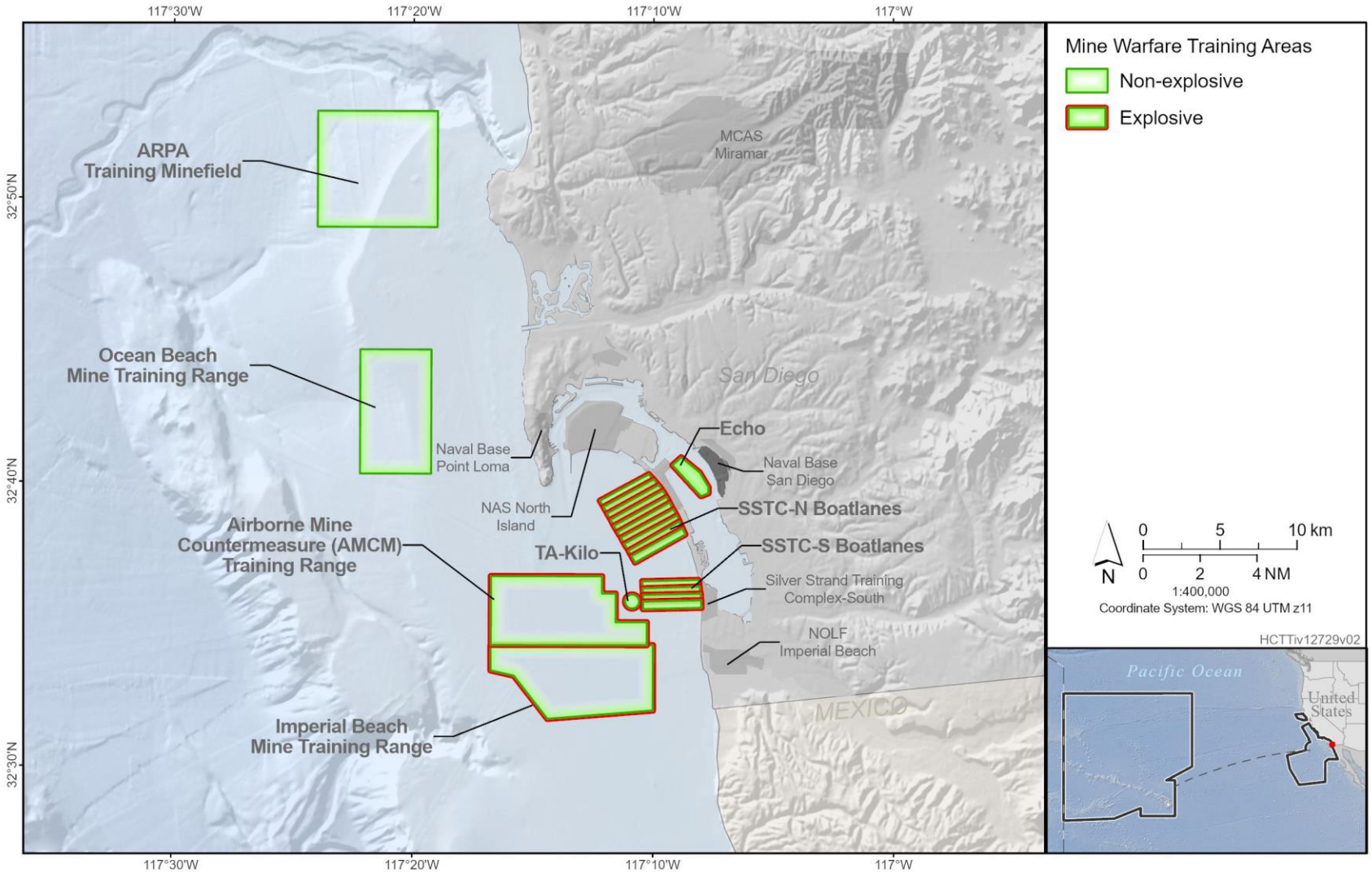


Figure H-39: San Clemente Island Offshore Training and Testing Areas

Table H-6: Silver Strand Training Complex Area Descriptions

Area Name	Area Description
Anchorages	Anchorages are numbered 101 through 178 and are 654 yards in diameter. They are grouped together in an area located primarily due west of Silver Strand Training Complex-North, east of Zuniga Jetty and the restricted areas on approach to the San Diego Bay entrance.
Bayside Training Areas	Bayside training beaches consist of Alpha, Bravo, and Charlie to the south, Delta, Echo (I-III), Foxtrot, Golf, and Hotel to the north. This area also includes the piers and Lilly Ann Drop Zone. Underwater explosives up to 0.5 pounds net explosive weight.
Lilly Ann Drop Zone	Within San Diego Bay, this area is used for a variety of Navy training, including insertion/extraction via parachute or helicopter.
Oceanside Boat Lanes	The 14 ocean training lanes are each 500 yards wide stretching 4,000 yards seaward and forming a 5,000-yard-long contiguous training area with the northern boat lanes and a 2,000-yard-long contiguous area with the southern boat lanes.
Training Area (TA) Kilo	TA Kilo is an exclusive use area for underwater detonation training. Inert bottom-laid, moored, or floating mine shapes can be used in this area.



Notes: TA = Training Area, NOLF = Naval Outlying Landing Field, NAS = Naval Air Station

Figure H-40: Nearshore In-Water Training Areas

H.2.2.3 Point Mugu Sea Range

PMSR is the Department of Defense's largest and most extensively instrumented over-water test range (Figure H-41). PMSR is located along the Pacific Coast of Central and Southern California and includes 27,000 NM^2 of air and sea space. The 27,000 NM^2 of PMSR-controlled airspace consists of 3 Restricted Areas and 11 Warning Areas. The Navy has been conducting testing and training activities on the PMSR since it was established in 1946. Testing activities are deemed necessary to accomplish Naval Air Systems Command's mission of providing for the safe and secure collection of decision-quality data; and developing, operating, managing, and sustaining the interoperability of the Major Range Test Facility Base at the PMSR into the foreseeable future.

