

Environmental Impact Statement/ Overseas Environmental Impact Statement Hawaii-California Training and Testing

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3.10 Cultural Resources

CULTURAL RESOURCES SYNOPSIS

Stressors to cultural resources that could result from the Proposed Action were considered, and the following conclusions have been reached for the Preferred Alternative (Alternative 1):

- Explosive: Explosive stressors resulting from underwater explosions creating shock waves and cratering of the seafloor would not result in any adverse effects on known submerged cultural resources because such activities only occur at the surface or, if underwater, in specific detonation areas where no known cultural resources are present. Additionally, the military routinely avoids known cultural resources.
- Physical Disturbance and Strike: Physical disturbance and strike stressors resulting from in-water devices, military expended materials, seafloor devices, and pile driving activities would not result in any adverse effects on known or unknown submerged cultural resources for the following reasons:
 - Vessels and in-water devices are routinely operated in a way that avoids submerged cultural resources.
 - MEM would likely be small in size and would diffuse as they descended through the water column, making any potential effects on submerged cultural resources unlikely.
 - Seafloor devices are only deployed in specific areas where no known cultural resources are present. Additionally, the military routinely avoids known cultural resources.
 - Pile driving activities are only conducted in a portion of the Study Area where no known cultural resources are present.

Therefore, effects on submerged cultural resources are expected to be less than significant.

3.10.1 Introduction

The following section describes the cultural resources within the Study Area and evaluates the potential effects of the proposed at-sea military readiness activities on them. Submerged cultural resources are found throughout the Study Area. The approach for the assessment of submerged cultural resources includes defining the resource; presenting the regulatory requirements for the identification, evaluation, and treatment within established jurisdictional parameters; establishing the specific resources subtypes in the Study Area; identifying the data used to define the current conditions; and providing the method for effect analysis.

The approach to identifying cultural resources for this HCTT EIS/OEIS involved identifying submerged cultural resources in the Study Area, which includes the expanded SOCAL Range Complex, the SSTC, the PMSR, the NOCAL Range Complex, the Hawaii Range Complex, and the temporary operating area. Land components are excluded from this EIS/OEIS, except for acoustic impacts on pinnipeds from ongoing land-based launch activities at SNI and PMRF, which are considered for MMPA authorization.

Cultural resources are the physical evidence or places of human activities that are considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural

resources include archaeological resources, architectural resources, and traditional cultural properties related to pre-contact (prior to European contact) and post-contact periods. Historic properties, as defined by the National Historic Preservation Act (NHPA), are prehistoric or historic districts, sites, buildings, structures, or objects (including remains, records, and artifacts) that are listed on, or eligible to be listed on, the National Register of Historic Places (NRHP) as defined under 36 CFR section 60.4(a)–(d).

In general, effects are assessed by the potential effects on the resource, the sensitivity of the resource to the proposed activities, and the duration of the effects on the environment. These regulatory requirements and methods are consistent with those analyzed in the 2018 HSTT and 2022 PMSR EIS/OEISs.

3.10.2 Affected Environment

The affected environment provides the context for evaluating the effects of the proposed at-sea military readiness activities on cultural resources. The affected environment includes the HCTT Study Area within 12 NM from shore. Submerged cultural resources, cultural resources identified underwater, have been documented in offshore areas throughout the HCTT Study Area.

Submerged cultural resources include shipwrecks, sunken airplanes, and other submerged historical material as well as submerged precontact cultural material. Additional resources within the Study Area could include traditional cultural properties and practices, which are resources and practices associated with beliefs and cultural practices of a living culture, subculture, or community, as described in Section 3.10.2.5.

No specific procedures for the identification and protection of cultural resources in areas more than 12 NM from shore have been defined by the international community (Zander & Varmer, 1996). In accordance with NHPA (54 U.S.C. 307101(e)) the effects on undertakings outside the United States that may directly and adversely affect a property on the World Heritage List must be taken into account. In this case, the World Heritage List was reviewed, and it was determined that no listings were present within the California Study Area beyond 12 NM to require further account of effects of the undertaking. Therefore, submerged resources beyond 12 NM will not be considered further, except in the areas specified below.

3.10.2.1 Submerged Prehistoric Resources

3.10.2.1.1 Hawaii

Submerged prehistoric resources could be present in the waters surrounding the Hawaiian Islands. These resources primarily consist of submerged artifacts such as fishing hooks, lure weights, and canoe anchors, as well as old shoreline features, such as fishponds.

Hawaiian fishponds, or *loko ia*, exemplify the endemic traditional aquacultural practices of the Native Hawaiians and thus are culturally significant. Fishponds could be used in coastal, nearshore, or inland environments and were productive, low-maintenance systems that cultivated many different species of fresh water and saltwater plants and animals. Previous surveys determined that there were up to 488 fishponds throughout the Hawaiian archipelago, with some of the remaining structures dating back to the 15th century (Hawaii Department of Land and Natural Resources, 2013). Although many historical fishponds have been degraded and destroyed, recent decades have witnessed a resurgence in preservation for those that remain, particularly for sites that are under the purview of *Konohiki* (traditional resource managers), individuals, or families. In some cases, identifying details and location information for fishpond sites were not disclosed during Section 106 consultations due their sensitivity

(54 U.S.C. section 307103) (Van Tilburg & Delgado, 2017). For purposes of this EIS/OEIS, only coastal fishponds (loko kuapa and loko umeiki) were analyzed for potential effect from the Proposed Action; fishponds that were in nearshore or inland environments will not be analyzed in this document.

No effect from the Proposed Action is expected on these properties because they are in waters that are too shallow for most ships to safely navigate, and they are in coastal environments not used for training and testing.

3.10.2.1.2 California

Submerged prehistoric cultural resources within the California Study Area may include Paleocoastal and Archaic archaeological sites in waters near island and southern coastal areas of the Study Area. These sites are most likely to occur nearshore within water depths of 100 m below mean high tide, reflecting the range of sea level rise that has occurred since people first settled island and coastal California. However, many of these sites would not have been preserved as the encroaching ocean inundated, reworked, and redeposited sediments. Approximately 110 submerged artifacts and sites from the Archaic period that have been identified in Southern California (Masters & Schneider, 2000a). Prehistoric cultural materials, such as stone bowls and mortars, have been found off the coast of San Diego County (Masters & Schneider, 2000b). A concentration of this cultural material is located off La Jolla and Point Loma and within the California Study Area; however, proposed activities would not occur in these areas (Masters, 2003).

PaleoIndian and Archaic period sites may occur on the continental shelf off the northern coast of California. However, much less is known about such sites as compared to the sites from these periods in Southern California and the Channel Islands. There is a recognized potential for the remains of prehistoric and historic sites, isolated artifacts, and Native American watercraft to be present offshore, although there is a lower potential for their preservation in-situ. At this time, no maritime finds of prehistoric origin are recorded within the NOCAL Range Complex.

3.10.2.2 Known Wrecks, Obstructions, Occurrences, or “Unknowns”

Freighters, tankers, ships-of-war, passenger ships, submarines, and fishing vessels have been sunk, lost, or run aground within the Study Area. Natural activities and features have played important roles in creating submerged historic-era cultural resources; those include powerful currents, winds, rough seas, and coastal topography.

3.10.2.2.1 Hawaii

Hundreds of submerged cultural resources lie in the open, deep waters surrounding the Hawaiian Islands; typical among these are wrecks of World War II submarines and ships, commercial fishing vessels and tankers, and aircraft. The most likely types of shipwrecks to occur around the Hawaiian Islands are 19th century cargo ships, submarines, old whaling and merchant ships, fishing boats, 20th century U.S. warships, and recreational crafts. Shipwrecks recorded around the Hawaiian Islands are depicted in Figure 3.10-1. The Automated Wreck and Obstruction Information System, Region 16 (2010) records the approximate locations of some deep-water submerged shipwrecks. Wrecks that were intentionally sunk to serve as artificial reefs or as a military target are not eligible to be placed on the NRHP.

