# Draft

# Supplemental Environmental Impact Statement/ Overseas Environmental Impact Statement Atlantic Fleet Training and Testing

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# 3.3 Habitats

**HABITATS SYNOPSIS**

The Action Proponents considered the stressors to abiotic habitats that could result from the Proposed Action in the Study Area. The following conclusions have been reached for the Preferred Alternative (Alternative 1):

- Acoustics: Acoustic stressors are not applicable to abiotic habitats and are not analyzed in this section.
- Explosives: Most explosives would detonate in air or at or near the water surface. Some explosives would be placed on the bottom (i.e., seafloor). Explosive detonations on or near the bottom would produce percussive energy that could impact bottom habitat. While hard bottom would mostly reflect the energy (and be avoided per area mitigations), a crater would form in soft bottom. On substrates other than clay, the effects would be temporary, whereas craters in clay may be persistent. Craters in soft bottom, where substrate moves around with the tides and currents, would only last for days to weeks. The surface area of bottom substrate affected would be a tiny fraction of the total training and testing area available in the Study Area.
- Energy: Energy stressors are not applicable because of the lack of sensitivity of abiotic habitats and are not analyzed in this section.
- Physical disturbance and strike: Most seafloor devices would be placed in areas that would result in minor and temporary bottom substrate impacts. Once on the seafloor and over time, military expended material 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 training and testing area available in the Study Area.
- Entanglement: Entanglement stressors are not applicable because habitats do not have the ability to become “entangled” by materials. The potential for expended material to cover a substrate is discussed under the physical disturbance and strike stressor.
- Ingestion: Ingestion stressors are not applicable because habitats lack the ability to ingest and are not analyzed in this section.
- Secondary stressors: Secondary stressors are not applicable to abiotic habitats, as they are the subject of secondary stressors for biological resources.

## 3.3.1 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 impacts from proposed military readiness activities on them. Impacts to habitats from the Proposed Action were analyzed in the 2018 Final EIS/OEIS. The primary changes from the analysis are provided where they apply in subsequent sections.

### 3.3.2 Affected Environment

The affected environment provides the context for evaluating the effects of the Action Proponent's military readiness activities on abiotic habitats. With noted exceptions, the general background for habitats in the Study Area is not meaningfully different from what is described in the 2018 *Final Atlantic Fleet Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement* (hereinafter referred to as the 2018 Final EIS/OEIS) (Section 3.5.2.1, General Background). See Appendix F (Biological Resources Supplemental Information) for updated details on the general background for habitat. The details are specified in this section when they directly affect the analysis.

The Study Area is generally consistent with that analyzed in the 2018 Final EIS/OEIS. Additions to the Study Area include pierside training and testing events and transit along established navigation channels from pierside locations to offshore range complexes in the Gulf of Mexico. United States (U.S.) Coast Guard activities are similar in nature to Navy activities and fall under the same stressor categories.

#### 3.3.2.1 General Background

Although many classification schemes are available that span a range of spatial dimensions and granularity of marine habitats (Allee et al., 2000; Cowardin et al., 1979; Federal Geographic Data Committee, 2012; 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, intermediate, and hard substrates. 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. Hard substrate areas are dominated by cobbles, boulders, or consolidated bedrock that is stable enough for colonization by habitat-forming invertebrates or attached seaweed. Intermediate substrate areas are dominated by unconsolidated material larger than sand but smaller than cobbles (e.g., gravel, shell fragments), covered by a thin layer of soft substrate over hard substrate, or described as coral rubble. These areas may or may not be stable enough for habitat-forming invertebrates or attached seaweeds, depending on depth and other factors (e.g., current speeds). Artificial features are another type of abiotic substrate that was made by humans (e.g., shipwrecks, artificial reefs). Spatial and temporal variation in abiotic substrate is created by the interplay of surficial geology, currents, tides, water quality, and biological activity at a location.

There is updated information for the mapping of aquatic habitat types in the Study Area that include both natural and artificial features of the shoreline, bottom, and water column. More information on the sources of mapping and the process for combining maps is provided in the Marine Habitat Database Technical Report (U.S. Department of the Navy, 2024). The mapping in this section includes both the abiotic and biotic components of habitat to provide a single location to reference in the biological resources sections.

##### 3.3.2.1.1 Natural Features

The features described in the following sections include only the naturally occurring features of the shoreline, bottom, and water column in the Study Area (e.g., rocky outcrops, sand bars). Artificial substrates that may serve as habitat are described in Section 3.3.2.1.2 (Artificial Features).

#### 3.3.2.1.1.1 Shore Habitats

Shoreline habitats were not mapped for the 2018 Final EIS/OEIS, although they were described for the inshore training and testing area. The general descriptions of shore habitats in the Study Area have not changed despite the addition of some inshore locations in the Gulf of Mexico that are mostly surrounded by coastal wetlands.

#### 3.3.2.1.1.2 Bottom Habitats

The overall distribution of substrate types within training and testing areas with proposed disturbance of the bottom is approximately 4 percent hard substrate (e.g., outcrops, bedrock, rubble), 5 percent intermediate substrate (e.g., gravel/shell), 24 percent soft substrate (e.g., silt, sand), and 67 percent not applicable/greater than 2,500 meters (m) deep (Table 3.3-1). Refer to Section 3.5 (Invertebrates) for why substrate types deeper than 2,500 m are considered not applicable. On seafloor less than 2,500 m deep, hard, intermediate, and soft substrate characterizes approximately 12, 16, and 72 percent of the bottom, respectively. The distribution of substrate types also varies among the training and testing locations, as summarized in Table 3.3-1 and depicted in Figure 3.3-1 through Figure 3.3-5. Among the offshore ranges, the Virginia Capes Range Complex has the largest proportion in substrate deeper than 2,500 m.

The table and figures in this section also depict the regional mapping for biotic features growing on various substrate types (e.g., vascular plant beds: seagrasses and coastal wetlands; benthic macroalgae, shallow-water hard corals). Hard substrate at depths less than 2,500 m may feature deep-sea hard corals and sponges. Hard substrate at depths less than 95 m may feature both sessile invertebrates and benthic macroalgae, including shallow-water hard corals in southern locations of the Study Area. Hard substrate that may feature living organisms is termed “live hard bottom.” Submerged aquatic vegetation (e.g., seagrass, benthic macroalgae) and live hard bottom occupy greater percentages of the seafloor in the national marine sanctuaries (areas excluded from Table 3.3-1). Outside of national marine sanctuaries, the highest concentration of submerged aquatic vegetation and live hard bottom are in the Northeast Range Complexes Inshore and Jacksonville Range Complex, respectively.

#### 3.3.2.1.1.3 Water Column

Water column habitats (e.g., floating *Sargassum*) and artificial feature points in the Study Area, including typical current speeds and directions of flow, are mapped in Figure 3.3-6 through Figure 3.3-10. The current satellite-based mapping is more detailed than the generalization of flow directions depicted in the 2018 Final EIS/OEIS Section 3.02 (Ecological Characterization of the Study Area).

**Table 3.3-1: Percent Coverage of Seafloor Habitats and Abiotic Substrate Types in Training and Testing Locations of the Study Area**

| Training and Testing Locations | Shallow Seafloor (0 to 95 m Depths) | | | | | | Deep Seafloor (95 to 2,500 m Depths) | | | Bathyal-Abyssal Zone (>2,500 m Depths) | Total Area ($km^2$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coastal Wetlands[1] | Seagrass Beds[1] | Mud/ Sand | Gravel/ Shell | Hard Bottom[1] | Coral Reef | Mud/ Sand | Gravel/ Shell | Hard Bottom | | |
| | Substrate: Soft | | | Inter-mediate | Hard[2] | | Soft | Inter-mediate | Hard[2] | | |
| **Range Complexes/Testing Ranges** | | | | | | | | | | | |
| Northeast RC[3] | 0.00% | 0.01% | 19.80% | 9.82% | 1.26% | 0.00% | 25.56% | 6.45% | 2.64% | 34.46% | ***201,135.11*** |
| VACAPES RC | 0.00% | 0.00% | 20.72% | 11.31% | 0.26% | 0.00% | 21.55% | 0.34% | 1.19% | 44.64% | ***102,536.37*** |
| Navy Cherry Point RC | 0.00% | 0.00% | 27.93% | 0.47% | 2.57% | 0.00% | 33.95% | 2.14% | 3.55% | 29.39% | ***69,110.53*** |
| JAX RC | 0.00% | 0.00% | 37.80% | 0.45% | 1.22% | 0.00% | 25.32% | 13.19% | 21.61% | 0.41% | ***180,222.36*** |
| Key West RC | 0.00% | 0.00% | 11.94% | 4.83% | 10.57% | 1.87% | 41.87% | 2.94% | 14.32% | 11.67% | ***77,969.04*** |
| GOMEX RC[3] | 0.00% | 0.00% | 36.33% | 10.56% | 1.97% | 0.00% | 41.27% | 2.07% | 3.20% | 4.59% | ***162,922.09*** |
| NUWC Newport Testing Area[3] | 0.01% | 0.16% | 72.12% | 15.52% | 2.71% | 0.00% | 8.37% | 0.21% | 0.89% | 0.00% | ***38,731.08*** |
| SFOMF | 0.01% | 0.00% | 3.80% | 0.08% | 0.07% | 2.95% | 16.40% | 5.80% | 66.63% | 4.27% | ***1,614.68*** |
| NSWC Panama City Testing Area[3] | 0.00% | 0.00% | 33.65% | 19.86% | 2.39% | 0.00% | 41.11% | 2.60% | 0.40% | 0.00% | ***78,527.72*** |
| **Other Areas** | | | | | | | | | | | |
| Other AFTT Areas[3] | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.08% | 99.92% | ***1,121,039.46*** |
| SINKEX Box[3] | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 100.00% | ***272,439.44*** |
| Northeast RC Inshore | 0.05% | 0.97% | 94.97% | 4.01% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | ***366.45*** |
| VACAPES RC Inshore | 0.92% | 0.00% | 80.64% | 18.35% | 0.09% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | ***1,980.76*** |
| JAX RC Inshore | 17.21% | 1.39% | 81.40% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | ***67.18*** |
| Key West RC Inshore | 0.14% | 1.57% | 75.02% | 23.26% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | ***0.04*** |
| GOMEX RC Inshore | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.08% | 99.92% | ***1,137.20*** |

**Table 3.3-1: Percent Coverage of Seafloor Habitats and Abiotic Substrate Types in Training and Testing Locations of the Study Area (continued)**

| *Training and Testing Locations* | *Shallow Seafloor (0 to 95 m Depths)* | | | | | | *Deep Seafloor (95 to 2,500 m Depths)* | | | *Bathyal-Abyssal Zone (>2,500 m Depths)* | *Total Area ($km^2$)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Coastal Wetlands*[1] | *Seagrass Beds*[1] | *Mud/ Sand* | *Gravel/ Shell* | *Hard Bottom*[1] | *Coral Reef* | *Mud/ Sand* | *Gravel/ Shell* | *Hard Bottom* | | |
| | *Substrate: Soft* | | | *Inter-mediate* | *Hard*[2] | | *Soft* | *Inter-mediate* | *Hard*[2] | | |
| ***All Locations***[4] | <0.01% | 0.04% | 10.93% | 2.76% | 1.00% | 0.09% | 11.06% | 1.99% | 2.84% | 64.75% | ***N/A*** |

[1] A habitat comprising "Submerged Aquatic Vegetation" (includes both seagrass and benthic macroalgae habitat).
[2] A habitat comprising "Live Hard Bottom."
[3] Includes some overlap with other locations.
[4] Average of percentages weighted by EIS/OEIS location area. Due to the overlap of locations, the areas cannot be simply added for the average.
Notes: % = percent; < = less than; > = greater than; AFTT = Atlantic Fleet Training and Testing; GOMEX = Gulf of Mexico; JAX = Jacksonville; $km^2$ = square kilometers; m = meters; NSWC = Naval Surface Warfare Center; NUWC = Naval Undersea Warfare Center; RC = Range Complex; SFOMF = South Florida Ocean Measurement Facility Testing Range; SINKEX = Sinking Exercise; VACAPES = Virginia Capes

