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

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## 3.5 Abiotic Habitats

**ABIOTIC HABITATS SYNOPSIS**

Stressors to abiotic habitats that could result from the Proposed Action within the Study Area were considered, and the following conclusions have been reached for the Preferred Alternative (Alternative 1).

- Explosives: Most of the high-explosive MEM would detonate at or near the water surface. The surface area of bottom substrate affected would be an extremely small fraction of the total training and testing area available in the Study Area. As such, impacts would be less than significant.
- Physical Disturbance and Strike: Most seafloor devices would be placed in areas that would result in minor and temporary bottom substrate effects. Once on the seafloor and over time, MEM would be buried by sediment, corroded from exposure to the marine environment, or colonized by benthic organisms. The surface area of bottom substrate affected over the short term would be a tiny fraction of the total Study Area. As such, impacts would be less than significant.

### 3.5.1 Introduction

The following sections describe the abiotic or non-living habitat features (e.g., water column, sandy shores, rocky bottoms) found in the Study Area and the potential for direct effects from proposed military readiness activities. Direct effects on habitats would be considered secondary stressors to the living resources that rely on these habitats.

Discussion of marine habitats is included in Chapter 6 from the perspective of the National Marine Sanctuaries Act, EO 13158 (Marine Protected Areas), and the Magnuson-Stevens Fishery Conservation and Management Act. For more detailed information on abiotic habitats, refer to Appendix C and Section C.4.

### 3.5.2 Affected Environment

The affected environment provides the context for evaluating the effects of the proposed military readiness activities on abiotic habitats.

#### 3.5.2.1 General Background

Much of the general background has not changed over what was described in the 2018 HSTT and 2022 PMSR EIS/OEISs. The HCTT Study Area differs from the HSTT Study Area in that HCTT includes an expanded SOCAL Range Complex (West Extension and South Extension); special use airspace corresponding to the new extensions; the inclusion of two existing training and testing at-sea ranges, PMSR and the NOCAL Range Complex; inclusion of areas along the SOCAL coastline from approximately Dana Point to Port Hueneme; and four amphibious approach lanes providing California land access from NOCAL and PMSR. Nearshore areas within the Hawaii Study Area, such as Kaneohe Bay or MCTAB, may be used more frequently or for new training or testing activities, but the geographic boundary of the Hawaii Study Area would remain unchanged. Updated information for abiotic substrate in these new areas was included, where available. Since 2018, higher quality and detailed data has been released for habitat data in both the California and Hawaii Study Areas. The most notable update to benthic habitat data from 2018 HSTT Phase III is the inclusion of the Multibeam Backscatter and Bathymetry Synthesis for the Main Hawaiian Islands, prepared in 2016 (Smith, 2016). This data provides high-quality benthic habitat data in the Hawaii Study Area. For supporting information on general background, refer to Appendix C.

Although many classification schemes are available that span a range of spatial dimension and granularity (Allee et al., 2000; Cowardin et al., 1979a; Federal Geographic Data Committee, 2012; Howell et al., 2010; Kendall et al., 2001; United Nations Educational Scientific and Cultural Organization, 2009; Valentine et al., 2005), three basic types of abiotic substrates describe the affected environment: soft, hard, and mixed substrates. The term “mixed” has been updated from the term “intermediate,” previously used in Phase III. This update is consistent with Coastal Marine Ecological Classification Standard developed to provide a consistent classification framework for federally funded projects (Federal Geographic Data Committee, 2012). Soft substrate areas are dominated by mud (including clay and silt) or sand – substrate often too unstable for colonization by habitat-forming invertebrates (e.g., hard corals, oysters) or attached seaweed in the marine environment. Soft substrate in sheltered, estuarine environments may be colonized by seagrass or coastal wetland species (Section 3.3; Appendix C). Hard substrate areas are dominated by cobbles, boulders, or consolidated bedrock that is stable enough for colonization by habitat-forming invertebrates or attached seaweed. For more information on invertebrates in the study areas, see Section 3.4. Mixed substrates are dominated by unconsolidated material larger than sand but smaller than cobbles (e.g., gravel, shell fragments), may or may not be stable enough for habitat-forming invertebrates or attached seaweeds, depending on depth and other factors (e.g., current speeds) (Appendix C). Artificial features (shipwrecks, artificial reefs, piers, and quay wall) are another type of abiotic substrate that is based on material type and origin. Detailed descriptions of substrate types (including grain sizes) can be found in Appendix C, Section C.1.1.2.1 for grain sizes, and Section C.4 all other habitats information.

#### 3.5.2.2 Bottom Habitats

The features described in this Draft EIS/OEIS include naturally and artificially occurring features of the shoreline and bottom within the Study Area (e.g., rocky reefs). Artificial substrates that may serve as habitat are described in Section 3.5.2.3. The general descriptions of shore habitats in the Study Area have not changed from those described in the 2018 HSTT and 2022 PMSR EIS/OEISs. Since shore habitats make up a relatively small portion of the Study Area, shore habitats are covered under bottom habitats. For detailed discussion of shore habitats, see Appendix C, Section C.4.1.1.

##### 3.5.2.2.1 Hard Bottom

Hard bottom includes all aquatic habitats with substrates having a surface of stones, boulders, or bedrock (75 percent or greater coverage) (Cowardin et al., 1979b). This includes rocky outcrops and ridges, banks, and seamounts and other areas of seafloor that are exposed because of ocean currents. Hard bottom habitats in the Main Hawaiian Islands consist mostly of consolidated bedrock (~33 percent), sand (25 percent), rock/boulder habitat (22 percent) (National Centers for Coastal Ocean Science, 2024). Hard bottom habitats are localized off the California coast, and the potential for transitional mixed bottom habitat as well.