During certain types of testing and under control of PMSR, the FAA will temporarily extend a restricted area of airspace westward beyond the defined PMSR boundaries until testing is complete. Due to the range and speed of weapons and missiles, this larger area is required to ensure a safety area in which debris or expended materials could impact outside of the PMSR with minimal risk of damage or injury to humans. PMSR supports training, testing, and evaluation of a wide variety of weapons, ships, aircraft, and specialized systems, as well as Department of Defense, Homeland Defense, foreign military sales, and commercial/private sector programs. The test range also includes portions of Naval Base Ventura County (NBVC) Point Mugu, NBVC Port Hueneme, and SNI. National Environmental Policy Act coverage of these land areas is included in the 2022 PMSR Final EIS/OEIS. In addition, sea space in the southwestern portion of PMSR has been designated to facilitate testing activities by ONR. Testing activities conducted by ONR are described in Appendix A (Activity Descriptions).

H.2.2.3.1 Naval Base Ventura County Port Hueneme

NBVC Port Hueneme is located 60 miles northwest of Los Angeles and 4 miles south of the city of Oxnard. NBVC Port Hueneme provides port and docking facilities for PMSR support ships, target surface craft, the Navy's Self Defense Test Ship, Fleet units, Naval Facilities Engineering & Expeditionary Warfare Center test vessels, and Naval Sea Systems Command unmanned surface and underwater vehicles using PMSR for testing and combat system qualification trials. NBVC Port Hueneme is also home to Naval Construction Group 1, the Seabees, who conduct important pre-deployment training in waterfront and in-water construction methods. The Study Area for this EIS/OEIS includes the port where support vessels and targets are located and transit to and from PMSR. Figure H-42 shows where within Port Hueneme Harbor the Navy would conduct pile driving activities as part of the Port Damage Repair activity.

