


# Northwest Training and Testing

## Final Environmental Impact Statement/ Overseas Environmental Impact Statement

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# Northwest Training and Testing Activities
# Final Environmental Impact Statement/
# Overseas Environmental Impact Statement

## Volume 2

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# 3.7 Marine Vegetation

## TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES

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## 3.7 MARINE VEGETATION

**MARINE VEGETATION SYNOPSIS**

The United States Department of the Navy considered all potential stressors, and the following have been analyzed for marine vegetation:

- Acoustic (underwater explosives)
- Physical disturbance and strike (vessel and in-water device strikes, military expended materials, and seafloor devices)

**Preferred Alternative (Alternative 1)**

- No Endangered Species Act-listed marine vegetation species are found in the Northwest Training and Testing Study Area.
- Acoustic and Physical Disturbance and Strike: Underwater explosives and physical disturbance and strike could affect marine vegetation by destroying individual plants or damaging parts of plants. The impacts of these stressors are not expected to result in detectable changes in growth, survival, or propagation that would result in population-level impacts on marine plant species.
- Secondary: Secondary stressors are not expected to result in detectable changes in growth, survival, propagation, or population-level impacts because changes in sediment and water quality or air quality are not likely to be detectable.
- These conclusions are based on the fact that the areas of impact are very small compared to the relative distribution and the locations where explosions or physical disturbance or strikes occur.
- Pursuant to the Essential Fish Habitat (EFH) requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of explosives and other impulsive sources, vessel movement, in-water devices, military expended materials, and seafloor devices during training and testing activities may have an adverse effect on EFH by reducing the quality and quantity of marine vegetation that constitutes EFH or Habitat Areas of Particular Concern.

### 3.7.1 INTRODUCTION

This section analyzes potential impacts on marine vegetation found in the Northwest Training and Testing (NWTT) Study Area (Study Area). Pierside maintenance and testing that would occur in the Offshore Area, Inland Waters (Puget Sound), and in Southeast Alaska (Behm Canal), would not create stressors affecting marine vegetation and, therefore, pierside maintenance and testing are not addressed in this section. Marine vegetation, including marine algae and flowering plants, are found throughout the Study Area. No Endangered Species Act (ESA)-listed marine vegetation species are found in the Study Area. United States (U.S.) Department of the Navy (Navy) training and testing activities are evaluated for their potential impacts on six major taxonomic groups of marine vegetation, as appropriate (Table 3.7-1).

Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act will be described in the Essential Fish Habitat Assessment (EFHA), and conclusions from the EFHA will be summarized in each substressor section. The EFHA is located on the NWTT EIS website, www.nwtteis.com.

The distribution and condition of offshore abiotic (non-living) substrates associated with attached macroalgae and the impact of stressors on those substrates are described in Section 3.3 (Marine Habitats).

Additional information on the biology, life history, and conservation of marine vegetation can be found on the websites of the following agencies and groups:

- National Marine Fisheries Service, Office of Protected Resources (including ESA-listed species distribution maps)
- Conservation International
- Algaebase
- National Resources Conservation Service
- National Museum of Natural History

The marine vegetation found in the Study Area consists of five groups of marine algae and one group of flowering plants (Table 3.7-1). More information on each of the major taxonomic groups is provided in the offshore, inshore, and southeast Alaska section discussions in Section 3.7.2 (Affected Environment).

**Table 3.7-1: Major Taxonomic Groups of Marine Vegetation in the Study Area**

| Marine Vegetation Groups[1] | | Distribution in the Study Area[2] | | |
|---|---|---|---|---|
| **Common Name (Taxonomic Group)** | **Description** | **Offshore Area** | **Inland Waters** | **Western Behm Canal (Alaska)** |
| Dinoflagellates (phylum Dinophyta) | Most are photosynthetic single-celled algae that have two whip-like appendages (flagella); Some live inside other organisms. Some produce toxins that can result in red tides or ciguatera poisoning. | Sea surface | Sea surface | Sea surface |
| Blue-green algae (phylum Cyanobacteria) | Many form mats that attach to reefs and produce nutrients for other marine species through nitrogen fixation. | Sea surface | Seafloor | Seafloor |
| Green algae (phylum Chlorophyta) | Marine species occur as unicellular algae, filaments, and large seaweeds. | None | Sea surface, seafloor | Sea surface, seafloor |
| Diatoms, brown and golden-brown algae (phylum Heterokontophyta) | Single-celled algae that form the base of the marine food web; brown and golden-brown algae are large multi-celled seaweeds that form extensive canopies, providing habitat and food for many marine species. | Sea surface | Sea surface, seafloor | Sea surface, seafloor |
| Red algae (phylum Rhodophyta) | Single-celled algae and multi-celled large seaweeds; some form calcium deposits. | Sea surface | Seafloor | Seafloor |
| Seagrass and cordgrass (phylum Spermatophyta) | Flowering plants are adapted to salty marine environments in mudflats and marshes, providing habitat and food for many marine species. | None | Seafloor | Seafloor |

[1] Species groups are based on the Catalogue of Life (Bisby et al. 2010).
[2] "None" indicates absence of the taxonomic group within the Study Area portion (see map of the Study Area in Figure 2.1-1).

## 3.7.2 AFFECTED ENVIRONMENT

Factors that influence the distribution and abundance of vegetation in the large marine ecosystems and open ocean areas of the Study Area are the availability of light, nutrients, water quality, water clarity, salinity level, seafloor type (important for rooted or attached vegetation), currents, tidal schedule, and temperature (Green and Short 2003). Marine ecosystems in the Study Area depend almost entirely on the energy produced by photosynthesis of marine plants and algae (Castro and Huber 2000), which is the transformation of the sun's energy into chemical energy. In surface waters of the open ocean and coastal waters, as well as within the portion of the water column illuminated by sunlight, marine algae and flowering plants provide oxygen, food, and habitat for many organisms (Dawes 1998).

Marine vegetation along the Pacific Northwest coast is represented by more than 700 varieties of seaweeds (such as corallines and other red algae, brown algae including kelp, and green algae), seagrasses (Dethier 1990; Berry and Ritter 1995; Wyllie-Echeverria and Ackerman 2003), and canopy-forming kelp species (Eissinger 2009). Red algae are the most diverse of the macroalgae in the Pacific Northwest, based on number of genera (about 115) and species (at least 265) (Waaland 1977). In intertidal and shallow subtidal areas, red algae often occupy the understory of the larger kelp. Green algae are the second most common vegetation in the intertidal areas of the Strait of Juan de Fuca (Bailey et al. 1998). Brown algae, such as the kelp beds in the Pacific Northwest, are among the most extensive and elaborate in the world. Kelp beds extend into the Strait of Juan de Fuca to Crescent Rock; however, they are uncommon in Dabob Bay and northern Hood Canal. In the Behm Canal near the Southeast Alaska Acoustic Measurement Facility (SEAFAC) portion of the Study Area, the marine vegetation mainly occurs in the near coastal waters around Back Island and includes green, brown, and red algae on rocky substrates, and some eelgrass on sandy substrates (U.S. Department of the Navy 1988). The rest of the SEAFAC area is composed of soft substrate outside of the photic zone and therefore lacks marine vegetation.

Certain species of microscopic algae (dinoflagellates and diatoms, for example) can form algal blooms, which can be toxic to human health and wildlife species. Harmful algal blooms can deplete oxygen within the water column and block sunlight that other organisms need to live, and some algae within algal blooms release toxins that are dangerous to human and ecological health (Center for Disease Control and Prevention 2004). These algal blooms have a negative economic impact of hundreds of millions of dollars annually world-wide (National Centers for Coastal Ocean Science 2010) with significant losses incurred by closed commercial fisheries and the public health costs of illnesses.

The marine vegetation in the taxonomic groups of seagrass and cordgrass has more limited distributions; none occur in open ocean areas. The relative distribution of seagrass is influenced by the availability of suitable substrate in low-wave-energy areas at depths that allow sufficient light exposure. Cordgrasses form dense colonies in salt marshes that develop in temperate areas in protected, low-energy environments, along the intertidal portions of coastal lagoons, tidal creeks or rivers, or estuaries, wherever the sediment can support plant root development (Mitsch et al. 2009).

### 3.7.2.1 General Threats

Stressors on marine vegetation are products of human activities (industrial, residential, and recreational) and natural occurrences such as storms. Species-specific information is discussed, where applicable, in Section 3.7.2.2 (Marine Vegetation Groups and Distribution), and the cumulative impacts of these threats are analyzed in Chapter 4 (Cumulative Impacts).

Human-made stressors that act on marine vegetation include excessive nutrient input (fertilizers, etc.), siltation (the addition of fine particles to the ocean), pollution (oil, sewage, trash), climate change, overfishing (Mitsch et al. 2009, Steneck et al. 2002), shading from structures (National Marine Fisheries Service 2002), habitat degradation from construction and dredging (National Marine Fisheries Service 2002), and invasion by exotic species (Hemminga and Duarte 2000, Spalding et al. 2003). The seagrass, and cordgrass taxonomic group is more sensitive to stressors than the algal taxonomic groups. The great diversity of algae makes generalization difficult but, overall, algae are resilient and colonize disturbed environments (Levinton 2009b).

Seagrasses and cordgrasses are all susceptible to the human-made stressors on marine vegetation, and their presence in the Study Area has decreased because of these stressors. Each of these types of vegetation is sensitive to additional unique stressors. Seagrasses are uprooted by dredging and scarred by boat propellers (Hemminga and Duarte 2000, Spalding et al. 2003). Seagrass beds that are scarred from boat propellers can take years to recover. Cordgrasses are damaged by sinking salt marsh habitat, a process known as marsh subsidence.

Oil in runoff from land-based sources, natural seeps, and accidental spills (such as offshore drilling and oil tanker leaks) is a major source of pollution in the marine environment (Levinton 2009a). The types and amounts of oil spilled, weather conditions, season, location, oceanographic conditions, and the method used to remove the oil (containment or chemical dispersants) are some of the factors that determine the severity of the effects. Sensitivity to oil varies among marine vegetation species and within species, depending on the life stage; generally, early-life stages are more sensitive than adult stages (Hayes et al. 1992).

Oil pollution can impact seagrasses directly by smothering the plants, or indirectly by lowering their ability to combat disease and other stressors (U.S. National Response Team 2010). Seagrasses that are totally submerged are less susceptible to oil spills because they largely escape direct contact with the pollutant. Depending on various factors, oil spills such as the Gulf War oil spill in 1991 (Kenworthy et al. 1993) range from no impact on seagrasses to long-term impacts, such as the 4-year decrease in eelgrass density caused by the *Exxon Valdez* oil spill in 1989 (Peterson 2001). Algae are relatively resilient to oil spills. Salt marshes can also be severely impacted by oil spills, and the effects can be long term (Culbertson et al. 2008).

### 3.7.2.2 Marine Vegetation Groups and Distribution

#### 3.7.2.2.1 Dinoflagellates (Phylum Dinophyta)

Dinoflagellates are single-celled organisms with two flagella (whiplike structures used for locomotion) in the phylum Dinophyta (Bisby et al. 2010). Dinoflagellates are predominantly marine algae, with an estimated 1,200 species living in surface waters of the ocean worldwide (Castro and Huber 2000). Most dinoflagellates can use the sun’s energy to produce food through photosynthesis and also can ingest small food particles. Photosynthetic dinoflagellates are important primary producers in coastal waters (Waggoner and Speer 1998). Organisms such as zooplankton (microscopic animals that drift passively in the water column), feed on dinoflagellates. In the oceanic system, dinoflagellates utilize a suite of light harvesting compounds to convert solar energy into chemical energy, the most common being Chlorophyll *a*. Rates of photosynthetic production can vary from between less than 0.1 gram of carbon (gC)/square meter ($m^2$)/day in less productive regions, such as the western equatorial Pacific, to more than 10 gC/$m^2$/day in highly productive areas (Thurman 1997).

Dinoflagellates cause some types of harmful algal blooms which result from sudden increases in nutrients (e.g., fertilizers) from land into the ocean or changes in temperature and sunlight (Levinton 2009c). About 75–80 percent of toxic phytoplankton species are dinoflagellates (Cembella 2003) and are known to cause harmful algal blooms. Harmful algal blooms often kill fish and shellfish either directly, because of toxin production, or because of effects caused by large numbers of cells that clog the animal's gills and deplete them of oxygen (Smayda 1997). When affected shellfish or fish are eaten by humans, they cause diseases like paralytic shellfish poisoning, neurotoxic shellfish poisoning, diarrheic shellfish poisoning, and ciguatera (Lehane and Lewis 2000). Additional information on harmful algal blooms can be accessed on the Centers for Disease Control and the National Oceanic and Atmospheric Administration websites.

#### 3.7.2.2.1.1 Offshore Area

The coast of the Pacific Northwest supports high primary productivity (Sutor et al. 2005). Because most dinoflagellates are photosynthetic and use Chlorophyll *a* to undergo the photosynthetic process, concentrations of Chlorophyll *a* measured in the Offshore Area can indicate the presence and population density of dinoflagellates. Concentrations greater than 3.0 milligrams of chlorophyll per cubic meter (mg chl/$m^3$) are present throughout the spring, summer, and fall within 40 kilometers (km) of shore, and rarely expand beyond 100 km offshore (Thomas and Strub 2001). Lowest concentrations (< 0.25 mg chl/$m^3$) are usually located over 200 km offshore and intrude towards the coast in mid-summer (June–July). Each year, two blooms occur, one in spring and another in summer. The timing of the first bloom varies, occurring from early April to May. The second offshore expansion typically occurs in August (Thomas and Strub 2001). Dinoflagellates produce some of the Chlorophyll *a* detected in the Offshore Area (Figure 3.7-1). The distribution of dinoflagellates depends on factors such as light intensity, salinity, water temperature, currents, topography, nutrients, reproductive cycles, and predators (Richlen and Lobel 2011).

#### 3.7.2.2.1.2 Inland Waters

Most Chlorophyll *a* production in the Inland Waters is detected in the Strait of Juan de Fuca (Figure 3.7-1), which is where the highest concentrations of phytoplankton such as dinoflagellates will occur.

#### 3.7.2.2.1.3 Western Behm Canal, Alaska

A study of sea surface chlorophyll concentrations for southeastern Alaska conducted in 2004 shows increased phytoplankton biomass near the Western Behm Canal portion of the Study Area between June and August (SALMON Project 2004). These late summer blooms of phytoplankton are triggered by wind driven vertical mixing of nutrients (Iverson et al. 1974, Ziemann et al. 1991). Dinoflagellates produce some of the Chlorophyll *a* detected in this portion of the Study Area.

### 3.7.2.2.2 Blue-Green Algae (Phylum Cyanobacteria)

Blue-green algae are single-celled, photosynthetic bacteria that inhabit the lighted surface waters and seafloors of the world's oceans (Bisby et al. 2010). Blue-green algae are key primary producers in the marine environment, and provide valuable ecosystem services such as producing oxygen and nitrogen. The blue-green algae *Prochlorococcus* is responsible for a large part of the oxygen produced globally by photosynthetic organisms. Other species of blue-green algae have specialized cells that convert nitrogen gas into a form that can be used by other marine plants and animals (nitrogen fixation) (Hayes et al. 2007; Sze 1998).

#### 3.7.2.2.2.1 Offshore Area

The coast of the Pacific Northwest supports high primary productivity (Sutor et al. 2005). Concentrations greater than 3.0 mg chl/$m^3$ are present throughout the spring, summer, and fall within 40 km of shore, and rarely expand beyond 100 km offshore (Thomas and Strub 2001). Lowest concentrations (< 0.25 mg chl/$m^3$) are usually located over 200 km offshore and intrude towards the coast in mid-summer (June–July). Each year, two blooms occur, one in spring and another in summer. The timing of the first of these episodes varies, occurring from early April to May. The second offshore expansion typically occurs in August (Thomas and Strub 2001). Blue-green algae produce some of the Chlorophyll *a* detected in the Offshore Area (Figure 3.7-1).

#### 3.7.2.2.2.2 Inland Waters

Most Chlorophyll *a* production in the Inland Waters is detected in the Strait of Juan de Fuca (Figure 3.7-1), which is where the highest concentrations of phytoplankton such as blue-green algae occurs. The inland waters show less variability in Chlorophyll *a* production than the Offshore Area.

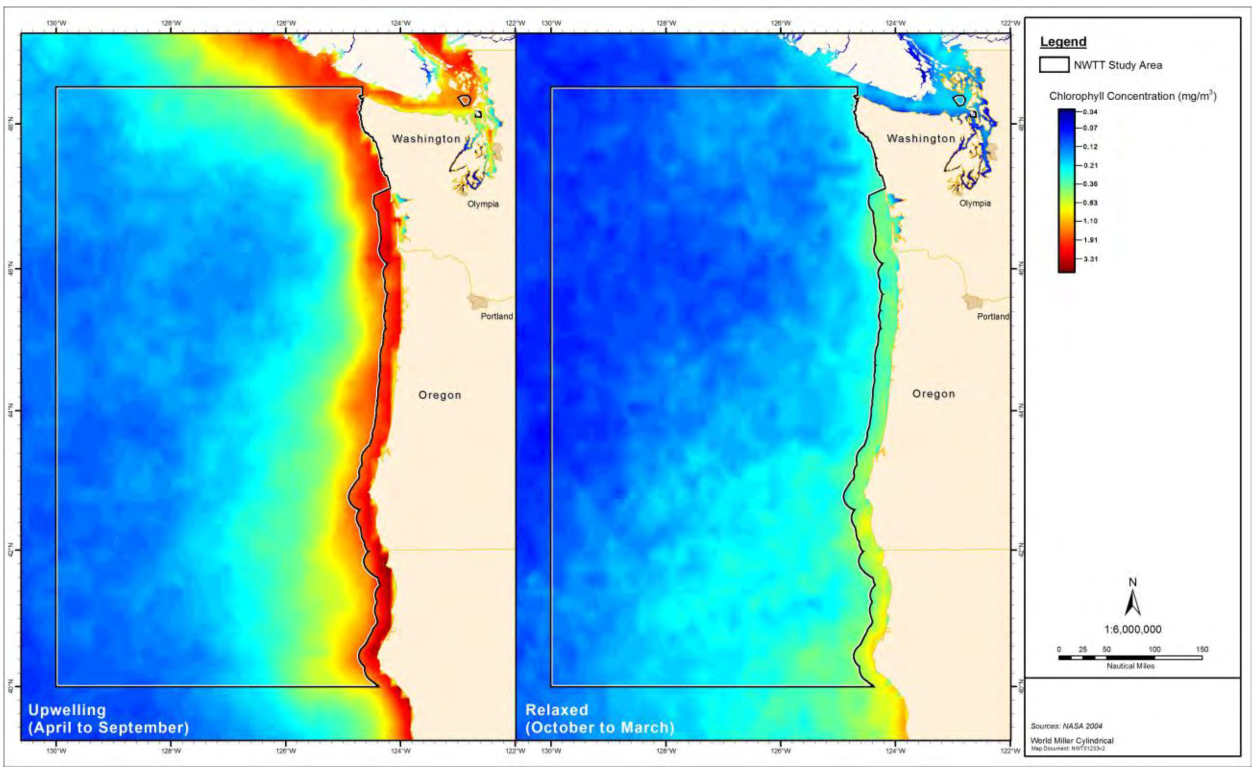


**Figure 3.7-1: Chlorophyll *a* Concentrations in the Northwest Training and Testing Study Area**

#### 3.7.2.2.2.3 Western Behm Canal, Alaska

A study of sea surface chlorophyll concentrations for southeastern Alaska conducted in 2004 shows increased phytoplankton biomass near the Western Behm Canal portion of the Study Area between June and August (SALMON Project 2004). These late summer blooms of phytoplankton are triggered by wind-driven vertical mixing of nutrients (Iverson et al. 1974, Ziemann et al. 1991). Blue-green algae produce some of the Chlorophyll *a* detected in this portion of the Study Area.

#### 3.7.2.2.3 Green Algae (Phylum Chlorophyta)

Green algae are single-celled organisms in the phylum Chlorophyta that may form large colonies of individual cells (Bisby et al. 2010). Green algae are predominately found in freshwater, with only 10 percent of the estimated 7,000 species living in the marine environment (Castro and Huber 2000). These species are important primary producers that play a key role at the base of the marine food web.

##### 3.7.2.2.3.1 Offshore Area

Green algae are less common in the exposed areas of the outer coast. However, sometimes they are found to occur on the sea surface and sea floor of the Offshore Area (Bailey et al. 1998). Green algae produce some of the Chlorophyll *a* detected in the Offshore Area (see Figure 3.7-1).

##### 3.7.2.2.3.2 Inland Waters

Green algae inhabit the more protected marine and estuarine areas in Washington, primarily in tide pools and rocky intertidal areas. They are the second most common vegetation in the intertidal areas of the Strait of Juan de Fuca (Bailey et al. 1998). The green algae community primarily is in the upper 330 feet (ft.) (100 meters [m]) of the water column. The distribution of phytoplankton depends on factors such as light intensity, salinity, water temperature, currents, topography, nutrients, reproductive cycles, and predators (Smith 1977, Strub et al. 1990, Batchelder et al. 2002). During the spring and summer, the upwelling of nutrient-rich waters into the surface layers combines with high solar radiation and long days to produce huge numbers of these tiny plants (Strub et al. 1990, Batchelder et al. 2002, Perry et al. 1989).

##### 3.7.2.2.3.3 Western Behm Canal, Alaska

A study of sea surface chlorophyll concentrations for southeastern Alaska conducted in 2004 shows increased phytoplankton biomass near the Western Behm Canal portion of the Study Area between June and August (SALMON Project 2004). These late summer blooms of phytoplankton are triggered by wind-driven vertical mixing of nutrients (Iverson et al. 1974, Ziemann et al. 1991). Green algae produce some of the Chlorophyll *a* detected in this portion of the Study Area. In addition to single cellular green algae, there are various species of green macroalgae in this portion of the Study Area, such as *Acrosiphonia mertensii*, *Enteromorpha linza*, and *Cladophora columbiana* (Guiry and Guiry 2013).

#### 3.7.2.2.4 Brown Algae (Phylum Heterokontophyta)

Brown and golden-brown algae can be single-celled (diatoms) or large, multi-celled species with structures varying from filamentous to thick, leathery forms.

##### 3.7.2.2.4.1 Diatoms

Diatoms are single-celled organisms with cell walls made of silicon dioxide. Two major groups of diatoms are generally recognized, centric diatoms and pennate diatoms. Centric diatoms exhibit radial symmetry (symmetry about a point), while the pennate diatoms are bilaterally symmetrical (symmetry about a line). Diatoms such as *Coscinodiscus* species (spp.) commonly occur in the Study Area. Some strains of another genus of diatoms, *Pseudo-nitzschia*, produce a toxic compound called domoic acid. Humans, marine mammals, and seabirds become sick or die when they eat organisms that feed on *Pseudo-nitzschia* strains that produce the toxic compound. Strains of another genus of diatoms, *Alexandrium*, produce a toxic bloom causing paralytic shellfish poisoning. Blooms that result in catastrophic losses of cultured and wild fish, but do not cause illness in humans are caused by a few species of the diatom genus *Chaetoceros*, which clogs fish gills (Boesch et al. 1997). Decreases in the movement of cool, nutrient-rich waters by the wind in combination with pollutants carried from land to the ocean by rainwater are believed to be the main causes of these harmful algal blooms in the Study Area (Kudela and Cochlan 2000). Researchers in the Olympic coastal region, which occurs in the Study Area, are testing the hypothesis that these harmful algal bloom events affecting coastal communities are largely caused by toxic algal species growing in the vicinity of the Juan de Fuca eddy which are transported to nearshore waters by storms (National Oceanic and Atmospheric Administration 2013).

**Offshore Area**

The diatom community primarily is in the upper 330 ft. (100 m) of the water column (Walsh et al. 1977, Estrada and Blasco 1979, Hardy 1993). The distribution of diatoms depends on factors such as light intensity, salinity, water temperature, currents, topography, nutrients, reproductive cycles, and predators (Smith 1977, Strub et al. 1990, Batchelder et al. 2002). The coast of the Pacific Northwest supports a high density of diatoms (Sutor et al. 2005). During the spring and summer, the upwelling of nutrient-rich waters into the surface layers combines with high solar radiation and long days to produce huge numbers of these tiny cells (Strub et al. 1990, Batchelder et al. 2002, Perry et al. 1989).

**Inland Waters**

Most Chlorophyll *a* production in the Inland Waters is detected in the Strait of Juan de Fuca (see Figure 3.7-1), which is where the highest concentrations of phytoplankton such as diatoms will occur.

**Western Behm Canal, Alaska**

Diatoms are known to occur in the sea surface and sea floor of the southeast Alaska portion of the Study Area. The main diatom species in this portion of the Study Area are *Thalassiosira, Skeletonema,* and *Chaetoceros* (Waite et al. 1992).

#### 3.7.2.2.4.2 Other Brown Algae Species

Most brown algae species are attached to the seafloor in coastal waters, although *Sargassum* may occur in a free-floating form in the Study Area (Eissinger 2009).Two species of brown algae dominate the Pacific Northwest, bull kelp (*Nereocystis leutkeana*) and giant kelp (*Macrocystis intergrifolia*). Bull kelp (*Nereocystis luetkeana*) can grow up to 5 inches (in.) (13 centimeters [cm]) per day (Dayton 1985). Bull kelp attaches to rocky substrate, and can grow up to 164 ft. (50 m) in length in nearshore areas. The giant kelp (*Macrocystis intergrifolia*) can live up to 8 years, and can reach lengths of 197 ft. (60 m). The leaf-like fronds can grow up to 24 in. (61 cm) per day (Leet et al. 2001). Sargassum (*Sargassum muticum*) is a non-indigenous brown algae from Asia and elsewhere that has been established in the Pacific Northwest for decades (Eissinger 2009).

**Offshore Area**

Kelp and Sargassum may occur in the sea surface of the Offshore Area of the Study Area. In turbid waters, the offshore edge of kelp beds occurs at depths of 50–60 ft. (15–18 m), which can extend to a depth of 100 ft. (30 m). The highest densities and most persistent kelp beds occur on solid rock substrate with moderately low relief and moderate sand coverage (Foster and Schiel 1985, Graham 1997). Sargassum, however, is least common along the outer coast, and offshore section of the Study Area (Shaffer 1998). Distribution of kelp and Sargassum in the Offshore Area is depicted in Figure 3.7-2.

**Inland Waters**

Kelp and *Sargassum* are known to occur in the sea surface and sea floor of the Inland Waters of the Study Area. Sargassum is common along the shorelines of the Hood Canal, San Juan Archipelago, and Strait of Georgia, whereas kelp is mostly found in the Strait of Juan de Fuca (Figure 3.7-2).

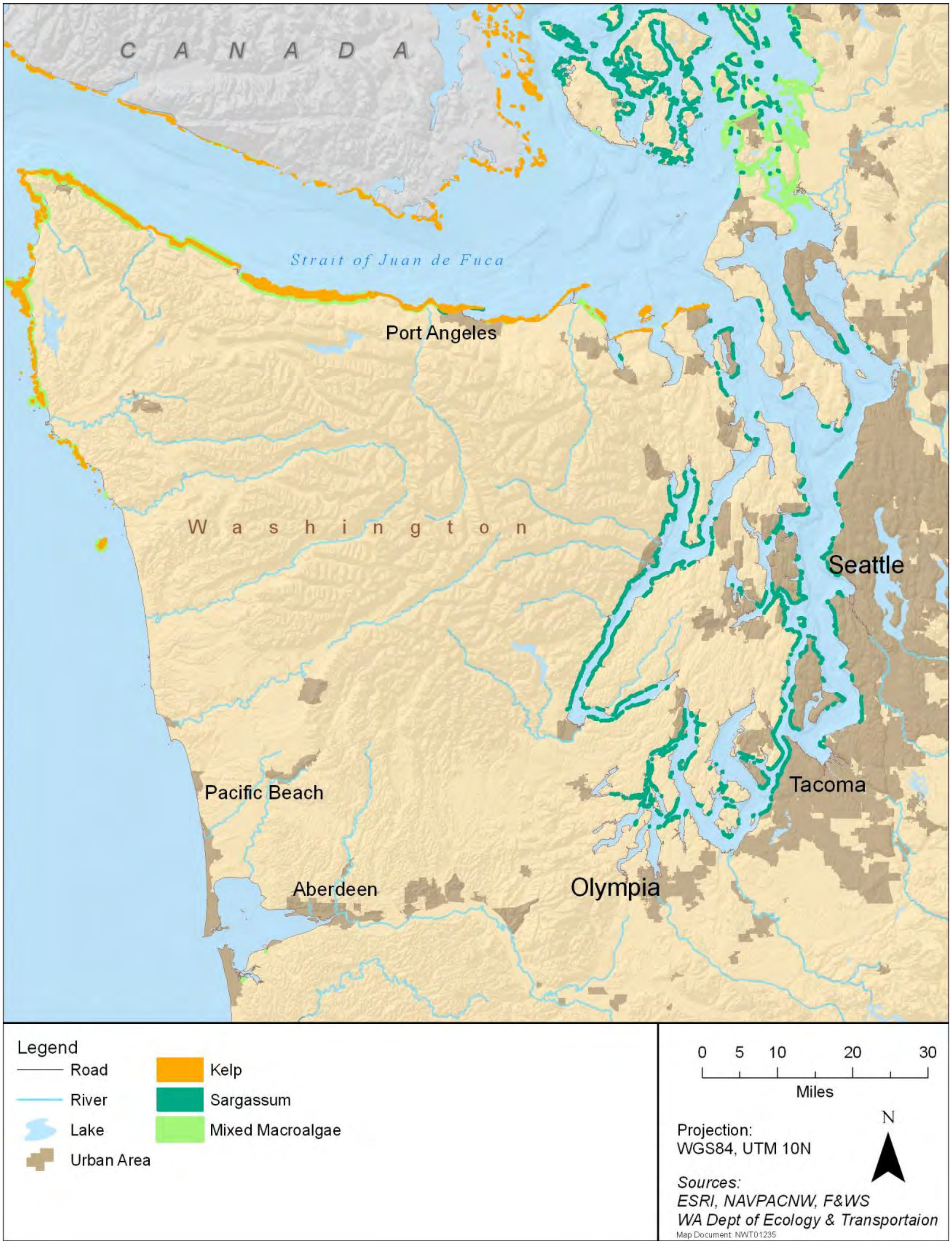


**Figure 3.7-2: Kelp and *Sargassum* in the Northwest Training and Testing Study Area**

**Western Behm Canal, Alaska**

Rockweed and kelp are known to occur in the sea surface and sea floor of the Western Behm Canal portion of the Study Area. Common species of rockweed and kelp in the Western Behm Canal portion of the Study Area include *Fucus distichus* and *Agarum marginata* (Guiry and Guiry 2013).

#### 3.7.2.2.5 Red Algae (Phylum Rhodophyta)

Red algae are predominately marine, with approximately 4,000 species worldwide (Castro and Huber 2000). Red algal species exist in a range of forms, including single and multicellular forms (Bisby et al. 2010)—from fine filaments to thick calcium carbonate crusts.

##### 3.7.2.2.5.1 Offshore Area

Red algae, such as *Rhodomela larix*, are known to occur in the sea surface of the Offshore Area of the Study Area (Guiry and Guiry 2013).

##### 3.7.2.2.5.2 Inland Waters

Red algae are known to occur on the sea floor of the Inland Waters of the Study Area. Within this portion of the Study Area, a common species is *Mastocarpus papillatus* which is found in the waters of Puget Sound, the Strait of Georgia, and the Strait of Juan de Fuca (Lindstrom 2005).

##### 3.7.2.2.5.3 Western Behm Canal, Alaska

In the Western Behm Canal portion of the Study Area shallow waters with rocky substrate are known to support red alga (*Rhodomela larix*) and even deeper waters were observed to be mainly sand substrates with patches of some red algae (U.S. Department of the Navy 1988).

#### 3.7.2.2.6 Seagrasses and Cordgrasses (Phylum Spermatophyta)

Seagrasses and cordgrasses are flowering marine plants in the phylum Spermatophyta (Bisby et al. 2010). These marine flowering plants create important habitat for many marine species (Harborne et al. 2006, Heck et al. 2003, National Oceanic and Atmospheric Administration 2001). Cordgrasses are temperate salt-tolerant land plants that inhabit salt marshes, mudflats, and other soft-bottom coastal habitats (Castro and Huber 2000). Salt marshes develop in intertidal, protected low-energy environments, usually in coastal lagoons, tidal creeks, rivers, or estuaries (Mitsch et al. 2009).

Seagrasses are unique among flowering plants because they grow submerged in shallow marine environments. Except for some species that inhabit the rocky intertidal zone, seagrasses grow in shallow, subtidal, or intertidal sediments, and can extend over a large area to form seagrass beds (Garrison 2004; Phillips and Meñez 1988). Seagrass beds provide habitat for numerous vertebrates and invertebrates, including nurseries for commercially important crustaceans, fish, and shellfish (Harborne et al. 2006; Heck et al. 2003; National Oceanic and Atmospheric Administration 2001). Additionally, seagrass beds combat coastal erosion, promote nutrient cycling through the breakdown of detritus (Dawes 1998), and improve water quality. Seagrasses also contribute a high level of primary production to the marine environment, which supports high species diversity and biomass (Spalding et al. 2003).

##### 3.7.2.2.6.1 Offshore Area

In the Pacific Northwest the dominant native seagrasses are eelgrass (*Zostera marina*) and surfgrass (*Phyllospadix* spp.) (den Hartog 1970). Eelgrass grows in shallow, subtidal or intertidal unconsolidated sediments, where as surfgrass grows on wave-beaten rocky shores. The primary vegetation in the Offshore Area is surfgrass (Figure 3.7-3).


**Figure 3.7-3: Surfgrass and Eelgrass in the Northwest Training and Testing Study Area**

###### 3.7.2.2.6.2 Inland Waters

Eelgrass grows in shallow, subtidal or intertidal unconsolidated sediments, whereas surfgrass grows on wave-beaten rocky shores. The primary vegetation in the intertidal areas of the Strait of Juan de Fuca and Puget Sound is eelgrass, which covers approximately 40 percent of the intertidal area (Bailey et al. 1998). Atlantic cordgrass (*Spartina alterniflora*) is a native cordgrass species from the Atlantic and Gulf coasts, and is considered an invasive species in the Study Area because it produces seeds at higher rates than the native cordgrass, and can quickly colonize mudflats (Howard 2008). Atlantic cordgrass is found in mudflats in Skagit, Clallam, and Jefferson counties (Puget Sound Partnership 2013).

###### 3.7.2.2.6.3 Western Behm Canal, Alaska

Eelgrass is found in the Western Behm Canal portion of the study area on sandy substrates in deeper waters surrounding Back Island (U.S. Department of the Navy 1998).

## 3.7.3 Environmental Consequences

This section evaluates how and to what degree the activities described in Chapter 2 (Description of Proposed Action and Alternatives) potentially impact marine vegetation. General characteristics of all Navy stressors were introduced in Section 3.0.5.3 (Identification of Stressors for Analysis), and living resources' general susceptibilities to stressors are described in Appendix G (Biological Resource Methods). Each marine vegetation stressor is introduced, analyzed by alternative, and analyzed for training activities and testing activities. Tables F-3 through F-5 in Appendix E (Training and Testing Activities Matrices) show the warfare areas and associated stressors that were considered for analysis of marine vegetation.