Subtidal rocky habitat occurs as extensions of intertidal rocky shores and as isolated offshore outcrops. The shapes and textures of the larger rock assemblages and the fine details of cracks and crevices are determined by the type of rock, the wave energy, and other local variables (Davis, 2009). Maintenance of mostly low relief hard bottom (e.g., bedrock) requires wave energy and/or currents sufficient to sweep sediment away (Lalli & Parsons, 1993) or offshore areas lacking a significant sediment supply; therefore, rocky reefs are rare on broad coastal plains near sediment-laden rivers and are more common on high-energy shores and beneath strong bottom currents, where sediments cannot accumulate.

In deep waters of the Pacific Ocean, there are also a number of chemosynthetic communities (cold seeps and thermal vents), which tend to support unique biotic communities. A cold seep, or cold vent, is an area of the ocean floor where chemical fluid seepage occurs. Cold seeps develop unique topography over time, where reactions between methane and seawater create carbonate rock formations and reefs. A thermal, or hydrothermal vent is a fissure in the seafloor where geothermally heated water is released. Hydrothermal vents are known near Hawaii Island. Cold seeps occur in association with multiple fault systems off Southern California. Hard substrate in the abyssal zone and some locations landward of the deep ocean are typically devoid of encrusting or attached organisms due to the scarcity of drifting food particles in the deep ocean (Nybakken, 1993).

The overall distribution of hard bottom substrate within the Study Area is illustrated in Figure 3.5-1 through Figure 3.5-3. In the Hawaii Study Area, approximately 5.28 percent is comprised of hard substrate, while 0.22 percent is present in the California Study Area (Table 3.5-1).

#### 3.5.2.2.2 Soft Bottom

Soft bottoms include all aquatic habitats with the following three characteristics: (1) more than 25 percent cover of particles smaller than stones, (2) unconsolidated sediment predominantly mud or sand, and (3) primarily subtidal water regimes (Cowardin et al., 1979a). Soft bottom forms the substrate of channels, shoals, subtidal flats, and other features of the bottom. Sandy channels emerge where strong currents connect estuarine and ocean water columns. Shoals or capes form where sand is deposited by interacting, sediment-laden currents. Subtidal flats occur between soft shores and channels or shoals. The continental shelf extends seaward of the shoals and inlet channels and includes relatively coarse-grained, soft bottom habitats. Relatively finer-grained sediments collect off the shelf break, continental slope, and abyssal plain. Organisms' characteristic of soft bottom environments, such as worms and clams, may be found at all depths where there is sufficient oxygen and sediment accumulation (Nybakken, 1993).

The overall distribution of soft bottom substrate within the Study Area is illustrated in Figure 3.5-1 through Figure 3.5-3. In the Hawaii Study Area, approximately 91.79 percent is comprised of soft substrate, while 88.72 percent is present in the California Study Area (Table 3.5-1).