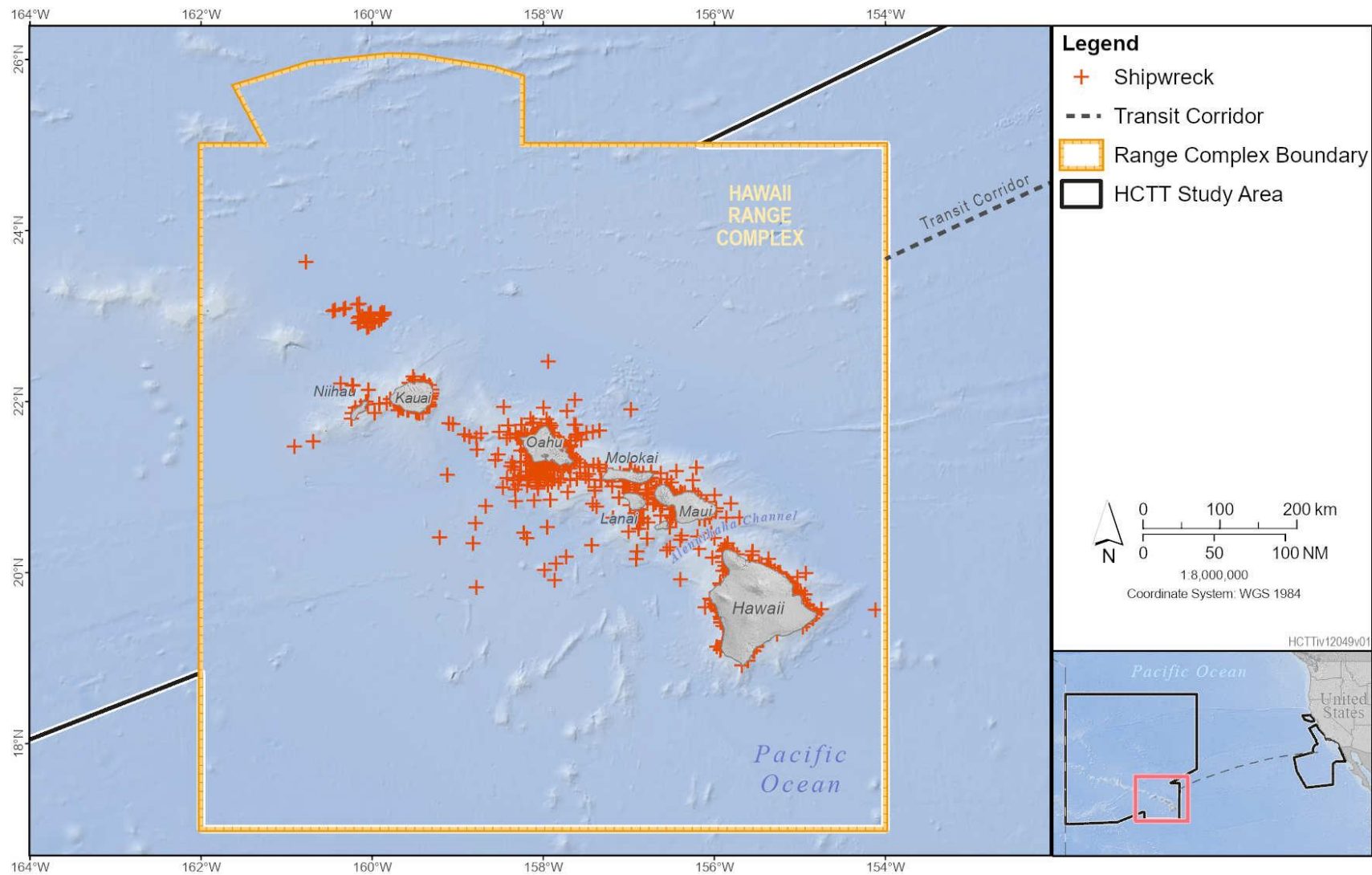


Figure 3.10-1: Known Shipwrecks Within the Hawaii Study Area

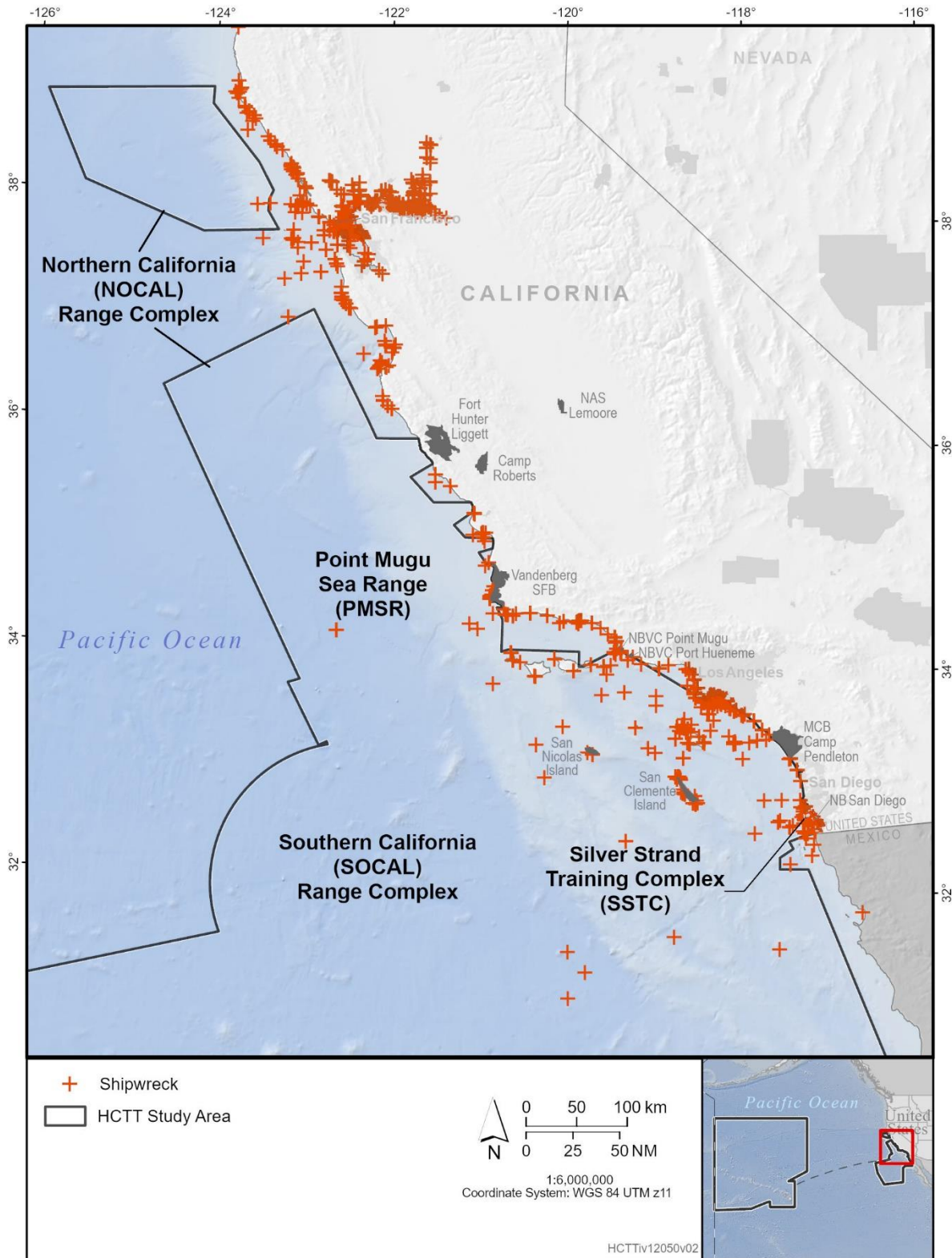
Shipwrecks located near the Island of Hawaii are concentrated along the northwestern coastline and within Hilo Bay. The Hawaii Study Area contains the sites of two major World War II exchanges: Pearl Harbor and the Battle of Midway. The Papahānaumokuākea Marine National Monument boundaries include the Midway Atoll, which has been designated as a National Memorial to the Battle of Midway. Aircraft and shipwrecks that are sunken from the Battle of Midway are considered war graves. None of the sunken sites from the battle that are currently known are eligible for listing on the NRHP. The Papahānaumokuākea Marine National Monument was inscribed to the World Heritage List in 2010, becoming the first U.S. site to be listed for the significance of its cultural and natural resources.

3.10.2.2.2 California

Thousands of vessels of varying types and descriptions have sunk off the coast of California (Figure 3.10-2). Various databases of these shipwrecks have been compiled, including the Automated Wreck and Obstruction Information System database, which collected data up until 2016 (National Oceanic and Atmospheric Administration, 2017). As part of a Minerals Management Service study (Minerals Management Service, 1990), a database was compiled that documents 4,676 shipwrecks off the coast of California, with 876 wrecks in Southern California. The California State Lands Commission maintains a list of known shipwrecks in state waters and documents at least 384 known wrecks within the coastal counties of San Diego, Orange, Los Angeles, Ventura, Santa Barbara, and San Luis Obispo counties (Automated Wreck and Obstruction Information System Database, 2010). The SSTC, SOCAL Range Complex, PMSR, and proposed amphibious approach lanes, located along the coast of PMSR and the southern portion of the NOCAL Range Complex, could also contain submerged archaeological sites on the continental shelf within 12 NM from shore, although none have been documented.

Southern California Range Complex

Known submerged cultural resources within the SOCAL Range Complex include 174 shipwrecks. Submerged cultural resources in the waters around SCI include pleasure craft, sport and commercial fishers, and cargo and military vessels (U.S. Department of the Navy, 2008). Twenty-two submerged cultural resources are within 12 NM of SCI, and seven are beyond the territorial limit. Figure 3.10-3 illustrates known shipwrecks near SCI. Additional submerged cultural resources in the area include 17 aircraft, an anchor, and the abandoned Sea Lab (an old Navy asset).