#### 3.3.2.1.2 Artificial Features

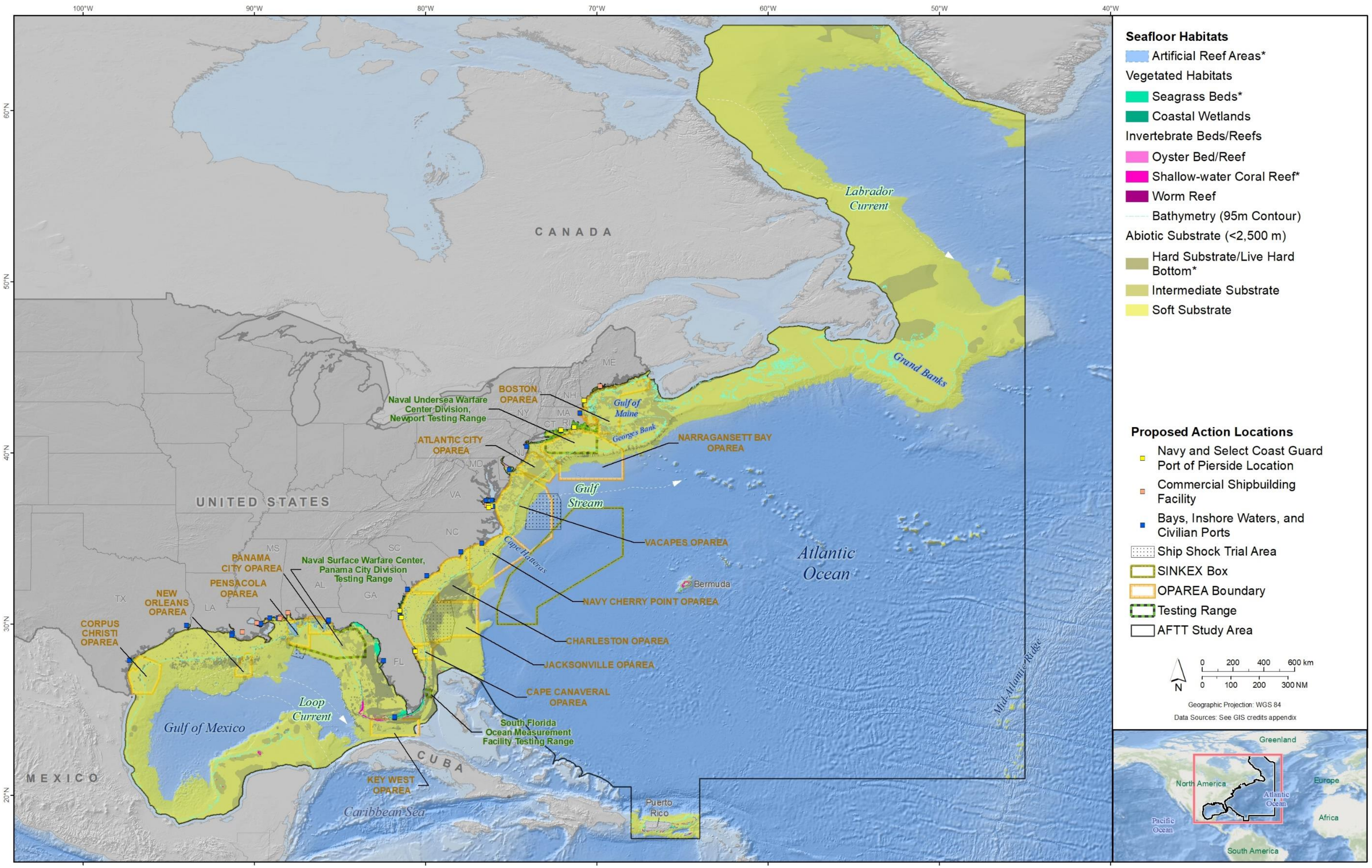
The distribution of fully submerged artificial features (shipwrecks and artificial reefs) varies among the training and testing locations in the Study Area, as summarized in Table 3.3-2 and depicted in Figure 3.3-1 through Figure 3.3-5 (artificial reef areas) and Figure 3.3-6 through Figure 3.3-10 (artificial feature points). Outside of national marine sanctuaries, the highest densities of both shipwrecks and artificial reefs are in the Naval Surface Warfare Center Panama City Testing Range. In the Study Area as a whole, there are close to 6,000 $km^2$ of designated artificial reef areas, and almost 17,000 mapped point features including 12,540 shipwrecks, 1,862 oil/gas platforms, 18 military towers, 6 wind turbines, and 2,632 unspecified obstructions (e.g., marker buoys). All of the inshore training areas and port/pier locations have artificial shoreline features (e.g., piers, seawalls).

**Table 3.3-2: Shipwrecks and Designated Artificial Reefs in Training and Testing Locations of the Study Area**

| *Training and Testing Locations* | *Shipwreck <2,500 m Deep* | | *Artificial Reef Areas* | |
|---|---|---|---|---|
| | *Number* | *Number per 100 $km^2$* | *Total Reef Area ($km^2$)* | *Percent of Location Area* |
| **Range Complexes and Testing Ranges** | | | | |
| Northeast RC[1] | 887 | 1.27 | 39.05 | 0.02% |
| VACAPES RC | 563 | 3.71 | 77.24 | 0.08% |
| Navy Cherry Point RC | 292 | 1.07 | 14.17 | 0.02% |
| JAX RC | 372 | 0.35 | 545.95 | 0.30% |
| Key West RC | 101 | 0.33 | 0.00 | 0.00% |
| GOMEX RC[1] | 809 | 1.07 | 3,923.69 | 2.47% |
| NUWC Newport Testing Area[1] | 728 | 2.87 | 7.79 | 0.02% |
| SFOMF | 41 | 2.86 | 28.85 | 1.82% |
| NSWC Panama City Testing Area[1] | 349 | 1.01 | 3,870.20 | 5.18% |
| **Other Areas** | | | | |
| Other AFTT Areas[1] | 0 | 0.00 | 0.00 | 0.00% |
| SINKEX Box[1] | N/A | N/A | 0.00 | 0.00% |
| Northeast RC Inshore | 91 | 24.83 | 0.00 | 0.00% |
| VACAPES RC Inshore | 490 | 24.74 | 10.32 | 0.52% |
| JAX RC Inshore | 23 | N/A | 0.00 | 0.00% |
| Key West RC Inshore | 2 | N/A | 0.00 | 0.00% |
| GOMEX RC Inshore | 125 | 10.99 | 0.34 | 0.03% |

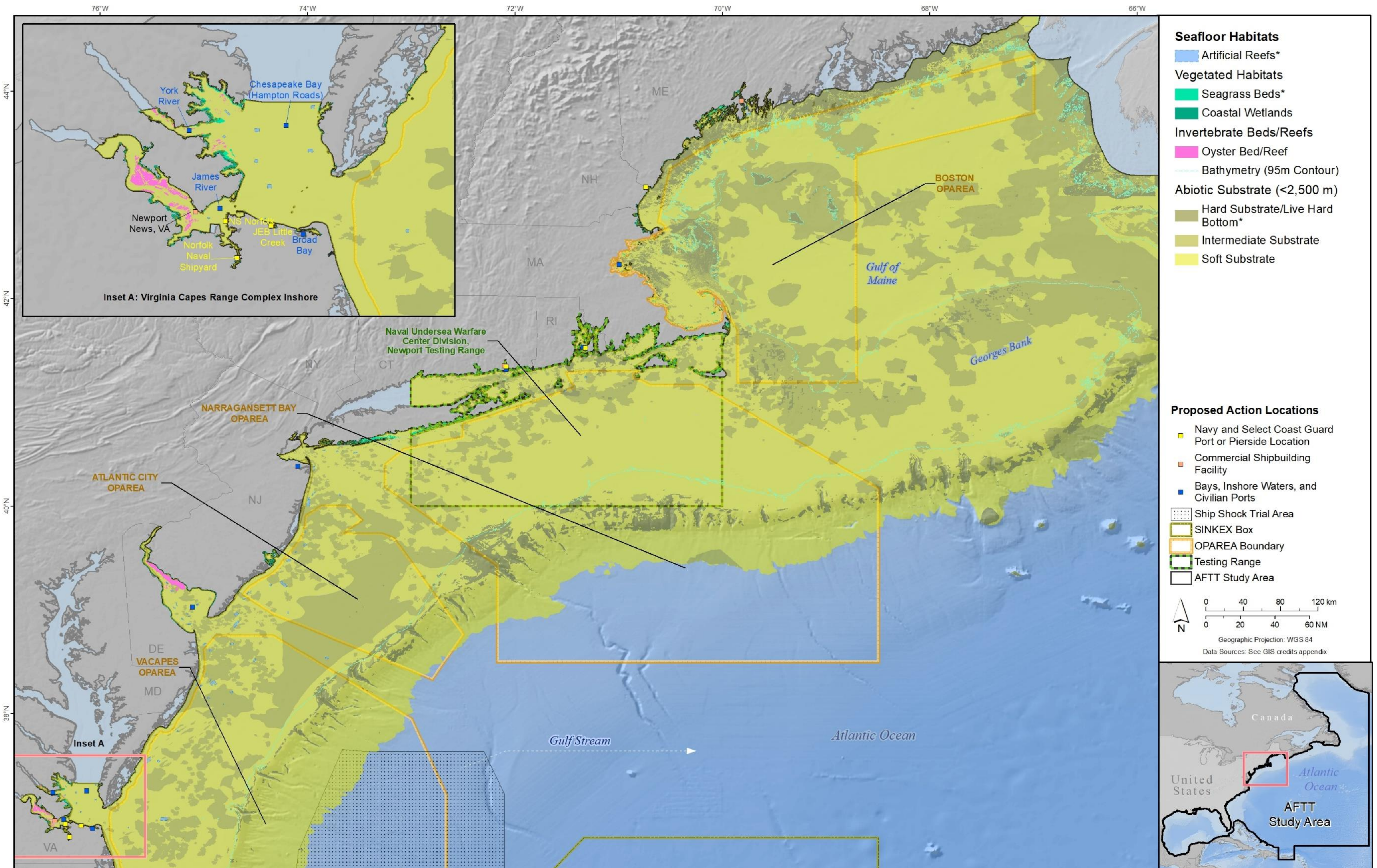
[1] Includes some overlaps with other locations.

Notes: % = percent; < = less than; AFTT = Atlantic Fleet Training and Testing; GOMEX = Gulf of Mexico; JAX = Jacksonville; $km^2$ = square kilometers; m = meters; N/A = not applicable (location area <100 $km^2$); NSWC = Naval Surface Warfare Center; NUWC = Naval Undersea Warfare Center; RC = Range Complex; SFOMF = South Florida Ocean Measurement Facility Testing Range; SINKEX = Sinking Exercise; VACAPES = Virginia Capes