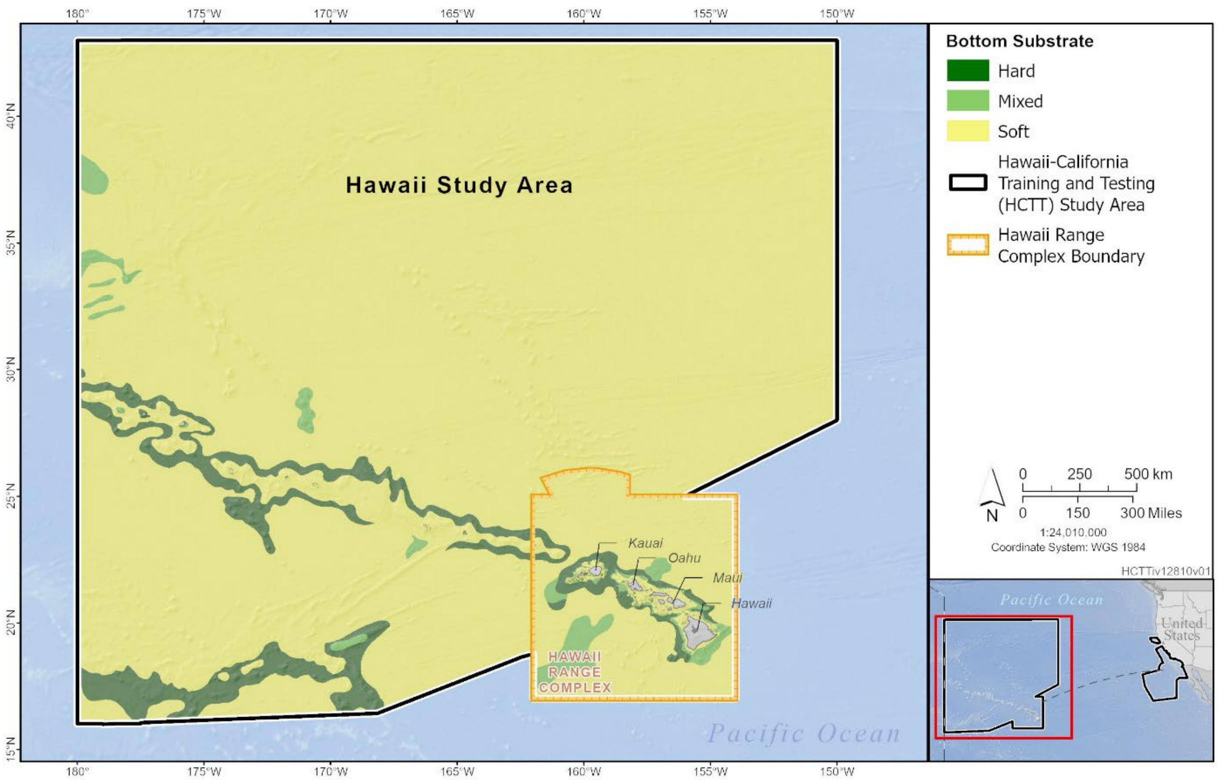


Figure 3.5-1: Substrate Type Within the Hawaii Study Area

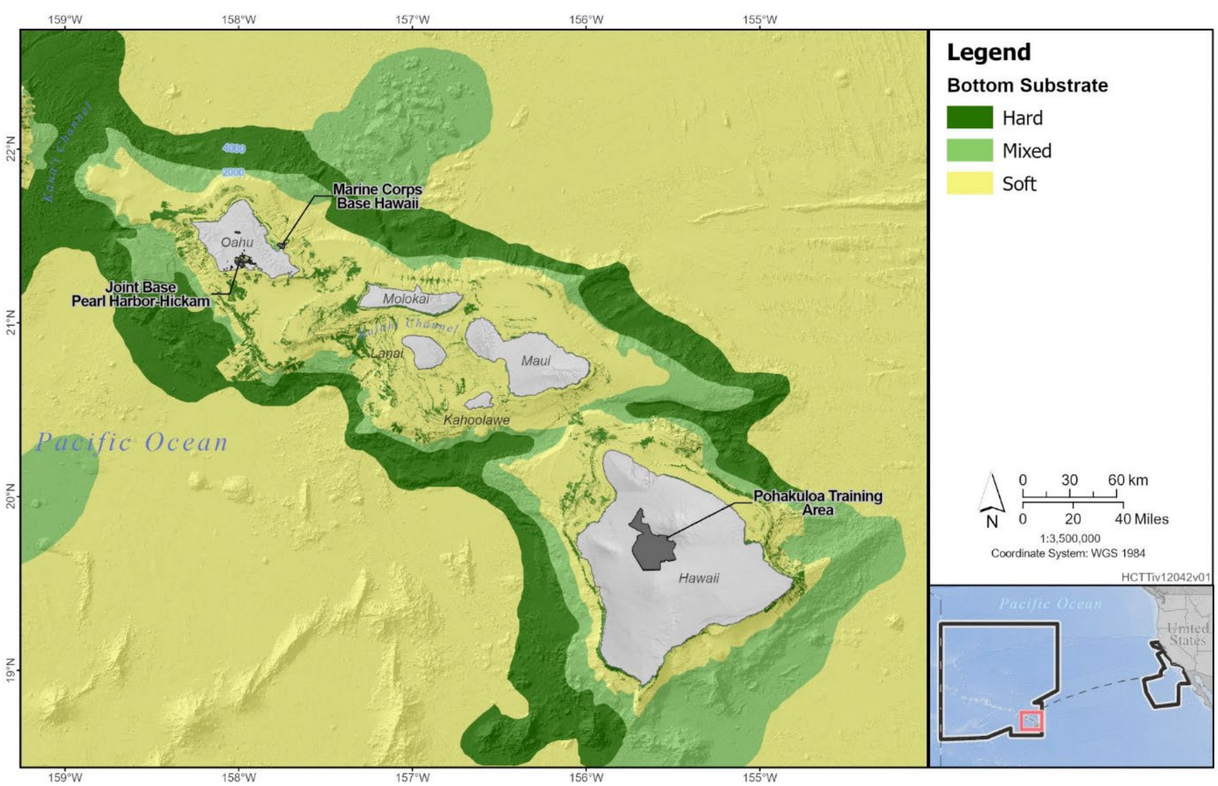


Figure 3.5-2: Substrate Type Within the Hawaii Range Complex

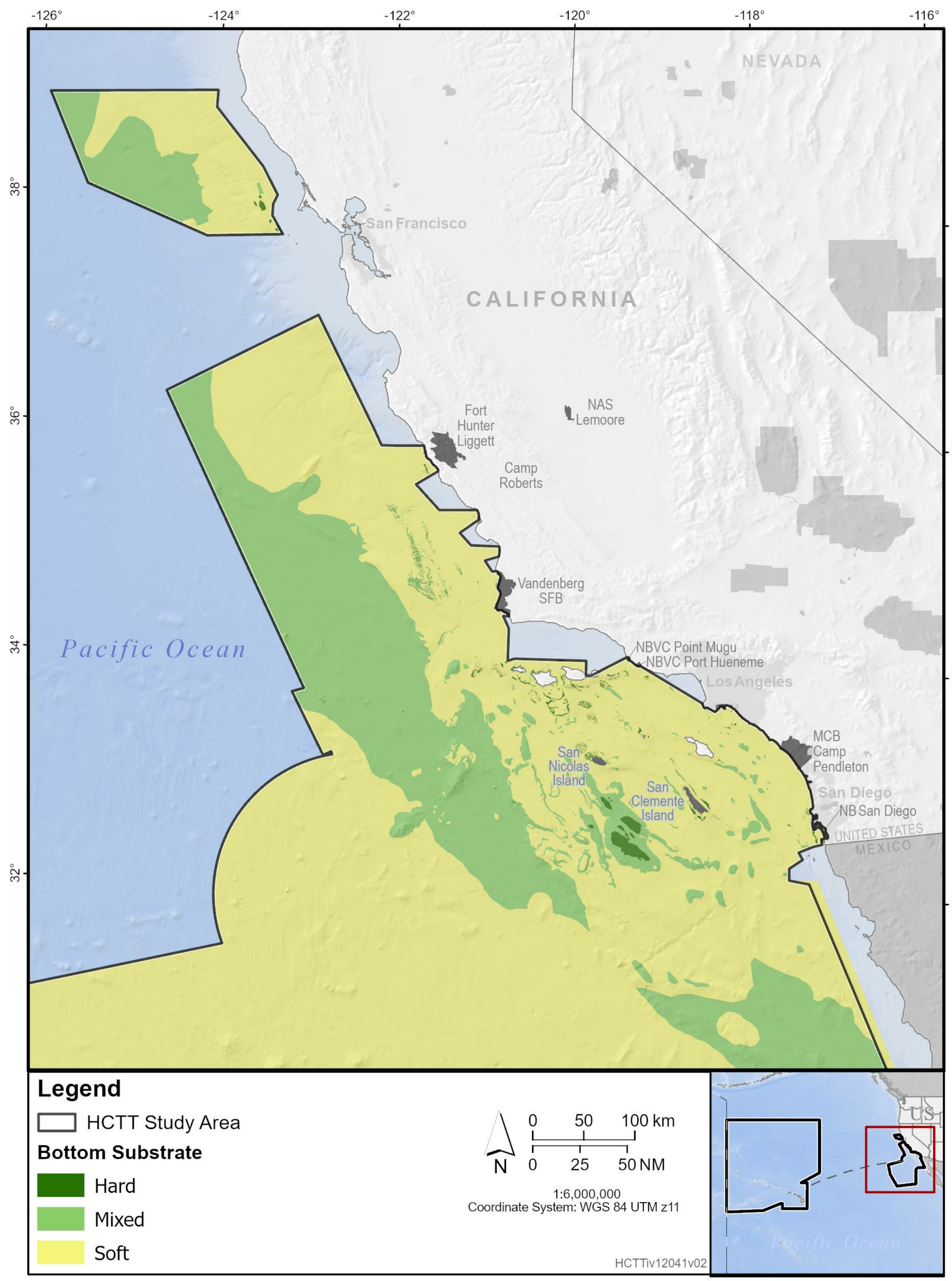


**Figure 3.5-3: Substrate Type Within the California Study Area**

#### 3.5.2.2.3 Mixed Bottom

Mixed bottom includes all aquatic habitats with the following three characteristics: (1) substrates with at least 25 percent cover in particles smaller than stones, (2) unconsolidated substrate is predominantly gravel or cobble-sized, and (3) primarily subtidal water regimes. Detailed information regarding grain sizes and distribution is located in Appendix C. These areas may or may not be stable enough for attached vegetation or sedentary invertebrates, depending on overlying hydrology and water quality.

The overall distribution of mixed bottom substrate within the Study Area is illustrated in Figure 3.5-1 through Figure 3.5-3. In the Hawaii Study Area, approximately 1.68 percent is comprised of mixed substrate, while 11.06 percent is present in the California Study Area (Table 3.5-1).

**Table 3.5-1: Percent Coverage of Abiotic Substrate Types in the Study Area**

| Study Area | Percent/Area of Study Area | | | Total Area ($km^2$) |
|---|---|---|---|---|
| | Hard | Soft | Mixed | |
| Hawaii Study Area | 5.37% (421,755 $km^2$) | 92.95% (7,300,565 $km^2$) | 1.68% (132,133 $km^2$) | 7,854,453 |
| California Study Area | 0.22% (1,960 $km^2$) | 88.72% (790,400 $km^2$) | 11.06% (98,532 $km^2$) | 890,893 |
| Grand Total[1] | 4.85% (423,715 $km^2$) | 92.52% (8,090,965 $km^2$) | 2.64% (230,665 $km^2$) | 8,745,346 |

[1] Numbers may not add up due to coordinate reference system projections.

### 3.5.2.3 Artificial Features

Man-made structures that are either deliberately or unintentionally submerged underwater create artificial habitats that mimic some characteristics of natural habitats, such as providing hard substrate and vertical relief (Broughton, 2012). Artificial reef habitats have been intentionally created with material from sunken ships, rock and stone, concrete and rubble, car bodies, tires, scrap metal, and various other materials. Artificial habitats also have been created as a result of structures built for other purposes (e.g., breakwaters, jetties, piers, wharves, bridges, oil and gas platforms, fish aggregating devices, cables and underwater range equipment). Some artificial structures provide ecological functions similar to natural hard bottom habitats, such as providing attachment substrate for algae and sessile invertebrates, which in turn supports a community of mobile organisms that may forage, shelter, and reproduce there (National Oceanic and Atmospheric Administration, 2007).

Artificial habitats in the Study Area include artificial reefs, shipwrecks, and cables. Artificial reefs are designed and deployed to supplement the ecological services provided by coral or rocky reefs. Artificial reefs range from simple concrete blocks to highly engineered structures. Vessels that are sunk in the Study Area may be colonized by encrusting and attached marine organisms if there is a larval source and enough nutrition (e.g., detritus) drifting through the water column. Wrecks in the abyssal zone and some locations landward of the deep ocean are typically devoid of encrusting or attached organisms due to the scarcity of drifting food particles in the deep ocean.

Supporting information on mapped artificial structures in the Study Area is found in Appendix C. As shown in Table 3.5-2, 1,355 mapped points were identified, consisting of shipwrecks (1,180), artificial reefs (166), and oil and gas platforms (9)

**Table 3.5-2: Number of Artificial Structures Documented in the Study Area**

| *Study Area* | *Artificial Reef* | *Shipwreck* | *Oil/Gas Platforms* | *Grand Total* |
|---|---|---|---|---|
| Hawaii Study Area | 35 | 626 | 0 | 661 |
| California Study Area | 131 | 554 | 9 | 694 |
| **Grand Total** | 166 | 1,180 | 9 | 1,355 |

Note: shipwrecks that are "address restricted" due to status on the National Register of Historic Places and ship hulks sunk during Naval SINKEX are not included in this table (U.S. Department of the Navy, 2018).

##### 3.5.2.3.1 Regulatory Environment

#### State Standards and Guidelines

State jurisdiction regarding water quality extends from the low tide line to 3 NM offshore for both California and Hawaii. Federal jurisdiction regarding water quality extends to 200 NM along the Pacific Coast of the U.S. Detailed information on the regulatory state and federal standards and guidelines is presented in Chapter 6.