Notes: HCTT = Hawaii-California Training and Testing

Figure 3.10-2: Known Shipwrecks Within the California Study Area

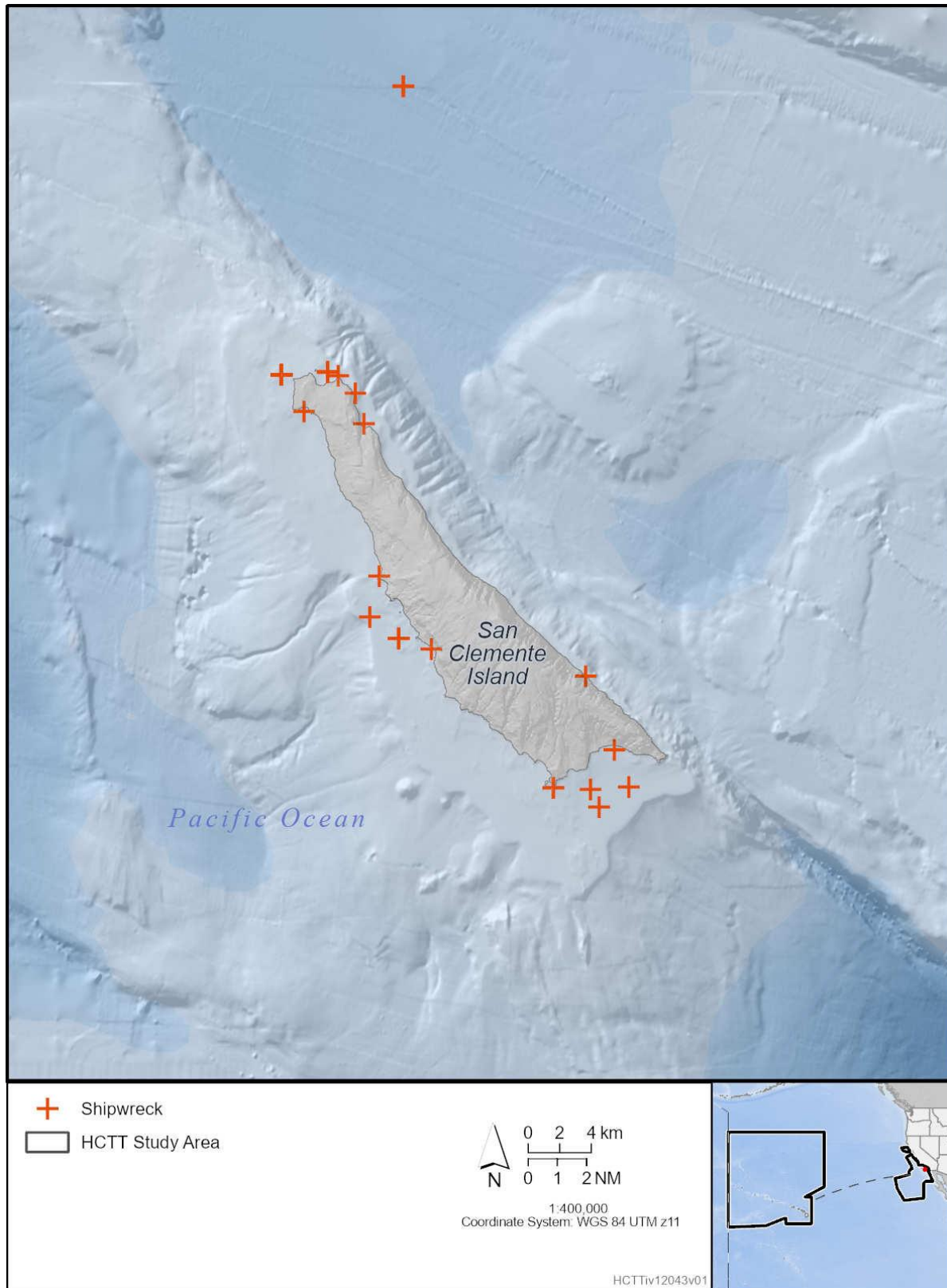


Figure 3.10-3: Known Shipwrecks Around San Clemente Island

Silver Strand Range Complex

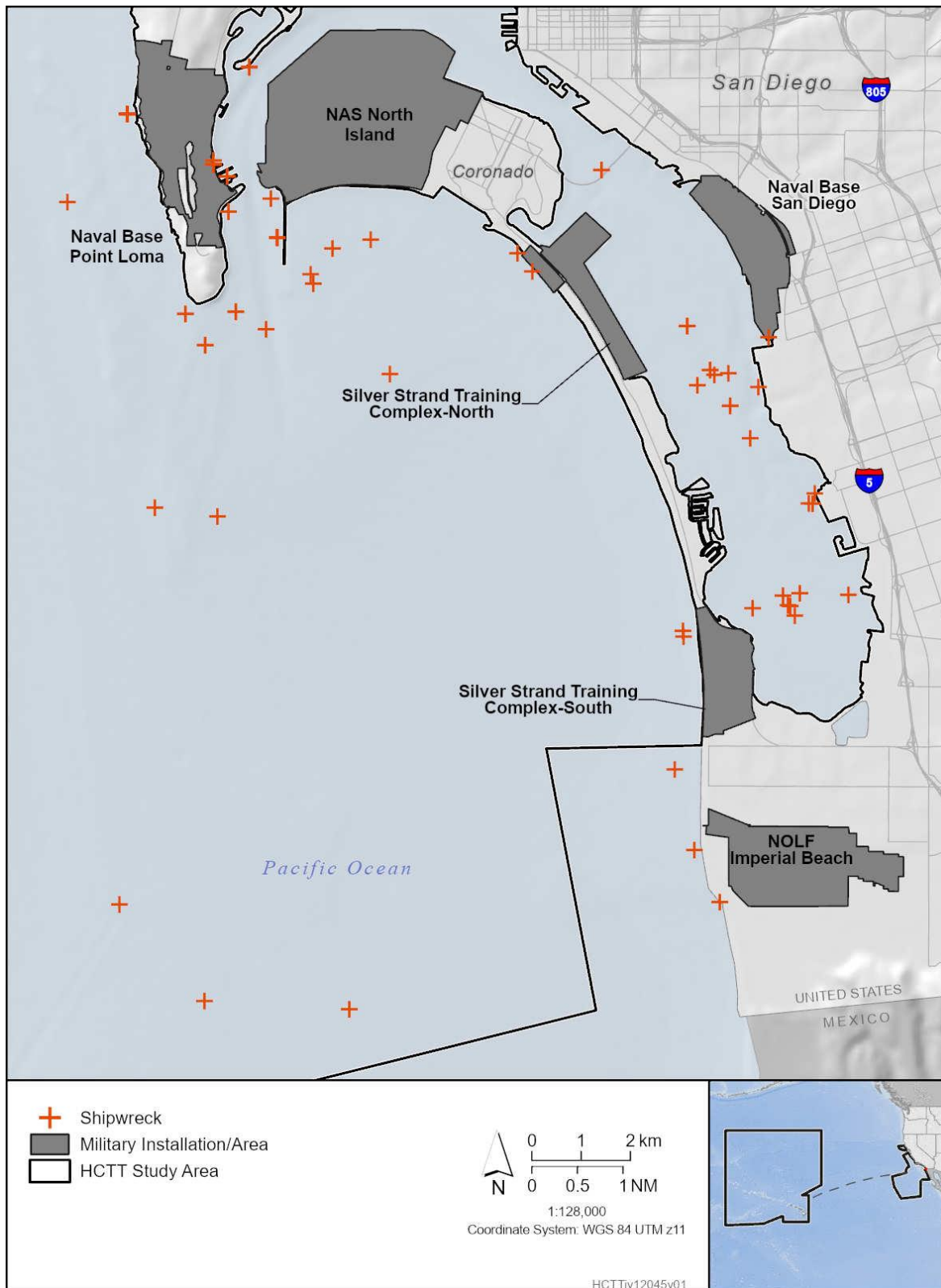
Submerged cultural resources are found on the bay and ocean sides of the SSTC. On the bay side of the Silver Strand peninsula, three shipwrecks are in or near the training beaches. Unnamed wrecks are recorded in shallow water at the northern end of Delta South beach, in the middle of San Diego Bay, and at the mouth of Fiddler's Cove. The ages and cultural value of these wrecks are not known (U.S. Department of the Navy, 2008). On the ocean side of the peninsula, three shipwrecks are located near the Silver Strand Training Complex training areas: the bark (a three- or four-masted sailing vessel) Narwhal (sank in 1934), the submarine S-37 (SS-142) which was decommissioned and sunk as target in 1945, and the subchaser YC689 (sank in 1943). The destroyer USS Hogan (DD178), a military aircraft (S2F Tracker), and a sunken sailboat are located offshore, south of the Silver Strand Training Complex and west of the City of Imperial Beach (U.S. Department of the Navy, 2008). Cultural resources in San Diego Bay were reviewed for the San Diego Deepening at Tenth Avenue Marine Terminal project. This review identified three known submerged cultural features: a shipwreck (the Della), an 1887 marine utility cable, and a sunken Ford Model T. Twenty-four shipwrecks were identified with unknown locations, but known to be lost in the San Diego area, including schooners, barges, a submarine, clippers, gas and oil screws, a yacht, a bark, a ferry, a ship, and a steamer. Figure 3.10-4 illustrates known shipwrecks in the vicinity of the SSTC.

Point Mugu Sea Range

Shipwrecks and planes comprise all of the documented submerged cultural resources within the PMSR. There are 195 shipwrecks known to have occurred within the PMSR, 129 of them with plottable coordinates (Morris & Lima, 1996; U.S. Department of the Navy, 1999). The largest number of shipwrecks found within the PMSR is near Santa Rosa Island, in the vicinity of Talcott Shoal, Sandy Point, Bee Rock, East Point, and Becher's Bay. Thirty-two shipwrecks are known to have occurred within the vicinity of SNI (U.S. Department of the Navy, 2010) (Figure 3.10-5). These wrecks include fishing boats, barges, yachts, cargo carriers, passenger ships, freighters, and target ships. In many cases, although a shipwreck is known to have occurred and its general coordinates are known, no wreckage has been located.

Known sunken military watercraft and aircraft losses within the PMSR include 31 sunken military watercraft and 92 aircraft losses (U.S. Department of the Navy, 2020). Two of the listed shipwrecks occurred before 1920, seven of the shipwrecks were involved in the 1923 Honda Point disaster, and 22 were listed as targets as part of fleet reductions.

The 92 identified aircraft losses (military and non-military) all occurred before 1951, with 87 of those losses occurring during the 1942–1945 period, and 63 were identified as possibly occurring within the PMSR. Precise locational data was not recorded; it is unclear whether or not any aircraft were salvaged.



Notes: NAS = Naval Air Station, NOLF = Naval Outlying Landing Field, HCTT = Hawaii-California Training and Testing

Figure 3.10-4: Known Shipwrecks Around the Silver Strand Peninsula

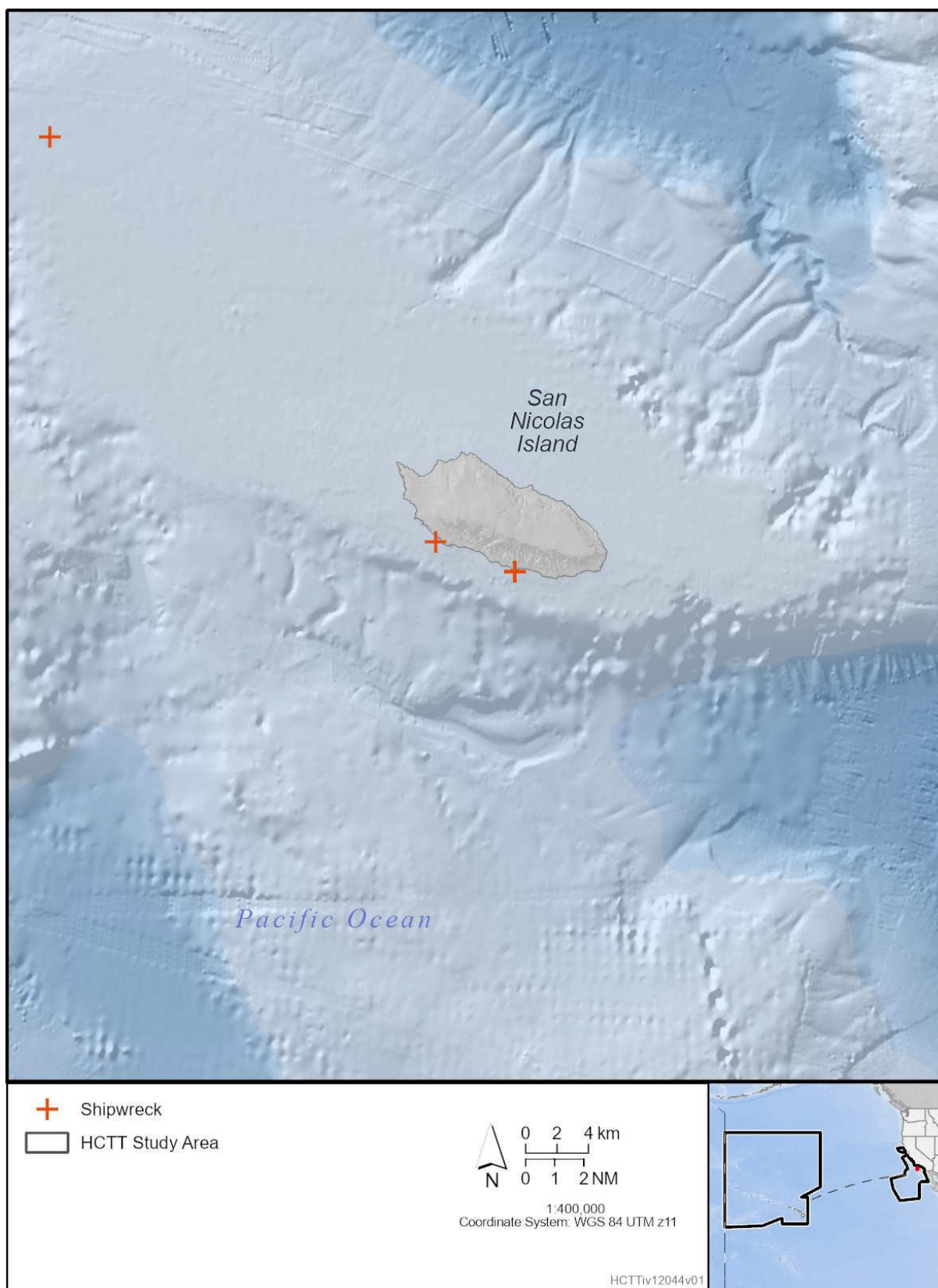


Figure 3.10-5: Known Shipwrecks Around San Nicolas Island

There are several identified cultural resources located within the proposed amphibious approach lanes within PMSR, including three destroyed wharf sites that have remnant components such as pilings on or below the mean highwater mark. The shipwreck of the SS Yankee Blade is located off the coast of Vandenberg Space Force Base and has been listed in the NRHP (as depicted in Figure 3.10-6 and detailed in Section 3.10.2.3.2).

Northern California Range Complex

A limited number of submerged cultural resources have been identified within the NOCAL Range Complex. While the tidal and submerged lands in the vicinity of the NOCAL Range Complex, to include the Point Reyes National Seashore, Golden Gate National Recreation Area, and the Greater Farallones National Marine Sanctuary, contain approximately 151 shipwrecks, only 3 are documented within or immediately adjacent to the NOCAL Range Complex boundary.

The Automated Wreck and Obstruction Information System database (Automated Wreck and Obstruction Information System Database, 2010) documents a single shipwreck (record 50767) located during an expedition to the Cordell Banks in 1981, in the northernmost section of the NOCAL Range Complex, and two shipwrecks on the northern boundary of the southernmost portion of this range (Figure 3.10-7). The locational accuracy for all three wrecks is recorded as low.

No cultural resources have been identified within the proposed amphibious approach lanes in the southern portion of the NOCAL Range Complex.

3.10.2.3 Cultural Resources Eligible for or Listed on the National Register of Historic Places

3.10.2.3.1 Hawaii

There are 10 properties in the State of Hawaii that are listed on the NRHP (Table 3.10-1)(Figure 3.10-8). Pearl Harbor, which is also listed on the NRHP as a National Historic Landmark (16 U.S.C. 470a [a][1]), contains an abundance of submerged cultural resources associated with World War II. Major shipwrecks include the USS Arizona and the USS Utah, both of which are listed on the NRHP. The whaleship Two Brothers, located in the Northern Hawaiian Islands encompassed by the Papahānaumokuākea Marine National Monument, is listed on the NRHP.

Hanalei Pier, located on the northern shore of Kauai, is listed on the NRHP for its association with the rice industry in Hawaii.

There are several extant fishponds that have been listed on the NRHP. Heeia, Huilua, and Kahaluu fishponds are on the eastern shore of Oahu, and Okiokilepe fishpond is located within Pearl Harbor on the southwestern side of Oahu. Kalepolepo fishpond is on the western shore of Maui. The fishponds consist of a seawall barrier, the condition of which varies by site.

No effect from the Proposed Action is expected on the fishponds or pier because they are in waters that are too shallow for most ships to safely navigate, or they are in coastal environments not used for training and testing.