The stressors vary in intensity, frequency, duration, and location within the Study Area (Table 3.7-2). Based on the general threats to marine vegetation discussed in Section 3.7.2 (Affected Environment) the stressors applicable to marine vegetation are:

- Acoustic (underwater explosives)
- Physical disturbance or strikes (vessel and in-water device disturbance, military expended materials)
- Secondary stressors (sediments and water quality)

Because marine vegetation is not susceptible to energy, entanglement, or ingestion stressors, those stressors will not be assessed. Only the Navy training and testing activity stressors and their components that occur in the same geographic location as marine vegetation are analyzed in this section. Training and testing activities pose no direct threat to some types of marine vegetation habitats. Training activities are not proposed in the Western Behm Canal; therefore, only the Offshore Area and the Inland Waters will be analyzed under Training Activities. Details of all training and testing activities, stressors, components that cause the stressor, and geographic occurrence within the Study Area, are summarized in Section 3.0.5.3 (Identification of Stressors for Analysis) and detailed in Appendix A (Navy Activities Descriptions).

### 3.7.3.1 Acoustic Stressors

This section analyzes the potential impacts of acoustic stressors that may occur during Navy training and testing activities on marine vegetation within the Study Area. The acoustic stressors that may impact marine vegetation include explosives that are detonated on or near the surface of the water, or underwater; therefore, only these types of explosions are discussed in this section.

#### 3.7.3.1.1 Impacts from Underwater Explosives

Various types of explosives are used during training and testing activities. The type, number, and location of activities that use explosives under each alternative are discussed in Section 3.0.5.3.1.2 (Explosives). Explosive sources are the only acoustic stressor applicable to this resource because explosives could physically damage marine vegetation.

**Table 3.7-2: Stressors for Marine Vegetation in the Northwest Training and Testing Study Area**

| Components | Area | Number of Components or Events | | | | | |
|---|---|---|---|---|---|---|---|
| | | No Action Alternative | | Alternative 1 | | Alternative 2 | |
| | | Training | Testing | Training | Testing | Training | Testing |
| **Acoustic Stressors** | | | | | | | |
| Explosives | Offshore Area | 209 | 0 | 142 | 148 | 142 | 164 |
| | Inland Waters | 4 | 0 | 42 | 0 | 42 | 0 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Physical Disturbance and Strike Stressors** | | | | | | | |
| Activities including vessels | Offshore Area | 1,003 | 39 | 1,116 | 158 | 1,116 | 187 |
| | Inland Waters | 4 | 339 | 310 | 602 | 310 | 665 |
| | W. Behm Canal | 0 | 28 | 0 | 60 | 0 | 83 |
| Activities including in-water devices | Offshore Area | 387 | 38 | 493 | 134 | 493 | 158 |
| | Inland Waters | 0 | 377 | 1 | 628 | 1 | 691 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Military expended materials | Offshore Area | 189,815 | 604 | 198,028 | 3,922 | 198,028 | 4,325 |
| | Inland Waters | 8 | 442 | 3,085 | 513 | 3,085 | 563 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Activities including seafloor devices | Offshore Area | 0 | 5 | 0 | 6 | 0 | 7 |
| | Inland Waters | 2 | 210 | 16 | 225 | 16 | 239 |
| | W. Behm Canal | 0 | 0 | 0 | 5 | 0 | 15 |
| **Secondary Stressors** | | | | | | | |
| Habitat (sediments and water quality; air quality) | Offshore Area | QUALITATIVE | | | | | |
| | Inland Waters | | | | | | |
| | W. Behm Canal | | | | | | |

The potential for an explosion to injure or destroy marine vegetation would depend on the amount of vegetation present, the number of munitions used, and their net explosive weight. In areas where marine vegetation and locations for explosions overlap, vegetation on the surface of the water, in the water column, or rooted in the seafloor may be impacted. Single-celled algae may overlap with acoustic stressors, but the impact would be minimal relative to their total population level; therefore, they will not be discussed further. Seafloor macroalgae, and eelgrass may overlap with underwater and sea surface explosion locations. If these vegetation types are near an explosion, only a small number of them are likely to be impacted relative to their total population level. The low number of explosions relative to the amount of seafloor macroalgae in the Study Area also decreases the potential for impacts on these vegetation types. In addition, seafloor macroalgae are resilient to high levels of wave action (Mach et al. 2007), which may aid in their ability to withstand underwater explosions that occur near them. Underwater explosions also may temporarily increase the turbidity (sediment suspended in the water) of nearby waters, incrementally reducing the amount of light available to marine vegetation. This increase in the amount of sediments and nutrients (e.g., iron) in the water may cause algal blooms (Anderson et al. 2002). Additionally, areas of sea floor impacted by explosions may become re-colonized by algae species (Emerson and Zedler 1978).

#### 3.7.3.1.1.1 No Action Alternative

**Training Activities**

**Offshore Area**

Under the No Action Alternative, training activities would utilize source class E4 explosives, which detonate at a depth of 66 ft. (20 m); source class E5 explosives, which detonate at a depth of 1 ft. (0.3 m); source class E8 and source class E11 explosives, both of which detonate at a depth of 90 ft. (27 m); and source class E12 explosives, which detonate at a depth of 3.3 ft. (1 m) (see Table 3.0-11). There are 209 training activities proposing the use of underwater explosions in the Offshore Area under the No Action Alternative. These explosions would likely occur over unvegetated seafloor because it is the predominant bottom type in the areas proposed for these activities; in addition, detonations would occur in waters greater than 200 ft. (61 m) in depth and greater than 3 nautical miles (nm) from shore. Detonations associated with anti-submarine warfare (source class E4) would typically occur in water greater than 600 ft. (183 m) depth. Underwater and surface explosions conducted for training activities in the Offshore Area are not expected to result in detectable changes to kelp beds, floating marine algae, or other marine algae because (1) the relative coverage of marine algae and vegetation is low in this portion of the Study Area, (2) new growth may result from floating and attached marine algae and vegetation exposure to explosives (see Section 3.7.3.1.1, Impacts from Underwater Explosives; Emerson and Zedler 1978), and (3) the impact area of underwater explosions is very small (see Figure 2.1-2) relative to marine algae and vegetation distribution. Based on these factors, potential impacts on marine algae and vegetation from underwater and surface explosions are not expected to result in detectable changes to growth, survival, or propagation that would result in population level impacts.

**Inland Waters**

The potential for eelgrass to overlap with underwater and surface explosions is limited to Underwater Demolition Training areas in Crescent Harbor and Hood Canal. Eelgrasses could be uprooted or damaged by sea surface or underwater explosions. They are much less resilient to disturbance than other marine algae; regrowth after uprooting can take up to 10 years (Dawes et al. 1997). Explosions may also temporarily increase the turbidity (sediment suspended in the water) of nearby waters, but the sediment would settle to pre-explosion conditions within a number of days. Sustained high levels of turbidity may reduce the amount of light that reaches vegetation.

Under the No Action Alternative, there would be a total of four explosive training events in the inshore portion of the Study Area. The impact of underwater explosions from mine neutralization activities on bottom habitats provides some perspective on the potential impact area. The total impact footprint of all underwater explosions under the No Action Alternative on bottom habitats would be approximately 313.28 square feet (ft.$^2$) (29.1 m$^2$). This impact footprint is small relative to the distribution of marine algae, such as kelp, in the inland portion of the Study Area, which is over 45.7 square nautical miles (nm$^2$).

Underwater and surface explosions conducted for training activities in the Inland Waters are not expected to pose a risk to eelgrass because (1) the impact area of underwater explosions is very small (313.28 ft.$^2$ [29.1 m$^2$]) relative to eelgrass distribution (45.7 nm$^2$); (2) the low number of charges reduces the potential for impacts; and (3) disturbance would be temporary, dependent upon the level of sediment redistributed, the amount of time it takes the sediment to settle, and the amount of light that reaches the disturbed area. The use of surface and underwater explosions is not expected to result in detectable changes to their growth, survival, or propagation that would result in population-level impact for marine algae and eelgrass.

**Testing Activities**

**Offshore Area**

No testing activities with underwater, surface, or seafloor detonations are proposed in the Offshore Area under the No Action Alternative.

**Inland Waters**

No testing activities with underwater, surface, or seafloor detonations are proposed in the Inland Waters under the No Action Alternative.

**Western Behm Canal, Alaska**

No testing activities with underwater, surface, or seafloor detonations are proposed in the Western Behm Canal under the No Action Alternative.

#### 3.7.3.1.1.2 Alternative 1

**Training Activities**

**Offshore Area**

Under Alternative 1, the total number of explosives used in training events in the Offshore Area would decrease by approximately 32 percent over No Action Alternative (see Table 3.7-2). The potential impacts on marine algae and vegetation from exposure to underwater and surface explosions are slightly increased, but remain similar in nature as described in Section 3.7.3.1.1.1 (No Action Alternative).

In comparison to the No Action Alternative, the increase in activities presented in Alternative 1 may increase the risk to marine algae from exposure to underwater and surface explosions. However, most of the increase under Alternative 1 comes from explosives with less than 10 pounds (lb.) of net explosive weight (see Table 3.0-11). Underwater and surface explosions conducted for training activities are not expected to pose a risk to marine algae and vegetation because (1) the impact area of underwater explosions is very small relative to marine algae and vegetation distribution in this portion of the Study Area; (2) the low number of charges reduces the potential for impacts; and (3) disturbance would be temporary, dependent upon the level of sediment redistributed, the amount of time it takes the sediment to settle, and the amount of light that reaches the disturbed area. For the same reasons as stated in Section 3.7.3.1.1.1 (No Action Alternative) for marine algae and vegetation, the use of surface and underwater explosions is not expected to result in detectable changes to their growth, survival, or propagation that would result in population-level impacts.

**Inland Waters**

Under Alternative 1, the total number of explosive training events would increase relative to the No Action Alternative, due to the additional use of 18 shock wave action generators (SWAG) in Crescent Harbor and 18 SWAG in Hood Canal. The mine neutralization exercises would increase from two 1.5 lb. mine neutralization charges to three 2.5 lb. charges in Hood Canal and from two to three 2.5 lb. mine neutralization exercises in Crescent Harbor.

The potential impacts on marine algae from exposure to underwater and surface explosions are as described in Section 3.7.3.1.1.1 (No Action Alternative). The impact of underwater explosions from mine neutralization activities on bottom habitats provides some perspective on the potential impact area. The impact footprint of underwater explosions on bottom habitats in the Inland Waters of the Study Area for the three 2.5 lb. charges and 18 SWAG (that occur three times) in Crescent Harbor, along with the three 2.5 lb. charges and 18 SWAG (that occur three times) in the Hood Canal Range, is approximately 823.14 $ft.^2$ (76.5 $m^2$) (see Table 2.8-1, Baseline and Proposed Training Activities). This impact footprint is small (see Figure 2.1-3) relative to the distribution of marine algae, such as kelp, in the Study Area.

In comparison to the No Action Alternative, the increase in activities presented in Alternative 1 may increase the risk to marine algae from exposure to underwater and surface explosions. However, underwater and surface explosions conducted for training activities are not expected to cause population level impacts to eelgrass because (1) the impact area of underwater explosions is very small (see Figure 2.1-2) relative to seagrass distribution; (2) the low number of charges reduces the potential for impacts; and (3) disturbance would be temporary, dependent upon the level of sediment redistributed, the amount of time it takes the sediment to settle, and the amount of light that reaches the disturbed area. For the same reasons as stated in Section 3.7.3.1.1.1 (No Action Alternative) for marine algae and eelgrass, the use of surface and underwater explosions is not expected to result in detectable changes to their growth, survival, or propagation that would result in population-level impacts.

**Testing Activities**

**Offshore Area**

Under Alternative 1, testing activities would involve the use of 148 explosives, during activities such as Naval Sea Systems Command (NAVSEA) torpedo testing and Naval Air Systems Command (NAVAIR) Improved Extended Echo Ranging (IEER) testing (see Tables 2.8-2 and 2.8-3). The majority of underwater explosions in the Offshore Area would occur over unvegetated seafloor because it is the predominant bottom type in the areas proposed for these activities. Underwater and surface explosions conducted for testing activities in the Offshore Area are not expected to cause any risk to marine algae and vegetation because (1) the relative coverage of marine algae and vegetation is low (see Figure 2.1-2), (2) new growth may result from marine algae and vegetation exposure to explosives (see Section 3.7.3.1.1, Impacts from Underwater Explosives), and (3) the impact area of underwater explosions is very small (see Figure 2.1-2) relative to marine algae and vegetation distribution in this portion of the Study Area. Based on these factors, potential impacts on marine algae and vegetation from underwater and surface explosions are not expected to result in detectable changes to growth, survival, or propagation that would result in population level impacts.

**Inland Waters**

No testing activities with underwater, surface, or seafloor detonations are proposed in the Inland Waters under Alternative 1.

**Western Behm Canal, Alaska**

No testing activities with underwater, surface, or seafloor detonations are proposed in the Western Behm Canal under Alternative 1.

#### 3.7.3.1.1.3 Alternative 2

**Training Activities**

**Offshore Area**

Under Alternative 2, the same number of underwater detonations would occur as under Alternative 1. Therefore, underwater detonations in the Offshore Area under Alternative 2 would have the same impacts on marine algae and vegetation as under Alternative 1.

**Inland Waters**

Under Alternative 2, the same number of underwater detonations would occur in the Inland Waters as under Alternative 1. Therefore, underwater detonations under Alternative 2 would have the same impacts on marine vegetation as under Alternative 1.

**Testing Activities**

**Offshore Area**

Under Alternative 2, testing activities would involve the use of explosives, such as NAVSEA torpedo testing and NAVAIR IEER testing (see Tables 2.8-2 and 2.8-3) and would increase by approximately 10 percent over Alternative 1. The majority of underwater explosions in the Offshore Area would likely occur over unvegetated seafloor because it is the predominant bottom type in the areas proposed for these activities. Underwater and surface explosions conducted for testing activities in the Offshore Area are not expected to cause any risk to marine algae and vegetation because (1) the relative coverage of marine algae and vegetation is low (see Figure 2.1-2), (2) new growth may result from marine algae and vegetation exposure to explosives (see Section 3.7.3.1.1, Impacts from Underwater Explosives), and (3) the impact area of underwater explosions is very small (see Figure 2.1-2) relative to marine algae and vegetation distribution. Based on these factors, potential impacts on marine algae and vegetation from underwater and surface explosions are not expected to result in detectable changes to growth, survival, or propagation that would result in population level impacts.

**Inland Waters**

No testing activities with underwater, surface, or seafloor detonations are proposed in the Inland Waters under Alternative 2.

**Western Behm Canal, Alaska**

No testing activities with underwater, surface, or seafloor detonations are proposed in the Western Behm Canal, Alaska portion of the Study Area under Alternative 2.

### 3.7.3.1.2 Substressor Impact on Marine Vegetation as Essential Fish Habitat from Explosives (Preferred Alternative)

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of explosives during training and testing activities may have an adverse effect on EFH by reducing the quality and quantity of marine vegetation that constitutes EFH or Habitat Areas of Particular Concern. Impact on attached macroalgae is determined to be minimal and temporary to long term throughout the Study Area. Given the available information, the impact on submerged rooted vegetation beds is determined to be minimal (meaning that effects do not cause large-scale changes in ecological function) and long term (stressor duration or recovery in more than 3 years but less than 20 years).

### 3.7.3.2 Physical Disturbance and Strike Stressors

This section analyzes the potential impacts on marine vegetation of the various types of physical disturbance stressors during training and testing activities within the Study Area. Three types of physical stressors are evaluated for their impacts on marine vegetation, including (1) vessels and in-water devices, (2) military expended materials, and (3) seafloor devices.

The evaluation of the impacts of physical disturbance stressors on marine vegetation focuses on proposed activities that may cause vegetation to be damaged by an object that is moving through the water (e.g., vessels and in-water devices), or dropped to the seafloor (e.g., military expended materials, anchors). Not all activities are proposed throughout the Study Area. Wherever appropriate, specific geographic areas of potential impact are identified.

Single-celled algae may overlap with physical disturbance stressors. However, as suspended particles, they are displaced by vessel movement in the same way as the water around them. The impact is negligible because the nature of the activity does not alter lifecycle or habitat; therefore, it does not affect the productivity or population health of these species. Impacts to single-cell algae will not be discussed further. Eelgrasses and macroalgae on the seafloor on the sea surface are the only types of marine vegetation that occur in locations where physical disturbance stressors may be encountered. Therefore, only eelgrasses and macroalgae are analyzed further for potential impacts of physical disturbance or strike stressors. Since the occurrence of marine algae is an indicator of marine mammal and sea turtle presence, some mitigation measures designed to reduce impacts on these resources may indirectly reduce impacts on marine algae; see Section 5.3.2.2 (Physical Disturbance and Strike).

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

Several different types of vessels (ships, submarines, boats, amphibious vehicles) and in-water devices (towed devices and unmanned underwater vehicles [UUVs]) are used during training and testing activities throughout the Study Area, as described in Section 3.0.5.3.3.1 (Vessels). Vessel movements occur intermittently, are variable in duration, ranging from a few hours to a few weeks, and are dispersed throughout the Study Area. Events involving large vessels are widely spread over offshore areas, while smaller vessels are more active in nearshore areas.

The potential impacts of Navy vessels and in-water devices used during training and testing activities on marine vegetation are based on the vertical distribution of the vegetation. Surface vessels include ships, boats, and amphibious vehicles, and seafloor devices include UUVs and autonomous underwater vehicles. Vessels may impact vegetation by disturbing vegetation on the sea surface or seafloor (Spalding et al. 2003). In the open ocean, marine algae on the sea surface such as kelp paddies have a patchy distribution. Marine algae could be temporarily disturbed by moving vessels or by the propeller action of transiting vessels. Fragmentation would be on a small spatial scale, and marine algal mats would be expected to re-form. These disturbances could also injure the organisms that inhabit kelp paddies or other marine algal mat, such as sea turtles, birds, marine invertebrates, and fish (see Sections 3.5, 3.6, 3.8, and 3.9, respectively). In open-ocean areas, marine algae on the sea surface may be disturbed by vessels and in-water devices. Marine algae could be temporarily disturbed by transiting vessels or by their propellers. It is resilient to winds, waves, and severe weather that could sink the mat or break it into pieces. Impacts on marine algae by vessels and in-water devices may collapse the pneumatocysts (air sacs) that keep the mats afloat. Evidence suggests that some floating marine algae will continue to float even when up to 80 percent of the pneumatocysts are removed (Zaitsev 1971).

Seafloor macroalgae may be present in locations where these vessels and in-water devices occur, but the impacts would be minimal because of their resilience, distribution, and biomass, although some types of microalgae are expected to recover faster than others. A literature search of at-risk marine macroalgae species in the Study Area (International Union for Conservation of Nature 2012) did not indicate that these species are more resilient to stressors than other marine vegetation. Additionally, seafloor macroalgae in coastal areas are adapted to natural disturbances, such as storms and wave action that can exceed 33 ft. (10 m) per second (Mach et al. 2007), and are expected to quickly recover from vessel and in-water device movements.

Towed in-water devices include towed targets that are used during activities such as Missile Exercises and Gun Exercises. These devices are operated at low speeds either on the sea surface or below it. The analysis of in-water devices will focus on towed surface targets because of the potential for impacts on marine algae. Unmanned underwater vehicles and autonomous underwater vehicles are used in training and testing activities in the Study Area. They are typically propeller-driven, and operate within the water column. The propellers of these devices are encased, eliminating the potential for seagrass propeller scarring. Algae on the seafloor could be disturbed by these devices; however, for the same reasons given for vessel disturbance, UUVs are not expected to compromise the health or condition of algae, and the impact would be minimal relative to their total population level.

Estimates of relative vessel use and location for each alternative are provided in Section 3.0.5.3.3.1 (Vessels). These estimates are based on the number of activities predicted for each alternative. While these estimates provide a prediction of use, actual Navy vessel use depends upon military training and testing requirements, deployment schedules, annual budgets, and other unpredictable factors. Testing and training activity concentrations are most dependent upon locations of Navy shore installations and established testing and training areas.

Under all alternatives, a variety of vessels and in-water devices would be used throughout the Study Area during training and testing activities, as described in Chapter 2 (Description of Proposed Action and Alternatives). The concentration of use in and the manner in which the Navy uses vessels to accomplish its mission requirements is likely to remain consistent with the range of variability observed over the last decade. Consequently, the Navy is not proposing appreciable changes in the levels, frequency, or locations where vessels have been used over the last decade.

On the open ocean, vessel disturbance of marine vegetation would be limited to floating marine algae. Vessel movements may disperse or injure algal mats. Because algal distribution is patchy, mats may re-form, and events would be on a small spatial scale. Navy training activities involving vessel movement would not impact the general health of marine algae; the impact would be minimal relative to their total population level. Navy protective measures would ensure that vessels avoid large algal mats, eelgrass beds, or other sensitive vegetation that other marine life depend on for food or habitat; these measures would safeguard sensitive vegetation from vessel strikes. In addition, Navy protective measures would require helicopter crews that tow in-water devices for mine warfare exercises to monitor the water surface before and during exercises to identify and avoid marine algae, algal mats, eelgrass beds, or other sensitive vegetation that other marine life depend on for food or habitat.

Marine vegetation in the path of moving vessels or in-water devices may have a clearly detectable response (e.g., algal mats dispersing, rupture of individual plant cells), followed by a recovery period lasting weeks to months. Marine vegetation growth near vessels or in-water devices used for training activities under the No Action Alternative, Alternative 1, and Alternative 2 would be inhibited during recovery. However, long-term survival, reproductive success, or lifetime reproductive success on a population level would not be impacted.

#### 3.7.3.2.1.1 No Action Alternative

**Training Activities**

**Offshore Area**

Under the No Action Alternative, the impacts of vessel and in-water devices physical disturbances of marine vegetation during training activities in the Offshore Area would be limited to floating algal mats and seaweeds. The net impact of vessel, in-water device, and in-water device physical disturbances on marine vegetation is expected to be short-term and temporary based on (1) the implementation of Navy protective measures; (2) the quick recovery (weeks) of most vegetation types; (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas; and (4) the deployment of in-water devices at depths where they would not likely come in contact with marine vegetation.

**Inland Waters**

Under the No Action Alternative, the impacts of vessel physical disturbances on marine vegetation during training activities in the Inland Waters would be limited to floating algal mats, kelp canopies, and seaweeds. No training activities involving in-water devices occur in the inland waters. Vessel movement for training activities in the Inland Waters is caused by the small boats for Explosive Ordnance Disposal (EOD), and the Sea, Air, Land Teams, and by access between pier and open water activities. The net impact of vessel physical disturbances on marine vegetation is expected to be negligible under the No Action Alternative, based on (1) the implementation of Navy protective measures; (2) the quick recovery of most vegetation types; and (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas.

**Testing Activities**

**Offshore Area**

Under the No Action Alternative, testing activities in the Offshore Area would include activities where vessels and in-water devices could come in contact with marine vegetation, including certain types of UUVs used in the Quinault Range Site during such training events as Recovery Operations (Appendix A.2.4.1). However, most testing activities in the Offshore Area would occur at depths greater than 100 ft. (30 m). Surf zone activities would occur in the Offshore Area at Pacific Beach in the Quinault Range Site, which extends north to south 5 nm along the eastern boundary of W-237A, approximately 3 nm to shore along the mean low water line, and encompasses 1 mile (1.6 km) of shoreline at Pacific Beach, Washington. Surf zone activities would be conducted from an area on the shore going toward the sea. Surf zone activities have the potential to effect marine vegetation that is rooted to the sea floor or floating in the water column. However, these testing activities are unlikely to have a population level effect on marine vegetation under the No Action Alternative. The net impact of vessel, in-water device physical disturbances on marine vegetation is expected to be negligible based on (1) the implementation of Navy protective measures; (2) the quick recovery of most vegetation types; (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas; and (4) the deployment of in-water devices at depths where they would not likely come in contact with marine vegetation.

#### Inland Waters

Under the No Action Alternative, testing activities in the Inland Waters of the Study Area would include activities where vessels and in-water devices, such as with certain types of UUVs, could come in contact marine vegetation. These in-water devices used for testing activities could have a temporary (not permanent) effect on marine vegetation under the No Action Alternative. The net impact of vessel and in-water devices physical disturbances on marine vegetation is expected to be short term and temporary under the No Action Alternative, based on (1) the implementation of Navy protective measures; (2) the quick recovery of most vegetation types; (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas; and (4) the deployment of in-water devices at depths where they would not likely come in contact with marine vegetation.

#### Western Behm Canal, Alaska

Under the No Action Alternative, approximately 28 events under testing activities involving vessels would occur in the Western Behm Canal portion of the Study Area (see Table 3.7-2). These vessels used for testing activities could have an effect on marine vegetation under the No Action Alternative. The net impact of vessel physical disturbances on marine vegetation is expected to be short term and temporary under the No Action Alternative, based on (1) Navy protective measures; (2) the quick recovery of most vegetation types; and (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas. Therefore, eelgrass and seagrass bed damage is not likely; however, if it occurs, the impacts would be minor, such as short-term turbidity increases.

#### 3.7.3.2.1.2 Alternative 1

#### <u>Training Activities</u>

#### Offshore Area

Under Alternative 1, training activities that involve vessels and in-water devices in the Offshore Area would increase slightly, from 1,390 events in the No Action Alternative to 1,609 events (see Table 3.7-2). The impacts of vessel physical disturbances of marine vegetation during training activities in the Offshore Area would be limited to floating algal mats and seaweeds. The net impact of vessel and in-water device physical disturbances on marine vegetation is expected to be short term and temporary based on (1) the implementation of Navy protective measures; (2) the quick recovery of most vegetation types; (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas; and (4) the deployment of in-water devices at depths where they would not likely come in contact with marine vegetation.

#### Inland Waters

Under Alternative 1, training activities that involve vessels and in-water devices in the Inland Waters of the Study Area would increase by 306 events over the No Action Alternative (see Table 3.7-2). The Navy follows protective measures that minimize conduct of training within zones of algal mats or fixed vegetation, so the risk of causing direct injury is low. Under Alternative 1, the impacts of vessel physical disturbances, including the addition of new Maritime Security Operations in Hood Canal, Dabob Bay, and the Strait of Juan de Fuca; Anti-Surface Warfare activities at Crescent Harbor; small boat Anti-Terrorism Force Protection at Crescent Harbor, Hood Canal, and the Keyport Range site; and the addition of in-water devices (used in Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise) during training activities in the inshore waters, would cause minimal disturbances to algal mats, kelp canopies, and seaweeds. The net impact of vessel physical disturbances on marine vegetation is expected to be negligible under Alternative 1, based on (1) Navy protective measures; (2) the quick recovery of most vegetation types; (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas; and (4) the deployment of in-water devices at depths where they would not likely come in contact with marine vegetation. Therefore, eelgrass bed damage is not likely; however, if it occurs, the impacts would be minor, such as short-term (weeks) turbidity increases.

## Testing Activities

### Offshore Area

Under Alternative 1, testing activities that would include vessels and in-water devices would increase by approximately 215 events over the No Action Alternative (see Table 3.7-2). This increase would be in the tempo of testing activities in the Offshore Area, not the type of activities as described under the No Action Alternative. Therefore, the impacts under Alternative 1 would be expected to be similar to those described under the No Action Alternative. Under Alternative 1, the net impact of vessel and in-water device physical disturbances on marine vegetation is expected to be negligible based on (1) Navy protective measures; (2) the quick recovery of most vegetation types; (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas; and (4) the deployment of in-water devices at depths where they would not likely come in contact with marine vegetation.

### Inland Waters

Under Alternative 1, testing activities that involve vessels and in-water devices in the Inland Waters of the Study Area would increase to 1,230 events over 716 events under the No Action Alternative (see Table 3.7-2). Additionally, testing activities that involve vessels and in-water devices would be extended to Carr Inlet. Testing activities in the Inland Waters of the Study Area would include activities where vessels and in-water devices could come in contact marine vegetation, such as with certain types of UUVs. These in-water devices used for testing activities could have an effect on marine vegetation under Alternative 1. The net impact of vessel physical disturbances on marine vegetation is expected to be negligible under Alternative 1, based on (1) Navy protective measures; (2) the quick recovery of most vegetation types; (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas; and (4) the deployment of in-water devices at depths where they would not likely come in contact with marine vegetation. Therefore, eelgrass bed damage is not likely but, if it occurs, the impacts would be minor, such as short-term turbidity increases.

### Western Behm Canal, Alaska

Under Alternative 1, approximately 60 events under testing activities involving vessels would occur in the Western Behm Canal portion of the Study Area (see Table 3.7-2). These vessels used for testing activities could have an effect on marine vegetation under Alternative 1. The net impact of vessel physical disturbances on marine vegetation is expected to be negligible under Alternative 1, based on (1) Navy protective measures; (2) the quick recovery of most vegetation types; and (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas. Therefore, eelgrass bed damage is not likely but, if it occurs, the impacts would be minor, such as short-term turbidity increases.

#### 3.7.3.2.1.3 Alternative 2

**Training Activities**

**Offshore Area**

Under Alternative 2, training activities that involve vessels in the Offshore Area would remain the same as under Alternative 1 (see Table 3.7-2). The impacts of vessel physical disturbances of marine vegetation during training activities in the Offshore Area would be limited to floating algal mats and seaweeds. The net impact of vessel and in-water device physical disturbances on marine vegetation is expected to be negligible based on (1) Navy protective measures; (2) the quick recovery of most vegetation types; (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas; and (4) the deployment of in-water devices at depths where they would not likely come in contact with marine vegetation.

**Inland Waters**

Under Alternative 2, training activities that involve vessels and in-water devices in the Inland Waters of the Study Area would remain the same number as described under Alternative 1 (see Table 3.7-2). Therefore, impacts from training in the Inland Waters would be similar to what is described in Section 3.7.3.2.1.2 (Alternative 1).

**Testing Activities**

**Offshore Area**

Under Alternative 2, testing activities that would include vessels and in-water devices would increase by approximately 268 events over the No Action Alternative (see Table 3.7-2). This increase would be in the tempo of testing activities by NAVAIR and NAVSEA in the Offshore Area, but it would not increase the potential effect on marine vegetation. Therefore the net impact of vessel and in-water device physical disturbances on marine vegetation is expected to be negligible based on (1) Navy protective measures; (2) the quick recovery of most vegetation types; (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas; and (4) the deployment of in-water devices at depths where they would not likely come in contact with marine vegetation.

**Inland Waters**

Under Alternative 2, the number of testing activities involving vessels, and in-water devices in the Inland Waters would increase by 10 percent compared to Alternative 1 (see Table 3.7-2). Despite this increase, the impacts to marine vegetation are expected to be the same as under Alternative 1.

**Western Behm Canal, Alaska**

Under Alternative 2, approximately 83 events under testing activities involving vessels would occur in the Western Behm Canal portion of the Study Area (see Table 3.7-2). These vessels used for testing activities could have an effect on marine vegetation under Alternative 2. The net impact of vessel physical disturbances on marine vegetation is expected to be negligible under Alternative 2, based on (1) Navy protective measures; (2) the quick recovery of most vegetation types; and (3) the short-term nature of most vessel movements and local disturbances of the surface water, with some temporary increase in suspended sediment in shallow areas. Therefore, eelgrass bed damage is not likely but, if it occurs, the impacts would be minor, such as short-term turbidity increases.

#### 3.7.3.2.1.4 Substressor Impact on Marine Vegetation as Essential Fish Habitat from Vessels and In-Water Devices (Preferred Alternative)

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of vessels and in-water devices during training and testing activities would have no impact on attached macroalgae or submerged rooted vegetation that constitutes EFH or Habitat Areas of Particular Concern.

### 3.7.3.2.2 Military Expended Materials

This section analyzes the disturbance potential to marine vegetation of the following categories of military expended materials: (1) non-explosive practice munitions; (2) fragments of high-explosive munitions; and (3) expended materials other than ordnance, such as sonobuoys, vessel hulks, and expendable targets. For a discussion of the types of activities that use military expended materials, where they are used, and how many activities would occur under each Alternative, see Section 3.0.5.3.3.3 (Military Expended Material).

Military expended materials can impact floating marine algae in the open ocean, and seagrass and other types of algae on the seafloor in coastal areas. Single-celled algae would not be impacted by military expended materials due to the nature of the algae and because there would not be any population-level impacts. Most types of military expended materials are deployed in the open ocean. In coastal water training areas, only projectiles (small and medium), target fragments, and countermeasures could be introduced into areas where shallow water vegetation such as eelgrass and seafloor macroalgae may be impacted.

The following are descriptions of the types of military expended materials that could impact marine algae and eelgrass. Marine algae could overlap with military expended materials anywhere in the Study Area. Puget Sound is the only location where these materials could overlap with eelgrasses. Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 present the numbers and locations of activities that expend military materials during training and testing activities by location and alternative.

**Small-, Medium-, and Large-Caliber Projectiles.** Small-, medium-, and large-caliber non-explosive practice munitions, or fragments of high-explosive projectiles expended during training and testing activities rapidly sink to the seafloor. The majority of these projectiles would be expended in the open ocean areas of the Study Area. Because of the small sizes of the projectiles and of their casings, damage to marine vegetation is unlikely. Large-caliber projectiles are primarily used in the Offshore Area at depths greater than 26 m (85.3 ft.), while small- and medium-caliber projectiles would be expended in both offshore and coastal areas at depths less than 26 m (85.3 ft.). Marine algae could occur where these materials are expended, but eelgrasses generally do not because these activities do not normally occur in water that is shallow enough for seagrass to grow (26 m [85.3 ft.]).

**Bombs, Missiles, and Rockets.** Bombs, missiles, and rockets, or their fragments (if high-explosive) are expended offshore (at depths greater than 26 m [85.3 ft.]) during training and testing activities, and rapidly sink to the seafloor. Marine algae could occur where these materials are expended, but eelgrass generally does not because of water depth limitations for activities that expend these materials.

**Parachutes.** Parachutes of varying sizes are used during training and testing activities. The types of activities that use parachutes, the physical characteristics of these expended materials, where they are used, and the number of activities that would occur under each alternative are discussed in Section

3.0.5.3.4.2 (Parachutes). Marine algae and eelgrass could occur in any of the locations where these materials are expended.

**Targets.** Many training and testing activities use targets. Targets that are hit by munitions could break into fragments. Target fragments vary in size and type, but most fragments are expected to sink. Pieces of targets that are designed to float are recovered when possible. Marine algae and eelgrass could occur where these materials are expended.

**Vessel Hulk.** Vessel hulks are a notable type of military expended material because of their size. Vessel hulks are expended at sea during sinking exercises (SINKEX). Sinking exercises use a target (vessel hulk) against which live high-explosive or non-explosive munitions are fired; the SINKEX is conducted in a manner that results in the sinking of the target. This activity would only be conducted in designated areas with bottom depths greater than 3,000 m (9,842.5 ft.). Floating marine algal mats could occur where these materials are expended, but eelgrass could not.

**Countermeasures.** Defensive countermeasures such as chaff and flares are used to protect against missile and torpedo attack. Chaff is made of aluminum-coated glass fibers and flares are pyrotechnic devices. Chaff, chaff canisters, and flare end caps are expendable materials. Chaff and flares are dispensed from aircraft or fired from ships. Floating marine algal mats could occur in any of the locations that these materials are expended.

#### 3.7.3.2.2.1 No Action Alternative

##### <u>Training Activities</u>

##### Offshore Area

Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 list the numbers and locations of military expended materials, most of which are small- and medium-caliber projectiles. The numbers and footprints of military expended materials from training activities under the No Action Alternative in the Offshore Area are detailed in Tables 3.7-2 and 3.3-4.