### 3.5.3 Environmental Consequences

None of the proposed military readiness activities would be conducted under the No Action Alternative. Therefore, baseline conditions of the existing environment would either remain unchanged or would improve slightly after cessation of ongoing military readiness activities. 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 and Section 3.0.3.3 could potentially affect abiotic habitats within the Study Area.

Appendix A provides detailed information on each activity. Appendix F provides more detailed effect analysis of stressors analyzed in the 2018 HSTT and 2022 PMSR EIS/OEISs. Appendix I provides detailed information regarding substrate effects from MEM, including but not limited to explosives, in-water devices, and buoys. Where such detailed information cannot be included in this document, these appendices are referenced.

For abiotic habitats, the stressors and sub-stressors considered in the analysis are the following:

- **explosives** (explosives detonated on or near the bottom)
- **physical disturbance and strike** (vessels and in-water devices [including amphibious vehicles], MEM, seafloor devices [including seafloor cables], pile driving)

The environmental effect analysis considers standard operating procedures and mitigation measures that would be implemented under Alternative 1 and Alternative 2.

As noted in Section 3.0.2, a significance determination is only required for activities that may have reasonably foreseeable adverse effects on the human environment based on the significance factors in 40 CFR 1501.3(d). Of the two stressors analyzed in this section, 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 would be considered significant if the effects have short-term or long-term changes well outside the natural variability in physical habitat characteristics. Habitat would be degraded over the long term or permanently such that it would no longer possess sustainable habitat requirements.

#### 3.5.3.1 Explosive Stressors

Table 3.5-3 contains a brief summary of information that is relevant to analyses of effects from explosive stressors. Detailed information on explosive stressor analysis is provided in Appendix D. Explosives use underwater has not been identified among the causes of habitat degradation and loss as documented in Appendix F, Section F.2.

**Table 3.5-3: Explosive Stressors Summary Information**

| Sub-Stressor | Background Information Summary |
|---|---|
| Explosions in the water | Explosions produce pressure waves with the potential to cause physical disturbance due to rapid pressure changes and other physical effects.<br>• The physical properties of water column habitat could be impacted by in-water explosions, but only for instances in increased temperature and water motion within relatively small areas. The physical properties of shoreline habitats would be unaffected by explosives because they are not used on any shorelines in the Study Area. Bottom habitats could be impacted by in-water explosions on or near the bottom.<br>• Most explosive detonations during military readiness activities involving the use of high explosive munitions would occur in the air or near the water's surface in waters greater than 3 nautical miles from shore in water depths greater than 100 feet (30 meters) and would not impact the bottom.<br>• Closer to shore, explosive charges could occur near the surface, in the water column, or on the bottom and generally in specific locations devoid of underwater hazards. Overall, impacts on hard bottom habitat would be avoided, where practicable.<br>• An explosive charge would produce percussive energy that would be absorbed and reflected by the bottom. The specific size of explosive charge, crater depths, and crater widths would vary depending on the depth of the charge and substrate type.<br>• On hard bottom, the explosive energy would be mostly reflected, and there would be some conversion of hard substrate to soft or mixed substrate. To the maximum extent practicable, explosives would not be used near hard substrate. All underwater detonations are either in the water column far from the bottom or are in the areas used for decades that are not hard bottom.<br>• On soft substrate types other than clay, the crater formed would be temporary (days to weeks), whereas craters in clay may persist for years. |
| Explosions in the air | Explosions in the air would not affect habitat due to the physical resilience for the medium (i.e., water, substrate) and lack of proximity to aquatic abiotic habitats. |

#### 3.5.3.1.1 Effects from Explosives Under Alternative 1

**Training and Testing**. Training and testing activities under Alternative 1 that may affect abiotic habitat would be mainly explosives placed on or near the bottom (seafloor detonations). The number and locations of these stressors under Alternative 1 are provided in Table 2-10 through Table 2-13. Overall, detonations on the seafloor would be very limited in where they occur. Detonations on the seafloor would result in approximately 0.8 acre (ac.) and 2.0 ac. of affected habitat per year in the Hawaii Study Area and California Study Area, respectively, under the conservative analysis scenario (refer to Appendix I). Some habitats would recover over time, as soft substrates are dynamic systems and craters could refill. Most areas of hard bottom and other sensitive habitats would be avoided using the Protective Measures Assessment Protocol (PMAP) (Chapter 5). Additionally, many in-water detonations would occur in the same areas, reducing effects on undisturbed areas. Although locations and quantities may differ somewhat, overall effects to habitats would be similar to what was analyzed in the 2018 HSTT and 2022 PMSR EIS/OEISs. As such, effects from in-water explosions under Alternative 1 would mostly be limited to local and short-term effects on habitat structure in the Study Area.

**Modernization and Sustainment of Ranges**. No explosives would be involved in modernization and sustainment of ranges.

**Conclusion**. Activities that include the use of explosives under Alternative 1 would result in less than significant effects since (1) seafloor detonations would be infrequent, (2) the percentage of the Study Area affected would be small, and (3) the disturbed areas are likely soft bottom areas that recover relatively quickly from disturbance.

#### 3.5.3.1.2 Effects from Explosives Under Alternative 2

The locations and types of military readiness activities using explosives would be the same under Alternatives 1 and 2. There would be a very small increase in the number of activities conducted in the California Study Area. However, the increase would not result in substantive changes to the potential for or types of effects on abiotic habitats.

Therefore, activities that include the use of explosives under Alternative 2 would be similar to Alternative 1 and would result in less than significant effects.

### 3.5.3.2 Physical Disturbance and Strike

This section analyzes the potential effects of the various types of physical disturbance and strike stressors resulting from military readiness activities within the Study Area. This analysis includes the potential effects of (1) vessels and in-water devices, (2) MEM, (3) seafloor devices, and (4) pile driving. Table 3.5-4 contains brief summaries of information that is relevant to the analysis of effects for each physical disturbance and strike sub-stressor on abiotic habitats. A detailed description of each of these potential effects are found in Appendix F.