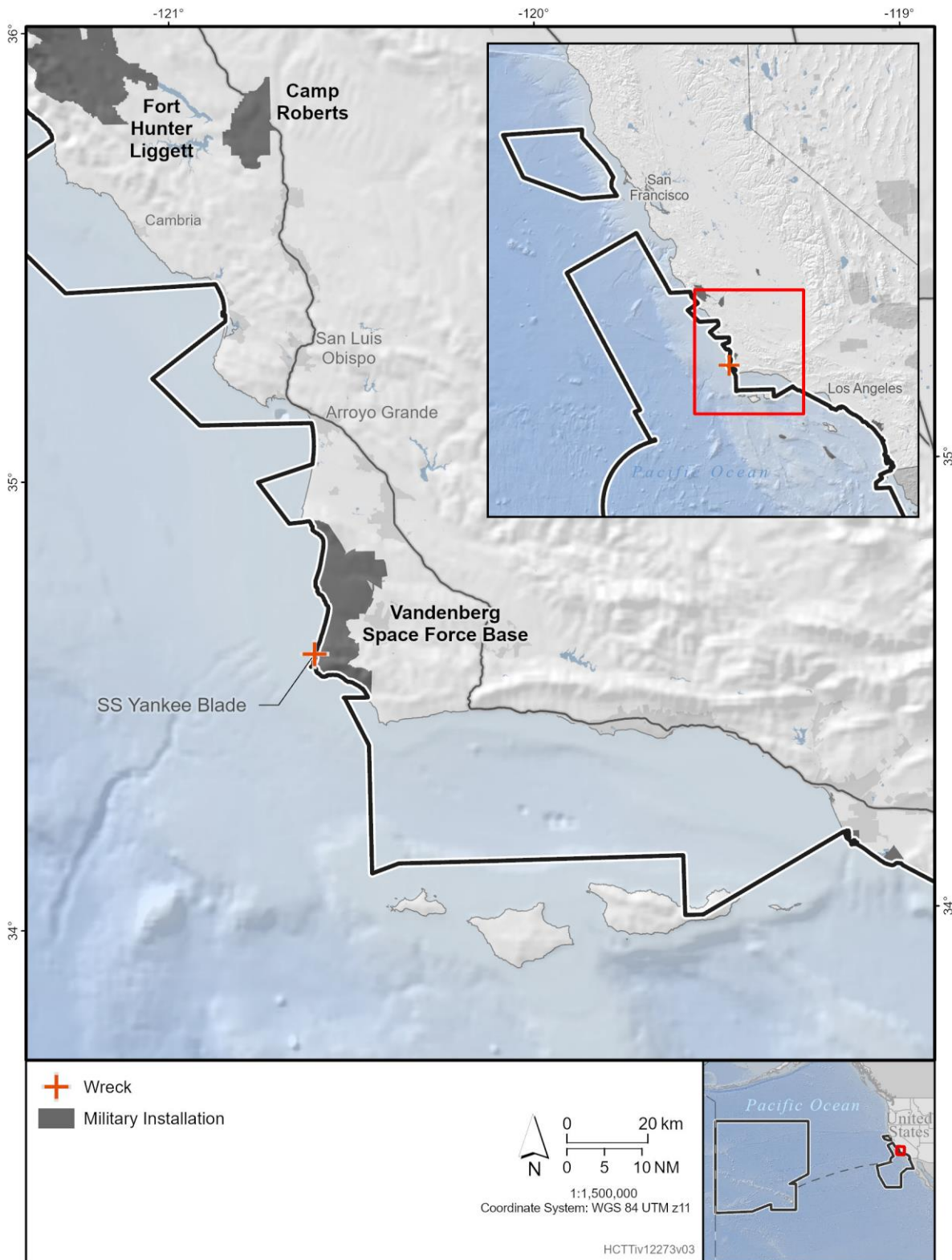


Figure 3.10-6: Properties Listed on the National Register of Historic Places Within the California Study Area

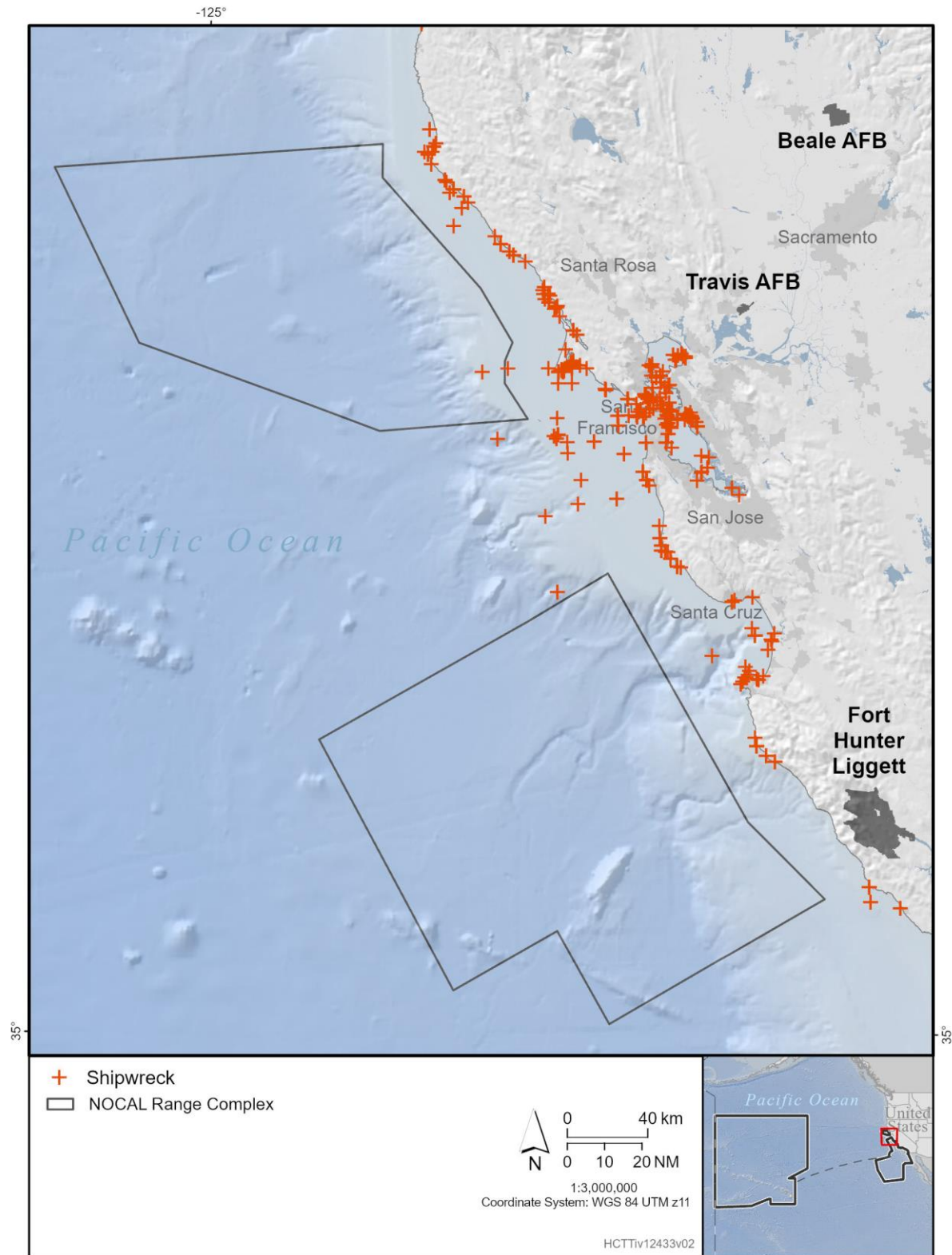


Figure 3.10-7: Known Shipwrecks in the Vicinity of the NOCAL Range Complex

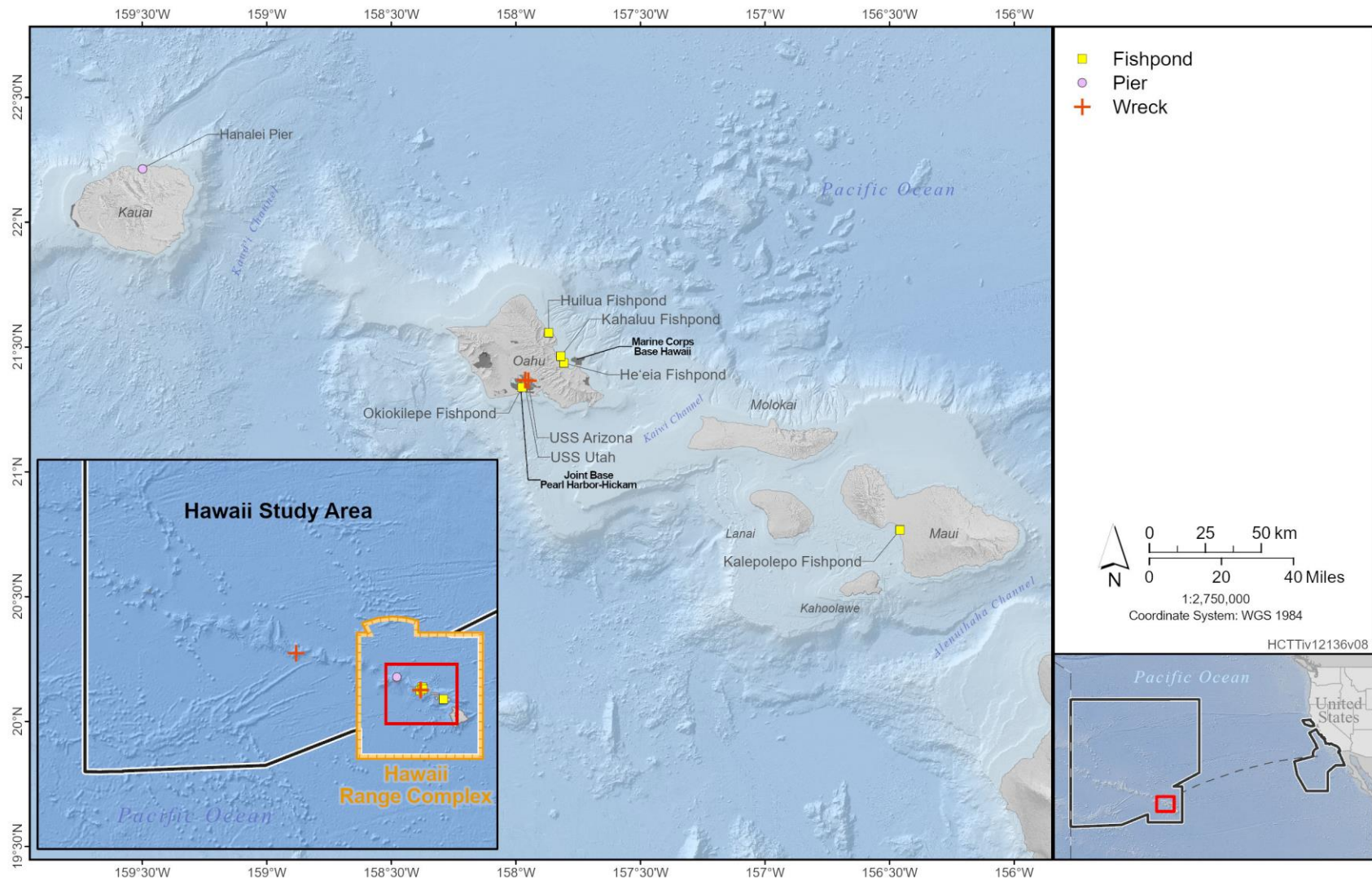


Figure 3.10-8: Properties Listed on the National Register of Historic Places Within the Hawaii Study Area

3.10.2.3.2 California

Based on a literature search and previous consultations, the California Study Area contains one NRHP-listed site (Table 3.10-1, Figure 3.10-6). The S.S. Yankee Blade was a three-masted side-wheel steamship which struck a rock off Point Pedernales during a heavy fog on October 1, 1854, while en route from San Francisco to Panama. The S.S. Yankee Blade was listed on the NRHP May 16, 1991. The wreck is located in approximately 75 feet of water in an area that is known for hazardous sea conditions, making it unlikely that training and testing activities would be conducted in the area. One historic period archaeological site, CA-SBA-3574H, includes a remnant of a concrete feature possibly dating to the Camp Cooke period (1941–1958) of Vandenberg Space Force Base; a portion of the feature wall extends to the beach below the mean high-water mark. The site has not been evaluated for inclusion on the NRHP. The military uses sonar in navigation and seafloor maps to avoid submerged cultural resources. Therefore, the Proposed Action will have no effect on these cultural resources.

As described in Chapter 2, this EIS/OEIS analyzes at-sea military readiness activities. SNI and SCI have been identified as Traditional Cultural Properties and part of a Traditional Cultural Landscape in previous consultations with tribes; however, they are not part of the Study Area, and no new land-based training and testing activities are proposed. SNI land activities continue to be covered under the 2022 PMSR EIS/OEIS. Tribal, State Historic Preservation Office (SHPO), and Advisory Council on Historic Preservation consultation for PMSR EIS/OEIS was completed in September 2021.