H.2.2.3.2 San Nicolas Island

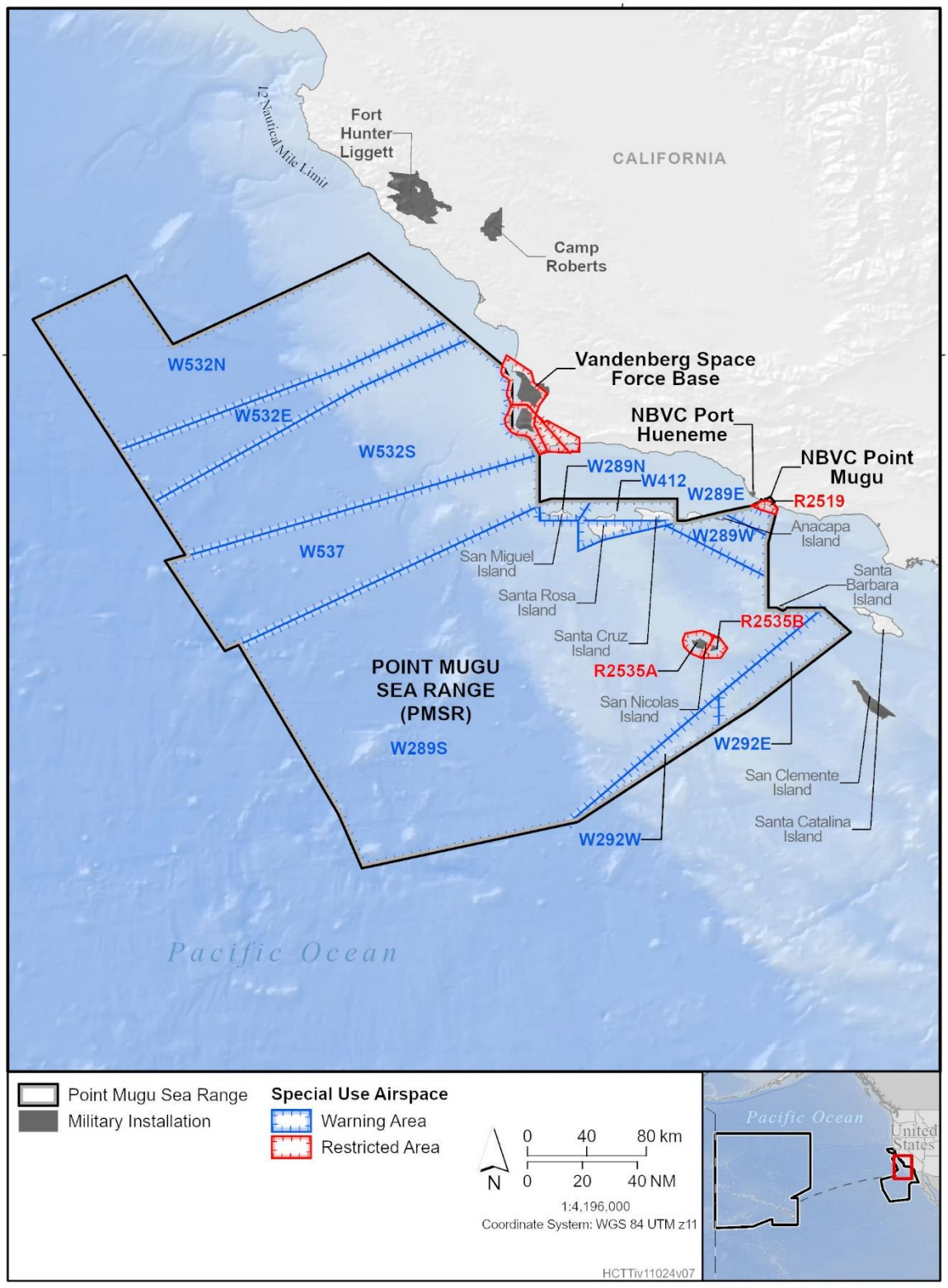
SNI is Navy owned and located approximately 62 miles southwest of Point Mugu, California (Figure H-41). The island covers a total of 13,370 acres and is approximately 9 miles long and 3.6 miles wide. Restricted airspace and corresponding surface danger zones extend out to 3 NM offshore of SNI and preclude public and commercial aircraft and vessel entry into this area when active.