Floating marine algal mats and other types of algae that occur on the sea surface in the Offshore Area may be temporarily disturbed by military expended materials. This type of disturbance would not likely be different from conditions created by waves or rough weather. If enough military expended materials land on algal mats, the mats can sink, but sinking occurs as a natural part of the aging process of marine algae (Schoener and Rowe 1970) and would, therefore, not be expected to impact the population. This disturbance would have a minor, temporary impact on marine algae. These stressors may impact the organisms that inhabit marine algae (e.g., sea turtles, birds, marine invertebrates, and fish); for analysis of potential impacts on the species that inhabit marine algae, see Sections 3.5, 3.6, 3.8, and 3.9.

The largest deposition in the No Action Alternative training activities is the SINKEX hulk that goes into very deep water. The rest of the material deposited is typically in small fragments. Military expended materials used for training activities are not expected to pose a risk to marine algae because (1) the relative coverage of marine algae in the Offshore Area is low, (2) new growth may result from marine algae exposure to military expended materials (see Section 3.7.3.1.1, Impacts from Underwater Explosives), and (3) the impact area of military expended materials is very small relative to marine algae distribution. Based on these factors, potential impacts on marine algae from military expended materials in the Offshore Area are not expected to result in detectable changes in their growth, survival, or propagation that would result in population-level impacts. There are no potential impacts on eelgrass as these activities would not occur in the vicinity of mapped eelgrass beds.

#### Inland Waters

Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 list the numbers and locations of military expended materials in the Study Area. The numbers and footprints of military expended materials in the Inland Waters are detailed in Tables 3.7-2 and 3.3-6.

Kelp, cordgrass, seagrass and other types of algae that occur on the in the Inland Waters of the Study Area may be temporarily disturbed when sediments are displaced by object settlement. Military expended materials will not be used over eelgrass beds. Sediment displacement may cause short-term, local turbidity. This type of disturbance would not likely be different from conditions created by waves or rough weather (Mach et al. 2007). This disturbance would have no impact to marine algae. These stressors may impact the organisms that inhabit marine algae (e.g., sea turtles, birds, marine invertebrates, and fish); for analysis of potential impacts to the species that inhabit marine algae, see Sections 3.5, 3.6, 3.8, and 3.9.

Military expended materials used for training activities in the Inland Waters are not expected to pose a risk to marine algae and eelgrass because (1) new growth may result from exposure to military expended materials for marine algae, and (2) the impact area of military expended materials is very small relative to marine algae and eelgrass distribution. Based on these factors, potential impacts on marine algae and eelgrass from military expended materials in the Inland Waters portion of the Study Area are not expected to result in detectable changes in their growth, survival, or propagation that would result in population-level impacts.

#### Testing Activities

#### Offshore Area

Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 list the numbers and locations of military expended materials. The numbers and footprints of military expended materials from testing activities under the No Action Alternative in the Offshore Area are detailed in Tables 3.7-2 and 3.3-5.

Floating marine algal mats and other types of algae that occur on the sea surface in the Offshore Area may be temporarily disturbed by military expended materials. Military expended materials will not be used over eelgrass beds. This type of disturbance would not likely be different from conditions created by waves or rough weather. If enough military expended materials land on algal mats, the mats can sink, but sinking occurs as a natural part of the aging process of marine algae (Schoener and Rowe 1970) and would, therefore, not be expected to impact the population. This disturbance would have no impact to marine algae. These stressors may impact the organisms that inhabit marine algae (e.g., sea turtles, birds, marine invertebrates, and fish); for analysis of potential impacts to the species that inhabit marine algae, see Sections 3.5, 3.6, 3.8, and 3.9.

Under the No Action Alternative, military expended materials used for testing activities in the Offshore Area are not expected to pose a risk to marine algae because (1) the relative coverage of marine algae in the Study Area is low, (2) new growth may result from marine algae exposure to military expended materials (see Section 3.7.3.1.1, Impacts from Underwater Explosives), and (3) the impact area of military expended materials is very small relative to marine algae distribution. Based on these factors, potential impacts on marine algae in the Offshore Area from military expended materials are not expected to result in detectable changes in its growth, survival, or propagation that would result in population-level impacts. There are no potential impacts on eelgrass.

**Inland Waters**

Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 list the numbers and locations of military expended materials. The numbers and footprints of military expended materials in the Inland Waters of the Study Area are detailed in Tables 3.7-2 and 3.3-6.

Under the No Action Alternative, military expended materials used for testing activities in the Inland Waters of the Study Area are not expected to pose a risk to marine algae and eelgrass because (1) new growth may result from marine algae exposure to military expended materials, (2) the impact area of military expended materials is very small relative to marine algae distribution, and (3) Military expended materials will not be used over eelgrass beds. Based on these factors, potential impacts on marine algae and eelgrass in the Inland Waters of the Study Area from military expended materials are not expected to result in detectable changes in its growth, survival, or propagation that would result in population-level impacts.

**Western Behm Canal, Alaska**

No testing activities with military expended materials are proposed in the southeast Alaska portion of the Study Area under the No Action Alternative.

#### 3.7.3.2.2.2 Alternative 1

**<u>Training Activities</u>**

**Offshore Area**

Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 list the numbers and locations of military expended materials, most of which are small- and medium-caliber projectiles. The numbers and footprints of military expended materials are detailed in Tables 3.7-2 and 3.3-4. Under Alternative 1, military expended materials would increase in the Offshore Area by approximately 4 percent as compared to the No Action Alternative. Military expended materials will not be used over eelgrass beds.

Floating marine algal mats and other types of algae that occur on the sea surface in the Offshore Area may be temporarily disturbed by military expended materials. This type of disturbance would not likely be different from conditions created by waves or rough weather. If enough military expended materials land on algal mats, the mats can sink, but sinking occurs as a natural part of the aging process of marine algae (Schoener and Rowe 1970) and would, therefore, not impact the population. This disturbance would have no impact on marine algae. These stressors may impact the organisms that inhabit marine algae (e.g., sea turtles, birds, marine invertebrates, and fish); for analysis of potential impacts to the species that inhabit marine algae, see Sections 3.5, 3.6, 3.8, and 3.9.

Therefore, military expended materials used for training activities under Alternative 1 are not expected to pose a risk to marine algae because (1) the relative coverage of marine algae in the Offshore Area is low, (2) new growth may result from marine algae exposure to military expended materials (see Section 3.7.3.1.1, Impacts from Underwater Explosives), and (3) the impact area of military expended materials is very small relative to marine algae distribution. Based on these factors, potential impacts on marine algae from military expended materials in the Offshore Area are not expected to result in detectable changes in their growth, survival, or propagation that would result in population-level impacts. There are no potential impacts on eelgrasses.

**Inland Waters**

Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 list the numbers and locations of military expended materials in the Study Area. Under Alternative 1, military expended materials would increase in the Inland Waters by 3,077 items as compared to the No Action Alternative. This increase is due almost entirely from EOD underwater detonations in which the military expended material consists of residue from the explosives.

Kelp, cordgrass, seagrass and other types of algae that occur on the in the Inland Waters of the Study Area may be temporarily disturbed by military expended materials. Military expended materials will not be used over eelgrass beds. This type of disturbance would not likely be different from conditions created by waves or rough weather. This disturbance would have no impact to marine algae. These stressors may impact the organisms that inhabit marine algae (e.g., sea turtles, birds, marine invertebrates, and fish); for analysis of potential impacts to the species that inhabit marine algae, see Sections 3.5, 3.6, 3.8, and 3.9.

The increase in military expended materials used for training activities under Alternative 1 in the Inland Waters is not expected to pose a risk to marine algae and eelgrass because (1) new growth may result from exposure to military expended materials, and (2) the impact area of military expended materials is very small relative to marine algae and eelgrass distribution. Based on these factors, potential impacts on marine algae and eelgrass from military expended materials in the Inland Waters portion of the Study Area are not expected to result in detectable changes in their growth, survival, or propagation that would result in population-level impacts.

**Testing Activities**

**Offshore Area**

Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 list the numbers and locations of military expended materials expended under Alternative 1 in the Offshore portion of the Study Area. The numbers and footprints of military expended materials in the Offshore Area are detailed in Table 3.3-5, which mainly include sonobuoys and parachutes. Under Alternative 1 the amount of military expended materials in the Offshore Area would increase from 604 items under the No Action Alternative to 3,922 items (see Table 3.7-2). Military expended materials will not be used over eelgrass beds.

Floating marine algal mats and other types of algae that occur on the sea surface in the Offshore Area may be temporarily disturbed by military expended materials. This type of disturbance would not likely be different from conditions created by waves or rough weather. If enough military expended materials land on algal mats, the mats can sink, but sinking occurs as a natural part of the aging process of marine algae (Schoener and Rowe 1970) and would, therefore, not impact the population. This disturbance would have no impact on marine algae. Although these stressors may impact the organisms that inhabit marine algae (e.g., sea turtles, birds, marine invertebrates, and fish), for analysis of potential impacts to the species that inhabit marine algae, see Sections 3.5, 3.6, 3.8, and 3.9.

Under the Alternative 1, the increased amounts of military expended materials used for testing activities in the Offshore Area are not expected to pose a risk to marine algae because (1) the relative coverage of marine algae in the Study Area is low, (2) new growth may result from marine algae exposure to military expended materials (see Section 3.7.3.1.1, Impacts from Underwater Explosives), and (3) the impact area of military expended materials is very small relative to marine algae distribution. Based on these factors, potential impacts on marine algae in the Offshore Area from military expended materials are not expected to result in detectable changes in its growth, survival, or propagation that would result in population-level impacts. There are no potential impacts on eelgrass.

#### Inland Waters

Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 list the numbers and locations of military expended materials; the numbers and footprints of military expended materials in the Inland Waters of the Study Area are detailed in Table 3.3-6.

Under Alternative 1, a small increase in military expended materials occurs for testing activities from the No Action Alternative. The increase in military expended materials is associated with Naval Undersea Warfare Center Division, Keyport and Naval Surface Warfare Center, Carderock Division Detachment Puget Sound testing activities.

Kelp, eelgrass, and other types of algae that occur on the in the Inland Waters of the Study Area may be temporarily disturbed by military expended materials. This type of disturbance would not likely be different from conditions created by waves or rough weather. Military expended materials will not be used over eelgrass beds. This disturbance would have no impact to marine algae. These stressors may impact the organisms that inhabit marine algae (e.g., sea turtles, birds, marine invertebrates, and fish); for analysis of potential impacts to the species that inhabit marine algae, see Sections 3.5, 3.6, 3.8, and 3.9.

The minimal increase in military expended materials used for testing activities under Alternative 1 in the Inland Waters is not expected to pose a risk to marine algae and eelgrass because (1) new growth may result from exposure to military expended materials, and (2) the impact area of military expended materials is very small relative to marine algae and seagrass distribution. Based on these factors, potential impacts on marine algae and eelgrass from military expended materials in the Inland Waters portion of the Study Area are not expected to result in detectable changes in their growth, survival, or propagation that would result in population-level impacts.

#### Western Behm Canal, Alaska

No testing activities with military expended materials are proposed in the southeast Alaska portion of the Study Area under the Alternative 1.

### 3.7.3.2.2.3 Alternative 2

#### <u>Training Activities</u>

#### Offshore Area

Under Alternative 2, military expended materials would increase by approximately 4 percent as compared to the No Action Alternative, the same increase as described above in Section 3.7.3.2.2.2 (Alternative 1). Therefore, impacts from military expended materials under Alternative 2 would be the same as under Alternative 1.

#### Inland Waters

Under Alternative 2, military expended materials would increase in the Inland Waters by 3,077 items as compared to the No Action Alternative, the same as described above in Section 3.7.3.2.2.2 (Alternative 1). Therefore, impacts from military expended materials under Alternative 2 would be the same as under Alternative 1.

#### <u>Testing Activities</u>

#### Offshore Area

Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 list the numbers and locations of military expended materials. The numbers and footprints of military expended materials in the Offshore Area are detailed in Table 3.3-5, which mainly includes sonobuoys and parachutes. Under Alternative 2 the number of military expended materials in the Offshore Area would increase from 604 items under the No Action Alternative to 4,325 items. Military expended materials will not be used over eelgrass beds.

Floating marine algal mats and other types of algae that occur on the sea surface in the Offshore Area may be temporarily disturbed by military expended materials. This type of disturbance would not likely be different from conditions created by waves or rough weather. If enough military expended materials land on algal mats, the mats can sink, but sinking occurs as a natural part of the aging process of marine algae (Schoener and Rowe 1970) and would, therefore, not impact the population. This disturbance would have no impact on marine algae. Although these stressors may impact the organisms that inhabit marine algae (e.g., sea turtles, birds, marine invertebrates, and fish), for analysis of potential impacts to the species that inhabit marine algae, see Sections 3.5, 3.6, 3.8, and 3.9.

Under the Alternative 2, the increased amounts of military expended materials used for testing activities in the Offshore Area are not expected to pose a risk to marine algae because (1) the relative coverage of marine algae in the Study Area is low, (2) new growth may result from marine algae exposure to military expended materials (see Section 3.7.3.1.1, Impacts from Underwater Explosives), and (3) the impact area of military expended materials is very small relative to marine algae distribution. Based on these factors, potential impacts on marine algae in the Offshore Area from military expended materials are not expected to result in detectable changes in its growth, survival, or propagation that would result in population-level impacts. There are no potential impacts on eelgrass.

#### Inland Waters

Tables 3.0-20 through 3.0-22 and Tables 3.0-25 through 3.0-28 list the numbers and locations of military expended materials. The numbers and footprints of military expended materials in the Inland Waters of the Study Area are detailed in Table 3.3-6.

Under Alternative 2, there is a small increase in military expended materials for testing activities from the No Action Alternative (see Table 3.7-2).

Kelp, eelgrass and other types of algae that occur in the Inland Waters of the Study Area may be temporarily disturbed by military expended materials. This type of disturbance would not likely be different from conditions created by waves or rough weather. This disturbance would have no impact to marine algae. These stressors may impact the organisms that inhabit marine algae (e.g., sea turtles, birds, marine invertebrates, and fish); for analysis of potential impacts to the species that inhabit marine algae, see Sections 3.5, 3.6, 3.8, and 3.9.

The minimal increase in military expended materials used for testing activities under Alternative 2 in the Inland Waters is not expected to pose a risk to marine algae and seagrass because (1) new growth may result from exposure to military expended materials, and (2) the impact area of military expended materials is very small relative to marine algae and eelgrass distribution. Based on these factors, potential impacts on marine algae and eelgrass from military expended materials in the Inland Waters portion of the Study Area are not expected to result in detectable changes in their growth, survival, or propagation that would result in population-level impacts.

#### Western Behm Canal, Alaska

No training or testing activities with military expended materials are proposed in the southeast Alaska portion of the Study Area under Alternative 2.

##### 3.7.3.2.2.4 Substressor Impact on Marine Vegetation as Essential Fish Habitat from Military Expended Materials (Preferred Alternative)

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, military expended materials used for training and testing activities may adversely affect EFH by reducing the quality and quantity of marine vegetation that constitutes EFH or Habitat Areas of Particular Concern. Any impacts of military expended materials on attached macroalgae or submerged rooted vegetation would be minimal and temporary.

#### 3.7.3.2.3 Impacts from Seafloor Devices

Several training and testing activities include the use of seafloor devices—items that may contact the ocean bottom temporarily. The activities and the specific seafloor devices are: (1) precision anchoring training, where anchors are lowered to the seafloor and recovered; (2) EOD mine countermeasures training exercises, where some mine targets may be moored to the seafloor; (3) crawler UUV tests in which UUVs “crawl” across the seafloor; and (4) various testing activities where small anchors are placed on the seafloor to hold instrumentation in place. Marine vegetation on the seafloor may be impacted by seafloor devices, while vegetation on the sea surface such as marine algal mats and single-celled algae are not likely to be impacted and will not be discussed further. Eelgrasses and seafloor macroalgae in the Study Area may be impacted by the use of seafloor devices.

Seafloor device operation or removal could impact eelgrass by physically removing vegetation (e.g., uprooting), crushing the vegetation, temporarily increasing the turbidity (sediment suspended in the water) of waters nearby, or shading seagrass, which may interfere with photosynthesis. If eelgrass is not able to photosynthesize, its ability to produce energy is compromised. Eelgrasses occur near the areas where seafloor devices are operated. Training activities involving seafloor devices occur only in the Inland Waters, so the Offshore Area and Western Behm Canal will not be analyzed under training activities.

##### 3.7.3.2.3.1 No Action Alternative

**<u>Training Activities</u>**

**Inland Waters**

Two EOD mine countermeasure exercises would occur each year in the Inland Waters under the No Action Alternative. These two activities could occur at either the Hood Canal EOD Training Range or the Crescent Harbor EOD Training Range. Not every activity would include a bottom-moored mine, as some exercises involve only a floating mine shape.

Eelgrass could be present where the mine countermeasure training activity takes place. Seafloor devices may impact vegetation in benthic habitats, but the impacts would be temporary (not permanent) and would be followed by rapid (within a few weeks) recovery. Eelgrass beds show signs of recovery after a cessation of physical disturbance; the rate of recovery is a function of the severity of the disturbance (Neckles et al. 2005). The main factors that contribute to eelgrass recovery include improving water quality and cessation of major disturbance activities (Chavez 2009). Bottom-moored mine shapes would have a minor impact limited to the area of the actual footprint of the mooring (approximately 1 $ft.^2$ [0.1 $m^2$]).

Seafloor device use in shallow water habitats under the No Action Alternative training activities would pose a negligible risk to marine vegetation. Any damage from seafloor devices would be followed by a rapid recovery period. Population-level impacts are unlikely because of the small, local impact areas, the limited frequency of training activities, and the wider geographic distribution of seagrasses in and adjacent to training areas.

<u>**Testing Activities**</u>

**Offshore Area**

Five crawler UUV testing activities would occur in the Offshore Area under the No Action Alternative. Because of the absence of marine vegetation in the surf zone area where the testing occurs, and the infrequency of testing, impacts to marine vegetation are unlikely.

**Inland Waters**

As shown in Table 3.7-2, 210 annual testing activities would occur in the Inland Waters under the No Action Alternative. These activities could include the use of small anchors or crawler UUVs.

Eelgrass could be present where these testing activities take place. Marine vegetation could be affected by the use of seafloor devices (e.g., anchors, targets, and crawler UUVs). However, these effects would be short term, as all test equipment is recovered after activities take place, would affect a very small portion of the Study Area (several square yards at most), and would not result in long-term changes in the distribution or abundance of these populations. Activities usually last less than a day and are localized within a small area. Given that the size of the disturbed area would be small and the activities would be short term and infrequent, impacts would be negligible. In addition, the disturbed area would likely be re-colonized within a relatively short time as the disturbed sediments would not be removed, but rather redistributed in the same location. Therefore, there would be minimal impacts to marine vegetation with the implementation of the No Action Alternative within the Inland Waters.

**Western Behm Canal, Alaska**

No testing activities with seafloor devices are proposed in the Western Behm Canal, Alaska, portion of the Study Area under the No Action Alternative.

#### 3.7.3.2.3.2 Alternative 1

<u>**Training Activities**</u>

**Inland Waters**

Under Alternative 1, the total number of explosive training events would increase relative to the No Action Alternative, due to the additional use of 18 SWAG in Crescent Harbor and 18 SWAG in Hood Canal. The mine neutralization exercises would increase from two 1.5 lb. mine neutralization charges to three 2.5 lb. charges in Hood Canal and from two to three 2.5 lb. mine neutralization exercises in Crescent Harbor. Not every activity would include a bottom-moored mine, as some exercises involve only a floating mine shape.

In addition, 10 precision anchoring training exercises would occur, in two locations within the Inland Waters: (1) a general anchorage area at Naval Station Everett, and (2) an anchorage area at Indian Island.

Eelgrass could be present at all of these locations. For the same reasons as described under the No Action Alternative, these activities would pose a negligible risk to marine vegetation. Any damage from anchors would be followed by a recovery period lasting weeks to months. Population-level impacts are unlikely because of the small, local impact areas; the limited frequency of training activities; and the wider geographic distribution of eelgrasses in and adjacent to training areas.

**<u>Testing Activities</u>**

**Offshore Area**

Six crawler UUV testing activities would occur in the Offshore Area under Alternative 1, an increase of one over the No Action Alternative. Because of the absence of marine vegetation in the surf zone area where the testing occurs, and the frequency of testing, impacts to marine vegetation are unlikely.

**Inland Waters**

As shown in Table 3.7-2, 225 annual testing activities would occur in the Inland Waters under Alternative 1, an increase of 15 over the No Action Alternative. These activities are of the same type in the same locations as described under the No Action Alternative.

Eelgrass could be present where these testing activities take place. For the same reasons as described under the No Action Alternative re-colonization would likely occur within a relatively short time. Therefore, there would be minimal impacts to marine vegetation with the implementation of Alternative 1 within the Inland Waters.

**Western Behm Canal, Alaska**

Under Alternative 1, five component system testing activities would occur in the Western Behm Canal. These activities involve the temporary placement of small anchoring devices on the seafloor.

Eelgrass could be present where these testing activities take place. Marine vegetation could be affected by the use of these anchors. However, these effects would be short term (weeks), would affect a very small portion of the area (several yards at most), and would not result in long-term changes in the distribution or abundance of these populations. Activities usually last less than a day and are localized within a small area. Given that the size of the disturbed area would be small (several yards at most) and the activities would be short term and infrequent, impacts would be minimal. In addition, the disturbed area would likely be re-colonized within a relatively short time as the disturbed sediments would not be removed, but rather re-distributed in the same location. Therefore, there would be minimal impacts to marine vegetation with the implementation of Alternative 1 in the Western Behm Canal.

#### 3.7.3.2.3.3 Alternative 2

**<u>Training Activities</u>**

**Inland Waters**

Under Alternative 2, the total number of explosive training events would increase relative to the No Action Alternative, due to the additional use of 18 SWAG in Crescent Harbor and 18 SWAG in Hood Canal. The mine neutralization exercises would increase from two 1.5 lb. mine neutralization charges to three 2.5 lb. charges in Hood Canal and from two to three 2.5 lb. mine neutralization exercises in Crescent Harbor. Not every activity would include a bottom-moored mine, as some exercises involve only a floating mine shape. This level and type of activity is the same as described for Alternative 1.

In addition, 10 precision anchoring training exercises would occur at the same locations and in the same manner as described above under Alternative 1.

Eelgrass could be present at all of these locations. For the same reasons as described under the No Action Alternative, these activities would pose a negligible risk to marine vegetation. Any damage from anchors would be followed by a recovery period lasting weeks to months. Population-level impacts are unlikely because of the small, local impact areas, the frequency of training activities, and the wider geographic distribution of eelgrasses in and adjacent to training areas.

**Testing Activities**

#### Offshore Area

Seven crawler UUV testing activities would occur in the Offshore Area under Alternative 2, an increase of two over the No Action Alternative. Because of the absence of marine vegetation in the surf zone area where the testing occurs, and the infrequency of testing, impacts to marine vegetation are unlikely.

#### Inland Waters

As shown in Table 3.7-2, 239 annual testing activities would occur in the Inland Waters under Alternative 2, an increase of 29 over the No Action Alternative. These activities are of the same type in the same locations as described under the No Action Alternative.

Eelgrass could be present where these testing activities take place. For the same reasons as described under the No Action Alternative, re-colonization would likely occur within a relatively short time. Therefore, there would be minimal impacts to marine vegetation with the implementation of Alternative 2 within the Inland Waters.

#### Western Behm Canal, Alaska

Under Alternative 2, 15 component system testing activities would occur in the Western Behm Canal, an increase of 10 over the No Action Alternative. These activities involve the temporary placement of small anchoring devices on the seafloor.

Eelgrass could be present where these testing activities take place. For the same reasons as described under the No Action Alternative, re-colonization would likely occur within a relatively short time. Therefore, there would be minimal impacts to marine vegetation with the implementation of Alternative 2 in the Western Behm Canal.

#### 3.7.3.2.3.4 Substressor Impact on Marine Vegetation as Essential Fish Habitat from Seafloor Devices (Preferred Alternative)

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of seafloor devices during training and testing activities may adversely affect EFH by reducing the quality and quantity of marine vegetation that constitutes EFH or Habitat Areas of Particular Concern. The EFH Assessment can be found on the NWTT EIS/OEIS website at nwtteis.com.

### 3.7.3.3 Secondary Stressors

This section analyzes potential impacts on marine vegetation exposed to stressors indirectly through changes in sediments and water quality. Section 3.1 (Sediments and Water Quality) considered the impacts on marine sediments and water quality from explosives and explosion by-products, metals, chemicals other than explosives, and other materials (marine markers, flares, chaff, targets, and miscellaneous components of other materials). The analysis determined that neither state or federal standards or guidelines for sediments nor water quality would be violated by the No Action Alternative, Alternative 1, or Alternative 2. Because of these conditions, population-level impacts on marine vegetation are likely to be inconsequential and undetectable. Therefore, because these standards and guidelines are structured to protect human health and the environment, and the proposed activities do not violate them, no indirect impacts are anticipated on marine vegetation from the training and testing activities proposed by the No Action Alternative, Alternative 1, or Alternative 2.

### 3.7.3.4 Summary of Potential Impacts (Combined Impacts of All Stressors) on Marine Vegetation

Activities described in this Environmental Impact Statement (EIS)/Overseas EIS that have potential impacts on vegetation are widely dispersed, and not all stressors would occur simultaneously in a given location. The stressors that have potential impacts on marine vegetation include acoustic (underwater and surface explosions) and physical disturbances or strikes (vessel and in-water devices, and military expended materials). Unlike mobile organisms, vegetation cannot flee from stressors once exposed. Marine algae are the vegetation most likely to be exposed to multiple stressors in combination because it occurs in large expanses. Discrete areas of the Study Area (mainly within offshore areas with depths greater than 26 m (85.3 ft.) in portions of range complexes and testing ranges) could experience higher levels of activity involving multiple stressors, which could result in a higher potential risk for impacts on marine algae within those areas. The potential for exposure of seagrasses and attached macroalgae to multiple stressors would be less because activities are not concentrated in coastal (areas with depths less than 26 m) distributions of these species. The combined impacts of all stressors would not be expected to affect marine vegetation populations because (1) activities involving more than one stressor are generally short in duration, (2) such activities are dispersed throughout the Study Area, and (3) activities are generally scheduled where previous activities have occurred. The aggregate effect on marine vegetation would not observably differ from existing conditions.

#### 3.7.3.4.1 Essential Fish Habitat Determinations

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of metal, chemical, other material contaminants, vessel movement, and in-water devices during training and testing activities would have no adverse impact on marine vegetation that constitutes EFH or Habitat Areas of Particular Concern. The use of explosives and other impulsive sources, military expended materials, and seafloor devices during training and testing activities may adversely affect EFH by reducing the quality and quantity of marine vegetation that constitutes EFH or Habitat Areas of Particular Concern. Individual stressor impacts on marine vegetation were either no effect or minimal and ranged in duration from temporary to long term, depending on the habitat impacted. The EFHA is located on the NWTT EIS website, www.nwtteis.com.

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# 3.8 Marine Invertebrates

## TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES

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## 3.8 Marine Invertebrates

**MARINE INVERTEBRATES SYNOPSIS**

The United States Department of the Navy considered all potential stressors and the following have been analyzed for marine invertebrates:

- Acoustic (sonar and other active acoustic sources, underwater explosives)
- Energy (electromagnetic devices)
- Physical disturbance and strike (vessels and in-water devices, strikes, military expended materials, and seafloor devices)
- Entanglement (fiber optic cables and guidance wires, parachutes)
- Ingestion (munitions and military expended materials other than munitions)
- Secondary stressors (metals and chemicals)

**Preferred Alternative (Alternative 1)**

- No Endangered Species Act-listed marine invertebrate species are found in the Northwest Training and Testing Study Area.
- Acoustic: The use of sonar and other active acoustic sources, and underwater explosives is not expected to result in detectable changes in growth, survival, propagation, or population-level impacts.
- Energy: The use of electromagnetic devices is not expected to result in detectable changes in growth, survival, propagation, or population-level impacts.
- Physical Disturbance and Strike: The use of vessels, in-water devices, military expended materials, and seafloor devices is not expected to result in detectable changes in growth, survival, propagation, or population-level impacts.
- Entanglement: The use of fiber optic cables and guidance wires and parachutes is not expected to result in detectable changes in growth, survival, propagation, or population-level impacts.
- Ingestion: The use of munitions and military expended materials other than munitions is not expected to result in detectable changes in growth, survival, propagation, or population-level impacts.
- Secondary: Secondary impacts to marine invertebrates would be inconsequential and not detectable.
- Pursuant to the Essential Fish Habitat (EFH) requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of sonar and other acoustic sources, vessel noise, weapons firing noise, electromagnetic sources, vessel movement, in-water devices, and metal, chemical, or other material contaminants will have no adverse effect on sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern. The use of electromagnetic sources would have minimal and temporary adverse impact to invertebrates occupying water column EFH or Habitat Areas of Particular Concern. The use of explosives, military expended materials, seafloor devices, and explosives and explosive byproduct contaminants may have an adverse effect on EFH by reducing the quality and quantity of sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern.

### 3.8.1 INTRODUCTION

In this Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS), marine invertebrates are evaluated based on their distribution and life history relative to the stressor or activity being considered. Activities are evaluated for their potential impact on marine invertebrates in general, and are evaluated by taxonomic and regulatory groupings as appropriate.

Invertebrates are animals without backbones, and marine invertebrates are a large, diverse group of at least 150,000 species inhabiting the marine environment (Brusca and Brusca 2003). Many of these species are important to humans ecologically and economically, providing essential ecosystem services (coastal protection) and income from tourism and commercial and recreational fisheries (Spalding et al. 2001; Anderson et al. 2011). Because marine invertebrates occur in all habitats, activities that affect the water column or the seafloor could impact numerous zooplankton (tiny animals found near the surface of the water column that drift along with currents), eggs, larvae, larger invertebrates living in the water column, and benthic invertebrates that live on or in the seafloor. The greatest densities of marine invertebrates are usually on the seafloor (Sanders 1968); therefore, activities that contact the seafloor have a greater potential for impact.

The following subsections briefly introduce federally managed species, habitat types, and major taxonomic groups of marine invertebrates in the Study Area. Although there are no Endangered Species Act (ESA) listed invertebrate species in the Study Area, some species are considered candidates for ESA listing, and were assessed. Federally managed marine invertebrate species regulated under the Magnuson-Stevens Fishery Conservation and Management Act are described in the Northwest Training and Testing (NWTT) Essential Fish Habitat Assessment (EFHA), and conclusions from the EFHA will be summarized in each substressor section. The EFHA is available on the NWTT EIS website, www.nwtteis.com.

The National Oceanic and Atmospheric Administration Fisheries Office of Protected Resources maintains a website that provides additional information on the biology, life history, species distribution (including maps), and conservation of invertebrates.

### 3.8.2 AFFECTED ENVIRONMENT

Marine invertebrates live in all of the world's oceans, from warm shallow waters to cold deep waters. They inhabit the seafloor and water column in all of the large marine ecosystems and open-ocean areas in the Study Area. Marine invertebrate distribution in the Study Area is influenced by habitat, ocean currents, and water quality factors such as temperature, salinity, acidity (ocean acidification), and nutrient content (Levinton 2009). The distribution of invertebrates is also influenced by their distance from the equator (latitude); in general, the number of marine invertebrate species increases toward the equator (Macpherson 2002). The higher number of species (diversity) and abundance of marine invertebrates in coastal habitats, compared with the open ocean, is a result of more nutrient availability from terrestrial environments and the variety of habitats and substrates found in coastal waters (Levinton 2009).

Marine invertebrates in the Study Area inhabit coastal waters and benthic habitats, including salt marshes, kelp forests, soft sediments, canyons, and the continental shelf. Salt marsh invertebrates include oysters, crabs, and worms that are important prey for birds and small mammals. Mudflats provide habitat for substantial amounts of crustaceans, bivalves, and worms. The sandy intertidal area is dominated by species that are highly mobile and can burrow. Some of the most common invertebrates found in sandy intertidal areas in the Olympic Coast National Marine Sanctuary are razor clams (*Siliqua* *patula*), Dungeness crabs (*Cancer magiste*), sea pens (*Ptilosarcus gurneyi*), smooth bay shrimp (*Crangon stylirostris*), Lewis's moonsnails (*Euspira lewisii*), and rainbow stars (*Orthasterias koehlen*) (National Marine Sanctuaries 2004). One of the most abundant invertebrates found in the near shore areas of the Study Area on soft sediments are geoduck clams (*Panopea generosa*).

#### 3.8.2.1 Taxonomic Groups

All marine invertebrate taxonomic groups are represented in the NWTT Study Area (Study Area). Major invertebrate phyla (taxonomic range)—those with greater than 1,000 species (Appeltans et al. 2010)—and the general zones they inhabit in the Study Area are listed in Table 3.8-1. Throughout the marine invertebrate section, organisms may be referred to by their phylum name or, more generally, as marine invertebrates.

**Table 3.8-1: Taxonomic Groups of Marine Invertebrates in the Northwest Training and Testing Study Area**

| Major Invertebrate Groups[1] | | Presence in Study Area | | |
|---|---|---|---|---|
| **Common Name (Species Group)** | **Description** | **Offshore** | **Inland Waters** | **Western Behm Canal, Alaska** |
| Foraminifera, radiolarians, ciliates (Phylum Foraminifera) | Benthic and pelagic single-celled organisms; shells typically made of calcium carbonate or silica. | Water column, seafloor | Water column, seafloor | Water column, seafloor |
| Sponges (Phylum Porifera) | Benthic animals; large species have calcium carbonate or silica structures embedded in cells to provide structural support. | Seafloor | Seafloor | Seafloor |
| Corals, hydroids, jellyfish (Phylum Cnidaria) | Benthic and pelagic animals with stinging cells. | Water column, seafloor | Water column, seafloor | Water column, seafloor |
| Flatworms (Phylum Platyhelminthes) | Mostly benthic; simplest form of marine worm with a flattened body. | Water column, seafloor | Water column, seafloor | Water column, seafloor |
| Ribbon worms (Phylum Nemertea) | Benthic marine worms with a long extension from the mouth (proboscis) from the mouth that helps capture food. | Water column, seafloor | Seafloor | Seafloor |
| Round worms (Phylum Nematoda) | Small benthic marine worms; many live in close association with other animals (typically as parasites). | Water column, seafloor | Water column, seafloor | Water column, seafloor |
| Segmented worms (Phylum Annelida) | Mostly benthic, highly mobile marine worms; many tube-dwelling species. | Seafloor | Seafloor | Seafloor |
| Bryozoans (Phylum Bryozoa) | Lace-like animals that exist as filter feeding colonies attached to the seafloor and other substrates. | Seafloor | Seafloor | Seafloor |

**Table 3.8-1: Taxonomic Groups of Marine Invertebrates in the Northwest Training and Testing Study Area (continued)**

| Major Invertebrate Groups[1] | | Presence in Study Area | | |
|---|---|---|---|---|
| **Common Name (Species Group)** | **Description** | **Offshore** | **Inland Waters** | **Western Behm Canal, Alaska** |
| Cephalopods, bivalves, sea snails, chitons (Phylum Molluska) | Mollusks are a diverse group of soft-bodied invertebrates with a specialized layer of tissue called a mantle. Mollusks such as squid are active swimmers and predators, while others such as sea snails are predators or grazers and clams are filter feeders. | Water column, seafloor | Water column, seafloor | Water column, seafloor |
| Shrimp, crab, barnacles, copepods (Phylum Arthropoda - Crustacea) | Benthic or pelagic; some are immobile; with an external skeleton; all feeding modes from predator to filter feeder. | Water column, seafloor | Water column, seafloor | Water column, seafloor |
| Sea stars, sea urchins, sea cucumbers (Phylum Echinodermata) | Benthic predators and filter feeders with tube feet. | Seafloor | Seafloor | Seafloor |

[1] Major species groups (those with more than 1,000 species) are based on the World Register of Marine Species (Appeltans et al. 2010) and Catalogue of Life (Bisby et al. 2010)
Notes: Benthic = A bottom-dwelling organism; Pelagic = relating to, living, or occurring in the waters of the ocean.