3.10.2.4 World Heritage Sites

3.10.2.4.1 Hawaii

The Hawaii Study Area contains one World Heritage Site, the Papahānaumokuākea Marine National Monument (refer to Chapter 6, Figure 6-4). This area encompasses 583,000 square miles of ocean and 10 islands and atolls northwest of Kauai. This World Heritage Site is the single largest fully-protected conservation area in the United States (bigger than all U.S. National Parks combined), and one of the largest marine conservation areas in the world. Attributes of the Papahānaumokuākea Marine National Monument that contribute to its cultural significance include notable features such as seamounts and submerged banks, coral reefs, and lagoons. The monument is significant to the cultural heritage of the Native Hawaiians not only for the unique ecosystem and geological features, but also voyaging and wayfinding. Wayfinding, which relies on celestial, biological, and natural signs, plays an important role within the cultural voyaging seascape of the Hawaiian Archipelago. Further details of the Papahānaumokuākea Marine National Monument and the Proposed Papahānaumokuākea National Marine Sanctuary are described in Sections 6.1.2.2.2 and 6.1.2.2.4.7, respectively.

3.10.2.4.2 California

The California Study Area contains no World Heritage Sites.

3.10.2.5 Traditional Cultural Practices in Hawaii

Traditional cultural practices may be implemented within the Hawaii Study Area and are described below. Such practices are not defined or protected under the NRHP.

Traditional Hawaiian cultural resources, such as ko'a (fishing areas and stone markers for fishing grounds), and freshwater seeps are located in the nearshore waters. Since these sites are considered sacred and secret, their locations were not disclosed during past consultations. Traditional Hawaiian settlements along the coast focused on the ocean and collection of its resources, and Native Hawaiians view their relationship to all things living as connected; this includes the plants and animals that live in

the mountains, those that live in and along the streams, and the sea creatures that live in the waters that flow into the ocean. Na aumakua are deities who Native Hawaiians believe they are connected to through their family lineage. Aumakua may manifest as animals, places, plants, and even other people. The relationship Native Hawaiians have with their aumakua is described as symbiotic; caring for or providing tribute to one's aumakua in turn brings comfort and protection, and can even bring vengeance on those who menace the aumakua's kin. Native Hawaiians who participated in Section 106 consultation for past EISs were concerned about any harm the Proposed Action would bring to the natural world, including harm to Kanaloa, who manifests as the ocean itself.

Military readiness activities within the Hawaii Study Area are believed by Native Hawaiians to hinder their cultural beliefs and their ability to practice cultural traditions. The presence of naval ships is believed to alter the behavior of marine life in traditional fishing grounds. It is said to affect not only traditional fishing methods, but also the manner that fishing is taught to younger generations. In addition, military readiness activities utilizing sonar or explosives may negatively affect their cultural interactions with marine life. Due to the close relationship Native Hawaiians have with aumakua living in the ocean, Native Hawaiians believe they are able to sense distress felt by marine life due to in-water military readiness activities. The presence of military warships and submarines in the waters around Hawaii is viewed as causing an elemental imbalance in nature. The military's presence in and around the Hawaiian Islands is also viewed as disrespectful and in contrast to the Native Hawaiian belief that they are a peaceable and neutral nation. During past consultations, it was consistently conveyed that military readiness activities in waters within the Study Area causes the Native Hawaiians emotional and at times physical distress.

Table 3.10-1: National Historic Landmarks, Monuments, and Cultural Resources Eligible for or Listed on the National Register of Historic Places Within the HCTT Study Area

Resource	Location	Description	National Register of Historic Places	Reference Number	National Historic Landmark/ Monument	Reference
Okiokilepe Pond	HI Study Area (Oahu)	Native Hawaiian Fishpond	Listed	73000673	No	(National Park Service, 2023b)
Heeia	Oahu	Native Hawaiian Fishpond	Listed	73000671	No	(National Park Service, 2023b)
Huilua	Oahu	Native Hawaiian Fishpond	Listed	66000295	No	(National Park Service, 2023b)
Kahaluu	Oahu	Native Hawaiian Fishpond	Listed	73000668	No	(National Park Service, 2023b)
Kalepolepo	Maui	Native Hawaiian Fishpond	Listed	96001503	No	(National Park Service, 2023b)
Hanalei Pier	Kauai	Pier	Listed	79000757	No	(National Park Service, 2023b)
Pearl Harbor	HI Study Area (Oahu)	Strategic Naval Base and site of the December 7, 1941, attack by the Japanese in WWII.	Listed	66000940	Yes	(National Park Service, 2023b)

Table 3.10-1: National Historic Landmarks, Monuments, and Cultural Resources Eligible for or Listed on the National Register of Historic Places Within the HCTT Study Area (continued)

Resource	Location	Description	National Register of Historic Places	Reference Number	National Historic Landmark/Monument	Reference
Two Brothers Shipwreck	HI Study Area (Northern Hawaiian Islands)	Whaling Ship, 1818–1823	Listed	100001416	No	National Park Service (2023a); (National Park Service, 2023b), (National Oceanic and Atmospheric Administration, 2021)
USS Arizona	HI Study Area (Pearl Harbor, HI)	U.S Battleship, 1916–1941	Listed	89001083	Yes	(National Park Service, 2023b)
USS Utah	HI Study Area (Pearl Harbor, HI)	U.S. Battleship, 1911–1941	Listed	89001084	Yes	(National Park Service, 2023b)
SS Yankee Blade	CA Study Area (Central Coast)	Steamship 1853–1854	Listed	91000564	No	(National Park Service, 2023b)

* An ethnographic study for SNI and SCI is underway.

Notes: CA = California, HI = Hawaii, USS = United States Ship, SS = Steamship, SNI = San Nicolas Island, SCI = San Clemente Island

3.10.2.6 Resources with Sovereign Immunity

Sovereign immunity is a principle of international law which recognizes each nation's sovereignty over its warships and vessels that are owned or operated by the nation for non-commercial service. Additional regulations and guidelines for submerged historic resources include 10 U.S.C. section 113, Title XIV for the Sunken Military Craft Act; *Abandoned Shipwreck Act Guidelines*, prepared by the National Park Service (National Park Service, 2007); and, for purposes of conducting research or recovering Navy ship and aircraft wrecks, *Guidelines for Archaeological Research Permit Applications on Ship and Aircraft Wrecks under the Jurisdiction of the Department of the Navy* (36 CFR part 767) overseen by the Naval History and Heritage Command. The Sunken Military Craft Act does not apply to actions taken by, or at the direction of, the United States. In accordance with the Abandoned Shipwreck Act of 1987, abandoned shipwrecks in state waters are considered the property of the U.S. government if the shipwreck meets the criteria for inclusion in the NRHP. However, the federal government may transfer the title of an abandoned shipwreck to the state if the shipwreck falls within the jurisdiction of the state (Barnette, 2010). Warships or vessels owned or operated by a state for non-commercial purposes at the time of their sinking retain sovereign immunity (e.g., Japanese freighters). Consistent with the principle of sovereign immunity, foreign warships sunk in U.S. territorial waters are protected by the U.S. government, which acts as custodian of the sites in the best interest of the sovereign nation (Neyland, 2001). In addition, the National Park Service Archeology Program, developed as a result of a Presidential Order, includes a collection of historical and archaeological resource protection laws to which federal managers adhere.

3.10.2.6.1 Hawaii

The Hawaii Study Area contains at least one resource with sovereign immunity. A World War II-era Japanese Midget "A" submarine was sunk by the USS Ward 90 minutes prior to the attack on Pearl Harbor in the first combat exchange of World War II in the Pacific. (New South Wales, 2012). While

Japan has jurisdiction and ownership of the Midget submarine, it is included in the Pearl Harbor National Landmark.

3.10.2.6.2 California

The California Study Area contains no resources with sovereign immunity.

3.10.3 Environmental Consequences

None of the proposed military readiness activities would be conducted under the No Action Alternative. Therefore, baseline conditions of the existing environment for cultural resources would remain unchanged. As a result, the No Action Alternative is not analyzed further within this section.

This section describes and evaluates how and to what degree the activities described in Chapter 2 potentially affect cultural resources within U.S. territorial waters located in the Study Area.

The stressors applicable to cultural resources that are analyzed in this EIS/OEIS include the following:

- **explosives** (explosives – shock [pressure] waves from underwater explosions, explosives – cratering)
- **physical disturbance and strikes** (in-water devices, MEM, seafloor devices, and pile driving)

As stated in Section 3.0.2, a significance determination is made only for activities that may have reasonably foreseeable adverse effects on the human environment based on the significance factors in Table 3.0-2. Both explosives, and physical disturbance and strike could have a reasonably foreseeable adverse effect, thus requiring a significance determination.

A stressor is considered to have a significant effect on the human environment based on an examination of the context of the action and the intensity of the effect. In the present instance, the effects of explosives or physical disturbance and strike would be considered significant if cultural resources or historic properties are physically destroyed, damaged, or altered in a manner that compromises the integrity of the resource.

Archaeologists regularly use multi-beam sonar and side-scan sonar to explore shipwrecks without disturbing them. Based on the physics of underwater sound, the shipwreck would need to be very close (less than 22 ft.) to the sonar sound source for the shipwreck to experience any slight oscillations from the induced pressure waves. Any oscillations experienced within a few yards from the sonar source would be negligible. This distance is smaller than the typical safe navigation and operating depth for most sonar sources and is not expected to affect historic shipwrecks. Therefore, sonar is not considered a stressor that would result in an effect on cultural resources and will not be analyzed further in this document. Additionally, there are no cultural resources within the Hawaii and California Study Areas that are susceptible to sonic booms, so sonic booms are not analyzed further in this EIS/OEIS. Submerged cultural resources located in the NOCAL Range Complex are not considered further in this analysis as they are located beyond 12 NM from shore.

The analysis for stressors and substressors in this section is derived from the 2018 HSTT and 2022 PMSR EIS/OEISs in comparison with the factors that have changed for the current Proposed Action alternatives that are being addressed in this EIS/OEIS.

The analysis considers SOPs and mitigation measures that would be implemented under Alternative 1 and Alternative 2 of the Proposed Action. The SOPs and mitigation measures that are specific to cultural resources are listed in Table 3.10-2. In the event that a submerged historic property is inadvertently

affected, consultation would be conducted with the appropriate SHPO in accordance with Title 36 CFR section 800.13(a)(3).

Table 3.10-2: List of Standard Operating Procedures, Best Management Practices, and Mitigations for Cultural Resources

Applicable Stressor	Requirements Summary and Protection Focus	Section Reference/Mitigation Measure
Explosives (in-water explosives); physical disturbance and strike (seafloor devices)	<ul style="list-style-type: none"> The Action Proponents will not detonate explosives, or place non-explosives, on or near the seafloor (e.g., explosive bottom-laid or moored mines) within a horizontal distance of 350 yd. from shipwrecks (except in designated areas in the Hawaii California OPAREAs, such as the nearshore areas of San Clemente Island and in the Silver Strand Training Complex, where these features will be avoided to the maximum extent practical). The Action Proponents will not set vessel anchors within the anchor swing circle radius from shipwrecks (except in designated anchorages). The Action Proponents will not position precisely placed non-explosive seafloor devices directly on shipwrecks. The Action Proponents will avoid positioning precisely placed non-explosive seafloor devices near shipwrecks by the largest distance that is practical to implement based on mission requirements. 	Chapter 5, Section 5.7.2.
Explosives (in-water explosives); physical disturbance and strike (seafloor devices)	Cultural Resources (Shipwrecks); Military readiness activities are only conducted in designated locations where no cultural resources are known to exist.	Chapter 3, Section 3.10
Explosives (in-water explosives); physical disturbance and strike (seafloor devices)	Cultural Resources (Shipwrecks); Locations of known submerged cultural resources are routinely avoided by the military by utilizing sonar and seafloor maps.	Chapter 3, Section 3.10

3.10.3.1 Explosive Stressors

Table 3.10-3 contains a summary of the information used to analyze the potential effects of explosive stressors on cultural resources.

Table 3.10-3: Explosive Stressors Information Summary

Substressor	Background Information Summary
Explosions in Air	Explosive stressors from in-air explosions are not anticipated to have an effect on submerged cultural resources as the shockwaves dissipate as they travel through the air and water column.
Explosions in Water	<p>Explosive stressors that could affect cultural resources are vibration, shock waves, and explosive cratering from underwater explosions.</p> <p>A shock wave and oscillating bubble pulses resulting from any kind of underwater explosion, such as explosive torpedoes, missiles, bombs, projectiles, mines, and explosive sonobuoys, could affect the exposed portions of submerged cultural resources if such resources were located nearby.</p> <p>Shock waves (pressure) generated by underwater explosions would be periodic rather than continuous, and could create overall structural instability and eventual collapse of architectural features of submerged cultural resources.</p> <p>The amount of damage would depend on factors such as the size of the charge, the distance from the historic shipwreck, the water depth, and the topography of the ocean floor.</p>

Detailed information on explosive effect categories in general, as well as effects specific to each substressor, is provided in Appendix D. For a discussion of the types of activities that create an explosive stressor, refer to Appendix B, and for information on the number of activities proposed for each alternative, see Chapter 2, Tables 2-11 through 2-19.