**Table 3.5-4: Physical Disturbance and Strike Stressors Summary Information**

| Sub-Stressor | Information Summary |
|---|---|
| Aircraft and aerial targets | Effects on aquatic abiotic habitats from aircraft and aerial targets are not applicable because they occur in airborne environments. Debris associated with such activities is considered MEM and covered in Section 3.5.3.2.2. |
| Vessels and in-water devices | The majority of the military readiness activities include vessels. In general, there would be a higher likelihood of vessels and in-water devices (e.g., unmanned underwater vehicles [UUVs], recovered surface targets) affecting seafloor habitats in the coastal areas than in the open ocean portions of the Study Area. This is due to the concentration of activities and the comparatively higher abundances of organisms in areas closer to shore.<br>• In most cases, vessels and in-water devices would avoid contact with the bottom per standard operating procedures. The exception would be if the vessel/vehicle is designed to touch the bottom (e.g., amphibious vehicles).<br>• Amphibious operations occur within regularly used lanes. The beaches, which are above the mean high tide line, are not a part of the study area and any potential associated effects to beach from amphibious operations are not analyzed in this document.<br>• Along more sheltered shorelines, vessels operating in very shallow water can temporarily disturb sediments through propeller wash and actual contact with the bottom (Sargent et al., 1995; Stevenson et al., 1979); touching the bottom in shallow, soft bottom is a common practice among boaters that temporarily disturbs the substrate.<br>• For safety reasons, small vessels are not generally operated at excessive speeds close to shore and outside of navigation canals, and the wakes generated would have similar effects as naturally occurring wind waves. |
| Military Expended Materials | MEM deployed over water include a wide range of items that may affect abiotic habitats where the item settles or moves across the bottom. Before the item is buried or encrusted with marine growth, the effects on abiotic habitat may include temporary increases in turbidity around the material and longer-term coverage of the underlying substrate with artificial materials.<br>• In soft substrate the expended material may result in a depression, localized turbidity, or sediment redistribution resulting in scouring. Solid expended materials (e.g., bombs, shell casings) may also function as artificial hard bottom, although differences in texture and mineral content may result in species composition that is different from the surrounding area (Perkol-Finkel et al., 2006; Ross et al., 2016).<br>• On hard bottom or artificial structures, a direct strike is unlikely to occur with sufficient force to damage the substrate due to the dissipation of kinetic energy within the first few feet of the water column.<br>• In shallower portions of the continental shelf, heavy materials would likely be covered by sediments in under a year (Inman & Jenkins, 2002). However, changes in the pattern of erosion and sedimentation on the bottom with intense storms and long-term shifts in currents can later expose MEM to some degree of mobility (e.g., World War II mines rolling up on beaches).<br>• On deep ocean substrate under less energetic conditions, heavy expended materials would persist for longer on the substrate surface. The potential effect of such persistent materials on the deep ocean floor is also minimized by a substantial decrease in size and density of benthic organisms as well as the relevance of structural differences in benthic habitat. |

**Table 3.5-4: Physical Disturbance and Strike Stressors Summary Information (continued)**

| Sub-Stressor | Information Summary |
|---|---|
| Military Expended Materials (continued) | • MEM that are less dense than the underlying substrate (e.g., decelerator/ parachutes) have the potential to remain on the substrate surface for some time after sinking. The effect of lighter materials on substrates would be temporary and minor due to the mobility of such materials. The rare exception would be for some light materials (e.g., decelerator/parachute or wire/cable) that snag on structure bottom features. The potential for lighter materials to drift into shallow, nearshore habitats from military readiness activities would be low based on the prevailing ocean currents.<br>• Within the Study Area, weapons firing and launch of munitions typically occurs greater than 3 nautical miles from shore. After striking the sea surface and falling relatively slowly through the water column, the effect of MEM on the seafloor would be on mostly soft substrate that is resilient to disturbance and would thus recover quickly in the event of a disturbance. |
| Seafloor devices | Seafloor devices are either stationary (e.g., mine shapes, anchors, bottom-placed instruments), or move very slowly along the bottom (e.g., bottom-crawling UUV) where they may temporarily disturb the bottom before being recovered. This also includes the existing and proposed modernization and range sustainment SWTRs that use underwater hydrophones and seafloor cables.<br>• Effects may include temporary increases in turbidity around the device and temporary coverage and compaction of underlying substrate.<br>• Intentional placement of seafloor devices on bottom structure is avoided to ensure recovery. Intentional placement of seafloor devices on hard bottom is avoided.<br>• Seafloor devices are most likely to affect abiotic habitats for soft and mixed bottom communities that cover 84% of Study Area locations less than 2,500 meters deep. |
| Pile Driving | Pile driving and removal at Port Hueneme, California involves both impact and vibratory methods in soft substrate.<br>• Pile driving would occur in a new location that did not previously occur in the 2018 HSTT EIS/OEIS.<br>• Effects would be limited to the number of piles, which is relatively small, and would be short term. |
| Range Sustainment and Modernization | Range sustainment and modernization activities are analyzed separately under applicable stressors as they have not been analyzed in the 2018 HSTT or 2022 PSMR EIS/OEISs. These activities include:<br>• SOAR range modernization<br>• Maintenance of Barking Sands Tactical Underwater Range/Barking Sands Underwater Range Expansion<br>• Deployment of seafloor cables<br>    o The cables installed at SOAR, Tanner Bank, SCI SWTR, and the Hawaii Cable Project (northeast of Oahu and west of Kauai) are thick, armored for durability and abrasion resistance, and relatively inflexible. These cables would not loop or drift during deployment, so effects to abiotic habitats would be localized.<br>• Installation and maintenance of mine warfare and other training areas<br>• Installation and maintenance of underwater platforms |

#### 3.5.3.2.1 Vessels and In-Water Devices

Table 3.5-4 contains a summary of the information used to analyze the potential effects of vessels and in-water devices on abiotic habitats. For detailed information on this sub-stressor, see Appendix F.