### 3.8.2.2 Invertebrate Hearing and Vocalization

Very little is known about sound detection and use of sound by aquatic invertebrates (Budelmann 2010; Montgomery et al. 2006; Popper et al. 2001). Organisms may detect sound by sensing either the particle motion or pressure component of sound, or both. Aquatic invertebrates probably do not detect pressure since many are generally the same density as water and few, if any, have air cavities that would function like the fish swim bladder in responding to pressure (Budelmann 2010; Popper et al. 2001). Many aquatic invertebrates, however, have ciliated "hair" cells that may be sensitive to water movements, such as those caused by currents or water particle motion very close to a sound source (Budelmann 2010). These cilia may allow invertebrates to sense nearby prey or predators or help with local navigation.

Aquatic invertebrates that can sense local water movements with ciliated cells include cnidarians, flatworms, segmented worms, urochordates (tunicates), mollusks, and arthropods (Budelmann 2010; Popper et al. 2001). The sensory capabilities of corals are largely limited to detecting water movement using receptors on their tentacles (Gochfeld 2004), and the exterior cilia of coral larvae likely help them detect nearby water movements (Vermeij et al. 2010). Some aquatic invertebrates have specialized organs called statocysts for the determination of equilibrium and, in some cases, linear or angular acceleration. Statocysts allow an animal to sense movement, and may enable some species, such as cephalopods and crustaceans, to be sensitive to water particle movements associated with sound (Hu et al. 2009; Kaifu et al. 2008; Montgomery et al. 2006; Popper et al. 2001). Because any acoustic sensory capabilities, if present at all, are limited to detecting water motion, and water particle motion near a sound source falls off rapidly with distance, aquatic invertebrates are probably limited to detecting nearby sound sources rather than sound caused by pressure waves from distant sources.

Both behavioral and auditory brainstem response studies suggest that crustaceans may sense sounds up to three kilohertz (kHz), but best sensitivity is likely below 200 Hertz (Hz) (Lovell et al. 2005; Lovell et al. 2006; Goodall et al. 1990). Most cephalopods (e.g., octopus and squid) likely sense low-frequency sound below 1,000 Hz, with best sensitivities at lower frequencies (Budelmann 2010; Mooney et al. 2010; Packard et al. 1990). A few cephalopods may sense higher frequencies up to 1,500 Hz (Hu et al. 2009). in a study, squid did not respond to toothed whale ultrasonic echolocation clicks at sound pressure levels ranging from 199 to 226 decibels (dB) referenced to (re) 1 micropascal (μPa) peak-to-peak, likely because these clicks were outside of squid hearing range (Andre et al. 2011).

Aquatic invertebrates may produce and use sound in territorial behavior, to deter predators, to find a mate, and to pursue courtship (Popper et al. 2001). Some crustaceans produce sound by rubbing or closing hard body parts together, such as lobsters and snapping shrimp (Latha et al. 2005; Patek and Caldwell 2006). The snapping shrimp chorus makes up a significant portion of the ambient noise budget in many locales (Cato and Bell 1992). Each click is up to 215 dB re 1 μPa, with a peak around 2–5 kHz (Heberholz and Schmitz 2001). Other crustaceans, such as the California spiny lobster (*Panulirus interruptus*), make low-frequency rasping or rumbling noises, perhaps used in defense or territorial display, that are often obscured by ambient noise (Patek and Caldwell 2006; Patek et al. 2009).

Reef noises, such as fish pops and grunts, sea urchin grazing (around 1.0–1.2 kHz), and snapping shrimp noises (around 5 kHz) (Radford et al. 2010), may be used as a cue by some aquatic invertebrates. Nearby reef noises were observed to affect movements and settlement behavior of coral and crab larvae (Jeffs et al. 2003; Radford et al. 2010; Stanley et al. 2010; Vermeij et al. 2010). Larvae of other crustacean species, including pelagic and nocturnally emergent species that benefit from avoiding coral reef predators, appear to avoid reef noises (Simpson et al. 2011). Detection of reef noises is likely limited to short distances (less than 330 ft. [101 m]) (Vermeij et al. 2010).

#### 3.8.2.3 General Threats

General threats to marine invertebrates include overexploitation and destructive fishing practices (Jackson et al. 2001; Miloslavich et al. 2011; Pandolfi et al. 2003), habitat degradation from pollution and coastal development (Cortes and Risk 1985; Downs et al. 2009), disease, and invasive species (Bryant et al. 1998; Galloway et al. 2009; National Marine Fisheries Service 2010; Wilkinson 2002). These threats are compounded by global threats to marine life, including the increasing temperature and decreasing pH of the ocean from pollution linked to global climate change (Cohen et al. 2009; Miloslavich et al. 2011).

In the Study Area, some marine invertebrates that are managed to ensure their sustainable harvest, have been used as characteristics to define groundfish essential fish habitat, which is designated by National Marine Fisheries Service (NMFS) and regional fishery management councils. The sustainability and abundance of these organisms are vital to the marine ecosystem and to the sustainability of the world's commercial fisheries (Pauly et al. 2002). Marine invertebrates are harvested for food and for the aquarium trade. Economically important invertebrate groups that are fished, commercially and recreationally, for food in the United States are crustaceans (e.g., shrimps, lobsters, and crabs), bivalves (e.g., scallops, clams, and oysters), and cephalopods (e.g., squid and octopuses) (Morgan and Chuenpagdee 2003; Pauly et al. 2002). These fisheries are a key part of the commercial fisheries industry in the United States (Food and Agriculture Organization of the United Nations 2005). Global threats to crustaceans, bivalves, and cephalopods are largely the result of overfishing, destructive fishing techniques (e.g., trawling) and habitat modification (Morgan and Chuenpagdee 2003; Pauly et al. 2002). A relatively new threat to invertebrates is bioprospecting, the collection of organisms in pursuit of new compounds for pharmaceutical products (see additional information in Section 3.8.2.6.8, Bryozoans [Phylum Bryozoa]).

Additional information on the biology, life history, and conservation of marine invertebrates can be found on the websites maintained by the following organizations:

- NMFS, particularly for ESA-listed species, species of concern, and candidate species
- United States (U.S.) Coral Reef Task Force
- MarineBio Conservation Society
- Monterey Bay Aquarium

The discussion above represents general threats to marine invertebrates. Additional threats to individual species within the Study Area are described below in the accounts of those species. The following sections include descriptions of species considered candidates for ESA listing, and descriptions of the major marine invertebrate taxonomic groups in the Study Area. These taxonomic group descriptions include descriptions of key habitat-forming invertebrates, including reef-forming sponges, corals and other organisms that define live hardbottom, reef-building worms, oysters, and other reef-building mollusks.

### 3.8.2.4 Endangered Species Act-Listed Species

#### 3.8.2.4.1 Offshore Area

There are no marine invertebrates in the Offshore Area of the Study Area listed as threatened or endangered under the ESA.

#### 3.8.2.4.2 Inland Waters

There are no marine invertebrates in the Inland Waters of the Study Area listed as threatened or endangered under the ESA; however, three species are listed as species of concern, the Pinto abalone (*Haliotis kamtschatkana*), the Olympia oyster (*Ostreola conchaphila*), and the Newcomb's littorine snail (*Algamorda subrotundata*). There are some concerns regarding status and threats for species of concern, but insufficient information is available to indicate a need to list the species under the ESA. Species of concern status does not carry any procedural or substantive protections under the ESA.

#### 3.8.2.4.3 Western Behm Canal, Alaska

There are no marine invertebrates in the Western Behm Canal portion of the Study Area listed as threatened or endangered under the ESA; however, three species are listed as species of concern, the Pinto abalone (*Haliotis kamtschatkana*), the Olympia oyster (*Ostreola conchaphila*), and the Newcomb's littorine snail (*Algamorda subrotundata*). There are some concerns regarding status and threats for species of concern, but insufficient information is available to indicate a need to list the species under the ESA. Species of concern status does not carry any procedural or substantive protections under the ESA.

### 3.8.2.5 Federally Managed Species

Federally managed species are species whose harvest and protection are overseen by a federal management council for conservation and as a benefit to the nation. In the context of federally managed species, the term "fishery" applies to any biologically generated object extracted from the ocean (e.g., there is a crab "fishery" even though the animals are not fish).

#### 3.8.2.5.1 Offshore Area

One federally managed species of marine invertebrate is found in the Offshore Area of the Study Area: the market squid (*Loligo opalescens*). Assessments in Section 3.8.3 (Environmental Consequences) combine federally managed species with the rest of their taxonomic group, unless impacts or differential effects warrant separate treatment. The analysis of impacts on commercial and recreational fisheries is provided in Section 3.12 (Socioeconomics).

#### 3.8.2.5.2 Inland Waters

One of the federally managed species of marine invertebrates in the Inland Waters portion of the Study Area is the market squid (*Loligo opalescens*). Assessments in Section 3.8.3 (Environmental Consequences) combine federally managed species with the rest of their taxonomic group, unless impacts or differential effects warrant separate treatment. The analysis of impacts on commercial and recreational fisheries is provided in Section 3.12 (Socioeconomics).

#### 3.8.2.5.3 Western Behm Canal, Alaska

Federally managed species of marine invertebrates in the Western Behm Canal portion of the Study Area include four species of scallops (*Patinopecten caurinus, Chlamys rubida, Chlamys hastata, Crassadoma gigantea*).

### 3.8.2.6 Taxonomic Group Descriptions and Distributions

#### 3.8.2.6.1 Foraminiferans, Radiolarians, Ciliates (Phylum Protozoa)

Foraminiferans, radiolarians, and ciliates are minute singled-celled organisms, sometimes forming colonies of cells, belonging to the Phylum Protozoa (Castro and Huber 2000). They are found in the water column and seafloor of the world’s oceans. Foraminifera form diverse and intricate shells out of calcium carbonate (Wetmore 2006). In general, the distribution of foraminiferans, radiolarians, and ciliates is patchy, occurring in regions with the optimal conditions for growth. The shells of foraminifera that live in the water column eventually sink to the deep seafloor, forming sediments known as foraminiferan ooze (Wetmore 2006). Foraminifera feed on diatoms and other small organisms such as phytoplankton. Their predators include copepods and other zooplankton. Radiolarians are microscopic organisms that form glass-like shells made of silica. Radiolarian ooze covers large areas of the ocean floor (Castro and Huber 2000; Wetmore 2006). Ciliates are protozoans with small hairs (cilia) that are used to feed and for mobility (Castro and Huber 2000).

##### 3.8.2.6.1.1 Offshore Area

In the Offshore Area, foraminiferans, radiolarians, and ciliates can be found freely floating (some are photosynthetic) and are distributed by ocean currents. The coast of the Pacific Northwest supports high primary productivity (Sutor et al. 2005). Concentrations greater than 3.0 milligrams of Chlorophyll per meter cubed (mg chl/$m^3$) are present throughout the spring, summer, and fall within 40 kilometers (km) (24.8 miles [mi.]) of shore, and rarely expand beyond 100 km offshore (Thomas and Strub 2001). Lowest concentrations (< 0.25 mg chl/$m^3$) are usually located over 200 km (124.2 mi.) offshore and intrude towards the coast in mid-summer (June to July). Each year, two episodes of seasonal bloom occur, one in spring and another in summer (Figure 3.8-1). The timing of the first of these episodes varies, occurring from early April to May. The second offshore expansion typically occurs in August (Thomas and Strub 2001).

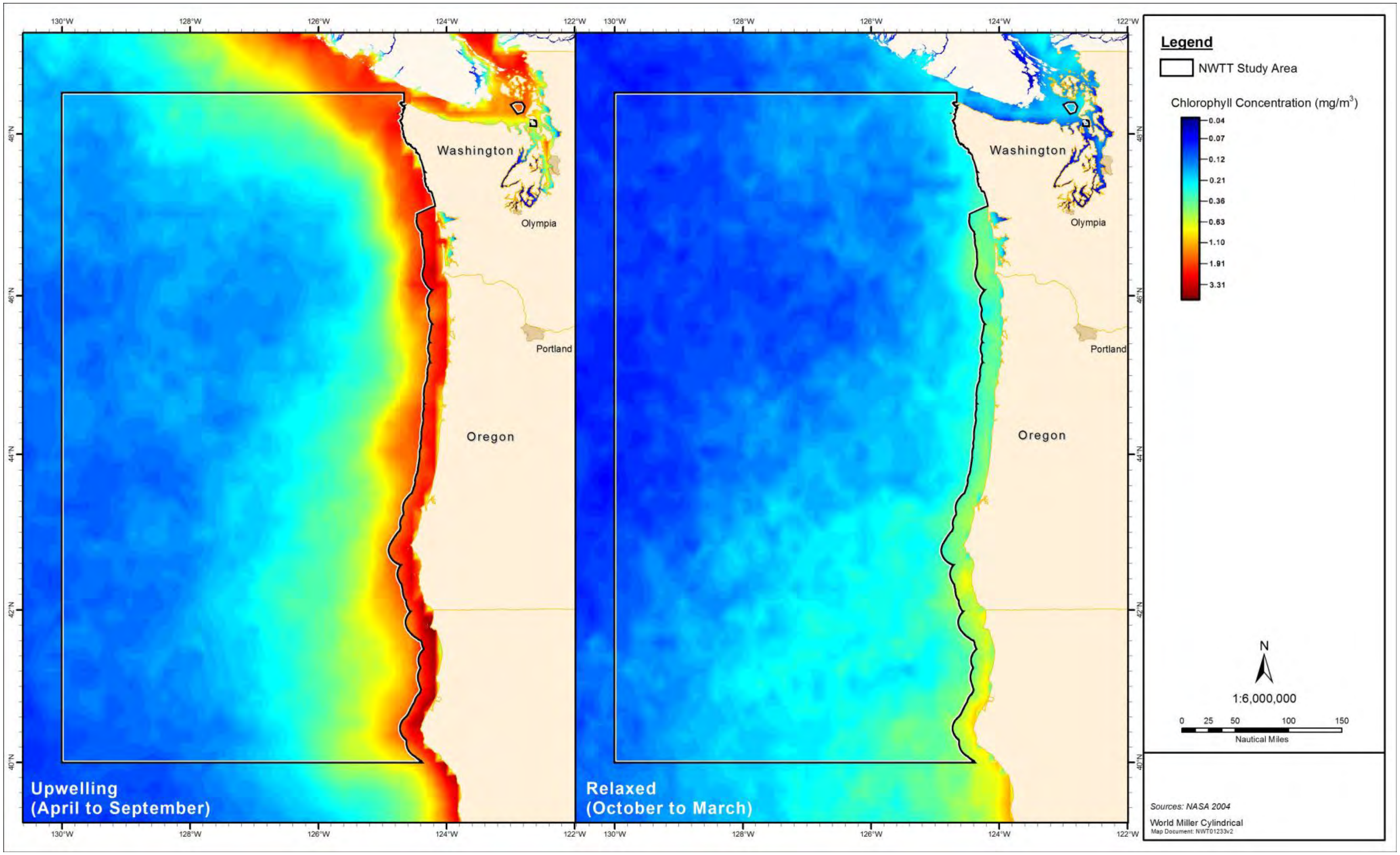


**Figure 3.8-1: Chlorophyll Concentrations in the Northwest Training and Testing Study Area**

Offshore, and following upwelling events along the coast, there is a dramatic shift in the composition of the phytoplankton community; the composition changes from blooms of large-sized and chain-forming diatoms in newly upwelled water along the shelf to phytoplankton communities dominated by cells < 5 microns (µm) in size (Sherr et al. 2005). At two sample stations along an upwelling front off the Oregon coast, 2–5 µm eukaryotic cells (mostly picoplankton) dominated the total phytoplankton biomass (Hood et al. 1992).

#### 3.8.2.6.1.2 Inland Waters

Four types of protozoans are encountered in the Puget Sound: foraminiferans and radiolarians are uncommon, while dinoflagellates and ciliates are more abundant. Ciliates are the most consistently abundant protozoans in the Puget Sound (Strickland 1983).

#### 3.8.2.6.1.3 Western Behm Canal, Alaska

In general, the concentration of phytoplankton decreases with increased distance from the shore and water depth. A study of sea surface chlorophyll concentrations for southeastern Alaska conducted in 2004 shows increased phytoplankton biomass near the Southeast Alaska Measurement Facility and other near shore areas between June and August (SALMON Project 2004). These late summer blooms of phytoplankton are triggered by wind driven vertical mixing of nutrients (Iverson et al. 1974, Ziemann et al. 1991).

### 3.8.2.6.2 Sponges (Phylum Porifera)

Sponges include over 8,000 marine species worldwide, and are classified in the Phylum Porifera (Appeltans et al. 2010). Sponges are bottom-dwelling, multi-cellular animals that can be best described as an aggregation of cells that perform different functions. Sponges are largely sessile (not mobile), except for their larval stages, and are common throughout the Study Area at all depths. Sponges reproduce both sexually and asexually. Water flowing through the sponge provides food and oxygen and removes wastes (Castro and Huber 2000; Collins and Waggoner 2006). Many sponges form calcium carbonate or silica spicules or bodies embedded in cells to provide structural support (Castro and Huber 2000). Sponges provide homes for a variety of animals, including shrimp, crabs, barnacles, worms, brittle stars, sea cucumbers, and other sponges (Colin and Arneson 1995d).

#### 3.8.2.6.2.1 Offshore Area

In the Offshore Area glass or siliceous sponges (Hexactinellids) typically live in deep water (500–3,000 m) (Jamieson and Chew 2002). The hexactinellid sponges are distributed along the continental shelf and are globally unique in that they are reef-building sponges. Hexactinellid reef-building sponges are different from other hexactinellids in that their siliceous skeleton remains intact after the death of the sponge to provide a suitable framework for reef construction. The Olympic Coast National Marine Sanctuary has found deep-sea corals in depths ranging from 50 m to over 2,000 m on continental shelves, slopes, canyons, and seamounts. Olympic Coast National Marine Sanctuary research has shown corals and sponges are widely distributed but generally low density on the continental shelf off Washington (Olympic Coast National Marine Sanctuary 2012).

Other sponges in the Offshore Area include large brilliant-yellow barrel sponges that are found on seamounts (Wilson and Kaufmann 1987; Rogers 1994). In general, chemosynthetic communities in deep-water environments in the Offshore Area of the Study Area also contain sponges (Kojima 2002).

#### 3.8.2.6.2.2 Inland Waters

In a study by Leys et al. (2004), the coastal waters of British Columbia were examined to document the glass sponge (hexactinellid) communities that inhabit the fjords. They found nine species of hexactinellid sponges that were observed on vertical or near-vertical walls and on bare rock or on rock with only a light sediment cover (Leys et al. 2004). In the Puget Sound section of the Study Area, multiple sponge communities occur. There are three sponge reef complexes that occur within the Puget Sound Study Area; these three areas all occur in the northern Puget Sound region from 90 to 210 m of water depth at North McCall Bank, South McCall Bank, and Fraser Ridge.

#### 3.8.2.6.2.3 Western Behm Canal, Alaska

On the Alaskan and Washington State continental shelves the rockfish trawl fishery has been correlated with sponge by-catch, suggesting that sponge reefs provide important habitat for many species of fishes and invertebrates and are distributed in the southeast Alaska area and the Behm Canal (Strickland 1983; Conway et al. 2002; Whitney et al. 2005).

#### 3.8.2.6.3 Corals, Hydroids, Jellyfish (Phylum Cnidaria)

There are over 10,000 marine species of corals, hydroids, and jellyfish worldwide (Appeltans et al. 2010). Members of this group are found throughout the Study Area at all depths. Hydroids are colonial animals similar in form to corals. Hydroids have both flexible and rigid skeletons, but are not considered to be habitat-forming (Colin and Arneson 1995a; Gulko 1998). Jellyfish are motile as larvae, sessile as an intermediate colonial polyp stage, and motile as adults (Brusca and Brusca 2003). They are predatory at all stages and, like all Cnidaria, use tentacles equipped with stinging cells to capture prey (Castro and Huber 2000; University of California at Berkeley 2010a). Jellyfish are an important prey species for a range of organisms, including some sea turtles and ocean sunfish (*Mola mola*) (Heithaus et al. 2002; James and Herman 2001).

Corals are in a class of animals that also includes anemones and soft corals. The individual unit is referred to as a polyp, and most species occur as colonies of polyps. All corals feed on small planktonic organisms or dissolved organic matter (Dubinsky and Berman-Frank 2001). Most hard corals and some soft corals are habitat forming (i.e., they form three-dimensional structures) (Freiwald et al. 2004; Spalding et al. 2001).

#### 3.8.2.6.3.1 Offshore Area

Open-ocean or pelagic cnidarians consist of jellyfish (cnidarians), comb jellyfish (ctenophorans), hydroids, and deep sea corals. In the Offshore Area of the Study Area habitat, with increasing depth, light intensity declines and eventually algae and plants are unable to survive. Below 100 m (328.1 feet [ft.]) a few, small, stony corals are found, along with deep-sea corals that lack symbiotic algae (zooxanthellae) and instead take in plankton and organic matter for their energy needs (Chave and Malahoff 1998, Olympic Coast National Marine Sanctuary 2012). Headlands are also common along the open rocky coasts of the Pacific Northwest and are very similar in habitat to islets (Proctor et al. 1980). Islets and headlands along the Pacific coast are high-energy, unique habitats (Airamé et al. 2003).

Deep-sea coral communities are found along the entire continental slope of the Offshore Area of the Study Area (Figure 3.8-2).While the mean depth range of deep-sea corals in the Northeast Pacific Ocean is 265–1,262 m (869.4–4,140.4 ft.), deep-sea corals of the Study Area occur in water depths ranging from 9 to 3,450 m (29.5 to 11,318.9 ft.) (Etnoyer and Morgan 2003). At greater depths, animals, including non-reef-building corals, obtain their food through suspension feeding. The most common invertebrates found on seamounts worldwide are cnidarians (i.e., hydroids, jellyfish, anemones, and corals) (Wilson and Kaufmann 1987, Rogers 1994).

True deep-sea coral communities live in complete darkness, in temperatures as low as 4°C and in waters as deep as 6,000 m (19,685 ft.) in the Offshore Area of the Study Area. Fifteen such forms of corals occur in the Offshore Area. These communities include sessile stony corals (Order Scleractinia), soft corals (Sub Class Octocorallia), black corals (Order Antipatharia), and lace corals (Freiwald et al. 2004, Hain and Corcoran 2004, Roberts and Hirshfield 2004). In complete darkness, deep-sea corals lack the symbiotic zooxanthellae found in their tropical counterparts and survive solely on suspension feeding. In the deep sea, Scleractinia and hydrocorals can build very large three-dimensional structures, "cold-water coral reefs," comparable in size and complexity with shallow water coral reefs (Hain and Corcoran 2004). Deep-sea coral communities are typically found from the edge of the continental shelf to the continental rise, on banks, and on seamounts (Freiwald et al. 2004). The distribution of known distribution of deep-sea corals in the Offshore Area of the Study Area is shown in Figure 3.8-2.

#### 3.8.2.6.3.2 Inland Waters

Inshore area islet (small island) habitats support an abundant biota, including many species of cnidarians, comparable to the benthic communities found on fringing and barrier reefs (Maragos 1998). Inshore islets occur almost continuously along the Pacific Northwest coastline except at the mouths of large bays and estuaries (e.g., Columbia River mouth). Human impact in these regions tends to be minor, allowing islets to provide sheltered habitat for coral communities.

Habitat-forming deep-sea corals occur in the Puget Sound, as well as on the continental shelf of the Offshore Area. While the mean depth range of deep-sea corals in the Northeast Pacific Ocean is 265 to 1,262 m (869.4 to 4,140.4 ft.), deep-sea corals of the Study Area occur in water depths ranging from 9 to 3,450 m (29.5 to 11,318.9 ft.) (Etnoyer and Morgan 2003). Stylasteriidae corals are found in Puget Sound and Georgia Strait and on the shelf and shelf slope in waters shallower than 823 m (2,700.1 ft.) (Etnoyer and Morgan 2003). Jellyfish (cnidarians), comb jellyfish (ctenophorans), and hydroids are also found in the inland water area, throughout the water column, and on the water surface.

#### 3.8.2.6.3.3 Western Behm Canal, Alaska

Many species of jellyfish occur in the Western Behm Canal as zooplankton, and the red-eye jellyfish (*Polyorchis penicellata*) is also present as an adult (Cowles 2006). Deep-sea coral ecosystems are also widespread throughout most of Alaska's marine waters, though knowledge of the distribution and abundance of deep-sea corals in Alaska is lacking. Therefore, deep sea coral may be found in the Western Behm Canal; however, the exact distribution and abundance of species is currently unknown (Alaska Coral and Sponge Initiative 2012).

#### 3.8.2.6.4 Flatworms (Phylum Platyhelminthes)

Flatworms include between 8,000 and 20,000 marine species worldwide (Appeltans et al. 2010; Castro and Huber 2000), and are the simplest form of marine worm (Castro and Huber 2000). The largest single group of flatworms is parasites commonly found in fishes, seabirds, and marine mammals (Castro and Huber 2000; University of California Berkeley 2010b). The life history of parasitic flatworms plays a role in the regulation of populations for the marine vertebrates they inhabit. Ingestion by the host organism is the primary dispersal method for parasitic flatworms. As parasites, they are not typically found in the water column, outside of a host organism. The remaining groups are non-parasitic carnivores, living without a host.

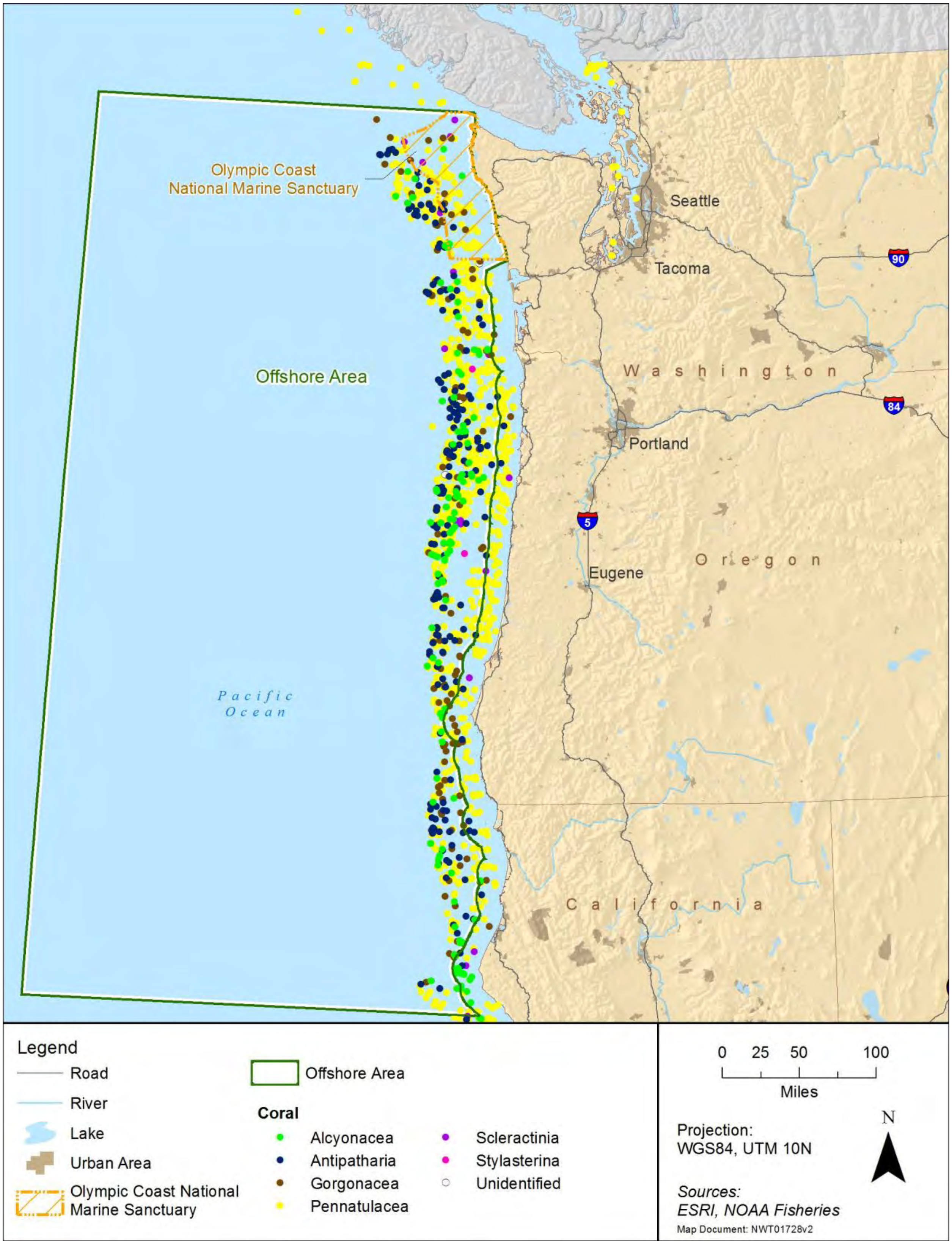


**Figure 3.8-2: Deep-Sea Corals in the Northwest Training and Testing Study Area**

Flatworms occur in the Offshore Area, Inland Waters, and the Western Behm Canal, Alaska, portions of the Study Area as parasites in various fishes, seabirds, and whales that occur throughout the area. Free-living flat worms are not typically found in the water column, outside of a host organism (Castro and Huber 2000; University of California Berkeley 2010b).

#### 3.8.2.6.5 Ribbon Worms (Phylum Nemertea)

Ribbon worms include approximately 1,000 marine species worldwide (Appeltans et al. 2010). Ribbon worms, with their distinct gut and mouth parts, are more complex than flatworms (Castro and Huber 2000). Organisms in this phylum are bottom-dwelling, predatory marine worms that are equipped with a long extension from the mouth (proboscis) that helps them capture food (Castro and Huber 2000). Some species are also equipped with a sharp needle-like structure that delivers poison to kill prey. Ribbon worms occupy an important place in the marine food web as prey for a variety of fish and invertebrates and as a predator of other bottom-dwelling organisms, such as worms and crustaceans (Castro and Huber 2000). Some ribbon worms are epiphytic and occupy the inside of the mantle of mollusks, where they feed on the waste products of their host (Castro and Huber 2000).

Ribbon worms occur on the seafloor of the Offshore Area, the Inland Waters, and the Western Behm Canal portions of the Study Area. They are widely distributed, carnivorous, and can be parasitic, feeding on the waste products of their mollusk hosts (Castro and Huber 2000).

#### 3.8.2.6.6 Round Worms (Phylum Nematoda)

Round worms include over 5,000 marine species, though this number may be a gross underestimate (Appeltans et al. 2010). Common genera include *Anisakis* and *Thynnascaris* (Castro and Huber 2000). Round worms are small and cylindrical, and are abundant in sediments and in host organisms as parasites (Castro and Huber 2000). Round worms are one of the most widespread marine invertebrates, with population densities of one million organisms per 11 square feet ($ft.^2$) (1 square meter [$m^2$]) of mud (Levinton 2009). This group has a variety of food preferences, including algae, small invertebrates, annelid worms, and organic material from sediment. Like free-living flatworms, parasitic nematodes provide important ecosystem services by regulating populations of other marine organisms by causing illness or mortality in less viable organisms.

Round worms occur in the Offshore Area, Inland Waters, and the Western Behm Canal, Alaska, portions of the Study Area. Nematodes are found in or on most types of organisms as parasites, or commensals. They inhabit organisms such as mollusks, fish, reptiles, birds, and mammals (Hodda 2000).

#### 3.8.2.6.7 Segmented Worms (Phylum Annelida)

Segmented worms include approximately 12,000 marine species worldwide in the phylum Annelida, although most marine forms are in the class Polychaeta (Appeltans et al. 2010). Segmented worms are the most complex group of marine worms, with a well-developed respiratory and gastrointestinal system (Castro and Huber 2000). Different species of segmented worms may be highly mobile or burrow in the seafloor (Castro and Huber 2000). Most segmented worms are predators; others are scavengers, deposit feeders, filter feeders, or suspension feeders of sand, sediment, and water (Hoover 1998c). The variety of feeding strategies and close connection to the seafloor make Annelids an integral part of the marine food web (Levinton 2009). Burrowing in the seafloor and agitating the sediment increases the oxygen content of the seafloor and makes important buried nutrients available to other organisms. This ecosystem service allows bacteria and other organisms, which are also an important part of the food web, to flourish on the seafloor.

#### 3.8.2.6.7.1 Offshore Area

Areas that contain chemosynthetic communities (communities that obtain energy from chemical oxidation of simple inorganic compounds) in the Offshore Area of the Study Area generally also contain tubeworms (Kojima 2002). The benthic communities of the Oregon subduction zone are characterized by colonies of tube worms (phylum Pogonophora, *Lamellibrachia barhami*) along the crest of the marginal ridge (Kulm et al. 1986).

#### 3.8.2.6.7.2 Inland Waters

In the Inland Waters portion of the Study Area, well-developed mudflat sediments are anaerobic, stable, and harbor substantial amounts of organic matter and microorganisms. Polychaete worms dominate the benthos where these mudflat sediments occur (Proctor et al. 1980).

#### 3.8.2.6.7.3 Western Behm Canal, Alaska

In the Western Behm Canal, Alaska area, polychaete worms dominate the benthos where the canal harbors substantial amounts of organic matter and microorganisms (Proctor et al. 1980). These worms are essential to the diet of many Alaskan fish (National Marine Fisheries Service 2012).

### 3.8.2.6.8 Bryozoans (Phylum Bryozoa)

Bryozoans are small box-like, colony-forming animals that make up “lace corals.” Classified in the Phylum Bryozoa, there are approximately 5,000 marine species worldwide (Appeltans et al. 2010). Bryozoans attach to a variety of surfaces, including rocks, shells, wood, artificial substrates, and algae, and feed on particles suspended in the water (Hoover 1998a). Bryozoans are found throughout the Study Area. Bryozoans are of economic importance for bioprospecting (the search for organisms for potential commercial use in pharmaceuticals). As common biofouling organisms, bryozoans also interfere with boat operations and clog industrial water intakes and conduits (Hoover 1998a).

#### 3.8.2.6.8.1 Offshore Area

The Offshore Area includes the continental slope, and undersea mountains, which are habitats for deep-sea coral communities that contain bryozoans (U.S. Department of the Navy 2010). Many different species of bryozoans (such as *Stomatopora granulate*, *Proboscina incrassata*, *Diaperoecia californica*, *Diaperoecia intermedia*, *Tubulipora flabellaris*, *Discocytis canadensis*, and many more) are found in the Pacific Northwest and are widely distributed throughout the Offshore Area and in deep-sea coral communities.

#### 3.8.2.6.8.2 Inland Waters

Two species of bryozoans (*Bugula pacifica* and *Tricellaria occidentalis*) from the northern Puget Sound have been shown to contain antibacterial compounds. The presence of antibacterial compounds may allow bryozoans to manipulate the microbial film growing on them, and may influence the types of organisms that are able to live near or on them. The ability to manipulate microbial films may also allow bryozoans to make the habitat nearby more suitable for the settlement of their own offspring (Shellenberger and Ross 1998). Bryozoans also make up a portion of deep-sea coral communities, which are found in a few locations in the Puget Sound and Inland Waters portion of the Study Area (U.S. Department of the Navy 2010).