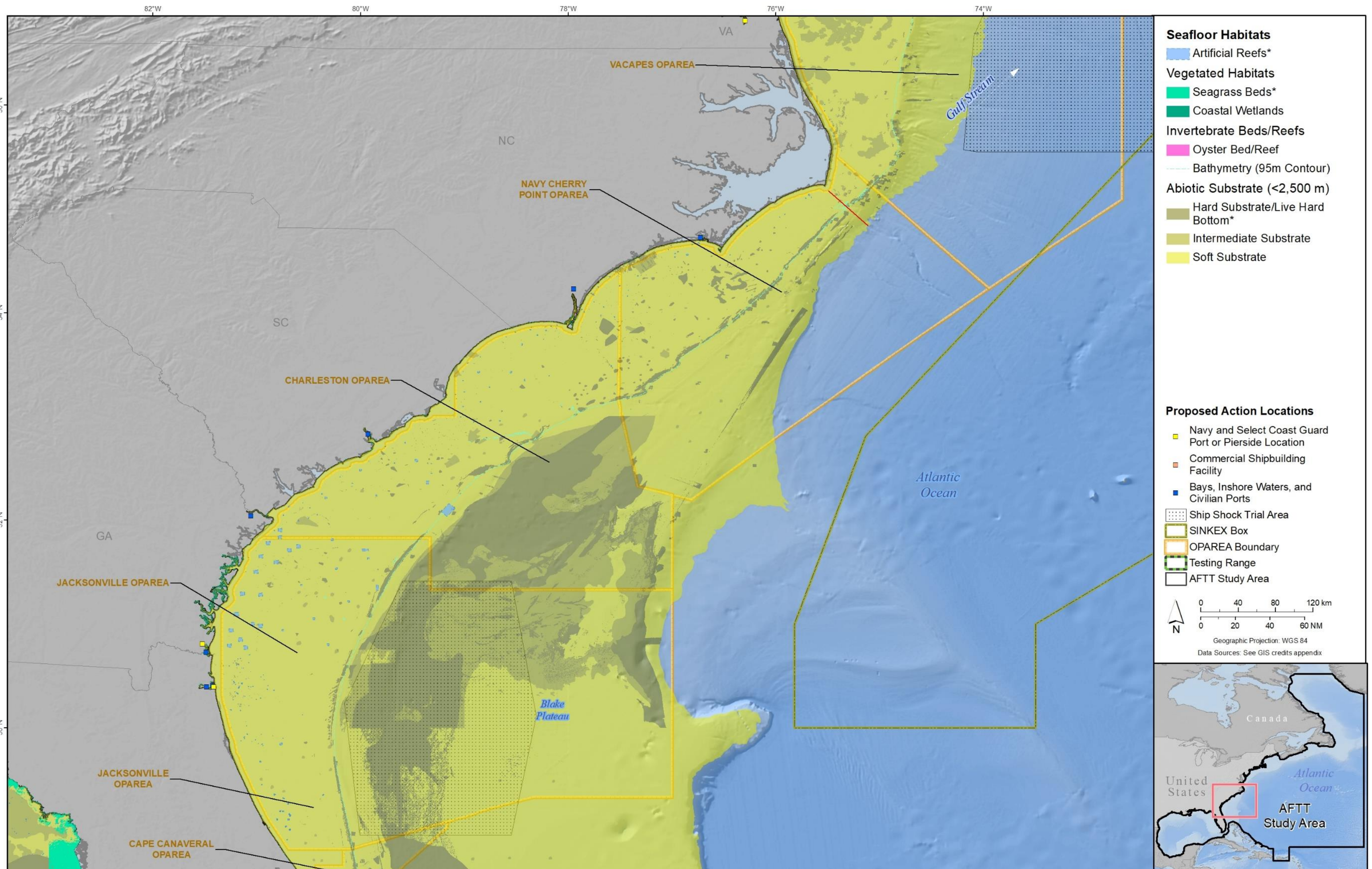

Notes: < = less than; * = Seafloor Resource Mitigation Area; AFTT = Atlantic Fleet Training and Testing; km = kilometer; m = meters; NM = nautical mile; OPAREA = operating area; SINKEX = Sinking Exercise

**Figure 3.3-1: Overview of Artificial Reef Areas and Bottom Habitats in the Study Area**



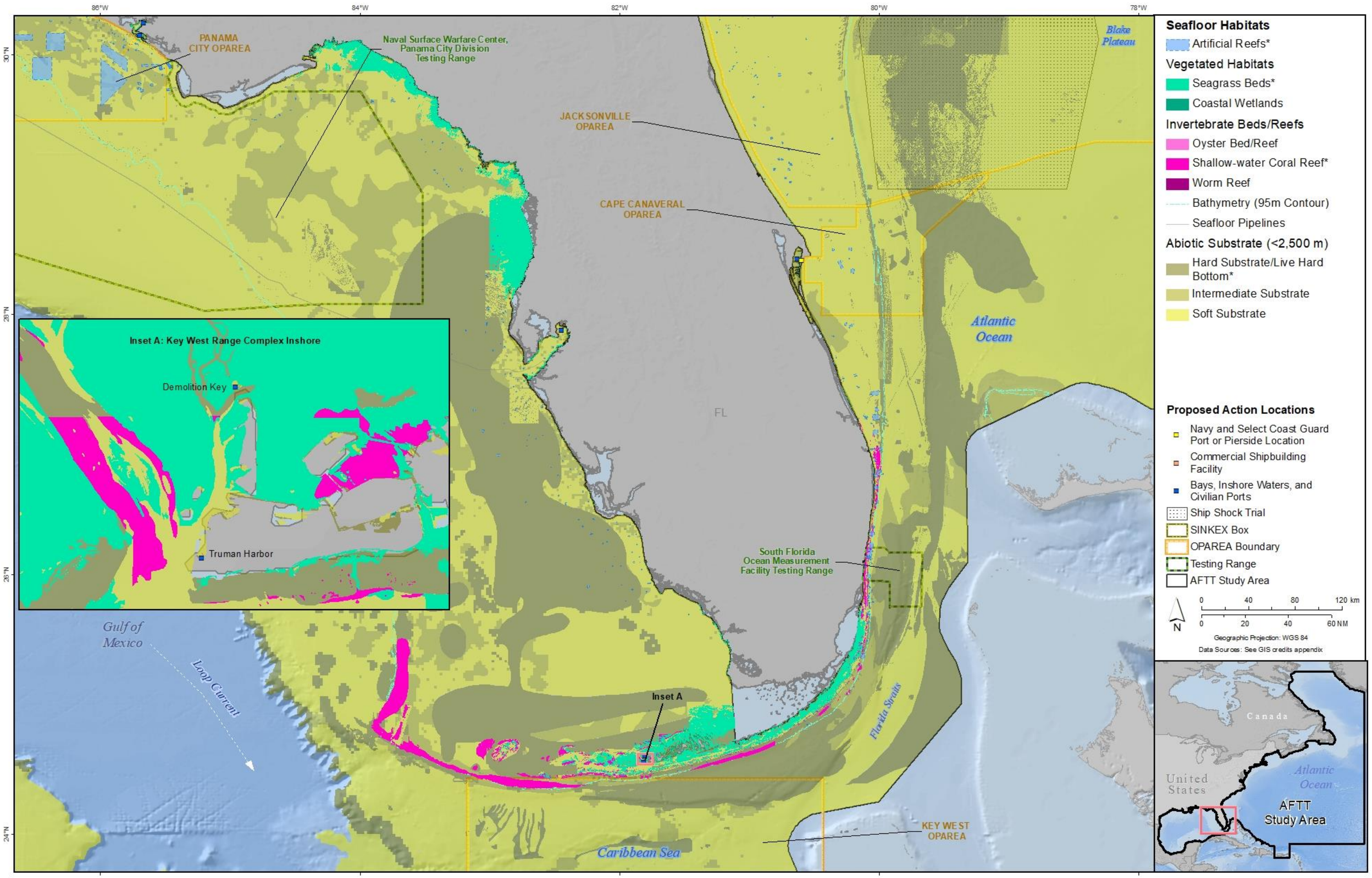

Notes: < = less than; * = Seafloor Resource Mitigation Area; AFTT = Atlantic Fleet Training and Testing; HAPCs = Habitat Areas of Particular Concern; km = kilometer; m = meters; NM = nautical mile; OPAREA = operating area; SINKEX = Sinking Exercise

**Figure 3.3-2: Artificial Reef Areas and Bottom Habitats in the Northeast Region of the Study Area**



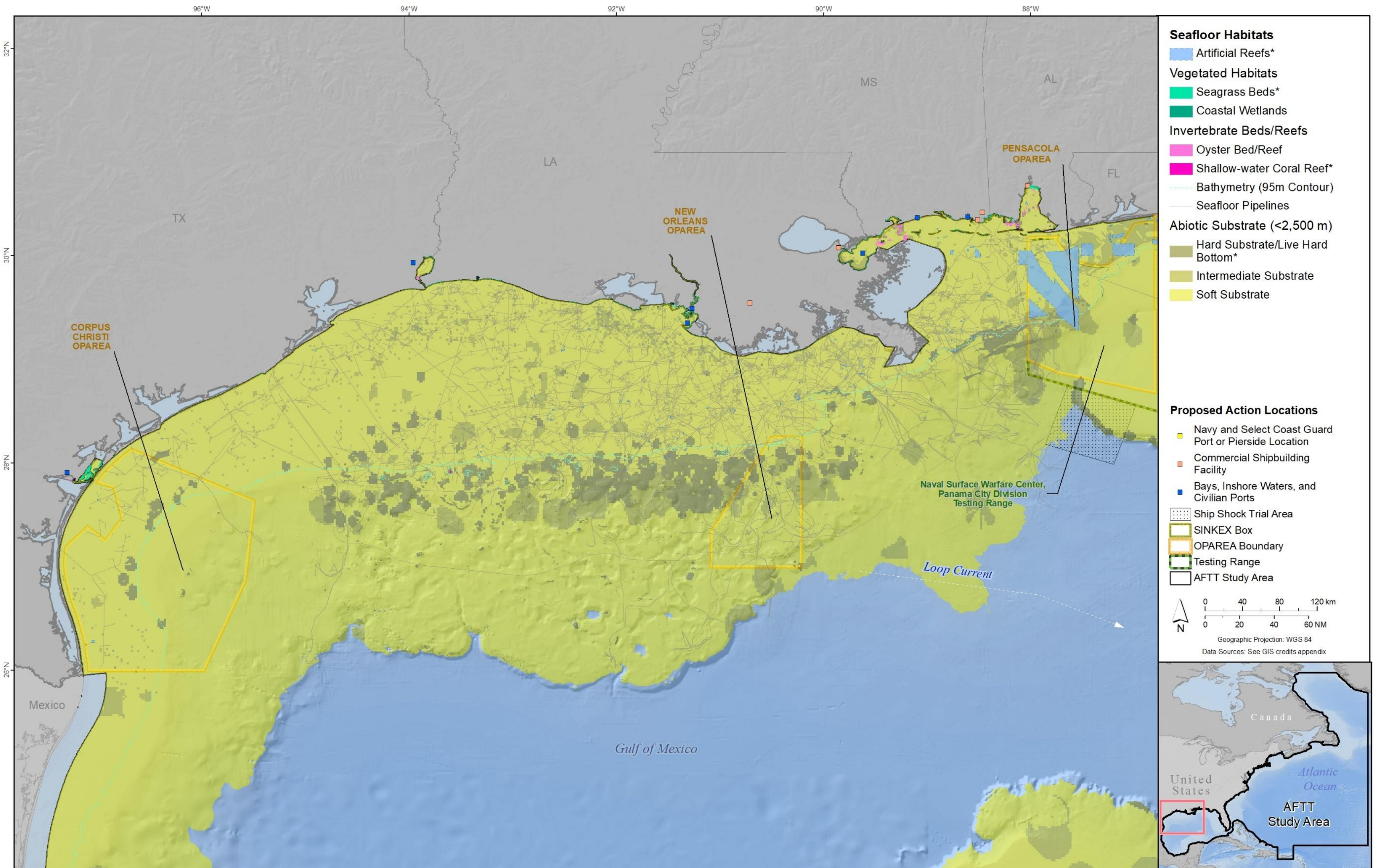

Notes: < = less than; * = Seafloor Resource Mitigation Area; AFTT = Atlantic Fleet Training and Testing; HAPCs = Habitat Areas of Particular Concern; km = kilometer; MPA = Marine Protected Area; m = meters; NM = nautical mile; OPAREA = operating area; SINKEX = Sinking Exercise