Due to its remote location, SNI can be used to simulate shipboard launches of missiles and serve as a target for a spectrum of inert weapons. The island is extensively instrumented with metric tracking radar, electro-optical devices, telemetry, and communications equipment necessary to support long-range and over-the-horizon weapons and combat systems testing. SNI provides test facilities that include buildings, launch areas, and the Land Impact Site, which is the only target area on the island.

The island also includes an airfield that supports day-to-day activities, as well as a pier structure for logistics barge landings. Activities occurring on land, including at the airfield and the pier (barge landings) are not part of the Proposed Action and are not analyzed in this EIS/OEIS. However, the effects

of missiles, targets, or artillery projectiles fired from SNI in support of training and testing activities are analyzed in this EIS/OEIS due to the potential impact on pinnipeds hauled out on the coastline of SNI, in support of the Navy's request for an incidental take authorization pursuant to the Marine Mammal Protection Act for SNI launch activities. All other training and testing activities occurring from SNI are analyzed in the 2022 PMSR EIS/OEIS.

For additional description of the PMSR, see the 2022 PMSR EIS/OEIS.



Notes: NM = nautical miles, NBVC = Naval Base Ventura County

Figure H-41: The Point Mugu Sea Range

Figure H-42: Naval Base Ventura County Port Hueneme Harbor

H.2.2.4 The Northern California Range Complex

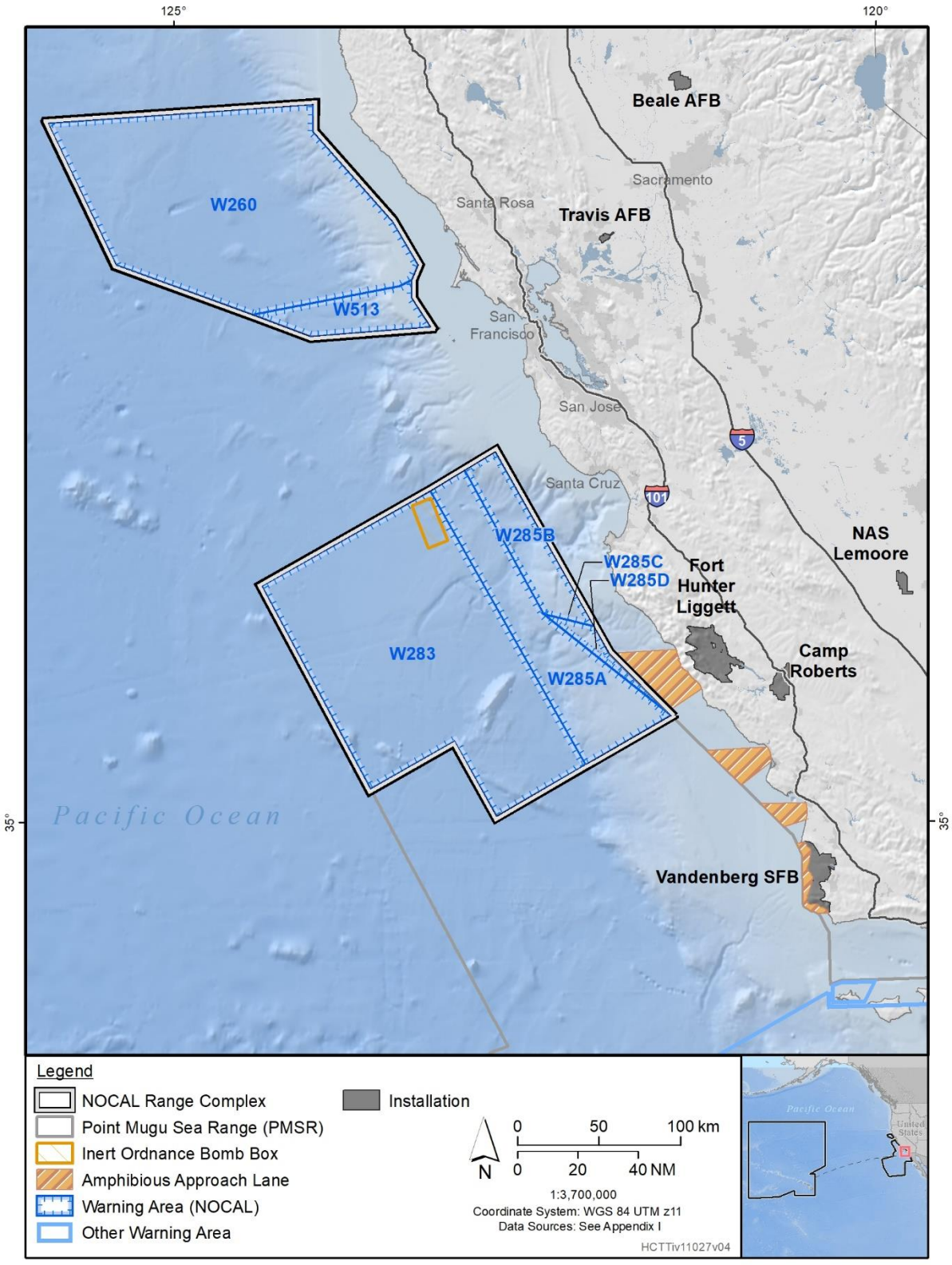