#### 3.8.2.6.8.3 Western Behm Canal, Alaska

The bryozoans common to the Western Behm Canal are leafy bryozoans (*Carbasea serrulata, Flustra serrulata*), crusty bryozoans (*Escharopsis lobata, Escharopsis sarsi*), and ribbed bryozoan (*Rhamphostomella costata*). Common substrates for bryozoan attachment in the Western Behm Canal include rocks and live or dead bivalve, gastropod, and crab shells (AFSC 2012).

#### 3.8.2.6.9 Squid, Bivalves, Sea Snails, Chitons (Phylum Molluska)

Approximately 27,000 marine species are classified in the Phylum Molluska worldwide (Appeltans et al. 2010). Octopus and squid (cephalopods), sea snails and slugs (gastropods), clams and mussels (bivalves), and chitons (polyplacophorans) are mollusks with a muscular organ called a foot, which is used for mobility (Castro and Huber 2000). Sea snails and slugs eat fleshy algae and a variety of invertebrates, including hydroids, sponges, sea urchins, worms, and small crustaceans, as well as detritus (Castro and Huber 2000; Colin and Arneson 1995c). Clams, mussels, and other bivalves feed on plankton and other suspended food particles (Castro and Huber 2000). Chitons use rasping tongues, known as radula, to scrape food (algae) off rocks (Castro and Huber 2000; Colin and Arneson 1995c). Squid and octopus are active swimmers at all depths, and use a beak to prey on a variety of organisms, including fish, shrimp, and other squids (Castro and Huber 2000; Hoover 1998c). Octopuses mostly prey on fish, shrimp, eels, and crabs (Wood and Day 2005).

#### 3.8.2.6.9.1 Offshore Area

In the Offshore Area, chemosynthetic communities are made of organisms that derive their energy from the conversion of carbon molecules and nutrients into organic matter. These organisms use the oxidation of inorganic molecules, or methane, as a source of energy (instead of using sunlight, as is the case with organisms that undergo photosynthesis). In the Pacific Northwest OPAREA giant white clams and mussels live in these chemosynthetic communities (Kojima 2002). The vesicomyid clam, *Calyptogena kilmeri*, is most common in areas characterized by high sulfide concentrations. In contrast, at the edge of seeps where sulfide levels are lower, *C. pacifica* is abundant. In cold seeps rich in methane such as brine pools or methane hydrates, mussels (*Bathymodiolus* spp.) are the dominant macrofauna. These mussels have a methane-based symbiosis where intracellular bacteria oxidize the methane and provide energy for the mussels and the bacteria (Nybakken 2001). Various species are attracted to the biological activity around cold seeps (Airamé et al. 2003). The benthic communities of the Oregon subduction zone contain giant clams (*Calyptogena* spp.) along the crest of the marginal ridge (Kulm et al. 1986). Humboldt squid (*Dosidicus gigas*) have been found off the coast of California, central Oregon, and Washington. The highest observed densities were in 2009 and measured 1,671 squid $(10^6\ m^3)^{-1}$ (Litz et al. 2011). Various other species of squid and octopus inhabit the Offshore Area, including the giant Pacific octopus (*Enteroctopus dofleini*) (Flory 2007).

#### 3.8.2.6.9.2 Inland Waters

The characteristic fauna of an Inland Waters portion of the Study Area sand flat includes cockle (*Clinocardium nuttalli*), white-sand clam (*Macoma secta*), and bent-nosed clam (*M. nasuta*) (Proctor et al. 1980). In unprotected rocky intertidal zones, mussels (*Mytilis* spp.) and barnacles form a biotic substrate that provides the necessary habitat for many other species.

Pacific oysters are widely cultivated in Dabob Bay, which is one of only three bays on the west coast where successful spawning of Pacific oysters occurs. Geoduck clams are the basis of an important commercial fishery in Puget Sound and are found in lower intertidal to subtidal soft bottom habitats;

they can be found in waters as deep as 360.9 ft. (110 m) but are most abundant from 29.5 to 59.1 ft. (9 to 18 m) below mean low water level (U.S. Department of the Navy 2002).

In Puget Sound, hard substrate provides a substrate for the Olympia oyster (*Ostreola conchaphila*). The Olympia oyster is the only oyster native to the Pacific Northwest. Historically Olympia oyster beds existed throughout most of southern Puget Sound and specifically Willapa and Samish Bays. By 1960, overharvesting and pollution had nearly exterminated most of south Puget Sound's once-thriving Olympia oyster populations. In 1998, the Washington Department of Fish and Wildlife developed the Olympia Oyster Stock Rebuilding Plan. Subsequently, Olympia oysters have survived in north and central Puget Sound, and populations in the south Sound and Hood Canal are gradually recovering (Peter-Contesse and Peabody 2005).

Within Washington State, Pacific razor clam (*Siliqua patula*), geoduck, Manila clam (*Veneruplis philippinarum*), and Pacific oyster (*Crassostrea gigas*) occur and are harvested as a commercial fishery.

Humboldt squid have also been found in Puget Sound (Litz et al. 2011). Various other species of squid and octopus inhabit the Inland Waters, including the giant Pacific octopus (Flory 2007).

#### 3.8.2.6.9.3 Western Behm Canal, Alaska

The Pacific razor clam occurs from western Alaska to Pismo Beach, California, on flat or gently sloping sandy beaches with heavy to moderate surf (Moore 2001). Squid and other mollusks could occur in the Western Behm Canal, Alaska; however, they are not densely distributed in the area.

#### 3.8.2.6.10 Shrimp, Crab, Barnacles, Copepods (Phylum Arthropoda)

Shrimp, crab, barnacles, and copepods are animals with skeletons on the outside of their body (Castro and Huber 2000). Classified in the Phylum Arthropoda, over 50,000 species belong to the subphylum Crustacea within Phylum Arthropoda (Appeltans et al. 2010). Shrimp and crabs are typically carnivorous or omnivorous predators or scavengers, preying on mollusks (primarily gastropods, such as limpets, sea snails and slugs), other crustaceans, echinoderms (such as starfish, urchins, and sea cucumbers), small fish, algae, and sea grass (Waikiki Aquarium 2009a, b, c; Western Pacific Regional Fishery Management Council 2009). Barnacles and copepods feed by filtering algae and small organisms from the water (Levinton 2009).

#### 3.8.2.6.10.1 Offshore Area

Juvenile crabs (megalopae), and copepods tend to seasonally dominate the near-surface zooplankton community in the Offshore Area of the Study Area (Peterson 1997; Reese et al. 2005; Swartzman et al. 2005). The distribution of zooplankton along the coastline of the Offshore Area of the Study Area can be described as "patchy," with localized regions of high zooplankton concentrations spanning a distance from the coastline out to 93 mi. (150 km) offshore (Swartzman and Hickey 2003; Ressler et al. 2005; Swartzman et al. 2005); highest zooplankton abundances are found within the upper 65 ft. (20 m) of the water column over the inner-and mid-shelf (Peterson and Miller 1975, 1977). Adult Dungeness crabs can be found in waters as deep as 300 ft. (91 m) and on substrates consisting of mud, rock, and gravel bottoms; however, they prefer soft substrates. The biological diversity of deep-sea coral communities is high, and includes crustaceans (crabs and lobsters) and mollusks (clams and snails). Deep-sea coral communities are found along the entire continental slope of the Offshore Area of the Study Area (Figure 3.8-2).

#### 3.8.2.6.10.2 Inland Waters

In the inshore area, copepods form the largest fraction of the zooplankton biomass in the main basin of Puget Sound. Small copepods are numerically dominant, with the genus *Acartia* being the most abundant. Larger copepods make up the majority of the zooplankton biomass, specifically the genus *Calanus* (Strickland 1983). These copepods tend to feed on diatoms that dominate the spring bloom in the region. Adult Dungeness (crabs can be found in waters as deep as 295 ft. (90 m) and on substrates consisting of mud, rock, and gravel bottoms; however, they prefer soft substrates. Juvenile crabs are often found in the soft substrata of intertidal eelgrass beds.

#### 3.8.2.6.10.3 Western Behm Canal, Alaska

In the Western Behm Canal copepods including *Pseudocalanus, Acartia,* and *Centropages,* are the dominate zooplankton. Common species of Anthropoda in the Western Behm Canal portion of the Study Area include dungeness crab, tanner crab (*Chionoecetes bairdi*), spot shrimp (*Pandalus platyceros*), and coonstripe shrimp (*Pandalus hypsinotus*). Dungeness crabs are found in estuarine, intertidal, and subtidal zones. Tanner crabs inhabit deeper water than the Dungeness crab. The Tanner crab is rare in water less than 328 ft. (100 m) deep and common in depths of over 492 ft. (150 m). Spot shrimp and coonstripe shrimp are found in high concentrations along the sides of fjord basins. Other less-abundant shrimp in the Western Behm Canal portion of the Study Area include sidestripe shrimp (*Pandalopsis dispar*) and Northern shrimp (*Pandalus borealis*).

#### 3.8.2.6.11 Sea Stars, Sea Urchins, Sea Cucumbers (Phylum Echinodermata)

Phylum Echinodermata has over 6,000 marine species, such as sea stars, sea urchins, and sea cucumbers (Appeltans et al. 2010). Sea stars (asteroids), sea urchins (echinoids), sea cucumbers (holothuriods), brittle stars and basket stars (ophuiroids), and feather stars and sea lilies (crinoids) are symmetrical around the center axis of the body (Castro and Huber 2000). Most echinoderms have separate sexes, but unisexual forms occur among the sea stars, sea cucumbers, and brittle stars. Many species have external fertilization, producing planktonic larvae, but some brood their eggs, never releasing free-swimming larvae (Colin and Arneson 1995b). Many echinoderms are either scavengers or predators on organisms that do not move, such as stony corals, sponges, clams, and oysters (Hoover 1998b). Some species filter food particles from sand, mud, or water.

#### 3.8.2.6.11.1 Offshore Area

In the Offshore Area, invertebrates are found on seamounts and include brittlestars (ophiuroids), sea lilies (crinoids), seastars, tunicates, sea urchins, and sea cucumbers (Wilson and Kaufmann 1987, Rogers 1994). In many areas of the deep sea, brittlestars are the dominant macrofauna; they are often found around sea pen (*Pennatulacea*) beds and are so abundant that their feeding behavior and high activity levels can alter the ecology of benthic soft-bottom communities. Habitat-forming deep-sea coral communities are commonly found between 875 and 4,200 ft. deep (265 and 1,260 m), but may be found as deep as 11,400 ft. (3,450 m) (Etnoyer and Morgan 2003) and include echinoderms (starfish, sea urchins, brittle stars, and feather stars) (U.S. Department of the Navy 2010).

#### 3.8.2.6.11.2 Inland Waters

Rocky intertidal habitats occur throughout the Inland Waters portion of the Study Area, and are where various sea anemones, sea stars, and brittle stars are very prominent (Proctor et al. 1980). Predacious sea stars (*Pisaster ochraceous*) are characteristic of unprotected rocky intertidal regions (Proctor et al. 1980). These sea stars can be found up to depths of 295 ft. (90 m) and are very resilient to environmental changes, such as temperature change, wave action, and decreased water availability (Grzimeck 1972).

#### 3.8.2.6.11.3 Western Behm Canal, Alaska

Sea anemones, sea stars, brittle stars, red urchins, and other echinoderms occur in rocky intertidal habitats throughout the Western Behm Canal. The abundance of sea cucumbers in Southeast Alaska is greatest in the southern and western portions in protected bays and inlets.

Red sea cucumbers (*Parastichopus californicus*) exist in habitat types ranging from shell debris, gravel, mud, silt, and boulders. A study conducted in Southeast Alaska showed that the most common habitat for sea cucumbers was shell debris and gravel. They occupy a broad range of subtidal habitats from nearshore shallows to over 100 fathoms. In the Western Behm Canal portion of the Study Area, the red sea urchin (*Strongylocentrotus franciscanus*) occurs primarily on rocky shorelines of the outside coast with largest concentrations in southeast. They can inhabit intertidal depth to up to 295.3 ft. (90 m) (Alaska Department of Fish and Game 2012).

### 3.8.3 Environmental Consequences

This section analyzes the potential impacts on marine invertebrates from implementing the project alternatives, including the No Action Alternative, Alternative 1, and Alternative 2. United States Department of the Navy (Navy) training and testing activities are evaluated for their potential impact on marine invertebrates in general, by taxonomic groups, species proposed for listing, and federally managed species or groups (see Section 3.8.2, Affected Environment).

General characteristics of all Navy stressors were introduced in Section 3.0.5.3 (Identification of Stressors for Analysis) and living resources' general susceptibilities to stressors are discussed in Appendix G (Biological Resource Methods). Stressors vary in intensity, frequency, duration, and location within the Study Area (Table 3.8-2).

Based on the general threats to marine invertebrates discussed in Section 3.8.2 (Affected Environment), stressors applicable to marine invertebrates in the Study Area and analyzed below include the following:

- Acoustic (sonar and other active acoustic sources, underwater explosives)
- Energy (electromagnetic devices)
- Physical disturbance and strike (vessels and in-water devices, strikes, military expended materials, and seafloor devices)
- Entanglement (fiber optic cables and guidance wires, decelerator/parachutes)
- Ingestion (munitions and military expended materials other than munitions)
- Secondary stressors (metals and chemicals)

These components are analyzed for potential impacts on marine invertebrates within the stressor categories contained in this section. The specific analyses of the training and testing activities consider these components, within the context of geographic location and overlap of marine invertebrate resources. Training activities are not proposed in the Western Behm Canal; therefore, only the Offshore Area and the Inland Waters will be analyzed under Training Activities. In addition to the analysis here, the details of all training and testing activities, stressors, and geographic occurrence within the Study Area are summarized in Section 3.0.5 3 (Identification of Stressors for Analysis) and detailed in Appendix A (Navy Activities Descriptions).

**Table 3.8-2: Stressors for Marine Invertebrates in the Northwest Training and Testing Study Area**

| Components | Area | Number of Components or Events | | | | | |
|---|---|---|---|---|---|---|---|
| | | No Action Alternative | | Alternative 1 | | Alternative 2 | |
| | | Training | Testing | Training | Testing | Training | Testing |
| **Acoustic Stressors** | | | | | | | |
| Sonar and other active acoustic sources (hours) | Offshore Area | 332 | 24 | 551 | 977 | 551 | 1,073 |
| | Inland Waters | 0 | 2,061 | 407 | 5,448 | 407 | 5,939 |
| | W. Behm Canal | 0 | 0 | 0 | 2,762 | 0 | 3,838 |
| Sonar and other active acoustic sources (items) | Offshore Area | 880 | 364 | 1,616 | 943 | 1,616 | 1,024 |
| | Inland Waters | 0 | 1,188 | 0 | 1,308 | 0 | 1,410 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Underwater Explosives | Offshore Area | 209 | 0 | 142 | 148 | 142 | 164 |
| | Inland Waters | 4 | 0 | 42 | 0 | 42 | 0 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Weapons firing, launch, and impact noise | Offshore Area | QUALITATIVE | | | | | |
| | Inland Waters | | | | | | |
| | W. Behm Canal | | | | | | |
| Activities including vessel noise | Offshore Area | 996 | 37 | 1,108 | 138 | 1,108 | 162 |
| | Inland Waters | 4 | 337 | 310 | 582 | 310 | 640 |
| | W. Behm Canal | 0 | 28 | 0 | 60 | 0 | 83 |
| Activities including aircraft noise | Offshore Area | 5,414 | 2 | 8,140 | 80 | 8,140 | 84 |
| | Inland Waters | 166 | 2 | 117 | 20 | 117 | 25 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Energy Stressors** | | | | | | | |
| Activities including electromagnetic devices | Offshore Area | 0 | 0 | 0 | 0 | 0 | 0 |
| | Inland Waters | 0 | 0 | 1 | 0 | 1 | 0 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Physical Disturbance and Strike Stressors** | | | | | | | |
| Activities including vessel movement | Offshore Area | 1,003 | 39 | 1,116 | 158 | 1,116 | 187 |
| | Inland Waters | 4 | 339 | 310 | 602 | 310 | 665 |
| | W. Behm Canal | 0 | 28 | 0 | 60 | 0 | 83 |
| Activities including in-water devices | Offshore Area | 387 | 38 | 493 | 134 | 493 | 158 |
| | Inland Waters | 0 | 377 | 1 | 628 | 1 | 691 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Military expended materials | Offshore Area | 189,815 | 604 | 198,028 | 3,922 | 198,028 | 4,325 |
| | Inland Waters | 8 | 442 | 3,085 | 513 | 3,085 | 563 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Activities including seafloor devices | Offshore Area | 0 | 5 | 0 | 6 | 0 | 7 |
| | Inland Waters | 2 | 210 | 16 | 225 | 16 | 239 |
| | W. Behm Canal | 0 | 0 | 0 | 5 | 0 | 15 |

**Table 3.8-2: Stressors for Marine Invertebrates in the Northwest Training and Testing Study Area (continued)**

| Components | Area | Number of Components or Events | | | | | |
|---|---|---|---|---|---|---|---|
| | | No Action Alternative | | Alternative 1 | | Alternative 2 | |
| | | Training | Testing | Training | Testing | Training | Testing |
| **Entanglement Stressors** | | | | | | | |
| Fiber optic cables and guidance wires | Offshore Area | 2 | 16 | 0 | 131 | 0 | 153 |
| | Inland Waters | 0 | 105 | 1 | 245 | 1 | 314 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Decelerator/Parachutes | Offshore Area | 8,381 | 0 | 8,952 | 1,210 | 8,952 | 1,331 |
| | Inland Waters | 0 | 0 | 0 | 0 | 0 | 5 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Ingestions Stressors** | | | | | | | |
| Military expended materials from munitions | Offshore Area | 177,926 | 200 | 183,374 | 1,946 | 183,374 | 2,139 |
| | Inland Waters | 4 | 6 | 3,042 | 6 | 3,042 | 6 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Military expended materials other than munitions | Offshore Area | 11,889 | 404 | 9,654 | 2,057 | 9,654 | 2,275 |
| | Inland Waters | 4 | 436 | 43 | 630 | 43 | 738 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Secondary Stressors** | | | | | | | |
| Habitat (sediments and water quality; air quality) | Offshore Area | QUALITATIVE | | | | | |
| | Inland Waters | | | | | | |
| | W. Behm Canal | | | | | | |

### 3.8.3.1 Acoustic Stressors

Assessing whether sounds may disturb or injure an animal involves understanding the characteristics of the acoustic sources, the animals that may be near the sound, and the effects that sound may have on the physiology and behavior of those animals. The methods used to predict acoustic effects on invertebrates build upon the Conceptual Framework for Assessing Effects from Sound-Producing Activities (Appendix G, Section G.1). Categories of potential impacts are direct trauma, hearing loss, auditory masking, behavioral reactions, and physiological stress. Little information is available on the potential impacts on marine invertebrates of exposure to sonar, explosions, and other sound-producing activities. Most studies focused on squid or crustaceans, and the consequences of exposures to broadband impulsive air guns typically used for seismic exploration, rather than on sonar or explosions.

Direct trauma and mortality may occur due to the rapid pressure changes associated with an explosion. Most marine invertebrates lack air cavities that could make them vulnerable to trauma due to rapid pressure changes. Marine invertebrates could also be displaced by a shock wave, which could cause injury.

To experience hearing impacts, masking, behavioral reactions, or physiological stress, a marine invertebrate must be able to sense sound. Marine invertebrates are likely only sensitive to water particle motion caused by nearby low-frequency sources, and likely do not sense distant or mid- and high-frequency sounds (see Section 3.8.2.2, Invertebrate Hearing and Vocalization). Andre et al. (2011)

found progressive damage to statocyst hair cells in squid after exposure to 2 hours of 50- to 100-Hz sweeps at sound pressure levels of 157–175 dB re 1 µPa; however, it is impossible to determine whether damage was because of the sound exposure or some other aspect of capture or captivity because inappropriate and incorrect controls were used. This limited information suggests that marine invertebrate statocysts may be resistant to impulsive sound impacts, but that the impact of long-term or non-impulsive sound exposures is undetermined.

Masking occurs when a sound interferes with an animal's ability to detect other biologically relevant sounds in its environment. Little is known about how marine invertebrates use sound in their environment. Some studies have shown that crab and coral larvae and post-larvae may use nearby reef sounds when in their settlement phase (Jeffs et al. 2003; Radford et al. 2007; Stanley et al. 2010; Vermeij et al. 2010), although it is unknown what component of reef noise is used. Larvae likely sense particle motion of nearby sounds, limiting their reef noise detection range (less than 328 ft. [100 m]) (Vermeij et al. 2010). Anthropogenic sounds could mask important acoustic cues, affecting detection of settlement cues or predators, potentially affecting larval settlement patterns or survivability in highly modified acoustic environments (Simpson et al. 2011). Low-frequency sounds could interfere with perception of low-frequency rasps or rumbles among crustaceans, although these are often already obscured by ambient noise (Patek et al. 2009).

Studies of invertebrate behavioral responses to sound have focused on responses to impulsive sound. Some captive squid showed strong startle responses, including inking, when exposed to the first shot of broadband sound from a nearby seismic airgun (sound exposure level of 163 dB re 1 $\mu Pa^2$-s), but strong startle responses were not seen when sounds were gradually increased (McCauley et al. 2000a, b). Slight increases in behavioral responses, such as jetting away or changes in swim speed, were observed at receive levels exceeding 145 dB re 1 $\mu Pa^2$-s (McCauley et al. 2000a, b). Other studies have shown no observable response by marine invertebrates to sounds. Snow crabs did not react to repeated firings of a seismic airgun (peak received sound level was 201 dB re 1 µPa) (Christian et al. 2003), while squid did not respond to killer whale echolocation clicks (higher frequency signals ranging from 199 to 226 dB re 1 µPa) (Wilson et al. 2007). Krill did not respond to a research vessel approaching at 2.7 knots (source level below 150 dB re 1 µPa) (Brierley et al. 2003). Distraction may be a consequence of some sound exposures. Hermit crabs were shown to delay reaction to an approaching visual threat when exposed to continuous noise, putting them at increased risk of predation (Chan et al. 2010).

There is some evidence of possible stress effects on invertebrates from long-term or intense sound exposure. Captive sand shrimp exposed to low-frequency noise (30 to 40 dB above ambient) continuously for three months demonstrated decreases in both growth rate and reproductive rate (Lagardère 1982). Sand shrimp showed lower rates of metabolism when kept in quiet, soundproofed tanks than when kept in tanks with typical ambient noise (Lagardère and Régnault 1980). Repeated intense airgun exposures caused no changes in biochemical stress markers in snow crabs (Christian et al. 2003), but some biochemical stress markers were observed in cephalopods (Andre et al. 2011). The study found the first morphological evidence of massive acoustic trauma, in four cephalopod species subjected to low-frequency controlled-exposure experiments. Exposure to low-frequency sounds resulted in permanent and substantial alterations of the sensory hair cells of the statocysts, the structures responsible for the cephalopod's sense of balance and position. These results indicate a need for further environmental regulation of human activities that introduce high-intensity, low-frequency sounds in the ocean, and the need for future research (Andre et al. 2011). No correlation was found between catch rate and seismic airgun activity, implying no long-term population impacts from intermittent anthropogenic sound exposure over long periods.

Because research on the consequences of marine invertebrate exposures to anthropogenic sounds is limited, qualitative analyses were conducted to determine the effects of the following acoustic stressors on marine invertebrates within the Study Area: non-impulsive sources (including sonar, vessel noise, aircraft overflights, and other active acoustic sources) and impulsive acoustic sources (including explosives and weapons firing).

#### 3.8.3.1.1 Impacts from Sonar and Other Active Acoustic Sources

Sources of sonar and other active acoustic sources during training and testing events include broadband vessel noise (including surface ships, boats, and submarines), aircraft noise (fixed-wing and rotary-wing aircraft), sonar, and other active non-impulsive sources. Non-impulsive sounds associated with training and testing are described in Section 3.0.5.3.1 (Acoustic Stressors).

Surface combatant ships and submarines are designed to be quiet to evade enemy detection, whereas other Navy ships and small craft have higher source levels, similar to equivalently sized commercial ships and private vessels (see Section 3.0.5.3.1.4, Vessel Noise). Ship noise tends to be low-frequency and broadband. Received noise levels from aircraft would depend on the platform, speed, and altitude (see Section 3.0.5.3.1.5, Aircraft Noise). Aircraft noise transmitted into water is strongest just below the surface and directly under the aircraft. Sonar and other active acoustic sound sources emit sound waves into the water to detect objects, safely navigate, and communicate. These sources may emit low-, mid-, high-, or very-high-frequency sounds at various sound pressure levels.

Most marine invertebrates do not have the capability to sense sound; however, some may be sensitive to nearby low-frequency and possibly lower-mid-frequency sounds, such as some active acoustic sources or vessel noise (see Section 3.8.2.2, Invertebrate Hearing and Vocalization). Because marine invertebrates lack the adaptations that would allow them to sense sound pressure levels at long distances, the distance at which they may detect a sound is limited.

The relatively low sound pressure level beneath the water surface due to aircraft is likely not detectable by most marine invertebrates. For example, the sound pressure level from an H-60 helicopter hovering at 50 ft. (15.3 m) is estimated to be about 125 dB re 1 µPa at 1 m below the surface, a sound pressure lower than other sounds to which marine invertebrates have shown no reaction (see Section 3.8.3.1, Acoustic Stressors [sonar and other active acoustic sources, underwater explosives]). Therefore, impacts due to aircraft noise are not expected.

There are no training activities proposed in the Western Behm Canal portion of the Study Area under the No Action Alternative, Alternative 1, or Alternative 2. Therefore, non-impulsive sound would have no impact on marine invertebrates under the No Action Alternative, Alternative 1, or Alternative 2.

##### 3.8.3.1.1.1 No Action Alternative

**Training Activities**

**Offshore Area**

The locations and number of activities proposed for training and testing under the No Action Alternative are shown in Tables 2.8-1 through 2.8-3 of Chapter 2 (Description of Proposed Action and Alternatives). Training activities producing sound which might affect marine invertebrates are described. Sounds produced during training are described in Section 3.0.5.3.1.1 (Sonar and Other Active Acoustic Sources), Section 3.0.5.3.1.4 (Vessel Noise), and Section 3.0.5.3.1.5 (Aircraft Noise).

Under the No Action Alternative, training activities using sonar and other active acoustic sources would occur throughout the Offshore Area of the Study Area. Training activities in the Offshore Area would result in approximately 332 hours of in-water noise from the use of sonar and other active acoustic sources. In addition to the 332 hours, 880 items that produce in-water acoustic noise would be used. The location and number of activities proposed for these training activities are shown in Table 2.8-1 of Chapter 2 (Description of Proposed Action and Alternatives). Navy vessel noise associated with training would occur throughout the Offshore Area of the Study Area with 996 vessel movements (see Table 3.0-18).

As discussed above, most marine invertebrates would not sense mid- or high-frequency sounds, distant sounds, or aircraft noise transmitted through the air-water interface (see Section 3.8.2.2, Invertebrate Hearing and Vocalization). Most marine invertebrates would not be close enough to intense sound sources, such as non-impulsive sonar, to potentially experience impacts to sensory structures. Any marine invertebrate capable of sensing sound may alter its behavior (e.g., change swim speed) if exposed to non-impulsive sound, although it is unknown if responses to non-impulsive sounds occur. Continuous noise, like that produced by vessels, may contribute to masking of relevant environmental sounds, such as reef noise. Because the distance over which most marine invertebrates are expected to detect any sounds is limited and vessels would be in transit, any sound exposures with the potential to cause masking or behavioral responses would be brief. Without prolonged proximate exposures, population level impacts are not expected. Although non-impulsive underwater sounds produced during training activities may momentarily distract individuals, intermittent exposures to non-impulsive sounds are not expected to impact survival, growth, recruitment, or reproduction of widespread marine invertebrate populations.

#### Inland Waters

The locations and number of activities proposed for training and testing under the No Action Alternative are shown in Tables 2.8-1 through 2.8-3 of Chapter 2 (Description of Proposed Action and Alternatives). Sounds produced during training are described in Sections 3.0.5.3.1.1 (Sonar and Other Active Acoustic Sources) and 3.0.5.3.1.4 (Vessel Noise).

Under the No Action Alternative, training activities using other active acoustic sources would occur in the Inland Waters. The location and number of activities proposed for these training activities are shown in Table 2.8-1 of Chapter 2 (Description of Proposed Action and Alternatives). Navy vessel noise associated with training would occur in the Inland Waters. Under the No Action Alternative, 4 activities would occur in the inland waters portion of the Study Area (see Table 3.8-2).

As discussed above, most marine invertebrates would not sense distant sounds, or aircraft noise transmitted through the air-water interface (see Section 3.8.2.2, Invertebrate Hearing and Vocalization). Most marine invertebrates would not be close enough to intense sound sources, to potentially experience impacts to sensory structures. Any marine invertebrate capable of sensing sound may alter its behavior due to masking of relevant environmental sounds. Human-made noise may impact coral larvae by masking the natural sounds that serve as cues to orient them towards suitable settlement sites (Vermeij et al. 2010). However, if exposed to non-impulsive sound, it is unknown if behavioral responses occur. Continuous noise, such as from vessels, may contribute to masking of relevant environmental sounds. Because the distance over which most marine invertebrates are expected to detect any sounds is limited and vessels would be in transit, any sound exposures with the potential to cause masking or behavioral responses would last only minutes. Without prolonged proximate exposures, population-level impacts are not expected. Although non-impulsive underwater sounds produced during training activities may briefly impact individuals, intermittent exposures to non-impulsive sounds under the No Action Alternative are not expected to impact survival, growth, recruitment, or reproduction of widespread marine invertebrate populations.

## Testing Activities

### Offshore Area

Under the No Action Alternative, testing activities using sonar and other active acoustic sources would occur in the Quinault Range Site surf zone portion of the Study Area (see Figure 2.1-2). Underwater noise from vessels associated with testing would occur throughout the Offshore Area of the Study Area while in transit. Under the No Action Alternative, testing activities using sonar and other active acoustic sources would occur throughout the Offshore Area of the Study Area. Testing activities in the Offshore Area would result in approximately 24 hours of in-water noise from the use of sonar and other active acoustic sources. In addition to the 24 hours, 364 items that produce in-water acoustic noise would be used. The location and number of activities proposed for these testing activities are shown in Tables 2.8-2 and 2.8-3 of Chapter 2 (Description of Proposed Action and Alternatives). Navy vessel noise associated with testing would occur throughout the Offshore Area of the Study Area with 37 vessel movements (see Table 3.8-2). Even with testing activities occurring in a smaller area than training activities, the impacts to marine invertebrates would be the same as for training activities under the No Action Alternative.

### Inland Waters

Under the No Action Alternative, testing activities using sonar and other active acoustic sources would occur throughout Inland Waters of the Study Area. Underwater noise from vessels and aircraft overflights associated with testing would occur in all the range complexes, the training ranges, and throughout the Inland Waters. Certain portions of the Inland Waters, such as areas near Navy ports, installations, and training and testing ranges are used more heavily by vessels and aircraft than other portions of the Study Area.

Testing activities in the Inland Waters would result in approximately 2,061 hours of in-water noise from the use of sonar and other active acoustic sources. In addition to the 2,061 hours, 1,188 items that produce in-water acoustic noise would be used. The location and number of activities proposed for these testing activities are shown in Tables 2.8-2 and 2.8-3 of Chapter 2 (Description of Proposed Action and Alternatives). Navy vessel noise associated with testing would occur in the Inland Waters. Under the No Action Alternative, 337 activities would occur in the inland waters portion of the Study Area (see Table 3.8-2).

As discussed above, most marine invertebrates would not sense mid- or high-frequency sounds, distant sounds, or aircraft noise transmitted through the air-water interface (see Section 3.8.2.2, Invertebrate Hearing and Vocalization). Most marine invertebrates would not be close enough to intense sound sources, such as some sonar, to potentially experience impacts to sensory structures. Any marine invertebrate capable of sensing sound may alter its behavior due to masking of relevant environmental sounds and become disoriented if exposed to non-impulsive sound, although it is unknown if responses to non-impulsive sounds occur. Continuous noise, such as from vessels, may contribute to masking of relevant environmental sounds, such as reef noise. Because the distance over which most marine invertebrates are expected to detect any sounds is limited and vessels would be in transit, any sound exposures with the potential to cause masking or behavioral responses would be brief. Without prolonged proximate exposures, population level impacts are not expected. Although non-impulsive underwater sounds produced during testing activities may briefly impact individuals (disorient), intermittent exposures to non-impulsive sounds under the No Action Alternative are not expected to impact survival, growth, recruitment, or reproduction of widespread marine invertebrate populations.

#### Western Behm Canal, Alaska

Under the No Action Alternative, marine invertebrates would be exposed to vessel noise during testing activities for approximately 28 vessel movements (see Table 3.8-2). The locations and number of activities proposed for testing under the No Action Alternative are shown in Tables 2.8-2 and 2.8-3 of Chapter 2 (Description of Proposed Action and Alternatives). Sounds produced during testing are described in Section 3.0.5.3.1.4 (Vessel Noise).

Any marine invertebrate capable of sensing sound may alter its behavior if exposed to non-impulsive sound, although it is unknown if responses to non-impulsive sounds occur. Continuous noise, such as from vessels, may contribute to masking of relevant environmental sounds, such as reef noise. Because the distance over which most marine invertebrates are expected to detect any sounds is limited and vessels would be in transit, any sound exposures with the potential to cause masking or behavioral responses would be brief. Without prolonged proximate exposures, population-level impacts are not expected. Although non-impulsive underwater sounds produced during testing activities under the No Action Alternative may momentarily impact individuals, intermittent exposures to non-impulsive sounds are not expected to impact survival, growth, recruitment, or reproduction of widespread marine invertebrate populations.

### 3.8.3.1.1.2 Alternative 1

#### <u>Training Activities</u>

#### Offshore Area

Under Alternative 1, marine invertebrates would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources, vessel noise, and aircraft noise during training activities. Training activities in the Offshore Area would increase to approximately 551 hours of in-water noise from the use of sonar and other active acoustic sources, and 1,616 items that produce in-water acoustic noise would be used. The use of vessels would increase from 996 under the No Action Alternative to 1,108 under Alternative 1 in the offshore portion of the Study Area (see Table 3.8-2)

In comparison to the No Action Alternative, the increased use acoustic sources associated with training under Alternative 1 would increase the likelihood of exposure of marine invertebrates to non-impulsive underwater sounds. The expected impacts to any individual marine invertebrates capable of detecting the sound, however, would remain the same. For the same reasons as stated above in No Action Alternative, non-impulsive sounds associated with training under Alternative 1 are not expected to impact marine invertebrates or cause more than a momentary behavioral disturbance (such as disorientation) to those marine invertebrates capable of detecting nearby sound. No population-level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 1.

#### Inland Waters

Under Alternative 1, marine invertebrates would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources, vessel noise, and aircraft noise during training activities. Training activities in the Inland Waters would increase to approximately 407 hours of in-water noise from the use of sonar and other active acoustic sources. The use of vessels would increase from 4 activities under the No Action Alternative to 310 under Alternative 1 (see Table 3.8-2).

In comparison to the No Action Alternative, the increased use of sonar, vessels, and aircraft associated with training under Alternative 1 would increase the likelihood of exposure of marine invertebrates to non-impulsive underwater sounds. The expected impacts to any individual marine invertebrates capable of detecting the sound, however, would be similar to the No Action Alternative. However, due to the increased exposure, there may be the potential for additional impacts. For the same reasons as stated above in No Action Alternative, non-impulsive sounds associated with training activities under Alternative 1 are not expected to impact the majority of marine invertebrates or cause more than a short-term behavioral disturbance (e.g., change in orientation or swim speeds) to some marine invertebrates capable of detecting nearby sound. No population-level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 1.