**Figure 3.3-3: Artificial Reef Areas and Bottom Habitats in the Southeast Region of the Study Area**



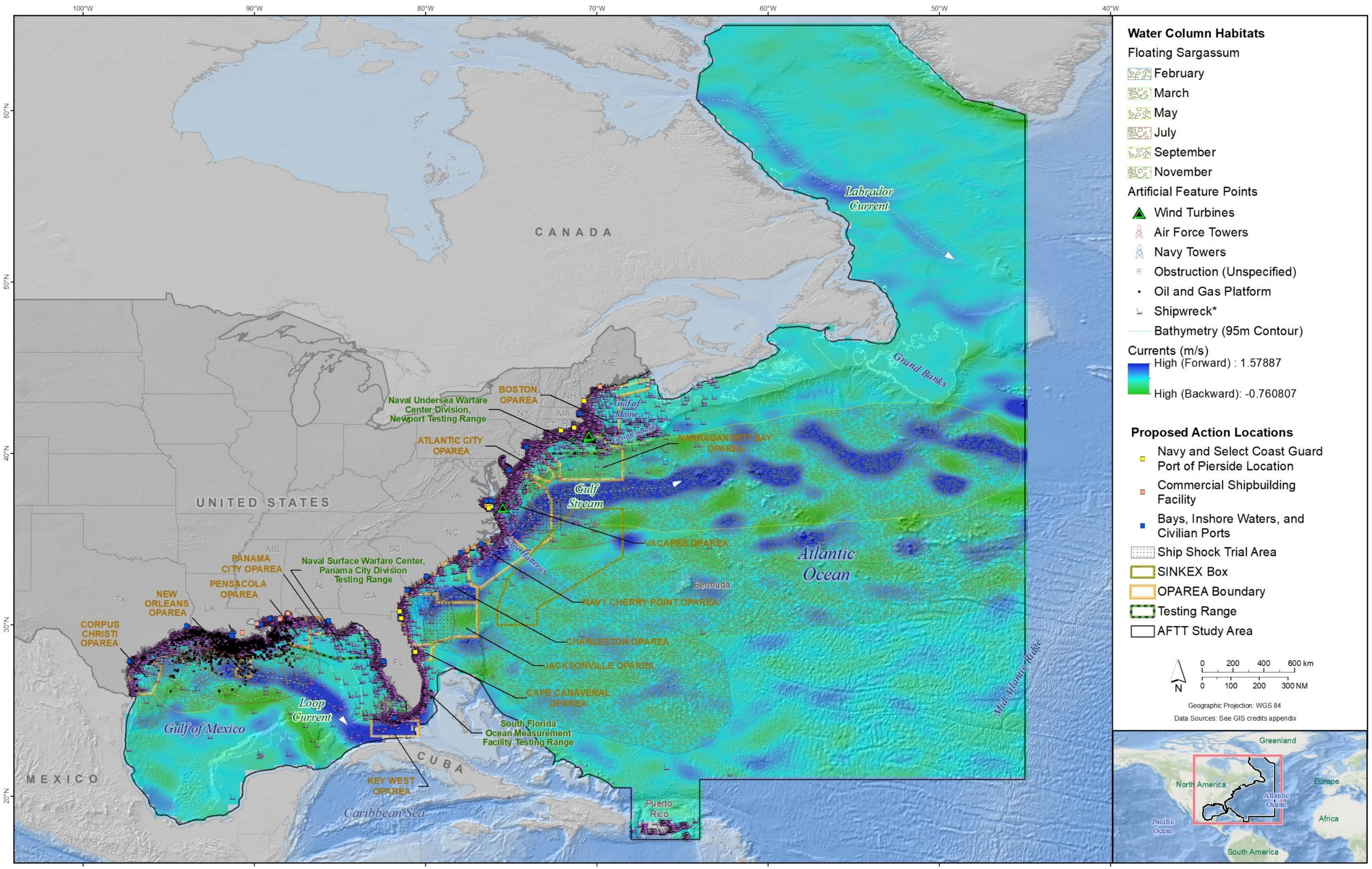

Notes: < = less than; * = Seafloor Resource Mitigation Area; AFTT = Atlantic Fleet Training and Testing; HAPCs = Habitat Areas of Particular Concern; km = kilometer; MPA = marine protected area; m = meters; NM = nautical mile; OPAREA = operating area; SINKEX = Sinking Exercise

**Figure 3.3-4: Artificial Reef Areas and Bottom Habitats in the South Florida Region of the Study Area**



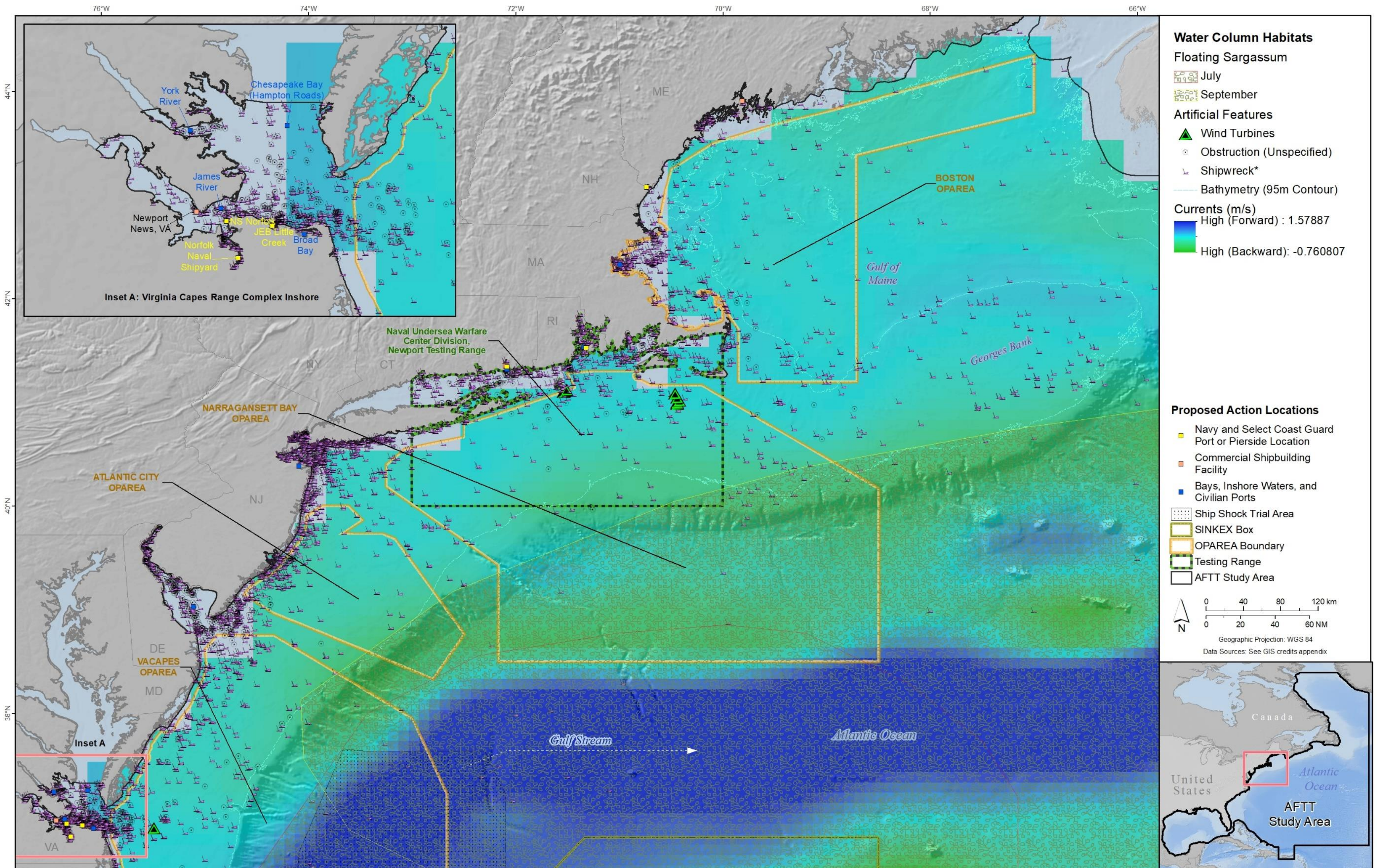

Notes: < = less than; * = Seafloor Resource Mitigation Area; AFTT = Atlantic Fleet Training and Testing; HAPCs = Habitat Areas of Particular Concern; km = kilometer; m = meters; NM = nautical mile; OPAREA = operating area; SINKEX = Sinking Exercise

**Figure 3.3-5: Artificial Reef Areas and Bottom Habitats in the Gulf of Mexico Region of the Study Area**



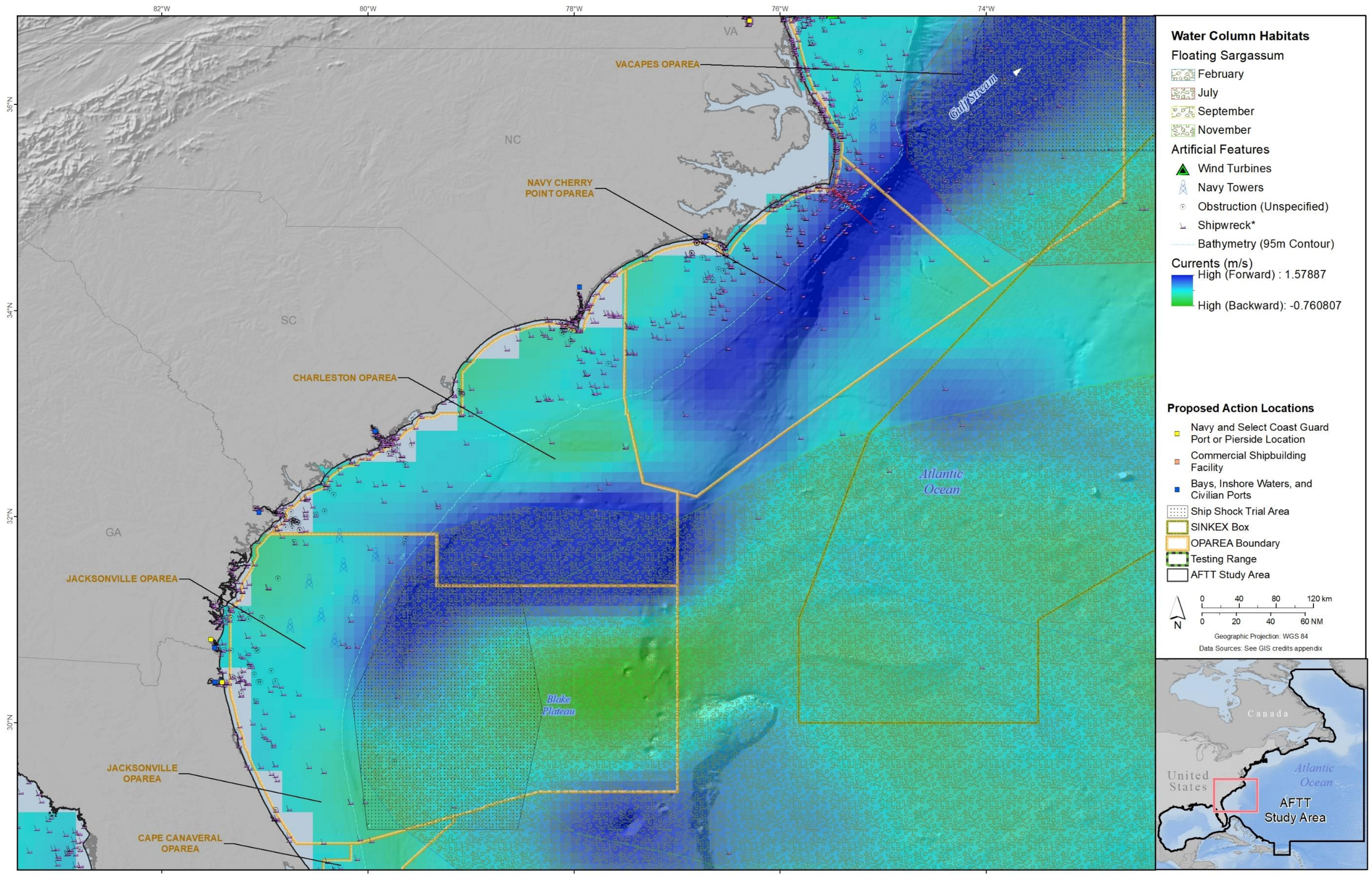

Notes: * = Seafloor Resource Mitigation Area; AFTT = Atlantic Fleet Training and Testing; km = kilometer; m = meters; m/s = meters per second; NM = nautical mile; OPAREA = operating area; SINKEX = Sinking Exercise