As discussed in Chapter 5 (Section 5.6.1, Table 5-2, and Section 5.7.2), the military will avoid effects from explosives on seafloor resources in mitigation areas throughout the Study Area. SOPs for in-water explosive safety, found in Section 3.0.4, Table 3.0-27 will also be followed. SOPs listed in Table 3.10-2, including the avoidance of wrecks by utilizing sonar and seafloor maps, provide additional protection to known cultural resources; in addition, the Navy's Section 106 compliance under the Navy's PAs ensures the effects on applicable historic properties by a proposed action are taken into account.

3.10.3.1.1 Effects from In-Water Explosives under Alternative 1

Military readiness activities involving explosives in water would generally continue as described in the 2018 HSTT and 2022 PMSR EIS/OEISs. Details on location-specific frequency and types of explosives to be used in the proposed military readiness activities can be found in Chapter 2 and Appendix A.

In California, cratering would be associated with diver-placed underwater detonations in shallow water at SCI (Pyramid Cove Target Minefield, TAR-2, and TAR-3), Camp Pendleton Amphibious Assault Area, Advanced Research Projects Agency, and SSTC (Echo Training Area, Imperial Beach Mine Training Range, Airborne Mine Countermeasure Mine Training Range, SSTC-N Boat Lanes, SSTC-S Boat Lanes, and Training Area [TA]-Kilo) (Figure 3.10-9). In Hawaii, cratering would be associated with underwater detonations at Pearl Peninsula, Puuloa Underwater Range, Barbers Point Underwater Range, Lima Landing, and Ewa Training Minefield (Figure 3.10-10) (U.S. Department of the Navy, 2003).

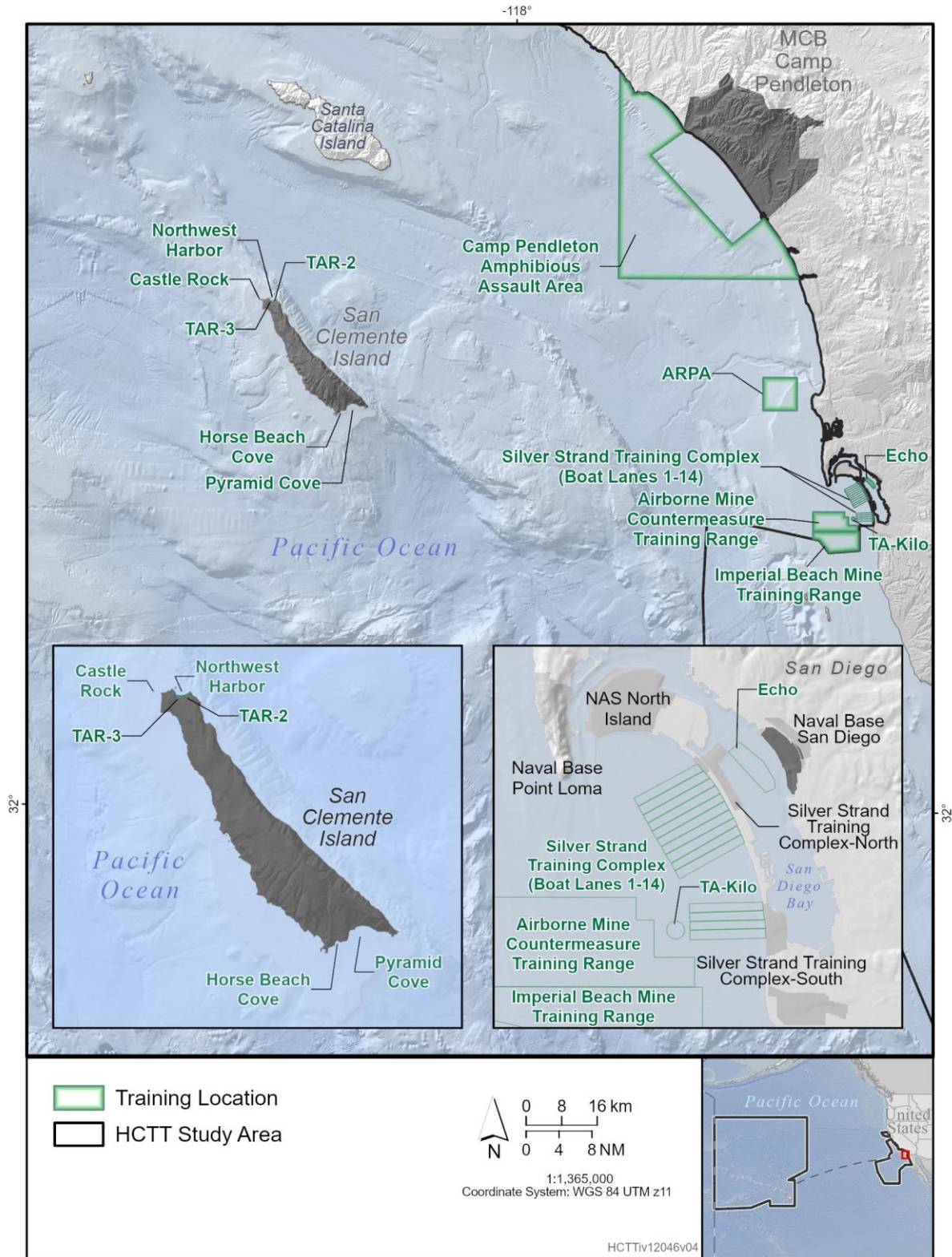


Figure 3.10-9: Underwater Detonation Areas in the California Study Area

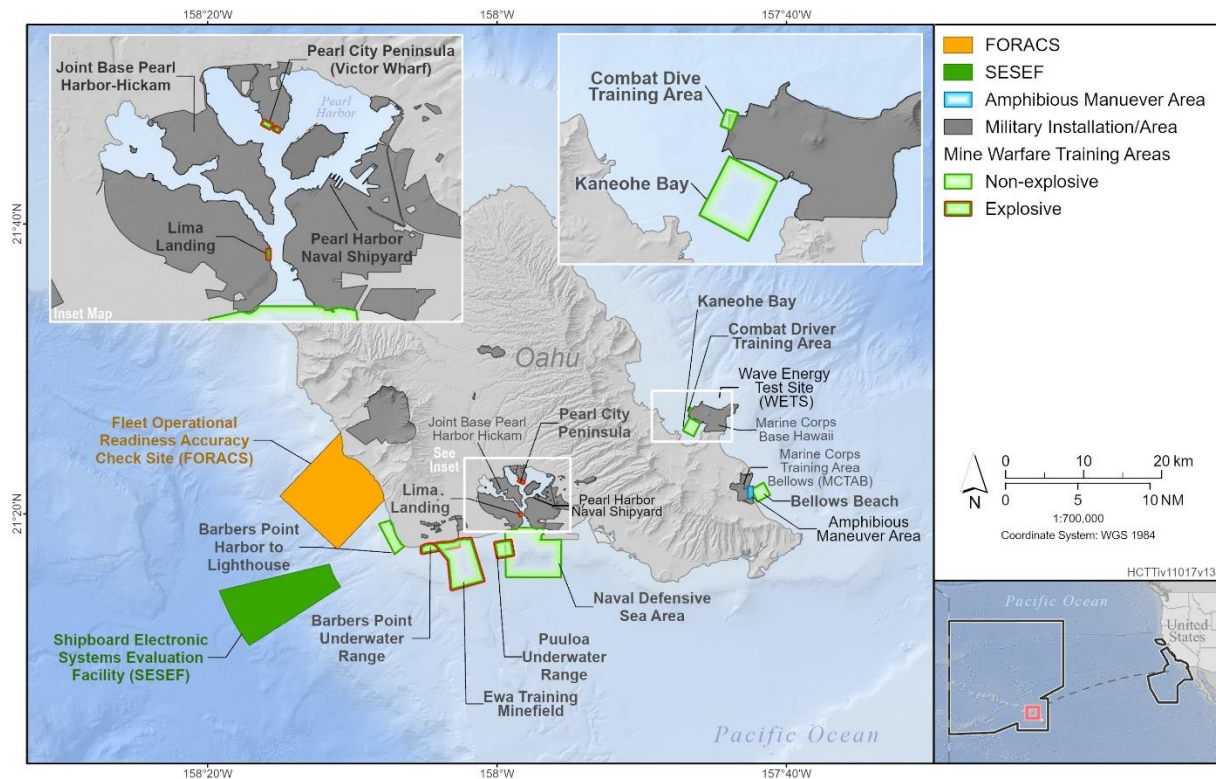


Figure 3.10-10: Underwater Detonation Areas in the Hawaii Study Area

Training and Testing. Under Alternative 1, shock waves and cratering created from underwater explosives are not expected to result in effects on cultural resources within the Study Area because (1) shock waves dissipate over distance and would be infrequent in areas where known resources occur, (2) bottom-placed explosives that could cause cratering are laid by divers in specific locations where bottom detonations have been conducted for decades, (3) bottom-placed explosives would be infrequent (one to three events every other year) and occur only on sandy bottom habitat in the same specific locations, (4) cratering would be temporary and refilled with sand between activities through tidal and current movements, and (5) there are no known cultural resources within areas where bottom-placed explosives would occur. Additionally, per the military's SOPs (Table 3.10-2), locations of known submerged cultural resources are routinely avoided by utilizing sonar and seafloor maps. Refer to Section 3.5 (Abiotic Habitats) for more information regarding overall effects on the seafloor from explosive stressors.

Modernization and Sustainment of Ranges. No explosives in water would be used in range modernization and sustainment activities.

Conclusion. Activities that include the use of in-water explosives under Alternative 1 would result in less than significant effects due to shock waves and cratering. No cultural resources have been identified within the designated detonation areas in the California or Hawaii Study Areas; however, activities would continue to be conducted in accordance with the SOPs (Table 3.10-2) that protect submerged cultural resources.

3.10.3.1.2 Effects from In-Water Explosives under Alternative 2

Under Alternative 2, military readiness activities would reflect the maximum frequency of activities to occur annually over a seven-year timeframe. As a result, the number of annual events conducted that involve in-water explosives would increase compared to Alternative 1. However, military readiness activities involving explosives in water would generally continue as described in the 2018 HSTT and 2022 PMSR EIS/OEISs. Although no cultural resources have been identified within the designated detonation areas, activities would be conducted in accordance with the SOPs described in Table 3.10-2. Therefore, activities that include the use of in-water explosives under Alternative 2 would be similar to Alternative 1 and would result in less than significant effects.

3.10.3.2 Physical Disturbance and Strike Stressors

The evaluation of the effects from physical disturbance and strike stressors on cultural resources focuses on proposed activities that may cause cultural resources to be damaged by an object that is moving through the water (e.g., vessels and in-water devices), dropped into the water (e.g., MEM), deployed on the seafloor (e.g., mine shapes and anchors), or propelled through the water column (e.g., explosive fragments).

Table 3.10-4 contains brief summaries of background information relevant to the analyses of effects for each physical disturbance and strike substressor. Detailed information on physical disturbance and strike stressors and substressors can be found in Chapter 3 of this EIS/OEIS. Additionally, the types of training and testing activities analyzed in the 2018 HSTT and 2022 PMSR EIS/OEISs are consistent with the Proposed Action. As such, the analysis included in those documents remains valid.