**Testing Activities**

**Offshore Area**

Under Alternative 1, marine invertebrates would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources, vessel noise, and aircraft noise during testing activities. Testing activities in the Offshore Area would increase to approximately 977 hours of in-water noise from the use of sonar and other active acoustic sources, and 943 items that produce in-water acoustic noise would be used. The use of vessels would increase, from 37 activities under the No Action Alternative to 138 under Alternative 1 (see Table 3.8-2).

In comparison to the No Action Alternative, the increased use of sonar, vessels, and aircraft associated with testing under Alternative 1 would increase the likelihood of exposure of marine invertebrates to non-impulsive underwater sounds. The expected impacts to any individual marine invertebrates capable of detecting the sound, however, would remain the same. As discussed above, most marine invertebrates would not sense distant sounds or aircraft noise transmitted through the air-water interface (see Section 3.8.2.2, Invertebrate Hearing and Vocalization). Most marine invertebrates would not be close enough to intense sound sources to potentially experience impacts to sensory structures. Any marine invertebrate capable of sensing sound may alter its behavior and become disoriented due to masking of relevant environmental sounds if exposed to non-impulsive sound, although it is unknown if responses to non-impulsive sounds occur. Continuous noise, such as from vessels, may contribute to masking of relevant environmental sounds. Because the distance over which most marine invertebrates are expected to detect any sounds is limited and vessels would be in transit, any sound exposures with the potential to cause masking or behavioral responses would last only minutes.

For the same reasons as stated above in No Action Alternative, non-impulsive sounds associated with testing under Alternative 1 are not expected to impact the majority of marine invertebrates or cause more than a short-term behavioral disturbance (e.g., change in orientation or swim speeds) to those marine invertebrates capable of detecting nearby sound. No population-level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 1.

**Inland Waters**

Under Alternative 1, marine invertebrates would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources, vessel noise, and aircraft noise during testing activities. Testing activities in the Inland Waters would increase to approximately 5,448 hours of in-water noise from the use of sonar and other active acoustic sources, and 1,308 items that produce in-water acoustic noise would be used. The use of vessels would increase from 337 activities under the No Action Alternative to 582 under Alternative 1 (see Table 3.8-2).

In comparison to the No Action Alternative, the increased use of sonar, vessels, and aircraft associated with testing under Alternative 1 would increase the likelihood of exposure of marine invertebrates to non-impulsive underwater sounds. The expected impacts to any individual marine invertebrates capable of detecting the sound, however, would be similar to the No Action Alternative. Due to the increased exposure, there may be increased potential for additional impacts. For the same reasons as stated above in No Action Alternative, non-impulsive sounds associated with testing activities under Alternative 1 are not expected to impact most marine invertebrates or cause more than a short-term behavioral disturbance(e.g., change in orientation or swim speeds to some marine invertebrates capable of detecting nearby sound. No population-level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 1.

**Western Behm Canal, Alaska**

Under Alternative 1, marine invertebrates would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources, vessel noise, and aircraft noise during testing activities. Testing activities in the Western Behm Canal would result in approximately 2,762 hours of in-water noise from the use of sonar and other active acoustic sources. The use of vessels would increase from 28 activities under the No Action Alternative to 60 under Alternative 1 (see Table 3.8-2).

Any marine invertebrate capable of sensing sound may alter its behavior if exposed to non-impulsive sound, although it is unknown if responses to non-impulsive sounds occur. Continuous noise, such as from vessels, may contribute to masking of relevant environmental sounds, such as reef noise. Because the distance over which most marine invertebrates are expected to detect any sounds is limited and vessels would be in transit, any sound exposures with the potential to cause masking or behavioral responses would be brief. Without prolonged proximate exposures, population-level impacts are not expected. Although non-impulsive underwater sounds produced during testing activities under the No Action Alternative may momentarily impact individuals, intermittent exposures to non-impulsive sounds are not expected to impact survival, growth, recruitment, or reproduction of widespread marine invertebrate populations.

#### 3.8.3.1.1.3 Alternative 2

**<u>Training Activities</u>**

**Offshore Area**

Under Alternative 2, marine invertebrates would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources, vessel noise, and aircraft noise during training activities. Training activities in the Offshore Area would increase to approximately 551 hours of in-water noise from the use of sonar and other active acoustic sources, and 1,616 items that produce in-water acoustic noise would be used. The use of vessels would remain 1,108, the same as under Alternative 1 (i.e., an increase from 996 under the No Action Alternative to 1,108 under Alternative 1 in the offshore portion of the Study Area [see Table 3.8-2]).

In comparison to the No Action Alternative, the increased use of sonar, vessels, and aircraft associated with training under Alternative 2 would increase the likelihood of exposure of marine invertebrates to non-impulsive underwater sounds. The expected impacts to any individual marine invertebrates capable of detecting the sound, however, would remain the same. For the same reasons as stated above in the No Action Alternative, non-impulsive sounds associated with training under Alternative 2 are not expected to impact the majority of marine invertebrates or cause more than a momentary disturbance to those marine invertebrates capable of detecting nearby sound. No population -level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 2.

### Inland Waters

Under Alternative 2, marine invertebrates would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources, vessel noise, and aircraft noise during training activities. Training activities in the Inland Waters would increase to approximately 407 hours of in-water noise from the use of sonar and other active acoustic sources. The use of vessels would remain 310, the same as under Alternative 1 (i.e., an increase from 4 activities under the No Action Alternative to 310 under Alternative 1 in the Inland Waters of the Study Area [see Table 3.8-2]).

## Testing Activities

### Offshore Area

Under Alternative 2, marine invertebrates would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources, vessel noise, and aircraft noise during testing activities. Testing activities in the Offshore Area would increase to approximately 1,073 hours of in-water noise from the use of sonar and other active acoustic sources, and 1,024 items that produce in-water acoustic noise would be used. That is an increase from approximately 24 hours and 364 items under the No Action Alternative. The use of vessels would increase from 37 activities under the No Action Alternative to 162 under Alternative 1 (see Table 3.8-2).

In comparison to the No Action Alternative and Alternative 1, the increased use of sonar, vessels, and aircraft associated with testing under Alternative 2 would increase the likelihood of exposure of marine invertebrates to non-impulsive underwater sounds. The expected impacts to any individual marine invertebrates capable of detecting the sound, however, would remain the same. For the same reasons as stated in the No Action Alternative, non-impulsive sounds associated with testing under Alternative 1 are not expected to impact the majority of marine invertebrates or cause more than a momentary behavioral disturbance (e.g., a change in swim speed) to those marine invertebrates capable of detecting nearby sound. No population-level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 2.

### Inland Waters

Under Alternative 2, marine invertebrates would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources, vessel noise, and aircraft noise during testing activities. Testing activities in the Inland Waters would increase to approximately 5,939 hours of in-water noise from the use of sonar and other active acoustic sources, and 1,410 items that produce in-water acoustic noise would be used. The use of vessels would increase from 337 activities under the No Action Alternative to 640 under Alternative 2 (see Table 3.8-2).

In comparison to the No Action Alternative and Alternative 1, the increased use of sonar, vessels, and aircraft associated with testing under Alternative 2 would increase the likelihood of exposure of marine invertebrates to non-impulsive underwater sounds. The expected impacts to any individual marine invertebrates capable of detecting the sound, however, would remain similar to Alternative 1. However, due to the increased exposure, there may be the potential for additional impacts. For the same reasons as stated above in Alternative 1, non-impulsive sounds associated with testing under Alternative 2 are not expected to impact most marine invertebrates or cause more than a momentary behavioral disturbance (e.g., a change in swim speed) to some marine invertebrates capable of detecting nearby sound. No population-level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 2.

#### Western Behm Canal, Alaska

Under Alternative 2 marine invertebrates would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources, and vessel noise during testing activities. Testing activities in the Western Behm Canal would result in approximately 3,838 hours of in-water noise from the use of sonar and other active acoustic sources, an increase from 28 hours under the No Action Alternative. The use of vessels would increase from 28 activities under the No Action Alternative to 83 under Alternative 2 (see Table 3.8-2).

In comparison to Alternative 1, the increased use of vessels associated with testing under Alternative 2 in the Western Behm Canal portion of the Study Area would increase the likelihood of exposure of marine invertebrates to non-impulsive underwater sounds. The expected impacts to any individual marine invertebrates capable of detecting the sound, however, would remain the same. For the same reasons as stated above in Alternative 1, non-impulsive sounds associated with testing under Alternative 2 are not expected to impact most marine invertebrates or cause more than a momentary behavioral disturbance (e.g., change in swim speed) to some marine invertebrates capable of detecting nearby sound. No population-level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 2.

### 3.8.3.1.1.4 Substressor Impact on Sedentary Invertebrate Beds and Reefs as Essential Fish Habitat (Preferred Alternative)

Pursuant to the Essential Fish Habitat (EFH) requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of sonar and other active acoustic sources during training and testing activities would have no adverse effect on sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern within the Study Area. The EFH Assessment can be found on the NWTT EIS/OEIS website at nwtteis.com.

### 3.8.3.1.2 Impacts from Underwater Explosives and Other Impulsive Sources

Explosions, weapons firing, launch, and impact of ordnance on the water surface, as well as airguns, introduce loud, impulsive, broadband sounds into the marine environment. Impulsive sources are characterized by rapid pressure rise times and high peak pressures. Explosions produce high-pressure shock waves that could cause injury or physical disturbance due to rapid pressure changes. Some other impulsive sources, such as airguns, also produce shock waves, but of lower intensity. Impulsive sounds are usually brief, but the associated rapid pressure changes can injure or startle marine invertebrates.

Limited studies have examined mortality rates of crustaceans at various distances from detonations in shallow water (Aplin 1947; Chesapeake Biological Laboratory 1948; Gaspin et al. 1976). Similar studies of mollusks have shown them to be more resistant than crustaceans to explosive impacts (Chesapeake Biological Laboratory 1948; Gaspin et al. 1976). Other invertebrates found in association with mollusks, such as sea anemones, polychaete worms, isopods, and amphipods, were observed to be undamaged in areas near detonations (Gaspin et al. 1976). Using data from these experiments, Young (1991) developed curves that estimate the distance from an explosion beyond which at least 90 percent of certain marine invertebrates would survive, depending on the weight of the explosive (Figure 3.8-3).

In deeper waters where most detonations would occur near the water surface, most benthic marine invertebrates would be beyond the 90 percent survivability ranges shown above, even for larger quantities of explosives. In addition, most detonations would occur near the water surface, releasing a portion of the explosive energy into the air rather than the water and reducing impacts to marine invertebrates throughout the water column. The number of organisms affected would depend on the size of the explosive, the distance from the explosion, and the presence of groups of pelagic invertebrates. In addition to trauma caused by a shock wave, organisms could be killed in an area of cavitation that forms near the surface above large underwater detonations. Cavitation is where the reflected shock wave creates a region of negative pressure followed by a collapse, or water hammer (see Section 3.0.4, Introduction to Acoustics).

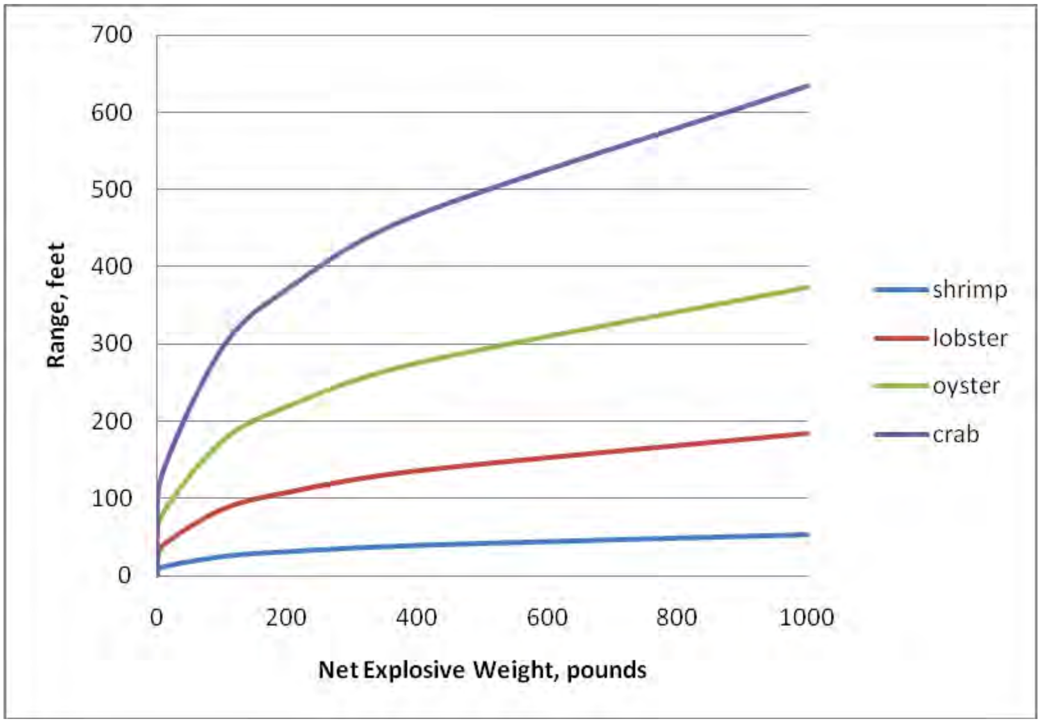


**Figure 3.8-3: Prediction of Distance to 90 Percent Survivability of Marine Invertebrates Exposed to Underwater Explosions (Young 1991)**

Some charges are detonated in shallow water or near the seafloor, including explosive ordnance demolition charges and some explosions associated with mine warfare. In addition to injuring nearby organisms, a blast near the bottom could potentially disturb hard substrate suitable for colonization (see Section 3.3.3.1, Acoustic Stressors). An explosion in the near vicinity of hard corals could cause fragmentation and siltation of the mollusk beds. Live hard bottom (such as shallow coral reefs and mollusk beds) are avoided during activities involving explosives and precision anchoring exercises (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring).

Firing weapons on a ship generates sound by firing the gun (muzzle blast), the shell flying through the air, and vibration from the blast propagating through the ship's hull (see Section 3.0.5.3.1.3, Weapons Firing, Launch, and Impact Noise). In addition, larger non-explosive munitions and targets could produce loud impulsive noise when hitting the water, depending on the size, weight, and speed of the object at impact (McLennan 1997). Small- and medium-caliber munitions are not expected to produce substantial impact noise.

At a distance, impulses lose their high pressure peak and take on characteristics of non-impulsive acoustic waves. Similar to the impacts expected for non-impulsive sounds discussed previously, it is expected these exposures would cause no more than brief startle reactions in some marine invertebrates.

No underwater explosions or weapons firing would take place for any training or testing activity under any proposed alternative in the Western Behm Canal portion of the Study Area. Therefore, explosions or weapons firing would have no impact to marine invertebrates under any alternative.

#### 3.8.3.1.2.1 No Action Alternative

**Training Activities**

The number of training events using explosives, weapons firing, launches, and non-explosive munitions and their proposed locations is presented in Tables 3.0-21 and 3.0-22. A discussion of explosives and the number of detonations in each source class is provided in Section 3.0.5.3.1.2 (Explosives). The types of noise produced during weapons firing, launches, and non-explosive munitions impact are discussed in Section 3.0.5.3.1.3 (Weapons Firing, Launch, and Impact Noise).

**Offshore Area**

Under the No Action Alternative, marine invertebrates would be exposed to explosions at or beneath the water surface and underwater impulsive noise from weapons firing, launches, and impacts of non-explosive munitions during training activities. Noise would be produced by explosions, weapons firing, launches, and impacts of non-explosive munitions throughout the Offshore Area of the Study Area.

In general, explosive events would consist of a single explosion or a few smaller explosions over a short period. Some marine invertebrates close to a detonation would likely be killed, injured, damaged, or displaced. Most detonations would occur greater than 12 nautical miles (nm) from shore, and less than 1 percent would occur in Inland Waters. As water depth increases away from shore, benthic and pelagic invertebrates would be less likely to be impacted by detonations at or near the surface. Pelagic marine invertebrates are generally disturbed, rather than struck, as the water flows around the vessel or in-water device. Shockwaves created by explosions would impact invertebrates in a similar way, causing them to be disturbed rather than struck as water flows from around the explosion. In addition, detonations near the surface would release a portion of their explosive energy into the air, reducing the explosive impacts in the water.

Many corals and hardbottom invertebrates are sessile, fragile, and particularly vulnerable to shock wave impacts. Many of these organisms are slow-growing and could require decades to recover (Precht et al. 2001). Explosive impacts on benthic invertebrates are more likely when an explosive is large compared to the water depth or when an explosive is detonated at or near the bottom; however, under the No Action Alternative in the offshore portion of the Study Area, explosions would occur at or near the water surface of deep waters as they are meant to explode in the water column, and not on the seafloor, reducing the likelihood of bottom impacts.

Noise produced by weapons firing, launches, and impacts of non-explosive munitions would consist of a single or several impulses over a short period and would likely not be injurious. Some marine invertebrates may be sensitive to the low-frequency component of impulsive sound, and they may exhibit startle reactions or temporary changes in swim speed in response to an impulsive exposure. Because exposures are brief, limited in number, and spread over a large area, no long-term impacts due to explosions are expected under the No Action Alternative. Although individual marine invertebrates may be injured or killed during an explosion, no long-term impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected from training activities under the No Action Alternative.

#### Inland Waters

Under the No Action Alternative, marine invertebrates would be exposed to explosions at or beneath the water during training activities. Noise could be produced by explosions and weapons firing in the Inland Waters of the Study Area.

Explosive events under the No Action Alternative would consist of a single explosion. Some marine invertebrates close to a detonation would likely be killed, injured, damaged, or displaced. The detonations would occur in Hood Canal and Crescent Harbor. As water depth increases away from the shoreline, benthic invertebrates would be less likely to be impacted by detonations at or near the surface.

Many hardbottom invertebrates are sessile, fragile, and particularly vulnerable to shock wave impacts. Many of these organisms are slow-growing and could require decades to recover (Precht et al. 2001). Explosive impacts on benthic invertebrates are more likely when an explosive is large compared to the water depth or when an explosive is detonated at or near the bottom; however, under the No Action Alternative in the offshore portion of the Study Area, most explosions would occur at or near the water surface over soft bottom areas of deep waters and, as they are meant to explode in the water column, and not on the seafloor, that would further reduce the likelihood of bottom impacts.

Because exposure to explosions would be brief and limited in number, no population level impacts from training activities are expected under the No Action Alternative. Although individual marine invertebrates may be injured or killed during an explosion, no population level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under the No Action Alternative.

#### Testing Activities

#### Offshore Area

Under the No Action Alternative, no testing activities involving explosions would occur in the Offshore Area of the Study Area. Therefore, marine invertebrates would not be exposed to explosions during testing activities.

#### Inland Waters

Under the No Action Alternative, marine invertebrates would not be exposed to explosions or weapons firing during testing activities in the Inland Waters of the Study Area. Therefore, explosions would have no impact to marine invertebrates under the No Action Alternative.

### 3.8.3.1.2.2 Alternative 1

#### Training Activities

#### Offshore Area

Under Alternative 1, marine invertebrates would be exposed to explosions at or beneath the water surface and underwater impulsive noise from weapons firing, launches, and impacts of non-explosive munitions during training activities in the Offshore Area of the Study Area. Although the number of explosives used in training activities would decrease by about 32 percent compared to training activities under the No Action Alternative, these activities would generally occur in the same areas as under the No Action Alternative (see Table 3.8-2).

Marine invertebrates could be exposed to explosions at or near the water surface and underwater impulsive noise due to weapons firing, launches, and non-explosive munitions impacts under Alternative 1; however, the type of impacts to individual marine invertebrates from training activities are expected to remain the same as those described above in the No Action Alternative. Even though individual marine invertebrates may be injured or killed during an explosion, no population level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 1.

#### Inland Waters

Under Alternative 1, marine invertebrates would be exposed to explosions at or beneath the water surface and underwater impulsive noise from weapons firing during training activities in the Inland Waters.

Explosives training would increase from two 2.5 lb. and two 1.5 lb. underwater detonations at Crescent Harbor and Hood Canal under the No Action Alternative, respectively, to three 2.5 lb. underwater detonations at each location under Alternative 1. Additionally, under Alternative 1, six annual events would take place (three each at Crescent Harbor and Hood Canal) in which up to six shock wave action generators (SWAG) would be used per event. No SWAG events occur under the No Action Alternative. Each SWAG consists of a small explosive charge of less than one-half ounce. Of the increase in underwater detonations from the No Action Alternative to Alternative 1, 36 of the 38 would be these much smaller SWAG detonations.

Training in which weapons firing occurs includes two new activities under Alternative 1 that would not occur under the No Action Alternative. Four surface-to-surface gunnery exercises would take place annually in which a total of 1,500 small-caliber blank rounds would be fired. Although this exercise involves only blanks, the weapons firing noise is similar to that when actual rounds are fired. The second new activity is a small boat attack exercise proposed to occur once per year at Naval Station Everett, Naval Base (NAVBASE) Kitsap Bangor, or NAVBASE Kitsap Bremerton. In this activity, 3,000 small-caliber blank rounds would be fired.

More marine invertebrates could be exposed to explosions at or near the water surface and underwater impulsive noise due to weapons firing, launches, and non-explosive munitions impacts; however, the type of impacts from training activities to individual marine invertebrates under Alternative 1 are expected to remain the same as those described above in the No Action Alternative. Even though individual marine invertebrates may be injured or killed during an explosion, no population level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected.

### Testing Activities

#### Offshore Area

Under Alternative 1, marine invertebrates would be exposed to explosions at or beneath the water surface and underwater impulsive sounds due to explosive and non-explosive munitions used during testing activities conducted by Naval Sea Systems Command (NAVSEA) and Naval Air Systems Command (NAVAIR) (see Tables 2.8-2 and 2.8-3).

The only explosives that would be used in the Offshore Area would be beyond 12 nm from shore, due to testing activities using explosive sonobuoys and explosive torpedoes. The number of explosive sonobuoys used in testing activities would increase from 0 in the No Action Alternative to 148 in Alternative 1. The number of explosive torpedoes would increase from zero in the No Action Alternative to six in Alternative 1.

Although more marine invertebrates would be exposed to explosions and impulsive noise due to weapons firing, launches, and non-explosive munitions impacts under Alternative 1, the type of impacts to individual marine invertebrates from testing activities are expected to remain the same as those described for training. Because impulsive exposures are brief, limited in number, and spread over a large area, no population level impacts due to startle reactions are expected under Alternative 1. Although individual marine invertebrates may be injured or killed during an explosion, no population level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 1.

**Inland Waters**

Under Alternative 1, no underwater explosions or weapons firing testing activities would take place in the Inland Waters. Therefore, the impacts would be the same as those described under the No Action Alternative.

#### 3.8.3.1.2.3 Alternative 2

**<u>Training Activities</u>**

**Offshore Area**

Under Alternative 2, the number of training activities and number of underwater explosions would be the same as under Alternative 1 in the Offshore Area of the Study Area. Therefore, Alternative 2 would have the same impacts as under Alternative 1 in the Offshore Area.

**Inland Waters**

Under Alternative 2, the type and number of training activities involving weapons firing and underwater explosions in the Inland Waters would be the same as under Alternative 1. Therefore, Alternative 2 would have the same impacts as under Alternative 1.

**<u>Testing Activities</u>**

**Offshore Area**

Under Alternative 2, marine invertebrates would be exposed to explosions at or beneath the water surface and increased amounts of underwater impulsive sounds due to explosive and non-explosive munitions used during testing activities.

The only explosives that would be used in the Offshore Area due to testing activities would be explosive sonobuoys and explosive torpedoes. The number of explosive sonobuoys used in testing activities would increase from 0 in the No Action Alternative to 164 in Alternative 2. The number of explosive torpedoes would increase from zero in the No Action Alternative to eight in Alternative 2.

Although more marine invertebrates could be exposed to explosions and impulsive noise due to explosive and non-explosive munitions impacts, the type of impacts to individual marine invertebrates from testing activities are expected to remain the same as those described above in Alternative 1. Because impulsive exposures are brief, limited in number, and spread over a large area, no long-term impacts due to startle reactions are expected under Alternative 2. Although individual marine invertebrates may be injured or killed during an explosion, no population level impacts on the survival, growth, recruitment, or reproduction of marine invertebrate populations are expected under Alternative 2.

#### Inland Waters

Under Alternative 2, no underwater explosions or weapons firing testing activities would take place in the Inland Waters; therefore, Alternative 2 would have the same impacts as under the No Action Alternative.

##### 3.8.3.1.2.4 Substressor Impact on Sedentary Invertebrate Beds and Reefs as Essential Fish Habitat (Preferred Alternative)

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of explosives and other impulsive sources during training and testing activities may have an adverse effect on EFH by reducing the quality or quantity of sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern. The use of other impulsive sources (weapons firing, launch, and impact noise) during training and testing activities would not have an adverse effect on EFH by reducing the quality or quantity of sedentary invertebrate beds or offshore reefs that constitute EFH or Habitat Areas of Particular Concern within the Study Area. The EFH Analysis is located on the NWTT EIS website, www.nwtteis.com.

#### 3.8.3.1.3 Summary of Effects from Acoustic Stressors

Under the No Action Alternative, Alternative 1, or Alternative 2, exposures to sound-producing and explosive stressors would occur within the Study Area. The Navy identified and analyzed the following acoustic and explosive stressors that could impact marine invertebrates: sonar, other active acoustic sources, vessel noise, aircraft noise, noise from explosions, weapons firing, weapons launches, and non-explosive water surface impact noise. Both pelagic and benthic marine invertebrates could be impacted by these stressors. In most cases, marine invertebrates would not respond to impulsive and non-impulsive sounds, although they may detect and briefly respond to nearby low-frequency sounds. These short-term responses would likely be inconsequential. Explosions could kill or injure nearby marine invertebrates. Explosions near the seafloor and very large explosions in the water column may impact shallow-water corals, mollusk beds, hardbottom habitat and associated marine invertebrates, and deep-water corals from physical disturbance, fragmentation, or mortality. Most explosions at the water surface would not injure benthic marine invertebrates because the explosive weights would be small compared to the water depth.

### 3.8.3.2 Energy Stressors

This section analyzes the potential impacts of the various types of energy stressors that can occur during training and testing activities within the Study Area. This section includes analysis of the potential impacts from electromagnetic devices.

#### 3.8.3.2.1 Impacts from Electromagnetic Devices

Several different types of electromagnetic devices are used during training activities. For a discussion of the types of activities that use electromagnetic devices, where they are used, and how many activities would occur under each alternative, see Section 3.0.5.3.2.1 (Electromagnetic). Aspects of electromagnetic stressors that are applicable to marine organisms in general are presented in Appendix G, Section G.2 (Conceptual Framework for Assessing Effects from Energy-Producing Activities).

Little information exists about marine invertebrates' susceptibility to electromagnetic fields. Some arthropods (e.g., spiny lobster and American lobster) can sense magnetic fields, and this ability is thought to assist the animal with navigation and orientation (Lohmann et al. 1995, Normandeau et al. 2011). These animals travel relatively long distances during their lives, and magnetic field sensation may exist in other invertebrates that travel long distances. Marine invertebrates, including several commercially important species and federally managed species, could use magnetic cues (Normandeau et al. 2011). Susceptibility experiments have focused on arthropods, but several mollusks and echinoderms are also susceptible. However, because susceptibility is variable within taxonomic groups it is not possible to make generalized predictions for groups of marine invertebrates. Sensitivity thresholds vary by species ranging from 0.3 to 30 milliteslas, and responses included non-lethal physiological and behavioral changes (Normandeau et al. 2011). The primary use of magnetic cues seems to be navigation and orientation. Human-introduced electromagnetic fields could disrupt these cues and interfere with navigation, orientation, or migration. Because electromagnetic fields weaken exponentially with increasing distance from their source, large and sustained magnetic fields present greater exposure risks than small and transient fields, even if the small field is many times stronger than the earth's magnetic field (Normandeau et al. 2011). Transient or moving electromagnetic fields may cause temporary disturbance to susceptible organisms' navigation and orientation.

No testing activities would involve the use of electromagnetic devices under any alternative. Therefore, only training activities will be evaluated.

No training activities in the Offshore Area of the Study Area would involve electromagnetic devices under any alternative. Therefore, electromagnetic devices would have no impact to marine invertebrates in the Offshore Area under any alternative.

#### 3.8.3.2.1.1 No Action Alternative

**<u>Training Activities</u>**

**Inland Waters**

No training or testing activities involving electromagnetic devices would occur in the Inland Waters under the No Action Alternative. Therefore, electromagnetic devices would have no impact to marine invertebrates under the No Action Alternative.

#### 3.8.3.2.1.2 Alternative 1

**<u>Training Activities</u>**

**Inland Waters**

Table 3.0-16 lists the number and location of training activities that use electromagnetic devices. As indicated in Section 3.0.5.3.2.1 (Electromagnetic), under Alternative 1, training activities involving electromagnetic devices occur during Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise as part of mine warfare. Training activities that use electromagnetic devices would occur in the Inland Waters portion of the Study Area once every other year.

The impact of electromagnetic fields on marine invertebrates under Alternative 1 would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the number of activities involving the stressor is low; (3) exposures would be localized, temporary, and would cease with the conclusion of the activity; and (4) even for susceptible invertebrates (e.g., some species of arthropods, mollusks, and echinoderms), the consequences of exposure are limited to temporary disruptions to navigation and orientation under Alternative 1.

#### 3.8.3.2.1.3 Alternative 2

**Training Activities**

**Inland Waters**

Table 3.0-16 lists the number and location of training activities that use electromagnetic devices. As indicated in Section 3.0.5.3.2.1 (Electromagnetic), under Alternative 2, training activities involving electromagnetic devices occur during Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise as part of mine warfare. Training activities that use electromagnetic devices would occur in the Inland Waters portion of the Study Area and would increase to once per year, compared to once every other year under the No Action Alternative.

The impact of electromagnetic fields on marine invertebrates would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the number of activities involving the stressor is low; (3) exposures would be localized, temporary, and would cease with the conclusion of the activity; and (4) even for susceptible invertebrates (e.g., some species of arthropods, mollusks, and echinoderms) the consequences of exposure are limited to temporary disruptions to navigation and orientation under Alternative 2.

#### 3.8.3.2.1.4 Substressor Impacts on Sedentary Invertebrate Beds or Reefs as Essential Fish Habitat

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of electromagnetic devices during training and testing activities would have minimal and temporary adverse effects on invertebrates that occupy water column EFH or Habitat Areas of Particular Concern, and would have no adverse effect on sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern within the Study Area. The EFH Analysis is located on the NWTT EIS website, www.nwtteis.com.

### 3.8.3.2.2 Summary of Effects from Energy Stressors

Exposures to energy stressors are limited spatially and temporally. Available evidence suggests that many marine invertebrates are not susceptible to electromagnetic fields. If susceptible invertebrates are near an electromagnetic source and if they sense the electromagnetic field, it could interfere with navigation and orientation. Because exposures would be temporary and cease with the conclusion of the activity, electromagnetic sources would not impede or disrupt the overall ability of marine invertebrates to navigate, orient, or migrate.

### 3.8.3.3 Physical Disturbance and Strike

This section analyzes the potential impacts of the various types of physical disturbance and strike stressors used by Navy during training and testing activities within the Study Area. For a list of locations and numbers of activities that may cause physical disturbance and strikes refer to Section 3.0.5.3.3 (Physical Disturbance and Strike Stressors). The physical disturbance and strike stressors that may impact marine invertebrates include (1) vessels and in-water devices, (2) military expended materials, and (3) seafloor devices.

Most marine invertebrate populations extend across wide areas containing hundreds or thousands of discrete patches of suitable habitat. Sessile (attached to the seafloor) invertebrate populations may be maintained by complex currents that carry adults and young from place to place. Such widespread populations are difficult to evaluate in terms of Navy training and testing activities that occur in relatively small areas of the Study Area. In this context, a physical strike or disturbance would impact individual organisms directly or indirectly, but not to the extent that the viability of populations or species would be impacted.

Activities involving vessels and in-water devices are not intended to contact the seafloor; there is no potential strike impact and limited potential disturbance impact on benthic or habitat-forming marine invertebrates.

With the exception of corals, mollusk beds, and other sessile benthic invertebrates, most invertebrate populations recover quickly from disturbance. Many large invertebrates, such as crabs, shrimps, and clams, undergo massive disturbance during commercial and recreational harvests. Other invertebrates, such as the small soft-bodied organisms that live in the bottom sediment, are thought to be well-adapted to natural physical disturbances, although recovery from some human-induced disturbances such as trawl fishing can be delayed by decades or more (Lindholm et al. 2011). Both of these populations would recover from a strike or other disturbance on scales of weeks to years. Biotic habitats, such as deep-sea coral and sponge communities, may take decades to re-grow following a strike or disturbance (Precht et al. 2001).

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

The majority of the training activities under all the alternatives involve vessels, and a few of the activities involve the use of in-water devices. For a listing of the number and location of activities that use vessels and in-water devices, see Tables 3.0-18 and 3.0-20. See Table 3.0-17 for a representative list of Navy vessel sizes and speeds and Table 3.0-19 for the types, sizes, and speeds of Navy in-water devices used in the Study Area.

Vessels and in-water devices could impact marine invertebrates by disturbing the water column or sediments, or directly striking organisms (Bishop 2008). The propeller wash (water displaced by propellers used for propulsion) from vessel movement and water displaced from vessel hulls could disturb marine invertebrates in the water column, and is a likely cause of zooplankton mortality (Bickel et al. 2011). This local and short-term exposure to vessel and propeller movements could displace, injure, or kill zooplankton, invertebrate eggs or larvae, and macro-invertebrates in the upper portions of the water column.

Few sources of information are available on the impact of non-lethal chronic disturbance on marine invertebrates. One study of seagrass-associated marine invertebrates, such as amphipods and polychaetes, found that chronic disturbance from vessel wakes resulted in the long-term displacement of some marine invertebrates from the impacted area (Bishop 2008). Impacts of this type resulting from repeated exposure in shallow water are not likely to result from Navy training and testing activities because (1) most vessel movements occur in relatively deep water, and (2) vessel movements are concentrated in well-established port facilities and associated channels (Mintz and Parker 2006).

Vessels and towed in-water devices do not normally collide with invertebrates that inhabit the seafloor because Navy vessels have navigational capabilities to avoid contact with these habitats. A consequence of vessel operation in shallow water is increased turbidity from resuspending bottom sediments. Turbidity can impact invertebrate communities on hardbottom areas by reducing the amount of light that reaches these organisms and by clogging siphons for filter feeding organisms. Encrusting organisms residing on hardbottom can be impacted by persistent silting from increased turbidity. In addition, propeller wash and accidental physical contact with hardbottom areas can cause structural damage to the substrate as well as mortality to encrusting organisms. While information on the frequency of vessel operations in shallow water is not adequate to support a specific risk assessment, typical navigational procedures minimize the likelihood of contacting the seafloor, and most Navy vessel movements in nearshore waters are confined to established channels and ports, or predictable transit lanes. Pelagic marine invertebrates are generally disturbed, rather than struck, as the water flows around the vessel or in-water device.

Unmanned underwater vehicles travel at relatively low speeds, and are smaller than most vessels, making the risk of strike or physical disturbance to marine invertebrates very low. These in-water devices would occur primarily over soft-bottom habitats; their effect would be temporary and localized, very short in duration, and would not alter the habitat's ability to function, although they would create a temporary disturbance in the vicinity of the device. Zooplankton, invertebrate eggs or larvae, and macro-invertebrates in the water column could be displaced, injured, or killed by unmanned underwater vehicle movements.