**Figure 3.3-6: Overview of Water Column Habitats and Artificial Features of the Study Area**



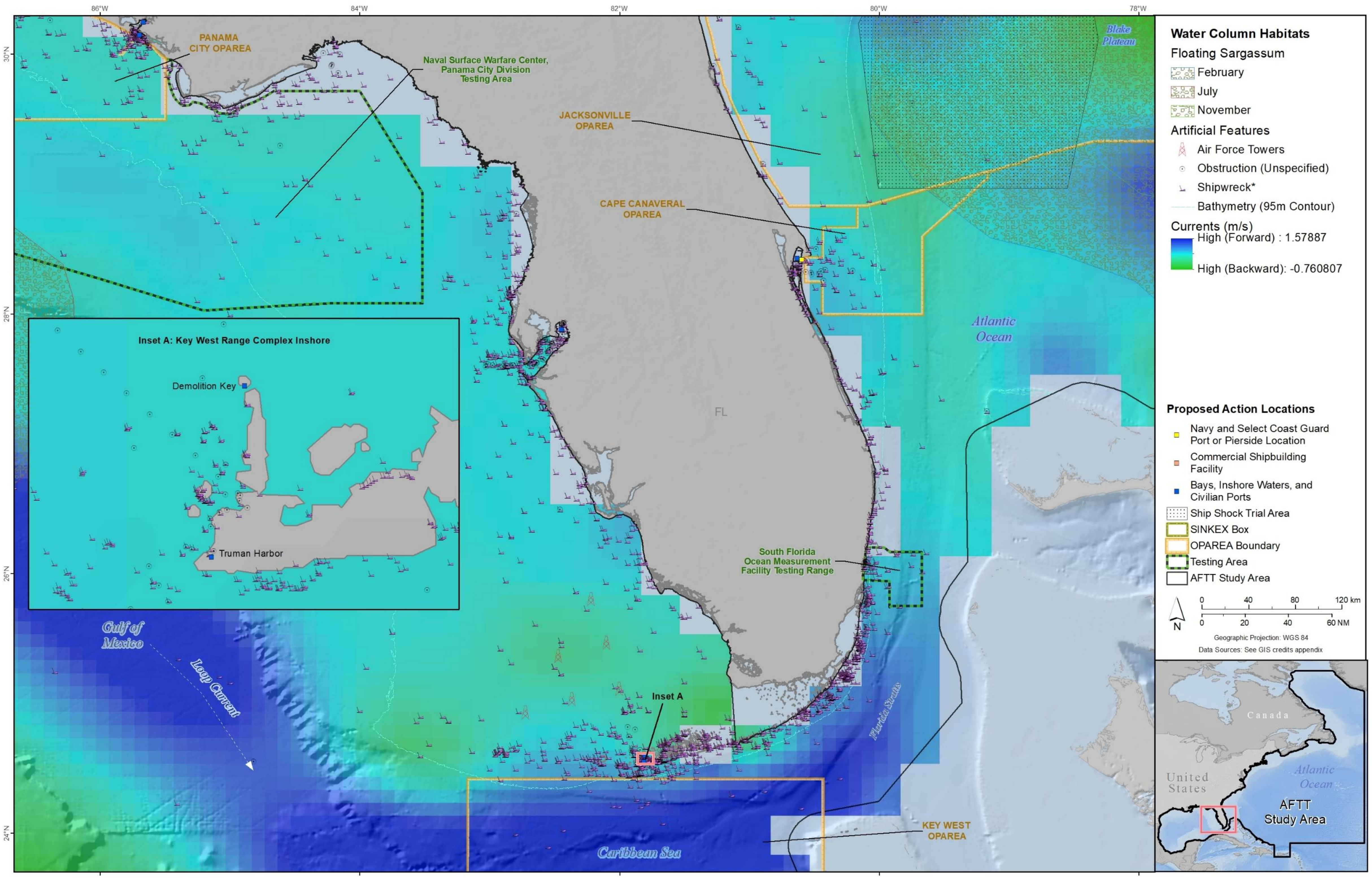

Notes: * = Seafloor Resource Mitigation Area; AFTT = Atlantic Fleet Training and Testing; m = meters; m/s = meters per second; OPAREA = operating area; SINKEX = Sinking Exercise

**Figure 3.3-7: Water Column Habitats and Artificial Features in the Northeast Region of the Study Area**



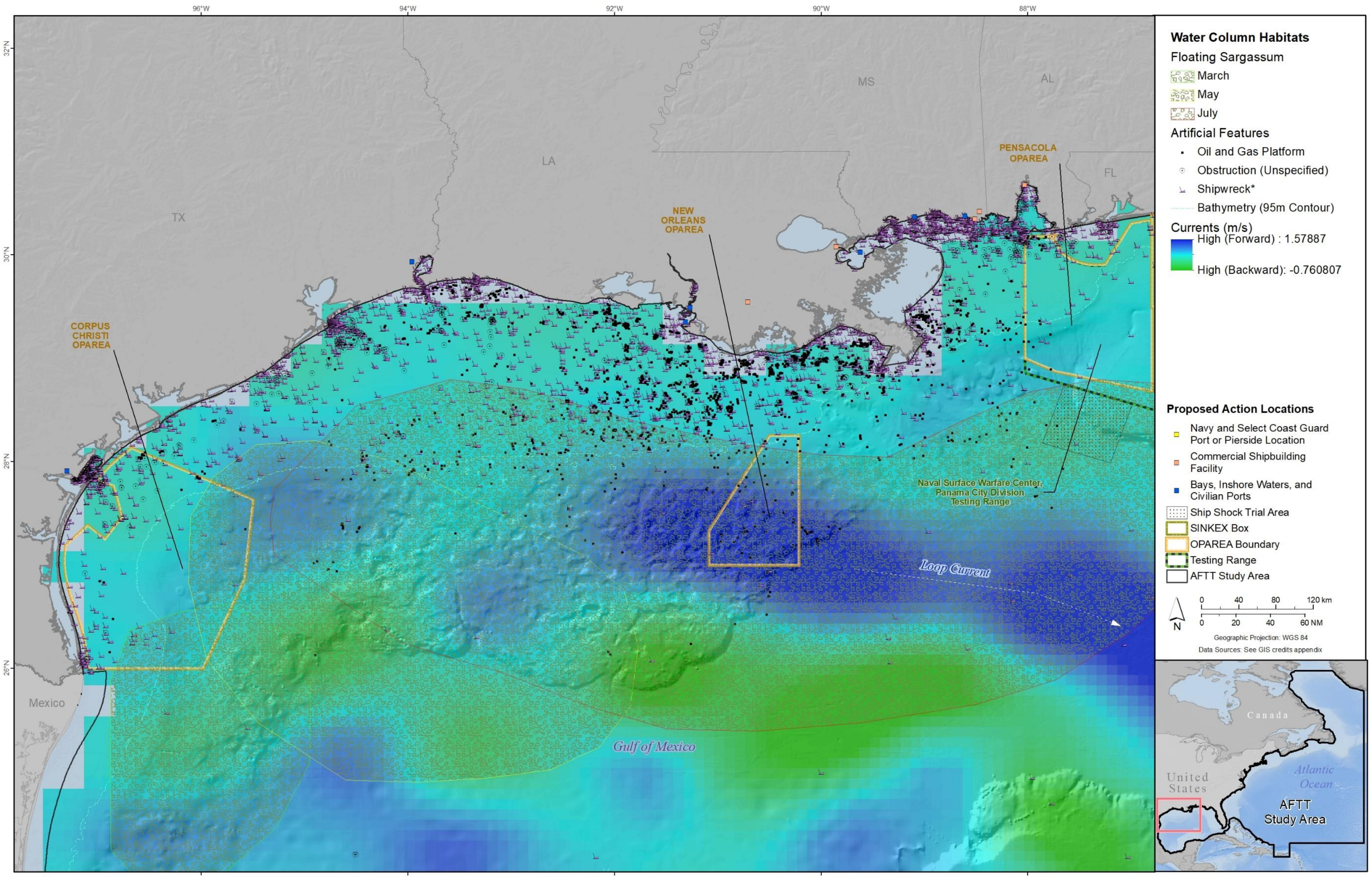

Notes: * = Seafloor Resource Mitigation Area; AFTT = Atlantic Fleet Training and Testing; km = kilometers; m = meters; m/s = meters per second; NM = nautical miles; OPAREA = operating area; SINKEX = Sinking Exercise

**Figure 3.3-8: Water Column Habitats and Artificial Features in the Southeast Region of the Study Area**




Notes: * = Seafloor Resource Mitigation Area; AFTT = Atlantic Fleet Training and Testing; km = kilometers; m = meters; m/s = meters per second; NM = nautical mile; OPAREA = operating area; SINKEX = Sinking Exercise

**Figure 3.3-9: Water Column Habitats and Artificial Features in the South Florida Region of the Study Area**




Notes: * = Seafloor Resource Mitigation Area; AFTT = Atlantic Fleet Training and Testing; km = kilometer; m = meters; m/s = meters per second; NM = nautical mile; OPAREA = operating area; SINKEX = Sinking Exercise

**Figure 3.3-10: Water Column Habitats and Artificial Features in the Gulf of Mexico Region of the Study Area**

#### 3.3.2.1.3 General Threats

The general threats to marine and estuarine habitats discussed in the 2018 Final EIS/OEIS include pressure from a variety of human activities, such as coastal development, shoreline stabilization, dredging, flood control and water diversion; destructive fishing practices; offshore energy and resource development and extraction; and global climate change. Updated information includes the following:

- Verification of numerous potential effects from the listed threats.
- The status of the listed threats, as well as emerging threats.

### 3.3.3 Environmental Consequences

Under the No Action Alternative, none of the proposed military readiness activities would be conducted. Therefore, baseline conditions of the existing environment for habitats 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 in this section.

This following section describes and evaluates how and to what degree the activities and stressors described in Chapter 2 (Description of Proposed Action and Alternatives) and Section 3.0.3.3 (Identifying Stressors for Analysis) potentially impact abiotic habitats in the Study Area.

The stressors vary in intensity, frequency, duration, and location in the Study Area. The activities that involve each of the following stressors are identified in Appendix A (Activity Descriptions) and Appendix B (Activity Stressor Matrices). The stressors and substressors presented for analysis include the following:

- **explosives** (explosions in water)
- **physical disturbance and strikes** (vessels and in-water devices; military expended materials; seafloor devices; pile driving)

A discussion of the potential impacts of all the stressors combined is provided at the end of the section.

The stressors that are not analyzed further in this Supplemental EIS/OEIS include acoustic, energy, entanglement, and ingestion because they are relevant to only biological resources. The reasoning for not analyzing these stressors is summarized in the habitat synopsis with supporting details provided in the 2018 Final EIS/OEIS Section 3.05 (Habitats).

The analysis of potential impacts to habitat considers standard operating procedures and mitigation measures that would potentially provide protection to habitat. Standard operating procedures relevant to habitats (e.g., using explosives, operating vessels safely, placing seafloor devices for retrieval) are detailed in Appendix A (Section A.1.7, Standard Operating Procedures). Mitigation measures relevant to seafloor habitats are referenced in Table 3.3-3 and shown in Figure 3.3-2 to Figure 3.3-5. Details on all mitigation measures are provided in Chapter 5 (Mitigation).

**Table 3.3-3: Mitigation Requirements Summary by Stressor for Habitats**

| *Applicable Stressor* | *Requirements Summary and Protection Focus* | *Section Reference* |
|---|---|---|
| Explosives | Restrictions on detonating explosives on or near the seafloor (e.g., explosive bottom-laid or moored mines) within a horizontal distance of 350 yards | Section 5.7.2 (Artificial Reef, Live Hard Bottom, Submerged Aquatic Vegetation, and Shipwreck Mitigation Areas) |

**Table 3.3-3: Mitigation Requirements Summary by Stressor for Habitats (continued)**

| *Applicable Stressor* | *Requirements Summary and Protection Focus* | *Section Reference* |
|---|---|---|
| | from artificial reefs, live hard bottom[1], submerged aquatic vegetation, and shipwrecks. | |
| | Restrictions on detonating explosives use near shallow-water coral reefs is summarized in Section 3.5, (Invertebrates)[2] | Section 5.7.1 (Shallow-Water Coral Reef Mitigation Areas) |
| Physical disturbance and strike | Restrictions on:<br>(1) setting vessel anchors (a seafloor device) within an anchor swing circle radius that overlaps artificial reefs, live hard bottom[1], submerged aquatic vegetation, and shipwrecks (except in designated anchorages)<br>(2) placing other seafloor devices within a horizontal distance of 350 yards from artificial reefs, live hard bottom[1], submerged aquatic vegetation, and shipwrecks except in the South Florida Ocean Measurement Facility Seafloor Mitigation Area<br>(3) deploying non-explosive ordnance against surface targets (including aerial-deployed mine shapes) within a horizontal distance of 350 yards from artificial reefs, live hard bottom[1], submerged aquatic vegetation, and shipwrecks | Section 5.7.1 (Shallow-Water Coral Reef Mitigation Areas) |
| | The Action Proponents will operate surface vessels in waters deep enough to avoid bottom scouring or prop dredging, with at least a 1-foot clearance between the deepest draft of the vessel (with the motor down) and the seafloor at mean low water. | Section 5.7.3 (Key West Range Complex Seafloor Mitigation Area) |
| | Requirements to:<br>(1) operate surface vessels in waters deep enough to avoid bottom scouring or prop dredging, with at least a 1-foot clearance between the deepest draft of the vessel (with the motor down) and the seafloor at mean low water<br>(2) use a real-time geographic information system and global positioning system (along with remote-sensing verification) during deployment, installation, and recovery of anchors and mine-like objects and during deployment of bottom-crawling unmanned underwater vehicles in waters deeper than 10 feet to avoid live hard bottom[1]<br>(3) deploy seafloor devices from surface vessels while holding a relatively fixed position over the intended mooring or deployment location using a dynamic positioning navigation system with global positioning system<br>(4) minimize surface vessel movement and drift in accordance with mooring installation and deployment plans and will conduct activities during | Section 5.7.4 (South Florida Ocean Measurement Facility Seafloor Mitigation Area) |

**Table 3.3-3: Mitigation Requirements Summary by Stressor for Habitats (continued)**

| *Applicable Stressor* | *Requirements Summary and Protection Focus* | *Section Reference* |
|---|---|---|
| | sea and wind conditions that allow vessels to maintain position and speed control during deployment, installation, and recovery of seafloor devices<br>(5) not anchor surface vessels or moor over live hard bottom[1]<br>(6) use semi-permanent anchoring systems that are assisted with riser buoys over soft bottom habitats to avoid contact of mooring cables any live hard bottom[1] | |

[1] Includes shallow-water coral reefs as a type of live hard bottom.
[2] The mitigation was developed to protect shallow-water coral species, but also protects reef-associated species.