The NOCAL Range Complex consists of two separate areas located offshore of central and northern California, one northwest of San Francisco and the other southwest of Monterey Bay (Figure H-43). Each area includes special use airspace and the underlying sea space. The southern area includes approximately 10,000 NM^2 of airspace within Warning Area 283 (W283) and W285A/B/C/D. The northern area includes approximately 6,000 NM^2 of airspace within W260 and W513. Both components of the NOCAL Range Complex are located at least 12 NM from shore and extend from the ocean surface to at least 45,000 ft. altitude. W260, W283, and W513 have a ceiling of 60,000 ft.

These areas' proximity to Naval Air Station Lemoore, where the Navy's Pacific Fleet Strike Fighter squadrons are based, is particularly important for the support of critical Strike Fighter Wing training. These areas also provide air and sea space for Carrier Strike Groups[3] and Amphibious Ready Groups[4] to conduct training, certifications, and testing. As evolving naval tactics and new weapon systems strain the capacity of the SOCAL Range Complex, both PMSR and the NOCAL Range Complex give air and surface platforms the freedom to maneuver and position themselves optimally for large-scale at-sea training scenarios.

Amphibious Approach Lanes (Figure H-44) extend the Study Area from PMSR and the NOCAL Range Complex to the shore to facilitate amphibious training at these locations. Amphibious approach lanes are used by amphibious assault landing craft to approach and land on a beach to move personnel and equipment from ship to shore. In this EIS/OEIS, only the at-sea components of amphibious warfare activities utilizing the amphibious approach lanes (e.g., amphibious assault) are analyzed.

[3] A Carrier Strike Group is an operational composition of combat ships and aircraft, centered around an aircraft carrier.

[4] An Amphibious Ready Group is an operational composition of combat ships, aircraft, and Marines, centered around several amphibious ships.