Potential impacts of precision anchoring are qualitatively different than other seafloor devices because the activity involves repeated disturbance to the same area of seafloor. Precision anchoring occurs in long-established soft-bottom areas that have a history of disturbance by anchors, and continued exposure is likely to be inconsequential and not detectable.

There are no training activities proposed in the Western Behm Canal portion of the Study Area under any Alternative. Therefore, vessels and in-water devices would have no impact on marine invertebrates under any Alternative.

#### 3.8.3.3.1.1 No Action Alternative

**<u>Training Activities</u>**

As indicated in Sections 3.0.5.3.3.1 (Vessels) and 3.0.5.3.3.2 (In-Water Devices), the training activities include vessels and in-water devices.

**Offshore Area**

Under the No Action Alternative, activities that include in-water devices would occur during training activities in the Offshore Area.

Species that do not occur near the surface within the Study Area would not be exposed to vessel strikes. Species that do occur near the surface within the Study Area would have the potential to be exposed to vessel strikes. Large, slow vessels would pose little risk to marine invertebrates in the open ocean although, in coastal waters, currents from large vessels may cause resuspension and settlement of sediment onto sensitive invertebrate communities. Vessels travelling at high speeds would generally pose more of a risk through propeller action in shallow waters.

There would be a higher likelihood of vessel strikes over the continental shelf portions of the Study Area because of the concentration of vessel movements in those areas. Exposure of marine invertebrates to vessel disturbance and strikes is primarily limited to organisms in the uppermost portions of the water column. Invertebrates that occur on the seafloor, including hardbottom and deep-water corals, are not likely to be exposed to this stressor because they typically occur at depths greater than that potentially impacted by vessels.

The impact of vessels on marine invertebrates under the No Action Alternative would be inconsequential because (1) the area exposed to the stressor amounts to a small portion of each vessel's footprint, and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Training activities involving vessels are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### Inland Waters

Within the Inland Waters, these activities would be more concentrated near naval ports, piers and ranges. The vessels used in the Inland Waters during training would be small boats and submersibles. Under the No Action Alternative, four activities that include vessel movement would occur during training activities in the Inland Waters; no activities would include in-water devices.

Vessels travelling at high speeds would generally pose more of a risk through propeller action in shallow waters. Under the No Action Alternative, these shallow-water vessels would continue to operate in defined boat lanes with sufficient depths to avoid propeller or hull strikes of benthic invertebrates.

Under the No Action Alternative, the impact of vessels and in-water devices on marine invertebrates would be inconsequential because (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint, and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is very low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Training activities involving vessels and in-water devices are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

### Testing Activities

#### Offshore Area

Under the No Action Alternative, 39 activities that include vessel movement and 38 activities that include in-water devices would occur during testing activities in the Offshore Area. Surf zone activities would occur in the Offshore Area of the Study Area at Pacific Beach in the Quinault Range Site, which extends north to south 5 nm along the eastern boundary of W-237A, approximately 3 nm to shore along the mean low water line, and encompasses 1 mi. (1.6 km) of shoreline at Pacific Beach, Washington. Surf zone activities would be conducted from an area on the shore going toward the sea. Surf zone activities include the use of bottom-crawling unmanned vehicles and have the potential to affect marine invertebrates located on the seafloor or floating in the water column, since the crawlers are moving through the water column.

The impact of vessels and in-water devices on marine invertebrates under the No Action Alternative would be inconsequential because (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint, and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Testing activities involving vessels and in-water devices are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### Inland Waters

Within the Inland Waters, these activities would be more concentrated near naval ports, piers, and ranges. Some of these activities would involve the use of in-water devices that may crawl along the sea floor. Under the No Action Alternative, 339 activities that include vessel movement and 377 activities that include in-water devices would occur during testing activities, and no activities using crawlers would occur in the Inland Waters.

The impact of vessels and in-water devices on marine invertebrates would be inconsequential because (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint, and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Testing activities involving vessels and in-water devices are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### Western Behm Canal, Alaska

Within the Western Behm Canal portion of the Study Area, these activities would only involve vessel movements. Under the No Action Alternative, 28 annual testing activities that include vessel movement would occur in the Western Behm Canal and 0 activities that include in-water devices would occur during testing activities.

The impact of vessels on marine invertebrates in the Western Behm Canal portion of the Study Area would be inconsequential because (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint, and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Testing activities involving vessels and in-water devices are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

### 3.8.3.3.1.2 Alternative 1

#### Training Activities

#### Offshore Area

The vessels and in-water devices used during training activities under Alternative 1 would increase from 1,390 activities under the No Action Alternative to 1,609 activities. These activities would be widely dispersed throughout the Offshore Area of the Study Area.

Despite the increase in training activities over the No Action Alternative, the impact of vessels and in-water devices on marine invertebrates would be inconsequential because (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint, and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Under Alternative 1, activities involving vessels and in-water devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### Inland Waters

These activities could be widely dispersed throughout the Inland Waters, but would be more concentrated near naval ports, piers, and ranges. Activities involving vessels and in-water devices would increase from four under the No Action Alternative to 310 under Alternative 1 (see Table 3.8-2).

The vessels and in-water devices used during training activities under Alternative 1 would be similar to those described under the No Action Alternative; however, there would be an increase in activities from the No Action Alternative to Alternative 1. The impact of vessels and in-water devices on marine invertebrates would be inconsequential because (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Training activities involving vessels and in-water devices are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

### Testing Activities

#### Offshore Area

Vessel movements and in-water devices used during NAVSEA testing activities (Table 3.8-2) include new activities not proposed under the No Action Alternative, including explosive torpedo testing, countermeasure testing, and anti-submarine warfare testing. However, each of these new activities is similar to training or testing that is historically conducted in the Offshore Area. Under Alternative 1, 158 activities that include vessel movement and 134 activities that include in-water devices would occur during testing activities, representing increases of 119 and 96 annual activities from the No Action Alternative, respectively.

Similar to testing activities under the No Action Alternative, the impact of vessels and in-water devices on marine invertebrates would be inconsequential because (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint, and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Under Alternative 1, testing activities involving vessels and in-water devices are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### Inland Waters

Within the Inland Waters, these activities would be more concentrated near naval ports, piers and ranges. Some of these activities would involve the use of in-water devices that may crawl along the sea floor. Activities involving vessels and in-water devices would increase from 716 under the No Action Alternative to 1,230 under Alternative 1. Despite this increase, the impact of vessels and in-water devices on marine invertebrates would be minimal because (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Testing activities involving vessels and in-water devices are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### Western Behm Canal, Alaska

Navy vessel movements would occur in the Western Behm Canal portion of the Study Area during testing activities under Alternative 1. These activities would increase from 28 under the No Action Alternative to 60 under Alternative 1. No activities involving in-water devices would occur in the Western Behm Canal.

Despite this increase, the impact of vessels on marine invertebrates under Alternative 1 would be inconsequential because (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint, and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Testing activities involving vessels are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

### 3.8.3.3.1.3 Alternative 2

#### Training Activities

#### Offshore Area

Under Alternative 2, training activities would be the same quantity as Alternative 1. Therefore, Alternative 2 would have the same impacts to marine invertebrates as under Alternative 1.

#### Inland Waters

Under Alternative 2, training activities involving vessels and in-water devices would be consistent with Alternative 1 (see Table 3.8-2) as the numbers of activities are the same. Therefore, Alternative 2 would have the same impacts to marine invertebrates as under Alternative 1.

#### Testing Activities

#### Offshore Area

Under Alternative 2, 187 activities that include vessel movement and 158 activities that include in-water devices would occur during testing activities. Although the tempo of activities increases slightly, and more individuals could be affected, the overall population impacts are the same as under Alternative 1 because of the short duration of events, the time for recovery between events, and the very limited portion of the population affected. Under Alternative 2, testing activities would be consistent with Alternative 1. Therefore, Alternative 2 would have the same effects as under Alternative 1.

#### Inland Waters

The vessels and in-water devices used during testing activities under Alternative 2 would increase by approximately 10 percent but are similar to those described under Alternative 1. Despite this slight increase, impacts from testing activities under Alternative 2 would be similar to Alternative 1 for these reasons: (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Therefore, impacts to marine invertebrates under Alternative 2 from vessel strikes and in-water devices would be similar to Alternative 1.

#### Western Behm Canal, Alaska

Navy vessel movements would occur in the Western Behm Canal portion of the Study Area during testing activities under Alternative 2. These activities would increase from 28 under the No Action Alternative to 83 under Alternative 2. No activities involving in-water devices would occur in the Western Behm Canal.

Despite this increase, the impact of vessels on marine invertebrates under Alternative 2 would be inconsequential because (1) the area exposed to the stressor amounts to a small portion of each vessel's and in-water device's footprint and is extremely small relative to most marine invertebrates' ranges; (2) the frequency of activities involving the stressor is low such that few individuals could be exposed to more than one event; and (3) exposures would be localized, temporary, and would cease with the conclusion of the activity. Testing activities involving vessels are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### 3.8.3.3.1.4 Substressor Impact on Sedentary Invertebrate Beds and Reefs as Essential Fish Habitat (Preferred Alternative)

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of vessels and in-water devices during training and testing activities would have no effect on sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern within the Study Area. The EFH Analysis is located on the NWTT EIS website, www.nwtteis.com.

### 3.8.3.3.2 Impacts from Military Expended Materials

This section analyzes the strike potential to invertebrates from the following categories of military expended materials: (1) non-explosive practice munitions, (2) fragments from high-explosive munitions, and (3) expended materials other than ordnance, such as sonobuoys, vessel hulks, and expendable targets. For a discussion of the types of activities that use military expended materials, where they are used, and how many activities would occur under each alternative, see Section 3.0.5.3.3.3 (Military Expended Material).

Military expended materials are deposited throughout the Study Area. However, the majority of military expended materials are deposited within the Offshore Area, and the Inland Waters, with no military expended materials being deposited in the Western Behm Canal portion of the Study Area. These areas of higher military expended materials deposition are generally away from the coastline but on the continental shelf and slope.

Chaff and flares include canisters, end-caps, and aluminum coated glass fibers. Chaff, in particular, may be transported great distances by the wind, beyond the areas where they are deployed before contacting the sea surface. These materials contact the sea surface and seafloor with very little kinetic energy and their low buoyant weight makes them a negligible strike and abrasion risk. Aerial countermeasures, therefore, will not be addressed as potential strike and disturbance stressors.

Physical disturbances or strikes by military expended materials on marine invertebrates are possible at the water's surface, through the water column, and on the seafloor. Disturbance or strike impacts on marine invertebrates by military expended materials falling through the water column are possible, but not very likely because military expended materials do not generally sink rapidly enough to cause strike injury (i.e., as opposed to fragments propelled by high explosives); and exposed invertebrates would likely experience only temporary displacement as the object passes by. Therefore, the discussion of military expended materials disturbance and strikes will focus on military expended materials at the water's surface and on the seafloor. While marine invertebrates on the seafloor may be impacted by military expended materials propelled by high explosives, this event is not very likely except for mine warfare detonations, which typically occur at or near the seafloor. Sessile marine invertebrates and infauna are particularly susceptible to military expended material strikes, including deep-water corals, since these species cannot move away from disturbances.

**Munitions**

### Small-, Medium-, and Large-Caliber Projectiles

Various types of projectiles could cause a temporary local impact when they strike the surface of the water. Navy training in the Study Area, such as gunnery exercises, include firing a variety of weapons and using a variety of non-explosive training and testing rounds, small-, medium-, and large-caliber projectiles. Large-caliber projectiles are primarily used in the open ocean beyond 20 nm.

Direct ordnance strikes from firing weapons are potential strike stressors to marine invertebrates. Military expended materials could impact the water with great force and produce a large impulse. Physical disruption of the water column is a local, temporary impact, and would be limited to a small area (within a radius of tens of meters) around the impact point, persisting for a few minutes. Physical and chemical properties of the surrounding water would be temporarily altered (e.g., slight heating or cooling and increased oxygen concentrations due to turbulent mixing with the atmosphere), but there would be no lasting change resulting in long-term impacts on marine invertebrates. Although the sea surface is rich with invertebrates, most are zooplankton and relatively few are large pelagic invertebrates (e.g., some jellyfish, squid, and some swimming crabs). Zooplankton, eggs and larvae, and larger pelagic organisms in the upper portions of the water column could be displaced, injured, or killed by military expended materials impacting the sea surface. Individual organisms would be impacted directly or indirectly, but not to the extent that the viability of populations or species would be impacted, primarily because the number of organisms exposed to these devices is extremely small relative to population sizes.

Marine invertebrates on the seafloor could be displaced, injured, or killed by military expended materials contacting the seafloor. While all marine invertebrates living on or in the seafloor are susceptible to disturbance, strikes, and burial by military expended materials, only sessile (attached to the seafloor) marine invertebrates are susceptible to impact by abrasion. Decelerator/parachutes are the principal source of abrasion stressors to marine invertebrates, and these are addressed separately because the nature of their potential impacts is materially different than other military expended materials.

Projectiles present the greatest risk of long-term damage to marine invertebrates compared with other seafloor communities because (1) many invertebrates are sessile, fragile, and particularly vulnerable; (2) many of these organisms grow slowly, and could require decades to recover (Precht et al. 2001); and (3) military expended materials are likely to remain mobile for a longer period because natural encrusting and burial processes are much slower on these habitats than on hardbottom habitats.

### Bombs, Missiles, and Rockets

Bombs, missiles, and rockets are potential strike stressors to marine invertebrates. The nature of their potential impacts is the same as projectiles. However, they are addressed separately because they are larger than most projectiles, and because high-explosive bombs, missiles, and rockets are likely to produce a greater number of small fragments than projectiles. Propelled fragments are produced by high explosives. Close to the explosion, invertebrates could be injured by propelled fragments. However, studies of underwater bomb blasts have shown that fragments are larger than those produced during air blasts and decelerate much more rapidly (O'Keeffe and Young 1984; Swisdak Jr. and Montaro 1992), reducing the risk to marine organisms. Bombs, missiles, and rockets are designed to explode within 3 ft. (1 m) of the sea surface where marine invertebrates are relatively infrequent. The fitness of individual organisms would be impacted directly or indirectly, but not to the extent that the viability of populations or species would be impacted, primarily because the number of organisms exposed to these devices would be extremely small relative to population sizes.

**<u>Military Expended Materials other than Munitions</u>**

**Vessel Hulk**

Sinking exercises are no longer planned to take place in the NWTT Study Area; therefore, future events are not included in Alternatives 1 or 2 of this EIS/OEIS. However, in order to analyze impacts under the No Action Alternative, the following information is provided.

During a sinking exercise, aircraft, ship, and submarine crews deliver ordnance on a surface target, which is a clean (see Section 3.1, Sediments and Water Quality), deactivated ship deliberately sunk using multiple weapon systems. Sinking exercises occur in specific open ocean areas, outside of the coastal range complexes. Ordnance strikes by the various weapons used in these exercises are a potential source of impacts. However, these impacts are discussed for each of those weapons categories in this section and are not repeated here. Therefore, the analysis of sinking exercises as a strike potential for benthic invertebrates is discussed in terms of the vessel hulk landing on the seafloor. The primary difference between a vessel hulk and other military expended materials as a strike potential for marine invertebrates is a difference in scale. As the vessel hulk settles on the seafloor, all marine invertebrates within the footprint of the hulk would be impacted by strike or burial, and invertebrates a short distance beyond the footprint of the hulk would be disturbed. A vessel hulk may also change ocean flow patterns, sediment transport, and benthic communities (by creating new suitable hard substrate for attachment and colonization). Habitat-forming invertebrates (i.e., corals) are likely absent where sinking exercises are planned because this activity occurs in depths greater than the range of corals and most other habitat-forming invertebrates (approximately 10,000 ft. [3,048 m]) and away from hydrothermal vent communities (see Section 3.3, Marine Habitats).

**Decelerator/Parachutes**

Decelerator/parachutes of varying sizes are used during training and testing activities. For a discussion of the types of activities that use decelerator/parachutes, physical characteristics of these expended materials, where they are used, and how many activities would occur under each alternative, see Section 3.0.5.3.4.2 (Decelerator/Parachutes). See Table 3.0-27 for information regarding the number and location of activities involving decelerator/parachutes. Activities that expend sonobuoy and air-launched torpedo decelerator/parachutes generally occur in water deeper than 600 ft. (180 m). Decelerator/parachutes may impact marine invertebrates by disturbance, strikes, burial, smothering, or abrasion. Movement of decelerator/parachutes in the water may break more fragile invertebrates such as deep-water corals.

**Countermeasures**

Defensive countermeasures such as chaff and flares are used to protect against missile and torpedo attack. Chaff is made of aluminum-coated glass fibers and flares are pyrotechnic devices. Chaff, chaff canisters, and flare end caps are expendable materials. Chaff and flares are dispensed from aircraft or fired from ships. Marine invertebrates may overlap with areas of chaff and flares that are expended in the near shore areas of the Study Area. Floating marine invertebrates could occur in any of the locations that these materials are expended.

No training or testing activities with military expended materials are proposed in the Western Behm Canal portion of the Study Area under the No Action Alternative, Alternative 1, or Alternative 2. Therefore, military expended materials would have no impact on marine invertebrates under any alternative.

#### 3.8.3.3.2.1 No Action Alternative

**<u>Training Activities</u>**

**Offshore Area**

The number of military expended materials used in the Offshore Area of the Study Area and their impact footprints are detailed in Tables 3.3-4 and 3.8-2. Under the No Action Alternative there are 189,815 military expended materials deposited in the Offshore Area.

Military expended materials that are ordnance (e.g., bombs, missiles, rockets, projectiles, and associated fragments) may strike marine invertebrates at the sea surface or on the seafloor. Consequences of strike or disturbance may include injury or mortality, particularly within the footprint of the object as it contacts the seafloor. Secondary impacts are possible if military expended materials are mobilized by currents or waves, and would cease when the military expended materials are incorporated into the seafloor by natural encrustation or burial processes. The fitness of individual organisms would be impacted directly or indirectly, but not to the extent that the viability of populations or species would be impacted primarily because the number of organisms exposed to these devices would be extremely small relative to population sizes.

During sinking exercises, pelagic invertebrates present near the water's surface in the immediate vicinity of the exercise have the potential to be injured or killed. Sinking exercise vessel hulks contacting the seafloor would result in mortality of marine invertebrates within the footprint of the hulk and disturbance or injury of marine invertebrates near the footprint of the hulk. Though the footprint of a sinking exercise is large relative to other military expended materials, the impacted area is extremely small relative to the spatial distribution of marine invertebrate populations. Sinking exercises would impact the fitness of individual organisms directly or indirectly, but not to the extent that the viability of populations or species would be impacted.

Activities occurring at depths less than 2,600 ft. (800 m) may impact deep-water corals and other marine invertebrate assemblages. Consequences from impacts of military expended materials on marine invertebrate assemblages may include breakage, injury, or mortality for each projectile or munitions (see Section 3.3, Marine Habitats). Decelerator/parachutes may cause abrasion injury or mortality, or breakage. The fitness of individual organisms would be impacted directly or indirectly, but not to the extent that the viability of populations or species would be impacted.

The impact of military expended materials under the No Action Alternative on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event, and (3) exposures would be localized and would cease when the military expended material stops moving. Training activities involving military expended material are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### Inland Waters

The number of military expended materials used in the Inland Waters under the No Action Alternative and their impact footprints are detailed in Tables 3.3-6 and 3.8-2. Under the No Action Alternative there are eight military expended materials deposited in the Inland Waters. Military expended materials, used in Crescent Harbor and Hood Canal, consist of mine neutralization underwater explosive charges and the targets used during the mine neutralization training. Impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event, and (3) exposures would be localized and would be focused on targets.

### Testing Activities

#### Offshore Area

The number of military expended materials and their impact footprints are detailed in Tables 3.3-5 and 3.8-2.

Military expended materials may strike marine invertebrates at the sea surface or on the seafloor. Military expended materials would number approximately 604 under the No Action Alternative. Activities occurring at depths less than 2,600 ft. (800 m) may impact deep-water corals and other marine invertebrate assemblages. Consequences may include breakage, injury, or mortality for each projectile or munitions (see Section 3.3, Marine Habitats). Decelerator/parachutes and cables may cause abrasion injury or mortality and breakage. Consequences of strikes or disturbances may include injury or mortality, particularly within the footprint of the object as it contacts the seafloor. Individual organisms would be impacted directly or indirectly, but not to the extent that the viability of populations would be impacted, because the number of organisms exposed to these devices would be extremely small relative to population sizes.

The impact of military expended materials on marine invertebrates under the No Action Alternative is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event, and (3) exposures would be localized and would cease when the military expended material stops moving. Testing activities involving military expended materials are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### Inland Waters

Under the No Action Alternative, 442 expended items would be used for testing in the Inland Waters. Military expended materials may strike marine invertebrates at the sea surface or on the seafloor. Consequences of strikes or disturbances may include injury or mortality, particularly within the footprint of the object as it contacts the seafloor. Individual organisms would be impacted directly or indirectly, but not to the extent that the viability of populations or species would be impacted primarily, because the number of organisms exposed to these devices would be extremely small relative to population sizes.

The impact of military expended materials on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event, and (3) exposures would be localized and would cease when the military expended material stops moving. Testing activities involving military expended materials are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### 3.8.3.3.2.2 Alternative 1

**<u>Training Activities</u>**

**Offshore Area**

The number of military expended materials and their impact footprints are detailed in Tables 3.3-4 and 3.8-2. Alternative 1 would include a decrease in military expended materials compared to the No Action Alternative due to the removal of the two sinking exercises. However, the overall number of military expended materials increases from 189,815 under the No Action Alternative to 198,028 under Alternative 1 due to an increase in small caliber and chaff utilization.

Since the number of military expended materials used under Alternative 1 is similar compared to the No Action Alternative, the effects would be similar to those described under the No Action Alternative. The impact of military expended materials under Alternative 1 on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event, and (3) exposures would be localized and would cease when the military expended material stops moving. Training activities involving military expended material are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

**Inland Waters**

Although Alternative 1 would include an increase in the military expended materials (from 8 to 3,085 annually), all of the military expended materials consist of mine neutralization underwater explosive charges and the targets used during the mine neutralization training. In no case would either of these items pose a physical disturbance or strike hazard to marine invertebrates. Impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event, and (3) exposures would be localized and would be focused on targets.

**<u>Testing Activities</u>**

**Offshore Area**

The number of military expended materials and their impact footprints are detailed in Tables 3.3-5 and 3.8-2. Activities proposed under Alternative 1 would include the use of sonobuoys and decelerator/parachutes because of the introduction of new testing activities. Military expended materials would increase from approximately 604 under the No Action Alternative to 3,922 under Alternative 1.

The probability of military expended material strikes on marine invertebrates would increase because of the increase in the number of military expended materials. The impact of military expended materials on marine invertebrates under Alternative 1 is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event, and (3) exposures would be localized and would cease when the military expended material stops moving. Testing activities involving military expended materials are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

**Inland Waters**

The amount of military expended materials used in the Inland Waters of the Study Area for Alternative 1 would increase by approximately 16 percent compared to the No Action Alternative. Despite this increase the impacts would be similar to those described under the No Action Alternative. Activities involving military expended materials are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### 3.8.3.3.2.3 Alternative 2

**<u>Training Activities</u>**

**Offshore Area**

Under Alternative 2, the Navy proposes the same type and tempo of activity resulting in the same quantity of military expended materials as described in Alternative 1. Therefore, the impacts of Alternative 2 training activities on marine invertebrates would be the same as for Alternative 1.

**Inland Waters**

Under Alternative 2, the Navy proposes the same type and tempo of activity resulting in the same quantity of military expended materials as described in Alternative 1. Therefore, the impacts of Alternative 2 training activities on marine invertebrates would be the same as for Alternative 1.

**<u>Testing Activities</u>**

**Offshore Area**

Military expended materials from testing activities would increase from approximately 604 under the No Action Alternative to 4,325 under Alternative 2. This equates to an approximately 10 percent increase in the numbers of military expended materials as described in Alternative 1. Therefore, despite this slight increase, the impacts of Alternative 2 testing activities on marine invertebrates would be similar to Alternative 1.

**Inland Waters**

The amount of military expended materials used in the Inland Waters of the Study Area for Alternative 2 would increase by approximately 27 percent compared to the No Action Alternative. Despite this increase the effects would be similar to those described under the No Action Alternative. Testing activities involving military expended materials are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### 3.8.3.3.2.4 Substressor Impact on Sedentary Invertebrate Beds and Reefs as Essential Fish Habitat (Preferred Alternative)

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of military expended materials during training and testing activities may have an adverse effect on EFH by reducing the quality or quantity of sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern. The EFHA states that the impact to sedentary invertebrate beds would be minimal and long-term to permanent in duration (based on substrate impacts), whereas impacts to reefs would be individually minimal and permanent in duration within the Study Area. The EFH Analysis is located on the NWTT EIS website, www.nwtteis.com.

#### 3.8.3.3.3 Impacts from Seafloor Devices

Seafloor devices are items used during training or testing activities that are deployed onto the seafloor. These items include moored mine shapes, anchors, bottom-placed instruments, and robotic vehicles referred to as “crawlers.” Seafloor devices are either stationary or move very slowly along the bottom.

Moored mines deployed by fixed-wing aircraft enter the water and impact the bottom, becoming partially buried in sediments. Upon impact, the mine casing separates and the semi-buoyant mine floats up through the water column until it reaches the end of the mooring line. Bottom mines are typically positioned manually and are allowed to free sink to the bottom to rest. Mine shapes are normally deployed over soft sediments and are recovered within 7–30 days following the completion of the training or testing event.

Precision anchoring testing exercises release anchors in precise locations. The intent of these testing exercises is to practice anchoring the vessel within 100 yards (91 m) of the planned anchorage location. These testing activities typically occur within predetermined shallow water anchorage locations near ports with seafloors consisting of unconsolidated sediments. Potential impacts of precision anchoring are qualitatively different than other seafloor devices because the activity involves repeated disturbance to the same area of seafloor. Precision anchoring occurs in long-established soft-bottom areas that have a history of disturbance by anchors, and continued exposure is likely to be inconsequential and not detectable.

##### 3.8.3.3.3.1 No Action Alternative

The numbers of activities including seafloor devices used for training and testing activities under each of the Alternatives in the Offshore Area, Inland Waters, and Western Behm Canal are listed in Table 3.8-2.

**<u>Training Activities</u>**

**Offshore Area**

No training activities with seafloor devices are proposed in the Offshore Area under the No Action Alternative. Therefore, seafloor devices for training activities would have no effect on marine invertebrates under the No Action Alternative.

**Inland Waters**

Two training activities would use seafloor devices in the Inland Waters under the No Action Alternative. Training events that include seafloor devices are infrequent and the percentage of training area affected is small. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms. The training activities in the Study Area would include activities where seafloor devices would contact bottom substrates. The impact of seafloor devices on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates’ ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one activity, and (3) exposures would be localized. Activities involving seafloor devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

**Testing Activities**

#### Offshore Area

There are five testing activities with seafloor devices proposed in the Offshore Area under the No Action Alternative. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms. The training activities in the Study Area would include activities where seafloor devices would contact bottom substrates. The impact of seafloor devices on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one activity, and (3) exposures would be localized. Activities involving seafloor devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### Inland Waters

Approximately 210 testing activities will use seafloor devices in the Inland Waters under the No Action Alternative. The testing activities in the Study Area would include activities where seafloor devices would contact bottom substrates, such as with certain types of unmanned underwater vehicles. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms. The impact of seafloor devices on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one activity, and (3) exposures would be localized. Activities involving seafloor devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### Western Behm Canal, Alaska

No testing activities with seafloor devices are proposed in the Western Behm Canal under the No Action Alternative. Therefore, seafloor devices for testing activities would have no effect on marine invertebrates under the No Action Alternative.

### 3.8.3.3.3.2 Alternative 1

The numbers of activities including seafloor devices used for training and testing activities under each of the Alternatives in the Offshore Area, Inland Waters, and Western Behm Canal are listed in Table 3.8-2.

**Training Activities**

#### Offshore Area

No training activities with seafloor devices are proposed in the Offshore Area under Alternative 1. Therefore, seafloor devices for training activities would have no effect on marine invertebrates under Alternative 1.

#### Inland Waters

Training activities would increase from two activities that use seafloor devices in the Inland Waters under the No Action Alternative to 16 under Alternative 1. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms. The training activities in the Study Area would include activities where seafloor devices would contact bottom substrates. The impact of seafloor devices on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one activity, and (3) exposures would be localized. Activities involving seafloor devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

**Testing Activities**

**Offshore Area**

Under Alternative 1, the testing activities with seafloor devices would increase from five under the No Action Alternative to six. The same type of testing activities would occur as under the No Action Alternative. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms. The training activities in the Study Area would include activities where seafloor devices would contact bottom substrates. The impact of seafloor devices on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one activity, and (3) exposures would be localized. Activities involving seafloor devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

**Inland Waters**

Approximately 225 testing activities will use seafloor devices in the Inland Waters under Alternative 1. The testing activities in the Study Area would include activities where seafloor devices would contact bottom substrates, such as with certain types of unmanned underwater vehicles. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms. The training activities in the Study Area would include activities where seafloor devices would contact bottom substrates. The impact of seafloor devices on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one activity, and (3) exposures would be localized. Activities involving seafloor devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

**Western Behm Canal, Alaska**

There are five activities that use seafloor devices proposed under Alternative 1 in the Western Behm Canal. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms. The training activities in the Study Area would include activities where seafloor devices would contact bottom substrates. The impact of seafloor devices on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one activity, and (3) exposures would be localized. Activities involving seafloor devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

#### 3.8.3.3.3.3 Alternative 2

The numbers of activities including seafloor devices used for training and testing activities under each of the Alternatives in the Offshore Area, Inland Waters, and Western Behm Canal are listed in Table 3.8-2.

**Training Activities**

**Offshore Area**

No training activities with seafloor devices are proposed in the Offshore Area under Alternative 2. Therefore, seafloor devices for training activities would have no effect on marine invertebrates under Alternative 2.

**Inland Waters**

Approximately 16 training activities will use seafloor devices in the Inland Waters under Alternative 2. The training activities in the Study Area would include activities where seafloor devices would contact bottom substrates, such as with certain types of unmanned underwater vehicles. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms. The training activities in the Study Area would include activities where seafloor devices would contact bottom substrates. The impact of seafloor devices on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one activity, and (3) exposures would be localized. Activities involving seafloor devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

**Testing Activities**

**Offshore Area**

Under Alternative 2, the testing activities with seafloor devices would increase from five under the No Action Alternative to seven. The same type of testing activities would occur as under the No Action Alternative. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms. The testing activities in the Study Area would include activities where seafloor devices would contact bottom substrates. The impact of seafloor devices on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one activity, and (3) exposures would be localized. Activities involving seafloor devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

**Inland Waters**

Under Alternative 2, the number of seafloor devices would increase from 225 under Alternative 1 to 239 under Alternative 2. Because the increase is not substantial, the impact of seafloor devices would be the same as under Alternative 1.

**Western Behm Canal, Alaska**

Testing activities under Alternative 2 that use seafloor devices increases from zero under the No Action Alternative to 15. The testing activities in the Study Area would include activities where seafloor devices would contact bottom substrates, such as with certain types of unmanned underwater vehicles. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms. The training activities in the Study Area would include activities where seafloor devices would contact bottom substrates. The impact of seafloor devices on marine invertebrates is likely to cause injury or mortality to individuals, but impacts to populations would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges, (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one activity, and (3) exposures would be localized. Activities involving seafloor devices are not expected to yield any behavioral changes or lasting impacts on the survival, growth, recruitment, or reproduction of invertebrate species at the population level.

###### 3.8.3.3.3.4 Substressor Impact on Marine Invertebrates as Essential Fish Habitat from Seafloor Devices (Preferred Alternative)

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of seafloor devices during training and testing activities may adversely affect EFH. The EFH Assessment can be found on the NWTT EIS/OEIS website at nwtteis.com.

##### 3.8.3.3.4 Summary of Effects from Physical Disturbance and Strike Stressors

Exposures to physical disturbance and strike stressors occur primarily on the range complexes and testing ranges within the Study Area. The Navy identified and analyzed three physical disturbance or strike substressors that could impact marine invertebrates: vessel and in-water device strikes, military expended materials, and seafloor devices. Vessel and in-water device strikes are unlikely to impact invertebrates other than plankton, while military expended materials strikes could impact resident benthic (seafloor) invertebrates. Because vessel and in-water device strikes impact only invertebrates in the water column it is unlikely to make population impacts in the Study Area. Military expended material strikes and seafloor devices could impact benthic invertebrates; however, the impact range is not significant and should not have population-level impacts on marine invertebrates in the Study Area.

### 3.8.3.4 Entanglement Stressors

This section analyzes the potential entanglement impacts of the various types of expended materials used by the Navy during training and testing activities within the Study Area. Included are potential impacts from two types of military expended materials (1) cables and wires and (2) decelerator/parachutes. Aspects of entanglement stressors that are applicable to marine organisms in general are presented in Section 3.0.5.3.4 (Entanglement Stressors).

Most marine invertebrates are less susceptible to entanglement than fishes, sea turtles, and marine mammals due to their size, behavior, and morphology. Because even fishing nets which are designed to take marine invertebrates operate by enclosing rather than entangling, marine invertebrates seem to be somewhat less susceptible than vertebrates to entanglement (Chuenpagdee et al. 2003). A survey of marine debris entanglements found that marine invertebrates composed 16 percent of all animal entanglements (Ocean Conservancy 2010). The same survey cites potential entanglement in military items only in the context of waste-handling aboard ships, and not for military expended materials. Nevertheless, it is conceivable that marine invertebrates, particularly arthropods and echinoderms with rigid appendages, might become entangled in cables and guidance wires, and in decelerator/parachutes.

#### 3.8.3.4.1 Impacts from Fiber Optic Cables and Guidance Wires

Fiber optic cables are only expended during mine neutralization testing activities and torpedo guidance wires are used in training and testing activities. For a discussion of the types of activities that use guidance wires and fiber optic cables, physical characteristics of these expended materials, where they are used, and how many activities would occur under each alternative, see Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires). Abrasion and shading-related impacts on sessile benthic (attached to the seafloor) marine invertebrates that may result from entanglement stressors are discussed with physical impacts in Section 3.8.3.3 (Physical Disturbance and Strike).

A marine invertebrate that might become entangled in cables and wires could be either temporarily confused and escape unharmed, could be held tightly enough that it could be injured during its struggle to escape, could be preyed upon while entangled, or could starve while entangled. The likelihood of these outcomes cannot be predicted with any certainty because interactions between invertebrate species and entanglement hazards are not well known. The potential entanglement scenarios are based on observations of how marine invertebrates are entangled in marine debris such as fishing gear, which is far more prone to tangling than guidance wire or fiber optic cable (Environmental Sciences Group 2005; Ocean Conservancy 2010). The small number of guidance wires and fiber optic cables expended across the Study Area results in an extremely low rate of potential encounter for marine invertebrates.

No training or testing activities involving the use of fiber optic cables or guidance wires are proposed under any alternative in the Western Behm Canal portion of the study area. Therefore, fiber optic cables or guidance wires would have no impact on marine invertebrates under any alternative.

#### 3.8.3.4.1.1 No Action Alternative

**<u>Training Activities</u>**

**Offshore Area**

Table 3.0-26 lists the number and locations of activities that expend fiber optic cables and guidance wires under the No Action Alternative. Under the No Action Alternative, only two activities in the Offshore Area of the Study Area will expend guidance wires.

Given the low numbers used, most marine invertebrates would never be exposed to guidance wires under the No Action Alternative. The impact of guidance wires on marine invertebrates is not likely to cause injury or mortality to individuals, and impacts would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event; (3) exposures would be localized; and (4) marine invertebrates are not particularly susceptible to entanglement stressors, as most would be temporarily disturbed. Training activities involving guidance wires are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at individual or population levels.