The criteria for determining the significance of an impact on habitats are described in Table 3.3-4. The abbreviated analysis under each substressor and alternative provides the technical support for these determinations, with reference to the 2018 Final EIS/OEIS or supporting appendices for details.

**Table 3.3-4: Criteria for Determining the Significance of Proposed Action Stressors on Abiotic Habitats**

| *Impact Descriptor* | *Context and Intensity* | *Significance Conclusions* |
|---|---|---|
| Negligible | Impacts on habitat would be limited to temporary (lasting up to several hours) changes to physical characteristics of habitat (e.g., substrate distribution, topography, water flow). Impacts on habitat would not cause lasting damage or alteration. | Less than significant |
| Minor | Impacts would be temporary or short-term (lasting several days to several weeks) changes that would not be outside the natural range of variability in physical habitat characteristics. Impacts on habitat would be easily recoverable with no long-term or permanent damage or alteration. | Less than significant |
| Moderate | Impacts would be short-term or long-term (lasting several months or longer) changes that would be outside the natural range of variability in physical habitat characteristics. Habitat would be damaged or altered potentially over the long term but would continue to support the species dependent on it. | Less than significant |
| Major | Short-term or long-term changes well outside the limits of 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. | Significant |

With noted exceptions, the stressor background information and environmental consequences are not meaningfully different from what is described in the 2018 Final EIS/OEIS (Section 3.5.3, Environmental Consequences).

#### 3.3.3.1 Explosive Stressors

Table 3.3-5 contains a brief summary of background information that is relevant to analyses of impacts from explosive stressors. Details on the updated information in general, as well as effects specific to each substressor, is provided in Appendix D (Acoustic and Explosive Impacts Supporting Information).

**Table 3.3-5: Explosive Stressors Summary Background Information**

| *Substressor* | *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 training and testing involving the use of high-explosive munitions would occur in the air or near the water's surface outside of state coastal waters in water depths greater than 100 feet (30 meters) and would not impact the bottom.<br>• In waters of the continental shelf, some explosive charges could occur near the surface, in the water column, or on the bottom and generally in specific locations devoid of underwater hazards.<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 intermediate substrate.<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 abiotic habitat due to the physical resilience of the medium (i.e., water, substrate) and lack of proximity to aquatic habitats. |

The Action Proponents will implement mitigation measures tailored to reduce the impact of explosives in the water on abiotic habitats that feature sensitive living organisms, as identified in Table 3.3-3 and shown in Figure 3.3-1 through Figure 3.3-5. The proposed mitigation areas are shown in this section because they primarily address impacts on the seafloor habitat of biological resources.

#### 3.3.3.1.1 Impacts from Explosives

Table 3.3-5 contains a summary of the background information used to analyze the potential impacts of explosives in the water on habitats. For information on explosive sizes and quantities for each alternative, see Table 3.0-5 (Explosive Sources Quantitatively Analyzed that Could Be Used Underwater or at the Water Surface).

In the unlikely event of underwater explosives use near unmapped hard bottom, some abiotic habitat for associated biological communities could be replaced with intermediate or soft bottom. The mitigation areas will reduce or eliminate the impact of bottom-placed explosives on hard substrate. Mapped sensitive habitat features within the Study Area only occur within mitigation areas (e.g., shallow-water coral reefs, live hard bottom), with the exception of Key West Range Complex Inshore. In those locations, the sensitive habitat features are not within a mitigation areas, but the explosive charges are very small and placed either on the seafloor or on a seafloor device (e.g., metal plate or steel frame) with the explosive energy directed upward.

#### 3.3.3.1.1.1 Impacts from Explosives under Alternative 1

The use of explosives would generally decrease from the 2018 Final EIS/OEIS for both training and testing activities. Notably, for testing there would be no use of bin E17 (greater than 14,500 – 58,000 pounds [lb.] net explosive weight [NEW]) and reduced use of bin E16 (greater than 7,250 to 14,500 lb. NEW) for ship shock trials. There is also a reduction in use of most of the largest explosive bins for both training and testing, and an extremely large decrease in explosives associated with medium-caliber gunnery (bin E1 [0.1 to 0.25 lb. NEW]). Very few detonations would occur at inshore locations and would involve the use of smaller charge sizes (E5 or below). Additionally, small ship shock trials could occur in Virginia Capes, Jacksonville, or the Gulf of Mexico Range Complexes.

The annual impacts of explosive craters on shallow soft and intermediate substrate types from training and testing would be approximately 4.1 and 41.1 acres, respectively; for location-specific details, refer to Table I-1 (Potential Impact from Explosive Charges on or Near the Bottom for Military Readiness Activities under Alternative 1 and 2 in a Single Year) in Appendix I (Military Expended Materials and Direct Strike Impact Analysis). This represents less than a thousandth of one percent of available bottom habitat in any range complex. For comparison, the 2018 Final EIS/OEIS estimated 18 acres of impacted soft and intermediate substrate from training and testing annually. The craters created in mostly intermediate or soft substrate areas would disappear in less than a year. No mapped hard bottom would be impacted by bottom-placed explosives, per mitigation measures. Improvements in mapping have also reduced the potential for impacting unmapped hard bottoms.

Based on the relative footprint and location of underwater explosives use, and the general description of impacts, the effects of this substressor on abiotic habitats are not expected to result in significant changes in bottom habitat. Training events that include seafloor detonations would be infrequent, the percentage of the Study Area affected would be small, and the disturbed areas are likely soft bottom areas that recover relatively quickly from disturbance. Therefore, in-water explosions under Alternative 1 would mostly be limited to local and short-term impacts on abiotic habitats in the Study Area.

The analysis conclusions for underwater explosives use with training and testing activities under Alternative 1 are consistent with a moderate (due to potential damage to habitat) impact on abiotic habitats.

#### 3.3.3.1.1.2 Impacts from Explosives under Alternative 2

Impacts from explosives in water under Alternative 2 are no different from Alternative 1 and therefore the impact conclusions are the same for both training and testing . The explosive sizes and numbers under Alternative 2 are the same as Alternative 1.

### 3.3.3.2 Physical Disturbance and Strike Stressors

Table 3.3-6 contains brief summaries of background information that is relevant to analyses of impacts for each physical disturbance and strike substressor (vessels and in-water devices, military expended materials, seafloor devices, and pile driving). The background information for physical disturbance and strike stressor effects on habitats in the Study Area as described in the 2018 Final EIS/OEIS (Section 3.4.3.4) has not appreciably changed. As such, the information presented in the 2018 Final EIS/OEIS remains valid.

**Table 3.3-6: Physical Disturbance and Strike Stressors Summary Background Information**

| *Substressor* | *Background Information Summary* |
|---|---|
| Aircraft and aerial targets | Impacts on aquatic habitats from aircraft and aerial targets are not applicable. |
| Vessels and in-water devices | In general, there would be a higher likelihood of vessels and in-water devices (e.g., unmanned underwater vehicles, recovered surface targets) impacting seafloor habitats in the coastal areas than in the open ocean portions of the Study Area because of 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>• Along more sheltered shorelines of bays and estuaries, vessels operating in 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>• Along dynamic ocean shorelines where amphibious vehicles are used, the soft substrate (e.g., sand, shell) being disturbed would quickly recover to pre-disturbance conditions.<br>• Wakes from small vessels in sheltered inshore waters may impact soft shorelines. For context, Navy vessels represent a small fraction of total maritime traffic (Mintz, 2016) and even less for Coast Guard vessels. For safety reasons, small vessels are not generally operated at excessive speeds close to shore and outside of navigation channels, and the wakes generated would have similar impacts as naturally occurring wind waves.<br>• Neither propeller scarring nor erosion from vessel wakes are considered significant threats to marine or estuarine habitats compared to other threats (e.g., nutrient enrichment, shoreline development). For supporting information, refer to Appendix F (Biological Resources Supplemental Information), Section F.1 (Habitats). |
| Military expended materials | There is a wide range of military expended materials that may impact marine habitats due to settling or moving across the sea bottom. Before the item is buried or encrusted with marine growth, the impacts 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 (e.g., more invasive species) (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 military expended materials to some degree of mobility (e.g., World War II mines rolling up on beaches). |

**Table 3.3-6: Physical Disturbance and Strike Stressors Summary Background Information (continued)**

| ***Substressor*** | ***Background Information Summary*** |
|---|---|
| | • On deep ocean substrate under less energetic conditions, heavy expended materials would persist for longer on the substrate surface. The potential impact of such persistent materials on the deep ocean floor is minimized by a substantial decrease in size and density of benthic organisms as well as the relevance of structural differences in benthic habitat. For supporting information, refer to Appendix F (Biological Resources Supplemental Information), Section F.1 (Habitats).<br>• Military expended materials 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 impact 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, inshore habitats from at-sea training and testing areas would be low based on the prevailing ocean currents depicted in Figure 3.3-6 through Figure 3.3-10.<br>• Within the at-sea ranges, weapons firing and launch of munitions mostly occurs outside of state coastal waters. After striking the sea surface and falling relatively slowly through the water column, the impact of military expended materials 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 unmanned underwater vehicles) where they may temporarily disturb the bottom before being recovered.<br>• Impacts may include temporary increases in turbidity around the device and temporary coverage and compaction of underlying substrate.<br>• Although intentional placement of seafloor devices on bottom structure is avoided to ensure recovery, seafloor devices placed in depths less than about 2,500 meters may inadvertently impact habitat for live hard bottom communities.<br>• Seafloor devices are most likely to impact habitats for soft and intermediate bottom communities that cover 84% of Study Area locations less than 2,500 meters deep (Table 3.3-1). |
| Pile driving | Pile driving and removal involves both impact and vibratory methods in soft substrate. Pile driving may have the potential to impact mostly benthic microalgae temporarily during driving, removal, and in the short term thereafter. The algae that grow on the pilings will also be removed when the piling is extracted. |

Note: % = percent

The Action Proponents will implement mitigation measures tailored to reduce the impact of physical disturbance and strike on abiotic habitats that feature sensitive living organisms, as identified in Table 3.3-3 and shown in Figure 3.3-1 through Figure 3.3-5. The overlap of sensitive vegetation and mitigation areas varies by substressor, as described in the subsequent sections.

#### 3.3.3.2.1 Impacts from Vessels and In-Water Devices

Table 3.3-6 contains a summary of the background information used to analyze the potential impacts of vessels and in-water devices on abiotic habitats. For information on the number of activities including vessels and in-water devices, see Table 3.0-9 (Number and Location of Activities Including Vessels) and Table 3.0-10 (Number and Location of Activities Including In-water Devices).