Notes: NOCAL = Northern California, SFB = Space Force Base, AFB = Air Force Base, NAS = Naval Air Station

Figure H-43: Northern California Range Complex

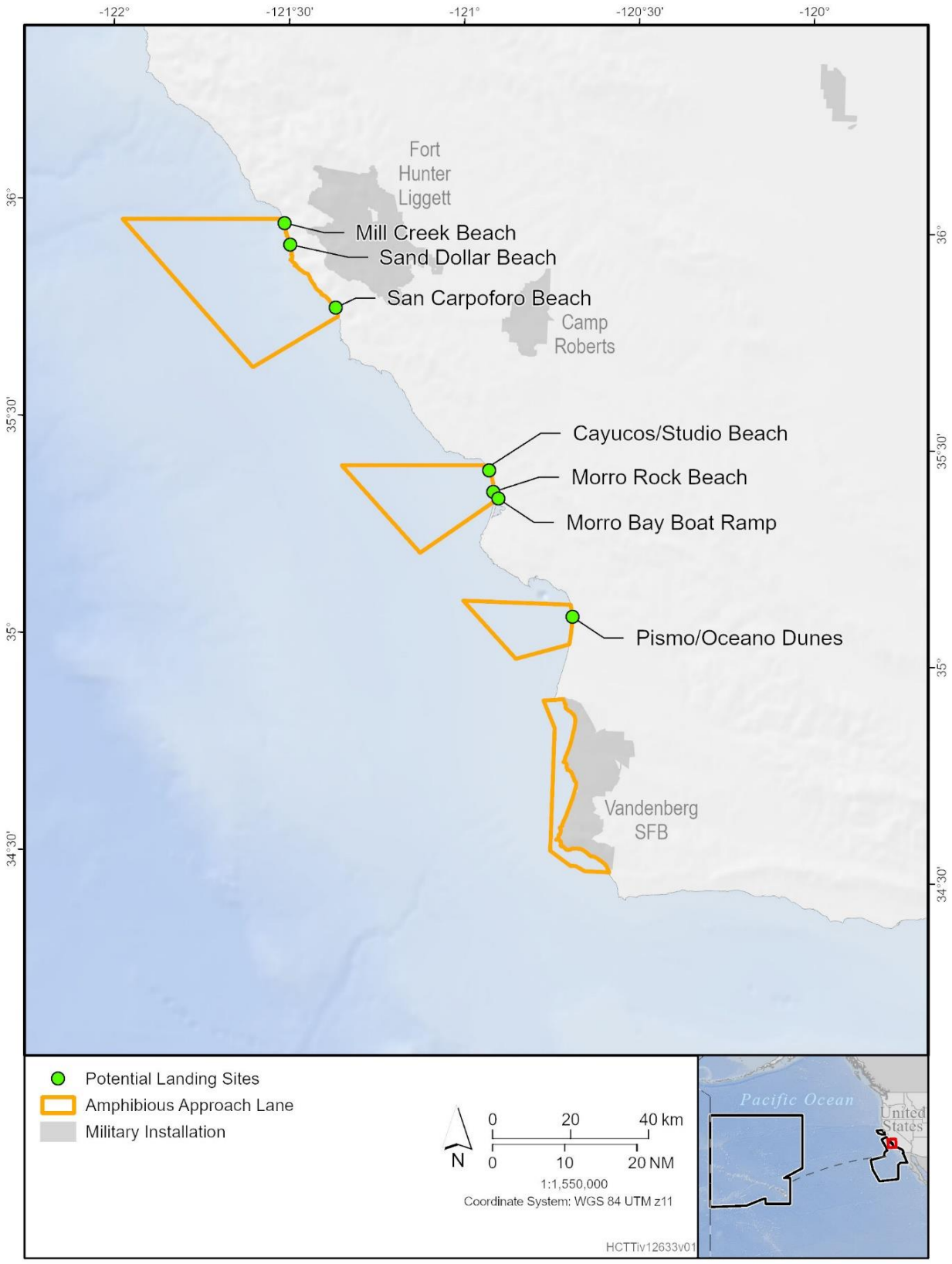


Figure H-44: Amphibious Approach Lanes