Table 3.10-4: Physical Disturbance and Strike Stressor Information Summary

Substressor	Background Information Summary
Vessels and In-Water Devices	<p>Physical disturbance and strike can occur as vessels move through the water and as some smaller craft and amphibious vessels can come into contact with the seafloor in the nearshore environment, potentially affecting submerged cultural resources.</p> <ul style="list-style-type: none"> Vessels used as part of the Proposed Action include ships (e.g., aircraft carriers, surface combatants), support craft, and submarines ranging in size from 15 feet to over 1,000 feet. In-water devices as discussed in this analysis include unmanned vehicles, such as remotely operated vehicles, unmanned surface vehicles, unmanned underwater vehicles, motorized autonomous targets, and towed devices.
Military Expended Materials	<p>The deposition of non-explosive practice munitions, sonobuoys, and military expended materials other than munitions could affect submerged cultural resources if such resources are located nearby.</p> <ul style="list-style-type: none"> Most of the anticipated expended munitions (e.g., large-caliber explosive munitions) would be small objects and fragments that would slowly drift to the seafloor after striking the ocean surface. Larger and heavier objects (e.g., non-explosive practice munitions) could displace sediments and artifacts upon impacting the ocean floor despite a reduction in their descent velocity. Effects on sites could occur should expended material fall on or near them.

Table 3.10-4: Physical Disturbance and Strike Stressor Information Summary (continued)

Substressor	Background Information Summary
Seafloor Devices	<p>Physical disturbances on the continental shelf and seafloor, such as precision anchoring, targets or mines resting on the ocean floor, moored mines, bottom-mounted tripods, bottom crawlers (unmanned underwater vehicles), and cable installation activities could damage or destroy submerged cultural resources if such resources are located nearby.</p> <ul style="list-style-type: none"> • Seafloor devices are either stationary or move very slowly along the bottom. • Bottom-placed instruments usually include an anchor which may be expended while recovering the instrument.
Pile Driving	<p>Impact pile driving (installing piles with an impact hammer mechanism) and vibratory pile removal could affect submerged cultural resources, if located nearby.</p> <ul style="list-style-type: none"> • Pile driving would subject surrounding sediments to vibration, disruption, and compaction which could affect cultural resources, if in close proximity. • Soft substrates such as sand bottom at the proposed elevated causeway system locations would absorb or attenuate impact more readily than hard substrates.

3.10.3.2.1 Effects from Vessels and In-Water Devices

Table 3.10-4 contains a summary of the background information used to analyze the potential effects of vessel and in-water devices on cultural resources. For a discussion of the types of activities that utilize vessels and in-water devices, refer to Appendix B, and for information on locations and the number of activities proposed for each alternative, see Table 3.0-17.

3.10.3.2.1.1 Effects from Vessels and In-Water Devices under Alternative 1

Military readiness activities involving vessels and in-water devices would generally continue as described in the 2018 HSTT and 2022 PMSR EIS/OEISs. Most military readiness activities include vessels, while a lower number of activities include in-water devices. As indicated in Section 3.0.3.3.4.1, vessel operation would be widely dispersed throughout the Study Area but would be more concentrated near ports, naval installations, and range complexes. Most vessel use would occur in the California Study Area.

Training and Testing. Under Alternative 1, training and testing activities using vessels and in-water devices would occur within the Hawaii and California Study Areas. Vessels and in-water devices are operated in a manner that avoids known submerged cultural resources and amphibious activities only occur in designated areas. Training and testing activities involving vessels and in-water devices would largely remain unchanged in nature and location as activities assessed in the 2018 HSTT and 2022 PMSR EIS/OEISs. One exception to this is the inclusion of proposed amphibious approach lanes along the coast of PMSR and the southern portion of the NOCAL Range Complex. Although vessels and in-water devices have not been utilized for training and testing activities in this capacity or location in the past, amphibious activities would only occur in designated areas where no known cultural resources are present.

Modernization and Sustainment of Ranges. The vessels used to deploy seafloor cables associated with the SOAR modernization, SWTR installation, Sustainment of Undersea Ranges, and deployment of seafloor cables and instrumentation using existing undersea infrastructure in the California and Hawaii Study Areas would avoid submerged cultural resources by utilizing sonar and seafloor maps. Previous installation planning and successful historical cable deployments indicates that the seafloor within SOAR is mostly flat and of constant depth with little if any underwater obstructions or seafloor anomalies.

Conclusion. Activities that include the use of vessels and in-water devices under Alternative 1 would result in less than significant effects. Military readiness activities involving vessels and in-water devices

would remain unchanged in nature as activities assessed in the 2018 HSTT and 2022 PMSR EIS/OEISs; therefore, the analysis and conclusions on effects on cultural resources from vessels and in-water devices under Alternative 1 of the Proposed Action would not be meaningfully different from the findings of these previous analyses. Training and testing activities conducted in the newly proposed amphibious approach lanes would only occur in designated areas where no known cultural resources are present. Overall types and locations of military readiness activities are not expected to change from those currently conducted by the military in the Study Area. Known cultural resources and historic properties would be avoided, and the stipulations of applicable SOPs (Table 3.10-2) that protect submerged cultural resources and historic properties remain in place and would continue to be implemented.

3.10.3.2.1.2 Effects from Vessels and In-Water Devices under Alternative 2

Under Alternative 2, military readiness activities would reflect the maximum frequency of activities to occur annually over a seven-year timeframe. As a result, the number of annual events conducted that involve in-water devices would increase compared to Alternative 1. However, military readiness activities involving vessels and in-water devices would generally continue as described in the 2018 HSTT and 2022 PMSR EIS/OEISs. Additionally, activities would be conducted in accordance with the SOPs described in Table 3.10-2. Therefore, activities that include the use of vessels and in-water devices under Alternative 2 would be similar to Alternative 1 and would result in less than significant effects.

3.10.3.2.2 Effects from Military Expended Materials

Table 3.10-4 contains a summary of the background information used to analyze the potential effects of MEM on cultural resources. For a discussion of the types of activities that create MEM, refer to Appendix B, and for information on locations and the number of activities proposed for each alternative, see Appendix A and Section 3.0.3.3.4.2, Tables 3.0-18–3.0-21.

3.10.3.2.2.1 Effects from Military Expended Materials under Alternative 1

Military readiness activities involving MEM would generally continue as described in the 2018 HSTT and 2022 PMSR EIS/OEISs.

Training and Testing. Under Alternative 1, MEM could be deposited on or in the vicinity of submerged cultural resources. However, such sites are most likely to occur within water depths of 100 m below mean high tide. The majority of proposed training and testing activities would occur over the open ocean, and the settling of MEM would primarily occur in areas away from where potential submerged cultural resources would be found.

MEM settling on the seafloor on or near submerged cultural resources, would have no significant effect on submerged cultural resources because (1) areas with known submerged cultural resources would be avoided, (2) most anticipated expended munitions would be small objects and fragments that would slowly drift to the seafloor after striking the ocean surface, and (3) settling of MEM on the seafloor would be diffuse and transitory, as MEM is likely to be transported by currents and other turbulence.

Modernization and Sustainment of Ranges. No MEM would be used in range modernization and sustainment activities.

Conclusion. Activities that include the use of MEM under Alternative 1 would result in less than significant effects. Military readiness activities involving MEM would remain unchanged in nature as activities assessed in the 2018 HSTT and 2022 PMSR EIS/OEISs; therefore, the analysis and conclusions on effects on cultural resources from MEM under Alternative 1 of the Proposed Action would not be

meaningfully different from the findings of these analyses. Overall types and locations of military readiness activities are not expected to change from those currently conducted by the military in the Study Area. Known cultural resources and historic properties would be avoided, and the associated SOPs (Table 3.10-2) that protect submerged cultural resources and historic properties remain in place and would continue to be implemented.

3.10.3.2.2.2 Effects from Military Expended Materials under Alternative 2

Under Alternative 2, military readiness activities would reflect the maximum frequency of activities to occur annually over a seven-year timeframe. As a result, the number of annual events conducted that involve MEM would increase compared to Alternative 1. However, military readiness activities involving MEM would generally continue as described in the 2018 HSTT and 2022 PMSR EIS/OEISs. Additionally, activities would be conducted in accordance with the SOPs described in Table 3.10-2. Therefore, activities that include the use of MEM under Alternative 2 would be similar to Alternative 1 and would result in less than significant effects.

3.10.3.2.3 Effects from Seafloor Devices

Table 3.10-4 contains a summary of the background information used to analyze the potential effects of seafloor devices on cultural resources. For a discussion of the types of activities that utilize seafloor devices, refer to Appendix B, and for information on locations and the number of activities proposed for each alternative, see Table 3.0-22.

3.10.3.2.3.1 Effects from Seafloor Devices under Alternative 1

Military readiness activities involving seafloor device use would generally continue as described in the 2018 HSTT and 2022 PMSR EIS/OEISs.

Training and Testing. Under Alternative 1, seafloor devices could be deployed in the vicinity of submerged cultural resources in both the California and Hawaii Study Areas. Seafloor devices usually include an anchor if placed on the bottom and are either stationary or move very slowly across the seafloor, which could affect submerged cultural resources. However, effects on cultural resources would be avoided because (1) most seafloor devices are laid out in designated, shallow water areas that have been utilized for decades where no known cultural resources are present and (2) the military routinely avoids submerged cultural resources by utilizing sonar and seafloor maps. No historic properties have been identified within the areas where seafloor devices will be deployed.

Modernization and Sustainment of Ranges. Placement of seafloor devices would occur in the SOAR modernization, SWTR installation, and deployment of seafloor cables and instrumentation using existing undersea infrastructure in the California and Hawaii Study Areas. Activities would largely be conducted in areas where seafloor devices have already been deployed. Placement of seafloor devices would avoid submerged cultural resources by utilizing sonar and seafloor maps. No historic properties have been identified within the areas described above. Additionally, previous installation planning and successful historical cable deployments indicates that the seafloor within SOAR is mostly flat and of constant depth with little if any underwater obstructions or seafloor anomalies.

Conclusion. Activities that include the use of seafloor devices under Alternative 1 would result in less than significant effects. No historic properties have been identified within the areas where seafloor devices would be deployed under Alternative 1. Military readiness activities involving seafloor devices would remain unchanged in nature as activities assessed in the 2018 HSTT and 2022 PMSR EIS/OEISs; therefore, the analysis and conclusions on effects on cultural resources from MEM under Alternative 1

of the Proposed Action would not be meaningfully different from the findings of these analyses. Overall types and locations of military readiness activities are not expected to change from those currently conducted by the military in the Study Area. Known cultural resources would be avoided, and the SOPs (Table 3.10-2) that protect submerged cultural resources, and historic properties remain in place and would continue to be implemented.

3.10.3.2.3.2 Effects from Seafloor Devices under Alternative 2

Under Alternative 2, military readiness activities would reflect the maximum frequency of activities to occur annually over a seven-year timeframe. As a result, the number of annual events conducted that involve seafloor devices would increase compared to Alternative 1. However, no historic properties have been identified within the areas where seafloor devices would be deployed and military readiness activities involving seafloor device use would generally continue as described in the 2018 HSTT and 2022 PMSR EIS/OEISs. Additionally, activities would be conducted in accordance with the SOPs described in Table 3.10-2. Therefore, activities that include the use of seafloor devices under Alternative 2 would be similar to Alternative 1 and would result in less than significant effects.

3.10.3.2.4 Effects from Pile Driving

Table 3.10-4 contains a summary of the background information used to analyze the potential effects of pile driving on cultural resources. For a discussion of the types of activities that utilize pile driving, refer to Appendix B, and for information on pile driving activities, see Tables 3.0-5 and 3.0-6. Pile driving activities are limited to Naval Base Ventura County, Port Hueneme.

3.10.3.2.4.1 Effects from Pile Driving under Alternative 1

Military readiness activities involving pile driving activities would generally continue as described in the 2018 HSTT and 2022 PMSR EIS/OEISs.

Training and Testing. Under Alternative 1, pile driving would be limited to six proposed annual Port Damage Repair training activities in the shallow waters at Port Hueneme. Pile driving activities would not take place in the Hawaii Study Area. While pile driving would subject nearshore sediments to vibration, disruption, and compaction, there are no known cultural resources or historic properties in Port Hueneme, and the potential for encountering submerged cultural resources that retain their integrity is negligible due to extensive past disturbance.

Modernization and Sustainment of Ranges. No pile driving would occur in range modernization and sustainment activities.

Conclusion. Activities that include pile driving under Alternative 1 would result in less than significant effects. No cultural resources have been identified within the areas where pile driving would be conducted; however, activities would continue to be conducted in accordance with SOPs (Table 3.10-2) that protect submerged cultural resources.