The mitigation requirements described in Table 3.3-3 for seafloor resources will reduce or eliminate the impact of vessel disturbance on or near shallow seafloor habitats in the Key West Range Complex (inshore and offshore locations) and the South Florida Ocean Measurement Facility Mitigation Areas.

##### 3.3.3.2.1.1 Impacts from Vessels and In-Water Devices under Alternative 1

For both training and testing activities, vessel and in-water device activity decreased overall from the 2018 Final EIS/OEIS (Tables 3.0-9 and Table 3.0-10).

Under Alternative 1 for training:

- Vessel activity would occur in two locations that are new or not previously analyzed (Gulfport and Pascagoula, Mississippi, respectively). For all other locations, there would either be a decrease or similar amount of vessel activity.
- In-water device activity (including both expended and recovered water-based targets) would occur in one location not previously analyzed (Northeast Range Complexes Inshore). For all other locations, there would either be a decrease, similar amount, or cessation of in-water device activity.

Under Alternative 1 for testing:

- Vessel activity would occur in five locations not previously analyzed (inshore locations of the Northeast, Virginia Capes, and Gulf of Mexico Range Complexes; Other AFTT Areas; Hampton Roads, Virginia). There would also be notable increases in vessel activity at the Naval Surface Warfare Center Panama City Division Testing Range, Naval Station Norfolk, and Pascagoula, Mississippi. For all other locations, there would either be a decrease or similar amount of vessel activity.
- In-water device activity (including both expended and recovered water-based targets) would occur in four locations not previously analyzed (Gulf of Mexico Range Complex Inshore; Bath, Maine; Newport, Rhode Island; Pascagoula, Mississippi). For all other locations, there would either be a decrease or similar amount of in-water device activity.

For locations without a notable increase in vessel and in-water device activity, the analysis from the 2018 Final EIS/OEIS remains valid; the updates to the affected environment noted in Section 3.3.2 (Affected Environment) do not alter the analysis because the general distribution of substrate types among training and testing locations has not changed.

For locations with notable increases in activity, the impact analysis that was conducted in the 2018 Final EIS/OEIS would remain valid because the infrequent and localized nature of vessel or in-water device activity remains an accurate characterization of the Proposed Action in those locations. Section 3.0 (Introduction) also describes high-speed vessel activity as similar to what was analyzed in the 2018 Final EIS/OEIS.

For the inshore testing locations that are new or not previously analyzed, standard operating procedures (e.g., vessel safety) and seafloor resource mitigation areas help reduce potential impacts in the shallow waters where more sensitive habitats are concentrated (e.g., oyster reefs in the Northeast Range Complexes Inshore). Furthermore, the locations not previously analyzed for testing were analyzed for training in the 2018 Final EIS/OEIS. The other locations not previously analyzed are port or pierside locations featuring artificial structures adjacent to bottom lacking sensitive habitats. These areas are also highly modified and disturbed due to human activity and frequent dredging.

Based on the relative amount and location of vessels and in-water devices and the general description of impacts, there would be (1) avoidance of artificial structures and hard bottom habitats; (2) quick recovery of soft bottom habitats that would likely be impacted; and (3) the short-term and localized disturbances of the water column (e.g., suspended sediment) and substrate (e.g., scarring) in shallow water.

The analysis conclusions for vessel and in-water device use with training and testing activities under Alternative 1 are consistent with a negligible impact on abiotic habitats.

##### 3.3.3.2.1.2 Impacts from Vessels and In-Water Devices under Alternative 2

Impacts from vessels and in-water device activities under Alternative 2 are not meaningfully different from Alternative 1 and therefore the impact conclusions are the same for both training and testing. The number of activities including vessels or in-water devices increases only slightly over that of Alternative 1.

#### 3.3.3.2.2 Impacts from Military Expended Materials

Table 3.3-6 contains a summary of the background information used to analyze the potential impacts of military expended materials on abiotic habitats. For information on the type, number, and location of military expended materials, see Table 3.0-11 (Number and Location of Non-explosive Practice Munitions Expended during Military Readiness Activities), Table 3.0-12 (Number and Location of Explosives that May Result in Fragments during Military Readiness Activities), Table 3.0-13 (Number of Location of Targets Expended during Military Readiness Activities), Table 3.0-14 (Number and Location of Other Military Materials Expended during Military Readiness Activities), Table 3.0-17 (Number and Location of Wires and Cables Expended during Military Readiness Activities), and Table 3.0-18 (Number and Location of Activities Including Biodegradable Polymers during Testing).

The mitigation areas described in Table 3.3-3 will reduce or eliminate the potential impacts by locating some military expended materials away from reef-associated vegetation species in the Key West Range Complex (inshore and offshore locations) and South Florida Ocean Measurement Facility. Shallow-water coral reefs are also protected from direct strike in the South Florida Ocean Measurement Facility. Elsewhere in the Study Area, live hard bottom is not protected from strike from military expended materials. However, the impact is limited by the distance from shore (e.g., most heavy munitions limited to seaward of coastal waters) which places most impacts seaward of dynamic nearshore habitats.

##### 3.3.3.2.2.1 Impacts from Military Expended Materials under Alternative 1

For both training and testing activities, the number of military expended materials decreased overall from the 2018 Final EIS/OEIS (Table 3.0-11 through Table 3.0-18).

Under Alternative 1 for training:

- Military expended materials would occur in one location not previously analyzed (Gulf of Mexico Range Complex Inshore), and there would be a notable increase in the Key West Range Complex Inshore from the 2018 Final EIS/OEIS. For all other locations, there would either be a decrease, similar amount, or cessation of military expended materials.

Under Alternative 1 for testing:

- Military expended materials would occur in three locations not previously analyzed (Other AFTT Areas; Naval Submarine Base Kings Bay, and Port Canaveral, Florida) in the 2018 Final EIS/OEIS. For all other locations, there would either be a decrease or similar amount of military expended materials.

For locations without a notable increase in military expended materials, the analysis from the 2018 Final EIS/OEIS remains valid; the updates to the affected environment noted in Section 3.3.2 (Affected Environment) do not alter the analysis because the general distribution of substrate types among training and testing locations has not changed.

For locations not previously analyzed, the quantitative impact analysis that was conducted in the 2018 Final EIS/OEIS has been updated. Qualitative aspects of the analysis include the potential for lighter expended materials (e.g., decelerator/parachutes) to drift into sensitive marine habitats covered earlier in Table 3.3-6 both military readiness activities.

Impact analysis determined that the total bottom area affected by all military expended materials in all training areas would be about 69 and 77 acres annually for training and testing, respectively. The distribution of the impact footprints among habitat types is depicted in Figure 3.3-11. This represents less than a thousandth of one percent of available bottom habitat in any range complex. For comparison, the 2018 Final EIS/OEIS estimated 108 and 52 acres of impacted substrate from training and testing, respectively. The total area of each habitat type is estimated in Table 3.3-1 and the disturbed areas of each habitat type and location are estimated in Appendix I (Military Expended Materials and Direct Strike Impact Analysis, Tables I-2 and I-3, Potential Impacts to Bottom Habitat from Military Expended Materials for Training and Testing Activities under Alternative 1 in a Single Year). Expended material footprints coincide with relatively small areas of estuarine habitat within only the inshore training areas of the Northeast, Virginia Capes, and Gulf of Mexico Range Complexes.

Based on the relative amount, impact footprint, and location of military expended materials under Alternative 1 for training and testing and the general description of impacts, there would be (1) a limited spatial coincidence between impact footprints and the distribution of sensitive marine habitats (e.g., live hard bottom); (2) a quick recovery of the soft and intermediate substrate types that are more likely impacted; and (3) mostly short-term impacts from most local disturbances of the seafloor, with some temporary increase in suspended sediment in mostly soft bottom areas. The effects of this sub-stressor on abiotic substrate are therefore not expected to result in detectable changes in availability of abiotic habitats for biological resources.

The analysis conclusions for military expended materials from training activities under Alternative 1 are consistent with a negligible impact on abiotic habitats.

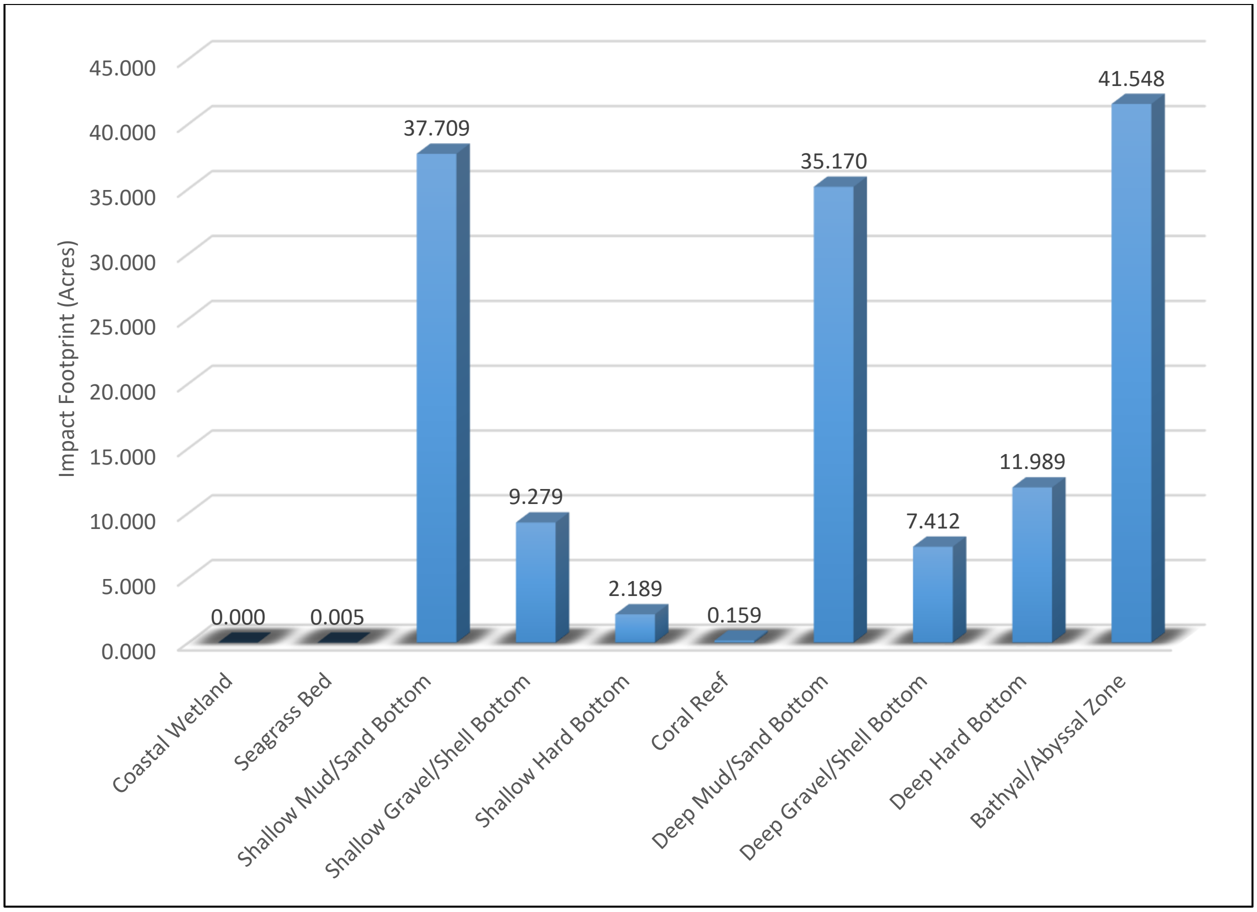



**Figure 3.3-11: Total Footprint of Military Expended Materials Impacting Seafloor Habitats Among Study Area Locations from Training and Testing Activities under Alternative 1**

#### 3.3.3.2.2.2 Impacts from Military Expended Materials under Alternative 2

Impacts from military expended materials under Alternative 2 are not meaningfully different from Alternative 1 and therefore the impact conclusions are the same for both training and testing. The increase in footprint from Alternative 1 to 2 is only 0.026 acres and located mostly in the Gulf of Mexico Range Complex, with relatively small footprints in the other range complexes.

### 3.3.3.2.3 Impacts from Seafloor Devices

Table 3.3-5 contains a summary of the background information used to analyze the potential impacts of seafloor devices on abiotic habitats. For information on the type, number, and location of military expended materials, see Table 3.0-15 (Number and Location of Activities that Use Seafloor Devices).