##### 3.5.3.2.1.1 Effects from Vessels and In-Water Devices Under Alternative 1

**Training and Testing**. The majority of the training and testing activities include vessels. These activities could be widely dispersed throughout the Study Area but would be more concentrated near naval ports, piers, and ranges. Amphibious training would be restricted to designated amphibious approach lanes within the Hawaii Study Area and California Study Area. Because of the nature of vessel operation and intentional avoidance of bottom strikes, bottom habitats would not be exposed to vessel strikes but could be exposed to vessel disturbance by propeller wash. Groundings would be accidental and rare.

With the exception of amphibious operations, which occur at predetermined locations, vessel disturbance and strikes affecting abiotic habitats would be extremely unlikely. Shallow-water vessels typically operate in defined boat lanes with sufficient depths to avoid propeller or hull strikes of bottom habitats. Amphibious landings would occur within one of the four amphibious approach lanes in the California Study Area (Figure 2-2), as well as existing amphibious landing locations previously analyzed in the 2018 HSTT EIS/OEIS. Landings would occur on designated lanes within the shallow water area that are regularly used and naturally resilient to disturbance. Overall, effects would be similar to those analyzed in the 2018 HSTT and 2022 PMSR EIS/OEISs. As such, under Alternative 1, vessels and in-water devices are unlikely to affect abiotic habitats because standard operating procedures avoid contact with the bottom. Any effects from amphibious training would be localized, temporary, and would cease with the conclusion of the activity.

**Modernization and Sustainment of Ranges**. Vessels and in-water devices associated with SOAR Modernization; SWTR Installation; Sustainment of Undersea Ranges; Hawaii and California undersea cable projects; and Installation and Maintenance of Underwater Platforms, Mine Warfare, and Other Training Areas would move very slowly during installation activities (0–3 knots), at the surface, and over depths where bottom habitats would not be exposed to vessel disturbance. These activities would occur offshore and on soft bottom habitat.

**Conclusion**. Activities that include the use of vessels and in-water devices under Alternative 1 would result in less than significant effects since there would be (1) avoidance of artificial structures and hard bottom habitats, (2) quick recovery of soft bottom habitats that would be likely affected, and (3) short-term and localized disturbances of the water column (e.g., suspended sediments) and substrate (e.g., scarring) in shallow water.

##### 3.5.3.2.1.2 Effects from Vessels and In-Water Devices Under Alternative 2

The locations and types of military readiness activities using vessels and in-water devices would be the same under Alternatives 1 and 2. There would be a very small increase in the number of activities conducted in the California Study Area. However, the increase would not result in substantive changes to the potential for or types of effects on vessel and in-water devices.

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.

#### 3.5.3.2.2 Military Expended Materials

Table 3.5-4 contains a summary of information used to analyze the potential effects of MEM on abiotic habitats. For detailed information on this sub-stressor, see Appendix F.

##### 3.5.3.2.2.1 Effects from Military Expended Materials Under Alternative 1

**Training and Testing**. Training and testing activities involving MEM (Appendix A) would have the potential to effect marine substrates. To determine the percentage of a given substrate within a Study Area that may potentially be impacted by MEM under a conservative scenario, the total affected area for each Study Area was divided by the total amount of that particular substrate type within the same Study Area as provided in Table 3.5-1 (Appendix I).

MEM is not expected to impact more than 0.01 percent of the available soft, 0.01 percent for mixed, and 0.01 percent for hard bottom habitats annually within any of the Study Areas. Even if MEM distribution is not uniform and some areas experience more MEM than other, the area of disturbance would still be small.

Additional analysis was conducted to determine the proportional impact of MEM from training and testing activities on marine habitats within the Study Area. A total of approximately 34.2 ac. would be affected by MEM across all substrate types in the Hawaii Study Area, and 116.6 ac. in the California Study Area would be impacted (150.8 ac. across both Study Areas). This represents less than a thousandth of one percent of available bottom habitat in any range complex. The distribution of the impact footprints among habitat types is described in Appendix I.

**Modernization and Sustainment of Ranges.**

No MEM is expected during modernization and sustainment of ranges activities. Some anchors may not be recovered and become MEM, but those are covered in the analysis of seafloor devices.

**Conclusion**. Activities that include the use of MEM under Alternative 1 would result in less than significant effects since (1) a limited spatial coincidence between impact footprints and the distribution of hard bottom, (2) a quick recovery of the soft and mixed substrate types that are more likely impacted and (3) mostly short-term effects for most local disturbances of the seafloor, with some temporary increase in suspended sediment in mostly soft bottom areas.

##### 3.5.3.2.2.2 Effects from Military Expended Materials Under Alternative 2

The locations and types of military readiness activities using MEM would be the same under Alternatives 1 and 2. There would be a very small increase in the number of activities conducted in the California Study Area. The increase in footprint from Alternative 1 to 2 is 182.9 ac., which is substantially low compared to the size of the California (890,893 square kilometers [$km^2$]) and Hawaii (7,854,453 $km^2$) Study Areas. However, the increase would not result in substantive changes to the potential for or types of effects on abiotic habitats.

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.

#### 3.5.3.2.3 Seafloor Devices

Table 3.5-4 contains a summary of the information used to analyze potential effects of seafloor devices on abiotic habitats. Appendix B and Chapter 2 summarize the types of activities that use seafloor devices, including where the devices are used and how many activities would occur under each alternative.