3.10.3.2.4.2 Effects from Pile Driving under Alternative 2

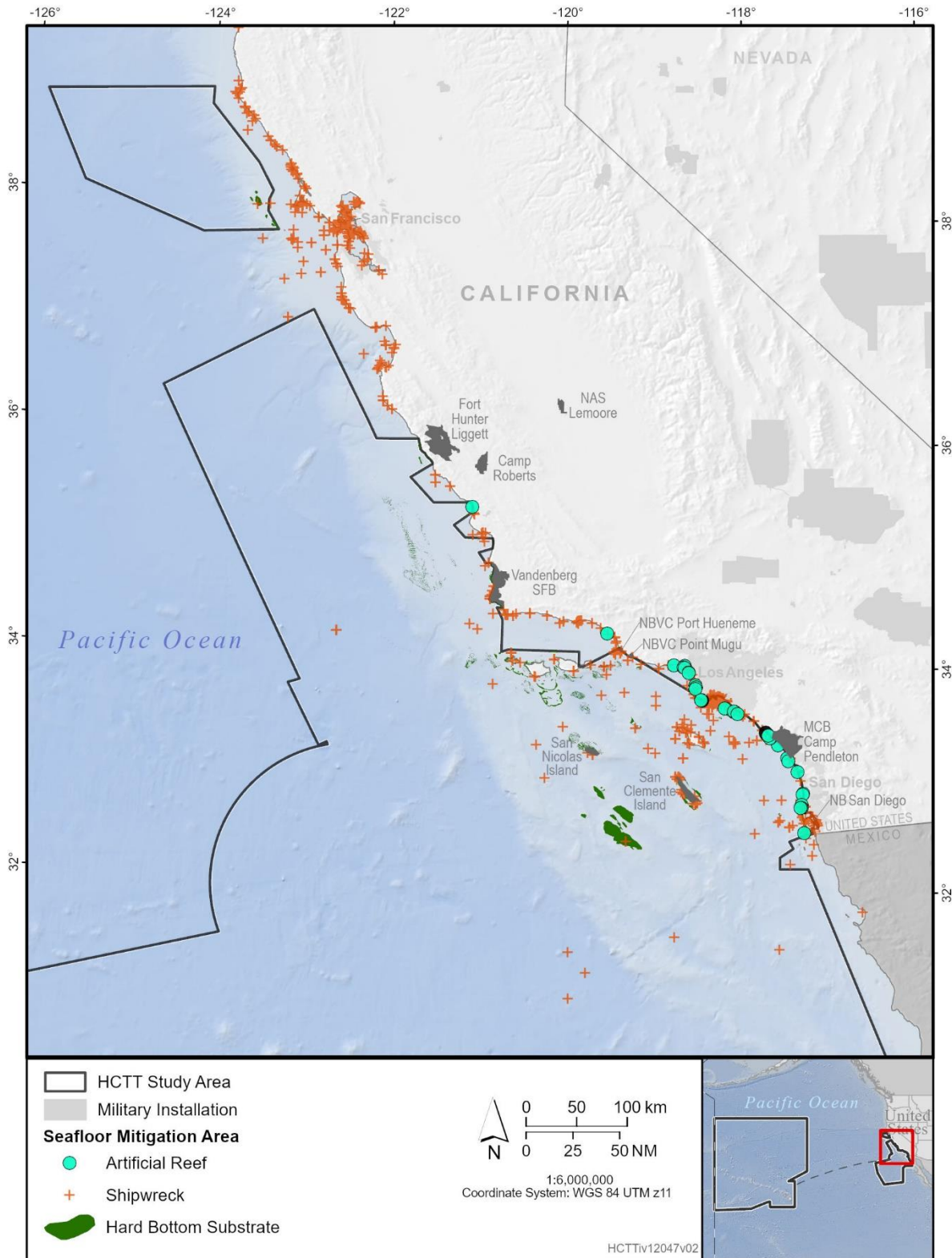
Under Alternative 2, the number of proposed annual pile driving events would be the same as Alternative 1. Therefore, activities that include pile driving under Alternative 2 would be the same as Alternative 1 and would result in less than significant effects.

3.10.4 Summary of Potential Effects on Cultural Resources

3.10.4.1 Combined Effects of All Stressors under Alternative 1

The analysis and conclusions for the potential effects from each of the individual stressors are discussed in the previous sections. Stressors associated with military readiness activities do not typically occur in isolation but rather occur in some combination. An analysis of the combined impacts of all stressors considers the potential consequences of additive stressors and synergistic stressors.

Individual stressors that would otherwise have minimal to no effect may combine to have a measurable response, and a submerged cultural resource could be exposed to multiple military readiness activities over the course of its life. More than one stressor to cultural resources could result from a single event (e.g., a single event could include activities that result in explosive and physical strike stressors within a relatively short amount of time). However, military readiness activities are conducted in a manner that avoids known cultural resources and mitigation areas (Figure 3.10-11 and Figure 3.10-12) by implementing the SOPs listed in Table 3.10-2. Additionally, activities may occur in the same general area (e.g., gunnery activities), but the majority would not occur at the same specific point each time and would therefore be unlikely to affect the same cultural resources.



Note: HCTT = Hawaii-California Training and Testing

Figure 3.10-11: Seafloor Resource Mitigation Areas off California

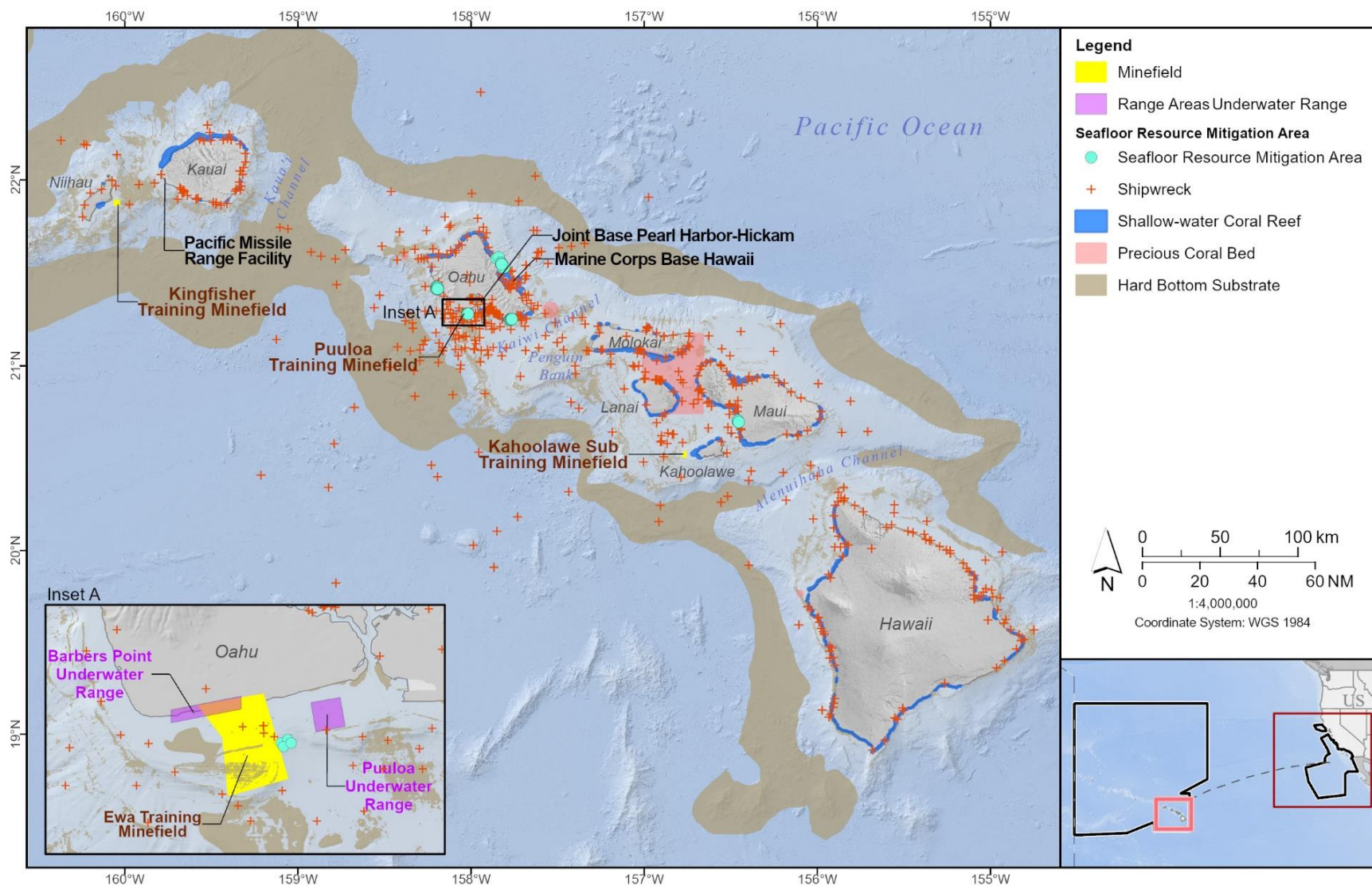


Figure 3.10-12: Seafloor Resource Mitigation Areas off Hawaii

Multiple stressors may also have synergistic effects. For example, synergistic effects of ocean acidification, sedimentation, and storms, among other factors could cause disturbance to submerged cultural resources. The potential for stressors to result in additive or synergistic consequences is limited to explosive effects and physical strike and disturbance; however, the potential synergistic interactions of multiple stressors resulting from proposed activities are difficult to predict quantitatively.

Although potential effects on cultural resources from military readiness activities may occur, they are not expected to lead to permanent damage or alteration to the character-defining features of the resource.

Overall types and locations of military readiness activities are not expected to change from those currently conducted by the military in the Study Area, and the associated SOPs (Table 3.10-2) that protect submerged cultural resources and historic properties remain in place and would continue to be implemented. As a result, the analysis of the effects on cultural resources from explosives and physical disturbance and strike stressors during military readiness activities under Alternative 1 are consistent with a less than significant determination.

3.10.4.2 Combined Effects of All Stressors under Alternative 2

Military readiness activities proposed under Alternative 2 would represent increases over what is proposed for Alternative 1. However, military readiness activities and associated SOPs would continue as described under Alternative 1. As such, the combined effects of all stressors under Alternative 2 are expected to be the same as those described under Alternative 1. Therefore, the analysis of the effects on cultural resources from explosives and physical disturbance and strike stressors during military readiness activities under Alternative 2 are consistent with a less than significant determination.

3.10.4.3 National Historic Preservation Act

Table 3.10-5 summarizes the potential effects of the Proposed Action (the undertaking) on submerged resources in accordance with Section 106 of the NHPA for Alternative 1 and Alternative 2. The Proposed Action is not anticipated to affect the characteristics that qualify a historic property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association of known historic properties within the Study Area. In both California and Hawaii, the Navy fulfilled the NHPA process with SHPO and consulting parties under procedures set forth in 36 CFR Section 800.

Table 3.10-5: Summary of Effects on Historic Resources

Alternative and Stressor	Section 106 Effects
Alternative 1	
Explosive Stressors	Explosive stressors resulting from underwater explosions creating shock waves and cratering of the seafloor would not affect known or unknown submerged historic properties; mitigation measures would continue to be implemented to protect historic properties.
Physical Disturbance and Strike Stressors	Physical stressors resulting from in-water devices, military expended materials, and seafloor devices, during military readiness activities would not affect known or unknown submerged historic properties; mitigation measures would continue to be implemented to protect historic properties.
Regulatory Determination	<i>No Historic Properties Affected</i>
Alternative 2	
Explosive Stressors	Explosive stressors resulting from underwater explosions creating shock waves and cratering of the seafloor would not affect known or unknown submerged historic properties; mitigation measures would continue to be implemented to protect historic properties.
Physical Disturbance and Strike Stressors	Physical stressors resulting from in-water devices, military expended materials, and seafloor devices, during military readiness activities would not affect known or unknown submerged historic properties; mitigation measures would continue to be implemented to protect historic properties.
Regulatory Determination	<i>No Historic Properties Affected</i>

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