The mitigation areas described in Table 3.3-3 will reduce or eliminate the potential impacts by locating most seafloor devices away from hard substrate habitats. Due to the prevalence of shallow-water hard coral species in the South Florida Ocean Measurement Facility, there is additional mitigation that ensures placement of seafloor devices away from sensitive habitats.

#### 3.3.3.2.3.1 Impacts from Seafloor Devices under Alternative 1

For both training and testing activities, the proposed use of seafloor devices increased from the 2018 Final EIS/OEIS devices (Table 3.0-15).

Under Alternative 1 for training:

- Seafloor device use would occur in five locations that are new or not previously analyzed (Northeast Range Complexes; Other AFTT Areas; Jacksonville Range Complex Inshore, Naval Station Mayport, and Gulfport, Mississippi). There would also be notable increases in seafloor devices at the Virginia Capes Range Complex (offshore and inshore locations) and Key West Range Complex Inshore. For all other locations, there would either be a decrease, similar amount, or cessation of seafloor device use.

Under Alternative 1 for testing:

- Seafloor device use would occur in five locations not previously analyzed (Virginia Cape Range Complex Inshore, Key West Range Complex Inshore, Naval Submarine Base New London, Naval Station Mayport, and Port Canaveral, Florida). There would also be notable increases in seafloor devices in the Northeast and Jacksonville Range Complexes, and in the Naval Surface Warfare Center Panama City Division Testing Range. For all other locations, there would either be a decrease or similar amount of seafloor device use.

For locations without a notable increase in seafloor devices, the analysis from the 2018 Final EIS/OEIS remains valid; the updates to the affected environment noted in Section 3.3.2 (Affected Environment) do not alter the analysis because the general distribution of substrate types among training and testing locations has not changed.

For locations with notable increases in activity, the impact analysis that was conducted in the 2018 Final EIS/OEIS would not change because the infrequent and localized nature of seafloor device activity remains an accurate characterization of the Proposed Action in those locations.

For the inshore locations not previously analyzed, standard operating procedures and seafloor resource mitigation areas help reduce potential impacts on sensitive marine habitats, as described earlier in this section (applies to mine shapes and other devices moored to the bottom). In the unlikely event of a seafloor device coinciding with live hard bottom, the impact would be negligible to the abiotic substrate.

Locations not previously analyzed include port or pierside locations. The new location of Gulfport, Mississippi, is a pierside location that is highly modified/disturbed due to human activity and frequent dredging and lack both seagrass beds and coastal wetlands.

Based on the relative amount, impact footprint, and location of seafloor device activity under Alternative 1 for training and testing and the general description of impacts, there would be: (1) a limited spatial coincidence between impact footprints and the distribution of sensitive marine habitats (e.g., live hard bottom); (2) a quick recovery of the soft and intermediate substrate types that are more likely impacted; and (3) only short-term impacts from most local disturbances of the seafloor, with some temporary increase in suspended sediment in mostly soft bottom areas. The effects of this substressor on abiotic substrate are therefore not expected to result in detectable changes in availability of abiotic habitats for biological resources.

The analysis conclusions for seafloor device use from training and testing activities under Alternative 1 are consistent with a negligible impact on abiotic habitats.

##### 3.3.3.2.3.2 Impacts from Seafloor Devices under Alternative 2

Impacts from seafloor device activities under Alternative 2 are not meaningfully different from Alternative 1 and therefore the impact conclusions are the same for both training and testing. The number of activities including seafloor devices under Alternative 2 would increase only slightly over Alternative 1.

#### 3.3.3.2.4 Impacts from Pile Driving

Table 3.3-6 contains a summary of the background information used to analyze the potential impacts of pile driving on abiotic habitats. Only port damage repair training includes pile driving (see Table 3.0-4, Number of Piles/Sheets Quantitatively Analyzed under Pile Driving and Removal Training Activities).

##### 3.3.3.2.4.1 Impacts from Pile Driving under Alternative 1

Under Alternative 1 for training:

- Pile driving would occur in one new location (Gulfport, Mississippi) that it did not occur in for the 2018 Final EIS/OEIS.
- Pile driving would no longer occur as part of the Elevated Causeway System at Joint Expeditionary Base Little Creek-Fort Story in the Virginia Capes Range Complex or Marine Corps Base Camp Lejeune in the Navy Cherry Point Range Complex.

There would be no pile driving or removal associated with testing activities.

While pile driving and removal may have the potential to impact soft bottom habitat, the impacts would be extremely limited since the number of piles is relatively small and the duration is short term. The activity would also occur in a highly disturbed estuarine habitat with mostly artificial shoreline which is dissimilar to the beach environments analyzed in the 2018 Final EIS/OEIS.

The analysis conclusions for pile driving for training under Alternative 1 are consistent with a minor impact on abiotic habitat.

##### 3.3.3.2.4.2 Impacts from Pile Driving under Alternative 2

Impacts from pile driving during training under Alternative 2 are no different from Alternative 1 and therefore the impact conclusions are the same.

There would be no pile driving associated with testing activities.

### 3.3.3.3 Combined Stressors

As described in Section 3.0.3.5 (Resource-Specific Impacts Analysis for Multiple Stressors), this section evaluates the potential for combined impacts of all stressors from the Proposed Action. The analysis and conclusions for the potential impacts from each of the individual stressors are discussed in the sections above. Stressors associated with proposed military readiness activities do not typically occur in isolation but rather occur in some combination. For example, mine neutralization activities include elements of physical disturbance and explosive stressors that are all coincident in space and time. An analysis of the combined impacts of all stressors on abiotic habitat considers the potential consequences of additive stressors that were quantified in this section (i.e., explosive crater footprints, military expended materials footprints).

#### 3.3.3.3.1 Combined Impacts of All Stressors under Alternative 1

The impact areas for in-water explosions and military expended materials were all much less than a thousandth of one percent of the total area of affected abiotic substrate types in any training or testing location over the course of a year, and the impacts are unlikely to persist beyond a year in most cases. Large and dense military expended materials (e.g., anchor blocks, large-caliber projectile casings, non-explosive bombs) settling on the bottom in deep water would be the most persistent on the substrate surface. In shallow, soft bottom habitats, heavier military expended materials would become buried in the shifting sediments in less than a year. Hard bottom habitats would recover over multiple years as the impacting military expended materials become overgrown with organisms from the surrounding environment.

The combined impact area of explosive and physical disturbance stressors proposed for training and testing events in Alternative 1 would have minimal impact on the ability of soft, intermediate, and hard substrate to serve their function as abiotic habitat. The total area of mapped live hard bottom in the Study Area (Figure 3.3-1 through Figure 3.3-5) dwarfs the estimated 14.3 acres of military expended material footprint impacting live hard bottom from both military readiness activities during a year (for location-specific details, refer to Appendix I, Military Expended Materials and Direct Strike Impact Analysis, Table I-4, Potential Impact to Bottom Habitat from Military Expended Materials for Military Readiness Activities Combined under Alternative 1 in a Single Year). For comparison, the 2018 Final EIS/OEIS estimated 17.5 acres of military expended material footprint impacting live hard bottom from both military readiness activities during a year. Explosive craters would not impact mapped live hard bottom, per mitigation measures covered earlier in this section.

Of the total 145-acre footprint of military expended materials from military readiness activities during a year, the vast majority would be to soft and intermediate substrate (90 acres) or the bathyal-abyssal zone (42 acres). For comparison, the 2018 Final EIS/OEIS estimated a 160-acre footprint of military expended materials during a year. Explosive craters would add approximately 47 acres for a total of 196 acres of impacted seafloor. The distribution of total impacts among habitat types is presented in Figure 3.3-12 (for location-specific details, refer to Appendix I, Military Expended Materials and Direct Strike Impact Analysis, Table I-1 through Table I-4). For comparison, the 2018 Final EIS/OEIS estimated a total impacted seafloor area of 178 acres. Whereas the differences between this Supplemental EIS/OEIS and the 2018 Final EIS/OEIS appear substantial, the explosive crater footprints are likely overestimated considering there is frequent overlap of footprints in specific locations typically used for associated activities (e.g., explosive ordnance disposal, mine neutralization).

The combined impact of all stressors from Alternative 1 are considered moderate (due to limited potential for damage to habitat) on abiotic habitats.

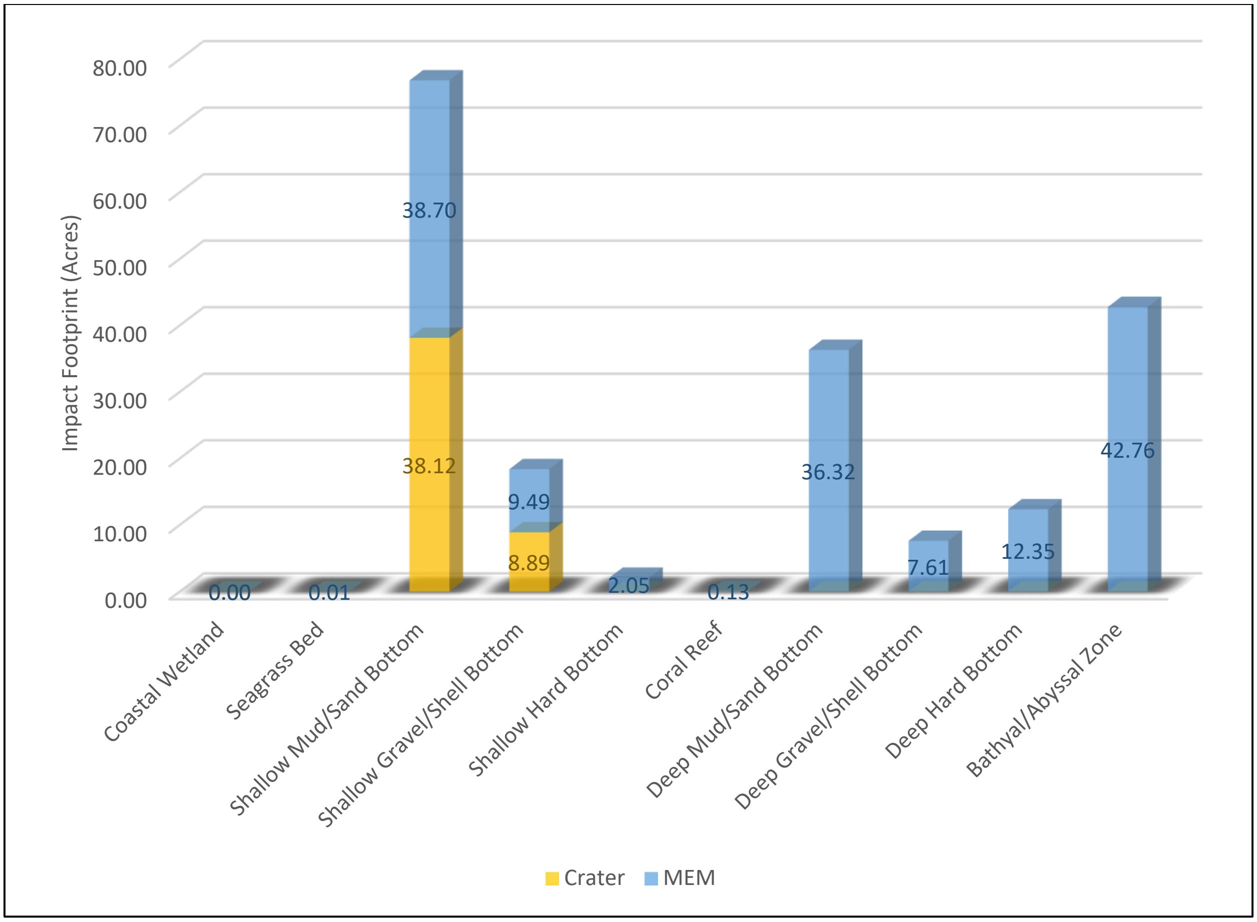



**Figure 3.3-12: Total Combined Footprint of Military Expended Materials and Explosive Craters Impacting Seafloor Habitats Among Study Area Locations under Alternative 1**

#### 3.3.3.3.2 Combined Impacts of All Stressors under Alternative 2

The combined impacts of stressors under Alternative 2 are not meaningfully different from Alternative 1 and therefore the impact conclusions are the same for both training and testing.

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