#### 3.5.3.2.3.1 Effects from Seafloor Devices Under Alternative 1

**Training and Testing**. Under Alternative 1, seafloor devices would be used throughout the Study Area during training and testing activities, as described in Chapter 2. The types of seafloor devices proposed under Alternative 1 would not vary significantly from what was analyzed in the 2018 HSTT and 2022 PMSR EIS/OEISs. As summarized in Table 3.5-4, seafloor devices would be used in previously disturbed soft bottom habitat. Hard bottom habitat would be avoided per mitigation measures.

**Modernization and Sustainment of Ranges**. The installation and maintenance of seafloor devices (cables, hydrophones, anchors, etc.) during implementation of modernization and range sustainment activities would disturb underlying abiotic habitat. Deployment of cables along the seafloor would occur in three locations: (1) south and west of SCI in the California Study Area, (2) to the northeast of Oahu and (3) west of Kauai in the Hawaii Study Area. Installation and maintenance of underwater platforms, mine warfare training areas, and installation of other training areas also involve seafloor disturbance. These activities would occur offshore and on soft bottom habitat. Seafloor devices would cover underlying substrate and temporarily inhibit the substrates' ability to function as habitat. Where hardbottom habitat cannot be avoided, over time seafloor devices would not change the substrates' ability to function as a habitat. As such, effects would only be long term; however, habitat would be expected to return to baseline conditions once modernization and range sustainment activities are complete.

**Conclusion**. Activities that include the use of seafloor devices under Alternative 1 would result in less than significant effects since (1) the area exposed to the stressor is extremely small relative to overall availability of habitat of each type, (2) the activities are dispersed such that with the exception of precision anchoring activities, few abiotic habitats would be exposed to multiple events, (3) effects would be localized and those involving soft bottom would likely be temporary due to the dynamic nature of the habitats, and (4) sensitive habitats would tend to be avoided due to snagging or entanglement that could hinder recovery of the device.

#### 3.5.3.2.3.2 Effects from Seafloor Devices Under Alternative 2

The locations and types of military readiness activities using seafloor devices would be the same under Alternatives 1 and 2. There would be a very small increase in the number of activities conducted in the California Study Area. However, the increase would not result in substantive changes to the potential for or types of effects on abiotic habitats.

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.

#### 3.5.3.2.4 Pile Driving

Table 3.5-4 contains a summary of the background information used to analyze the potential effects of pile driving on abiotic habitats. For detailed information on this sub-stressor, see Appendix C**.**

#### 3.5.1.1.1.1 Effects from Pile Driving Under Alternative 1

**Testing and Training**. Pile driving would occur in Port Hueneme Harbor, a developed industrial harbor in the California Study Area. While pile driving may have the potential to effect soft bottom habitat, the effects would be extremely limited since the number of piles and size is relatively small (n = 20 concrete 24-in. piles), and the duration is short (20 days for assembly and 10 days for disassembly). Piles would remain in the water for up to 60 days. Since pile driving would occur in the harbor, the dynamic nature of the soft bottom habitat is likely to return to its previous state shortly following removal of the temporary piles. Effects to abiotic habitats from pile driving would be consistent with what was previously analyzed in the 2018 HSTT and 2022 PMSR EIS/OEISs.

**Modernization and Sustainment of Ranges**. Pile driving would not occur during modernization and sustainment of ranges activities.

**Conclusion.** Activities that include pile driving under Alternative 1 would result in less than significant effects since (1) number of piles would be relatively small, (2) duration is short term, and (3) would occur in previous disturbed areas.

###### 3.5.1.1.1.2 Effects from Pile Driving Under Alternative 2

The locations and types of military readiness activities using pile driving would be the same under 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.

### 3.5.4 Summary of Potential Effects on Abiotic Habitats

#### 3.5.4.1 Combined Effects of All Stressors Under Alternative 1

The impact area for in-water explosions and MEM were all much less than a thousandth of one percent of the total area of documented hard, soft, or mixed bottom for each mapped substrate type, in both Study Areas. Hard bottom habitat would be avoided to the maximum extent practicable, and effects would mostly occur on soft bottom habitat. Large and dense MEM (e.g., large-caliber projectile casings, non-explosive bombs) deposited on the bottom would be the most persistent. However, soft-bottom habitats may recover in the short term where heavier MEM are buried under shifting sediments; hard bottom habitats would recover over the long term where hard, stable MEM become overgrown with similar organisms.

For abiotic habitat, the combined impact area of explosive stressors, physical disturbances, and strike stressors proposed from military readiness activities in Alternative 1 would have minimal effect on the ability of soft bottom, mixed bottom, or hard bottom to serve their function as habitat. Military readiness activities under Alternative 1 would have a total footprint of potential impact across all habitat types of 150.8 ac. from MEM and 2.8 ac. from explosive detonations. This also represents less than a thousandth of one percent (0.00007 percent) of the bottom habitat within the Study Area (8,745,346 $km^2$). The total area of mapped hard bottom in the area dwarfs the estimated 0.08 ac. impacted from explosive detonations (there are no habitat-specific acreages for MEM) (Appendix I). The combined total proportional impact from military readiness activities is primarily to soft bottom habitat, much less to hard and mixed substrate habitats, and very little to areas with unknown substrate type. Overall, the effects from implementation of military readiness activities under Alternative 1 on abiotic habits would be less than significant.

#### 3.5.4.2 Combined Effects of All Stressors Under Alternative 2

For abiotic habitats, the combined effects of explosive stressors, physical disturbances, and strike stressors proposed for military readiness activities would have minimal effect on the ability of soft, mixed, or hard bottom to function as habitat. Activities would have a total footprint of potential impact of 299.5 ac. across all habitat types from MEM and 3.1 ac. from explosive detonations. This represents less than a thousandth of one percent (0.00014 percent) of the bottom habitat within the Study Area (8,745,346 $km^2$). Overall, the effects from implementation of military readiness activities under Alternative 2 on abiotic habitat would be less than significant.

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