**Inland Waters**

No training activities with fiber optic cables and guidance wires are proposed in the Offshore Area of the Study Area under the No Action Alternative.

**<u>Testing Activities</u>**

**Offshore Area**

Fiber optic cables and guidance wires expended during testing activities would be greater in number (16 events compared to 2 training activities) than is expended during training. Despite this slight increase, the impact of fiber optic cables and guidance wires to marine invertebrates would be the same as those analyzed for training activities under the No Action Alternative.

#### Inland Waters

As indicated in Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires), there would be 105 activities that expend fiber optic cables and guidance wires under the No Action Alternative. The impact of cables and guidance wires on marine invertebrates is not likely to cause injury or mortality to individuals, and impacts would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges (see Figure 2.1-3); (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event; (3) exposures would be localized; and (4) marine invertebrates are not particularly susceptible to entanglement stressors, and would simply be temporarily disturbed. Testing activities involving cables and guidance wires are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at individual or population levels.

### 3.8.3.4.1.2 Alternative 1

**<u>Training Activities</u>**

#### Offshore Area

Due to the removal of the SINKEX under Alternative 1, no training activities with fiber optic cables and guidance wires are proposed in the Offshore Area of the Study Area under Alternative 1.

#### Inland Waters

As indicated in Table 3.8-2, there would be one training activity (Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise), conducted once every 2 years, that would expend fiber optic cables or guidance wires under Alternative 1. Given the low numbers used, most marine invertebrates would never be exposed to a fiber optic cable or guidance wire. Under Alternative 1 the impact of fiber optic cables and guidance wires on marine invertebrates is not likely to cause injury or mortality to individuals, and impacts would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event; (3) exposures would be localized; and (4) marine invertebrates are not particularly susceptible to entanglement stressors and would not become entangled, and simply be temporarily disturbed. Activities involving fiber optic cables and guidance wires are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at individual or population levels.

**<u>Testing Activities</u>**

#### Offshore Area

As indicated in Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires), under Alternative 1, the number of testing activities that expend fiber optic cables and guidance wires would increase from 16 under the No Action Alternative to 131 under Alternative 1. Despite this increase, as stated above in No Action Alternative, cables and guidance wires would not be expected to cause injury or mortality to marine invertebrate individuals.

#### Inland Waters

As indicated in Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires), under Alternative 1, the number of testing activities that expend fiber optic cables and guidance wires would increase from 105 under the No Action Alternative to 245 under Alternative 1. Under Alternative 1, the impact of fiber optic cables and guidance wires on marine invertebrates is not likely to cause injury or mortality to individuals, and impacts would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event; (3) exposures would be localized; and (4) marine invertebrates are not particularly susceptible to entanglement stressors, and would simply be temporarily disturbed. Testing activities involving fiber optic cables and guidance wires are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at individual or population levels.

#### 3.8.3.4.1.3 Alternative 2

**<u>Training Activities</u>**

**Offshore Area**

Under Alternative 2, the Navy proposes the same numbers and types of fiber optic cables and guidance wires as described in Alternative 1. Therefore, the impacts of Alternative 2 training activities on marine invertebrates would be the same as for Alternative 1.

**Inland Waters**

Under Alternative 2, the Navy proposes to conduct the Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise once per year. Given the low numbers used, most marine invertebrates would never be exposed to a cable or guidance wire. Under Alternative 2 the impact of fiber optic cables and guidance wires on marine invertebrates is not likely to cause injury or mortality to individuals, and impacts would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event; (3) exposures would be localized; and (4) marine invertebrates are not particularly susceptible to entanglement stressors, and simply be temporarily disturbed. Training activities involving fiber optic cables and guidance wires are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at individual or population levels.

**<u>Testing Activities</u>**

**Offshore Area**

As indicated in Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires), under Alternative 2, the number of testing activities that expend fiber optic cables and guidance wires would increase from 16 under the No Action Alternative to 153 under Alternative 2. Despite this increase, as stated above in No Action Alternative, cables and guidance wires would not be expected to cause injury or mortality to marine invertebrate individuals.

**Inland Waters**

As indicated in Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires), the number of testing activities that expend fiber optic cables and guidance wires would increase from 105 under the No Action Alternative to 314 under Alternative 2. Under Alternative 2, the impact of fiber optic cables and guidance wires on marine invertebrates is not likely to cause injury or mortality to individuals, and impacts would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event; (3) exposures would be localized; and (4) marine invertebrates are not particularly susceptible to entanglement stressors, and would simply be temporarily disturbed. Testing activities involving fiber optic cables and guidance wires are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at individual or population levels.

#### 3.8.3.4.2 Impacts from Decelerator/Parachutes

Decelerator/parachutes of varying sizes are used during training and testing activities. For a discussion of the types of activities that use decelerator/parachutes, physical characteristics of these expended materials, where they are used, and how many activities would occur under each alternative, see Section 3.0.5.3.4.2 (Decelerator/Parachutes). Decelerator/parachutes pose a potential, though unlikely, entanglement risk to susceptible marine invertebrates. The most likely method of entanglement would be a marine invertebrate crawling through the fabric or cord that would then tighten around it.

Abrasion and shading-related impacts on sessile benthic (attached to the seafloor) marine invertebrates that may result from entanglement stressors are discussed with physical impacts in Section 3.8.3.3 (Physical Disturbance and Strike). Potential indirect effects of the parachute being transported laterally along the seafloor are discussed in Section 3.8.3.6 (Secondary Stressors).

A marine invertebrate that might become entangled could be temporarily confused and escape unharmed, held tightly enough that it could be injured during its struggle to escape, preyed upon while entangled, or starved while entangled. The likelihood of these outcomes cannot be predicted with any certainty because interactions between invertebrate species and entanglement hazards are not well known. The potential entanglement scenarios are based on observations of how marine invertebrates are entangled in marine debris (Environmental Sciences Group 2005; Ocean Conservancy 2010). The number of decelerator/parachutes expended across the Study Area is extremely small relative to the number of marine invertebrates, resulting in a low rate of potential encounter for marine invertebrates.

No training or testing activities involving the use of decelerator/parachutes are proposed under any alternative in the Western Behm Canal portion of the Study Area. Therefore, decelerator/parachutes would have no impact on marine invertebrates under any Alternative.

##### 3.8.3.4.2.1 No Action Alternative

**Training Activities**

Tables 3.0-27 and 3.8-2 list the number and locations of expended decelerator/parachutes under each alternative in the Offshore Area of the Study Area.

**Offshore Area**

Under the No Action Alternative, 8,381 decelerator/parachutes would be used in the Offshore Area. Under the No Action Alternative, the impact of decelerator/parachutes on marine invertebrates is not likely to cause injury or mortality to individuals, and impacts would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event; (3) exposures would be localized; and (4) marine invertebrates are not particularly susceptible to entanglement stressors, and would simply be temporarily disturbed. Training activities involving decelerator/parachutes are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at individual or population levels.

**Inland Waters**

No training activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under the No Action Alternative. Therefore, decelerator/parachutes would have no impact on marine invertebrates under the No Action Alternative.

**Testing Activities**

**Offshore Area**

No testing activities with decelerator/parachutes are proposed in the Offshore Area under the No Action Alternative. Therefore, decelerator/parachutes would have no impact on marine invertebrates under the No Action Alternative.

**Inland Waters**

No testing activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under the No Action Alternative. Therefore, decelerator/parachutes would have no impact on marine invertebrates under the No Action Alternative.

#### 3.8.3.4.2.2 Alternative 1

**Training Activities**

**Offshore Area**

The number of expended decelerator/parachutes in the Offshore Area of the Study Area increases from 1 under the No Action Alternative to 8,952 under Alternative 1. The impact of decelerator/parachutes on marine invertebrates is not likely to cause injury or mortality to individuals, and impacts would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event; (3) exposures would be localized; and (4) marine invertebrates are not particularly susceptible to entanglement stressors, and would simply be temporarily disturbed. Training activities involving decelerator/parachutes are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at individual or population levels.

**Inland Waters**

No training activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under Alternative 1. Therefore, decelerator/parachutes would have no impact on marine invertebrates under Alternative 1.

**Testing Activities**

**Offshore Area**

The number of expended decelerator/parachutes in the Offshore Area of the Study Area increases from 0 under the No Action Alternative to 1,210 under Alternative 1. This increase is due to the addition of NAVAIR testing activities (see Table 2.8-3), which would typically occur in deep waters offshore.

Under Alternative 1, the impact of decelerator/parachutes on marine invertebrates is not likely to cause injury or mortality to individuals, and impacts would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the activities are dispersed such that few individuals could conceivably be exposed to more than one event; (3) exposures would be localized; and (4) marine invertebrates are not particularly susceptible to entanglement stressors, therefore most would simply be temporarily disturbed. Testing activities involving decelerator/parachutes are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at individual or population levels.

#### Inland Waters

No testing activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under Alternative 1. Therefore, decelerator/parachutes would have no impact on marine invertebrates under Alternative 1.

#### 3.8.3.4.2.3 Alternative 2

**Training Activities**

#### Offshore Area

Under Alternative 2, the Navy proposes the same type and tempo of activity resulting in the same quantity of decelerator/parachutes as described in Alternative 1 (8,952). Therefore, the impacts of Alternative 2 training activities on marine invertebrates would be the same as for Alternative 1.

#### Inland Waters

No training activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under Alternative 2. Therefore, decelerator/parachutes would have no impact on marine invertebrates under Alternative 2.

**Testing Activities**

#### Offshore Area

The number of expended decelerator/parachutes under Alternative 2 would increase by approximately 10 percent compared to Alternative 1. This increase of 121 decelerator/parachutes would result in the same effects as described under Alternative 1, and for the same reasons there is no effect in Alternative 2.

#### Inland Waters

Five decelerator/parachutes would be expended in the Inland Waters under Alternative 2. Under Alternative 2 the use of these four decelerator/parachutes on marine invertebrates is not likely to cause injury or mortality to individuals, and impacts would be inconsequential because (1) the area exposed to the stressor is extremely small relative to most marine invertebrates' ranges; (2) the activities are few and dispersed such that few individuals could conceivably be exposed to more than one event; (3) exposures would be localized; and (4) marine invertebrates are not particularly susceptible to entanglement stressors, and would simply be temporarily disturbed. Testing activities involving decelerator/parachutes are not expected to yield any behavioral changes or lasting effects on the survival, growth, recruitment, or reproduction of invertebrate species at individual or population levels under Alternative 2.

### 3.8.3.4.3 Summary of Effects from Entanglement Stressors

Based on the analysis presented above, the impact of entanglement on marine invertebrates is not likely to cause injury or mortality to individuals. The impacts would be minimal to marine invertebrates due to the small area exposed relative to the range of the invertebrates, the dispersed nature of the activities, the limitation of exposures to only a local area, and because marine invertebrates are not particularly susceptible to entanglement stressors; therefore most would simply be temporarily disturbed.

## 3.8.3.5 Ingestion Stressors

### 3.8.3.5.1 Impacts from Military Expended Materials

This section analyzes the potential ingestion impacts of the various types of military expended materials used by the Navy during training and testing activities within the Study Area. Expended materials could be ingested by marine invertebrates in all large marine ecosystems and open ocean areas. Ingestion could occur at the surface, in the water column, or on the seafloor, depending on the size and buoyancy of the expended object and the feeding behavior of the animal. Floating material is more likely to be eaten by animals that feed at or near the water surface, while materials that sink to the seafloor present a higher risk to bottom-feeding animals. Marine invertebrates are universally present in the water and the seafloor, but the majority of individuals are smaller than a few millimeters (e.g., zooplankton, most roundworms, and most arthropods). Most military expended materials and fragments of military expended materials are too large to be ingested by marine invertebrates (see Tables 3.3-4 through 3.3-7 for the specific size of fragments). The potential for marine invertebrates to encounter fragments of ingestible size increases as the military expended materials degrades into smaller fragments.

If expended material is ingested by marine invertebrates, the primary risk is from a blocked digestive tract. Most military expended materials are relatively inert in the marine environment, and are not likely to cause injury or mortality via chemical effects (see Section 3.8.3.6, Secondary Stressors, for more information on the chemical properties of these materials).

The most abundant military expended material of ingestible size is chaff. Chaff is similar in form to fine human hair, and somewhat analogous to the spicules of sponges or the siliceous cases of diatoms (Spargo 1999). Many invertebrates ingest sponges, including the spicules, without suffering harm (Spargo 1999). Marine invertebrates may occasionally encounter chaff fibers in the marine environment and may incidentally ingest chaff when they ingest prey or water. Literature reviews and controlled experiments suggest that chaff poses little environmental risk to marine organisms at concentrations that could reasonably occur from military training and testing (Arfsten et al. 2002, Spargo 1999). Laboratory studies were conducted to determine the likely effects on marine invertebrates from ingesting chaff, using crabs that were fed radio frequency chaff. Blue crabs were force-fed a chaff-and-food mixture daily for a few weeks at concentrations 10 to 100 times the predicted real-world exposure levels without a notable increase in mortality (Arfsten et al. 2002).

As described in Section 3.8.2 (Affected Environment), tens of thousands of marine invertebrate species inhabit the Study Area. There is little literature about the effects of debris ingestion on marine invertebrates; consequently, there is little basis for an evidence-based assessment of risks. It is not feasible to speculate on which invertebrates in which locations might ingest specific types of military expended materials. However, invertebrates that actively forage (e.g., worms, octopus, shrimp, and sea cucumbers) are at much greater risk of ingesting military expended materials than invertebrates that filter-feed (e.g., sponges, corals, oysters, and barnacles). Though ingestion is possible in some circumstances, based on the little scientific information available, negative impacts on individuals are unlikely and impacts on populations would be inconsequential and not detectable. Adverse consequences of marine invertebrates ingesting military expended materials are possible but not probable.

No training or testing activities involving ingestible expended materials are proposed under any alternative in the southeast Alaska portion of the Study Area. Therefore, ingestible military expended materials would have no impact on marine invertebrates under any alternative.

##### 3.8.3.5.1.1 No Action Alternative

**<u>Training Activities</u>**

**Offshore Area**

Under the No Action Alternative, a variety of potentially ingestible military expended materials, such as chaff, would be released to the Offshore Area of the Study Area during Navy training activities. The Navy proposes 2,900 training events in which chaff may be expended (see Table 3.0-28). Ingestion is not likely in the majority of cases because most military expended materials, such as sonobuoys, in-water devices, and guidance wires, are too large to be ingested by most marine invertebrates. Chaff has been extensively studied, and no indirect toxic effects are known to occur at realistic concentration in the marine environment (Arfsten et al. 2002). The total number of military expended materials from munitions expended under the No Action Alternative in the Offshore Area is 177,926, and the number of military expended materials other than munitions expended in the Offshore Area is 11,889 (see Table 3.8-2) The fractions of military expended materials that are of ingestible size, or become ingestible after degradation, are unlikely to impact individuals under the No Action Alternative.

**Inland Waters**

Under the No Action Alternative, a variety of potentially ingestible military expended materials would be released to the inland water environment by Navy training activities. No chaff canisters would be released during training activities under the No Action Alternative. Ingestion of military expended materials in the inland area, such as sonobuoys, in-water devices, and guidance wires, is not likely as they are too large to be ingested by most marine invertebrates. The total number of military expended munitions expended under the No Action Alternative in the Inland Waters is four, and the number of military expended materials other than munitions expended in the Inland Waters is four (see Table 3.8-2). The fractions of military expended materials that are of ingestible size, or become ingestible after degradation, are unlikely to impact individuals.

**<u>Testing Activities</u>**

**Offshore Area**

Under the No Action Alternative, a variety of potentially ingestible military expended materials would be released to the Offshore Area of the Study Area during Navy testing activities. No chaff canisters would be released during testing activities under the No Action Alternative. Ingestion of military expended materials such as sonobuoys, in-water devices, and guidance wires are not likely as they are too large to be ingested by most marine invertebrates. The total number of military expended munitions expended under the No Action Alternative in the Offshore Area is 200, and the number of military expended materials other than munitions expended in the Offshore Area is 421 (see Table 3.8-2). The fractions of military expended materials that are of ingestible size, or become ingestible after degradation, are unlikely to impact individuals under the No Action Alternative.

**Inland Waters**

Under the No Action Alternative, a variety of potentially ingestible military expended materials would be released to the inland water environment by Navy testing activities. No chaff canisters would be released during testing activities under the No Action Alternative. Ingestion of military expended materials such as sonobuoys, in-water devices, and guidance wires is not likely as they are too large to be ingested by most marine invertebrates. The total number of military expended munitions expended under the No Action Alternative in the Inland Waters is 6, and the number of military expended materials other than munitions expended in the Inland Waters is 440 (see Table 3.8-2). The fractions of military expended materials that are of ingestible size, or become ingestible after degradation, are unlikely to impact individuals.

#### 3.8.3.5.1.2 Alternative 1

**Training Activities**

**Offshore Area**

Under Alternative 1, a variety of potentially ingestible military expended materials, such as chaff, would be released to the Offshore Area of the Study Area during Navy training activities. Training activities in which chaff may be expended would increase from 2,900 annual activities under the No Action Alternative to 5,000 annual activities under Alternative 1. Despite the increase in chaff-related activities, chaff remains unlikely to result in impacts to marine invertebrates. Chaff has been extensively studied, and no indirect toxic effects are known to occur at realistic concentrations in the marine environment (Arfsten et al. 2002). As with the No Action Alternative, ingestion is not likely because most military expended materials, such as sonobuoys, in-water devices, and guidance wires, are too large to be ingested by most marine invertebrates. The fraction of military expended materials that are of ingestible size, or that become ingestible after degradation, may impact individual marine invertebrates, but are unlikely to have impacts on populations or sub-populations.

**Inland Waters**

Under Alternative 1, a variety of potentially ingestible military expended materials, such as chaff, would be released to the Inland Waters environment by Navy training activities. No chaff canisters would be released during training activities under Alternative 1. As with the No Action Alternative, ingestion of military expended materials such as sonobuoys, in-water devices, and guidance wires is not likely as they are too large to be ingested by most marine invertebrates. Under Alternative 1 the number of military expended materials from munitions would increase by 3,042 over the No Action Alternative (see Table 3.8-2). The fraction of military expended materials that are of ingestible size, or that become ingestible after degradation, may impact individual marine invertebrates, but are unlikely to have impacts on populations or sub-populations.

**Testing Activities**

**Offshore Area**

Under Alternative 1, a variety of potentially ingestible military expended materials would be released to the Offshore Area of the Study Area during Navy testing activities. No chaff canisters would be released during testing activities under Alternative 1. Ingestion is not likely in the majority of cases because most military expended materials, such as sonobuoys, in-water devices, and guidance wires, are too large to be ingested by most marine invertebrates. Under Alternative 1 the number of military expended materials from munitions would increase by 1,746 over the No Action Alternative. Military expended materials other than munitions would increase by 1,655 (see Table 3.8-2).The fractions of military expended materials that are of ingestible size, or become ingestible after degradation, are unlikely to impact individuals under Alternative 1.

**Inland Waters**

Under Alternative 1, a variety of potentially ingestible military expended materials would be released to the Inland Waters environment by Navy testing activities. No chaff canisters would be released during testing activities under Alternative 1. Ingestion is not likely in the majority of cases because most military expended materials, such as sonobuoys, in-water devices, and guidance wires, are too large to be ingested by most marine invertebrates. Under Alternative 1 the number of military expended materials from munitions remains six, the same as the No Action Alternative. Military expended materials increases 194 over the No Action Alternative (see Table 3.8-2). The fractions of military expended materials that are of ingestible size, or become ingestible after degradation, are unlikely to impact individuals.

#### 3.8.3.5.1.3 Alternative 2

**Training Activities**

**Offshore Area**

Under Alternative 2, the Navy proposes the same numbers and types of military expended materials as described in Alternative 1. Therefore, the impacts of Alternative 2 training activities on marine invertebrates would be the same as for Alternative 1.

**Inland Waters**

Under Alternative 2, the Navy proposes the same numbers and types of military expended materials as described in Alternative 1. Therefore, the impacts of Alternative 2 training activities on marine invertebrates would be the same as for Alternative 1.

**Testing Activities**

**Offshore Area**

Under Alternative 2, a variety of potentially ingestible military expended materials would be released to the marine environment during Navy testing activities. No chaff canisters would be released during testing activities under Alternative 2. Ingestion is not likely in the majority of cases because most military expended materials, such as sonobuoys, in-water devices, and guidance wires, are too large to be ingested by most marine invertebrates. Under Alternative 2, the number of military expended materials from munitions would increase to 2,139 compared to 200 under the No Action Alternative. Military expended materials other than munitions would increase by 1,874 compared to the No Action Alternative (see Table 3.8-2). The fractions of military expended materials that are of ingestible size, or become ingestible after degradation, are unlikely to impact individuals.

**Inland Waters**

Under Alternative 2, a variety of potentially ingestible military expended materials would be released to the Inland Waters environment by Navy testing activities. No chaff canisters would be released during testing activities under the Alternative 2. Ingestion of military expended materials such as sonobuoys, in-water devices, and guidance wires is not likely as they are too large to be ingested by most marine invertebrates. Under Alternative 2 the number of military expended materials from munitions remains six, the same as the No Action Alternative. Military expended materials other than munitions increases by 303 over the No Action Alternative (see Table 3.8-2). The fractions of military expended materials that are of ingestible size, or become ingestible after degradation, are unlikely to impact individuals.

### 3.8.3.5.2 Summary of Effects from Ingestion Stressors

Most military expended materials and fragments of military expended materials are too large to be ingested by marine invertebrates. The potential for marine invertebrates to encounter fragments of ingestible size increases as the military expended materials degrade into smaller fragments. The fractions of military expended materials of ingestible size, or that become ingestible after degradation, may impact individual marine invertebrates, but are unlikely to impact populations.

### 3.8.3.6 Secondary Stressors

This section analyzes potential impacts on marine invertebrates exposed to stressors indirectly through sediment and water. These two ecosystem constituents, sediment and water, are also primary constituents of marine invertebrate habitat and clear distinctions between indirect impacts and habitat impacts are difficult to maintain. For this analysis, indirect impacts on marine invertebrates via sediment or water that do not require trophic transfers (e.g., bioaccumulation) to be observed are considered here. The terms "indirect" and "secondary" do not imply reduced severity of environmental consequences, but instead describe how the impact may occur in an organism or its ecosystem.

Stressors from Navy training and testing activities could pose secondary or indirect impacts on marine invertebrates via habitat, sediment, or water quality. These include (1) explosives and by-products; (2) metals; (3) chemicals; and (4) other materials such as targets, chaff, and plastics.

#### 3.8.3.6.1 Explosives, Explosion By-Products, and Unexploded Ordnance

High-order explosions consume most of the explosive material, creating typical combustion products. In the case of royal demolition explosive, 98 percent of the combustion products are common seawater constituents, with the remainder rapidly diluted by ocean currents and circulation (see Table 3.1-8 in Section 3.1, Sediments and Water Quality). Explosion by-products from high order detonations present no indirect stressors to marine invertebrates through sediment or water. Low-order detonations and unexploded ordnance present an elevated likelihood of effects on marine invertebrates, and the potential impacts of these on marine invertebrates will be analyzed. Explosive material not completely consumed during a detonation from ordnance disposal and mine clearance training are collected after training is complete; therefore, potential impacts are assumed to be inconsequential and not detectable for these training and testing activities. Marine invertebrates may be exposed by contact with the explosive, contact with contaminants in the sediment or water, and ingestion of contaminated sediments. Most marine invertebrates are very small relative to ordnance or fragments, and direct ingestion of unexploded ordnance is unlikely.

Indirect impacts of explosives and unexploded ordnance on marine invertebrates via sediment are possible near the ordnance. Degradation of explosives proceeds via several pathways discussed in Section 3.1.3.1 (Explosives and Explosion By-Products). Degradation products of royal demolition explosive are not toxic to marine organisms at realistic exposure levels (Rosen and Lotufo 2010). Trinitrotoluene and its degradation products impact developmental processes in marine invertebrates and are acutely toxic to adults at concentrations similar to real-world exposures (Rosen and Lotufo 2007, 2010). The relatively low solubility of most explosives and their degradation products indicate that concentrations of these contaminants in the marine environment are relatively low and readily diluted. Furthermore, while explosives and their degradation products were detectable in marine sediment approximately 6–12 inches (15–30 centimeters) from degrading ordnance, the concentrations of these compounds were not statistically distinguishable from background beyond 3–6 ft. (1–2 m) from the degrading ordnance (Durrach et al. 1998; Section 3.1.3.1, Explosives and Explosion By-Products). Taken together, marine invertebrates, eggs, and larvae probably would be adversely impacted by the indirect effects of degrading explosives within a very small radius of the explosive (1–6 ft. [0.3–2 m]).

Indirect impacts of explosives and unexploded ordnance on marine invertebrates via water are likely to be inconsequential and not detectable for two reasons. First, most explosives and explosive degradation products have very low solubility in sea water (see Table 3.1-12 in Section 3.1, Sediments and Water Quality). This means that dissolution occurs extremely slowly, and harmful concentrations of explosives and degradation are not likely to accumulate except within confined spaces. Second, a low concentration of contaminants, slowly delivered into the water column, is readily diluted to non-harmful concentrations. While marine invertebrates may be adversely impacted by the indirect effects of degrading explosives via water (Rosen and Lotufo 2007a, 2010), this is extremely unlikely in realistic scenarios.

Impacts on marine invertebrates, including zooplankton, eggs, and larvae, are likely to occur within a very small radius of the ordnance (1–6 ft. [0.3–2 m]). These impacts may continue as the ordnance degrades over months to decades. Because most ordnance is deployed as projectiles, multiple unexploded or low-order detonations would not accumulate on spatial scales of 1 to 6 ft. (0.3 to 2 m); therefore, potential impacts are likely to remain local and widely separated. Given these conditions, the possibility of population-level impacts on marine invertebrates is inconsequential.

#### 3.8.3.6.2 Metals

Certain metals are harmful to marine invertebrates at concentrations above background levels (e.g., cadmium, chromium, lead, mercury, zinc, copper, manganese, and many others) (Negri et al. 2002; Wang and Rainbow 2008). Metals are introduced into seawater and sediments as a result of training and testing activities involving vessel hulks, targets, ordnance, munitions, and other military expended materials (see Section 3.1.3.2, Metals). Many metals bioaccumulate and physiological impacts begin to occur only after several trophic transfers concentrate the toxic metals. Indirect impacts of metals on marine invertebrates via sediment and water involve concentrations several orders of magnitude lower than concentrations achieved via bioaccumulation. Marine invertebrates may be exposed by contact with the metal, contact with contaminants in the sediment or water, and ingestion of contaminated sediments. Most marine invertebrates are very small relative to Navy military expended materials, and ingestion would be unlikely.

Because metals often concentrate in sediments, potential adverse indirect impacts are much more likely via sediment than via water. Despite the acute toxicity of some metals (e.g., hexavalent chromium or tributyltin) (Negri et al. 2002) concentrations above safe limits are rarely encountered even in live-fire areas of Vieques where deposition of metals from Navy activities is very high (see Section 3.1.3.2, Metals. Other studies described in Section 3.1.3.2 (Metals) find no harmful concentrations of metals from deposition of military metals into the marine environment. Marine invertebrates, eggs, or larvae could be indirectly impacted by metals via sediment within a few inches of the object.

Concentrations of metals in seawater are orders of magnitude lower than concentrations in marine sediments. Marine invertebrates probably would not be indirectly impacted by toxic metals via the water, or via sediment near the object (e.g., within a few inches) because such impacts would be local and widely separated. Concentrations of metals in water are not likely to be high enough to cause injury or mortality to marine invertebrates. Therefore, indirect impacts of metals via water are likely to be inconsequential and not detectable. Given these conditions, population-level impacts on marine invertebrates are likely to be inconsequential and not detectable.

#### 3.8.3.6.3 Chemicals

Several Navy training and testing activities introduce potentially harmful chemicals into the marine environment; principally, flares and propellants from rockets, missiles, and torpedoes. Properly functioning flares, missiles, rockets, and torpedoes combust most of their propellants, leaving benign or readily diluted soluble combustion by-products (e.g., hydrogen cyanide). Operational failures allow propellants and their degradation products to be released into the marine environment. The greatest risk to marine invertebrates from flares, missiles, and rocket propellants is perchlorate, which is highly soluble in water, persistent, and impacts metabolic processes in many plants and animals. Torpedo propellant poses little risk to marine invertebrates because the chemicals have relatively low toxicity (see Section 3.1.3.3). Marine invertebrates may be exposed by contact with the chemical, contact with chemical contaminants in the sediment or water, and ingestion of contaminated sediments. Most marine invertebrates are very small relative to Navy military expended materials or fragments of military expended materials, and ingestion of military expended materials would be unlikely.

Therefore, missile and rocket fuel poses inconsequential risks of indirect impacts on marine invertebrates via sediment. In contrast, the principal toxic components of torpedo fuel, propylene glycol dinitrate and nitrodiphenylamine, adsorb to sediments, have relatively low toxicity, and are readily degraded by biological processes (Section 3.1.3.3, Chemicals Other than Explosives). Marine invertebrates, eggs, or larvae could be indirectly impacted by propellants via sediment near the object (e.g., within a few inches), but these potential impacts would diminish rapidly as the propellant degrades (see discussion in Section 3.1.3.3, Chemicals Other than Explosives).

Perchlorate contamination rapidly disperses throughout the water column and water within sediments. While it impacts biological processes at low concentrations (e.g., less than 10 parts per billion), toxic concentrations are unlikely to be encountered in seawater. The principal mode of perchlorate toxicity in the environment is bioaccumulation.

Torpedo propellants have relatively low toxicity and therefore pose an inconsequential risk to marine invertebrates. Marine invertebrates, zooplankton, eggs, or larvae could be indirectly impacted by hydrogen cyanide produced by torpedo fuel combustion, but these impacts would diminish rapidly as the chemical becomes diluted below toxic levels. Chemicals are rapidly diluted and readily biodegraded, and concentrations high enough to be acutely toxic are unlikely in the marine environment (see Section 3.1.3.3, Chemicals Other than Explosives, for a discussion of these mechanisms). Concentrations of chemicals in sediment and water are not likely to cause injury or mortality to marine invertebrates; therefore; indirect impacts of chemicals via sediment and water are likely to be inconsequential and not detectable. Based on negligible impacts on individuals, population-level impacts on marine invertebrates are likely to be inconsequential and not detectable.

In the past, polychlorinated biphenyls (PCBs) were a concern because they were present in certain materials (e.g., insulation, sires, felts, and gaskets) on vessels used as targets during sinking exercises. PCBs have a variety of deleterious effects on marine organisms. Polychlorinated biphenyls persist in the tissues of organisms at the bottom of the food chain. Consumers of those species may accumulate PCBs at concentrations many times higher than the PCB concentration in the surrounding water or sediments. Vessels now used for sinking exercises are selected from a list of U.S. Navy-approved vessels that were cleaned in accordance with U.S. Environmental Protection Agency guidelines, but may contain PCBs that could not be removed during cleaning.

#### 3.8.3.6.4 Other Materials

Military expended materials that are re-mobilized after their initial contact with the seafloor (e.g., by waves or currents) may continue to strike or abrade marine invertebrates. Secondary physical strike and disturbances are relatively unlikely because most expended materials are more dense than the surrounding sediments (i.e., metal), and are likely to remain in place as the surrounding sediment moves. The principal exception is likely to be decelerator/parachutes, which are moved easily relative to projectiles and fragments. Potential secondary physical strike and disturbance impacts may cease only (1) when the military expended materials is too massive to be mobilized by typical oceanographic processes, (2) when the military expended material becomes encrusted by natural processes and incorporated into the seafloor, or (3) when the military expended materials becomes permanently buried. The fitness of individual organisms would be impacted directly or indirectly, but not to the extent that the viability of populations or species would be impacted.

All military expended material, including targets and vessel hulks used for sinking exercises that contain materials other than metals, explosives, or chemicals, is evaluated for potential indirect impacts on marine invertebrates via sediment and water. Principal components of these military expended materials include: aluminized fiberglass (chaff); carbon or Kevlar fiber (missiles); and plastics (canisters, targets, sonobuoy components, decelerator/parachutes, etc.). Potential effects of these materials are discussed in Section 3.1.3.4 (Other Materials). Chaff has been extensively studied, and no indirect toxic effects are known to occur at realistic concentrations in the marine environment (Arfsten et al. 2002). Plastics contain chemicals, including persistent organic pollutants, which could indirectly affect marine invertebrates (Derraik 2002; Mato et al. 2001; Teuten et al. 2007). Marine invertebrates may be exposed by contact with the plastic, contact with associated plastic chemical contaminants in the sediment or water, or ingestion of contaminated sediments. Most marine invertebrates are very small relative to Navy military expended materials or fragments of military expended materials, and direct ingestion of military expended materials is unlikely.

The only material that could impact marine invertebrates via sediment is plastics. Harmful chemicals in plastics interfere with metabolic and endocrine processes in many plants and animals (Derraik 2002). Potentially harmful chemicals in plastics are not readily adsorbed to marine sediments; instead, marine invertebrates are most at risk via ingestion or bioaccumulation (see Sections 3.8.3.5, Ingestion Stressors, and Section 3.3, Marine Habitats). Because plastics retain much of their chemical properties as they are physically degraded into microplastic particles (Singh and Sharma 2008), the exposure risks to marine invertebrates are dispersed over time. Marine invertebrates could be indirectly impacted by chemicals from plastics expended during training and testing activities but these effects would be limited to direct contact with the material. Because of these conditions, population-level impacts on marine invertebrates are likely to be inconsequential and not detectable.

##### 3.8.3.6.5 Substressor Impact on Sedentary Invertebrate Beds and Reefs as Essential Fish Habitat (Preferred Alternative)

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of metal, chemical, and other material contaminants, and secondary physical disturbances during training and testing activities, would have no adverse effect on sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern. The use of explosives, explosive byproducts, and unexploded ordnance during training and testing activities may have an adverse effect on sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern. The EFHA states that substressor impacts on invertebrate beds or reefs would be minimal and short-term within the Study Area. The EFH Analysis is located on the NWTT EIS website, www.nwtteis.com.

### 3.8.4 Summary of Potential Impacts (Combined Impacts of All Stressors) on Marine Invertebrates

#### 3.8.4.1 Combined Impacts of All Stressors

As described in Section 3.0.5.5 (Resource-Specific Impacts Analysis for Multiple Stressors), this section evaluates the potential for combined impacts of all the 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 Navy training and testing activities do not typically occur in isolation but rather occur in some combination. For example, mine neutralization activities include elements of acoustic, physical disturbance and strike, entanglement, ingestion, and secondary stressors that are all coincident in space and time. An analysis of the combined impacts of all stressors considers the potential consequences of aggregate exposure to all stressors and the repetitive or additive consequences of exposure over multiple years. This analysis makes the reasonable assumption that the majority of exposures to stressors are non-lethal, and instead focuses on consequences potentially impacting the organism's fitness (e.g., physiology, behavior, and reproductive potential).

It is unlikely that mobile or migratory marine invertebrates that occur within the water column would be exposed to multiple activities during their lifespan because they are relatively short lived, and most Navy training and testing activities impact small, widely-dispersed areas. It is much more likely that stationary organisms or those that only move over a small range (e.g., corals, worms, and sea urchins) would be exposed to multiple activities because many Navy activities occur in the same location (e.g., gunnery and mine warfare).

Multiple stressors can co-occur with marine invertebrates in two general ways. The first would be if a marine invertebrate were exposed to multiple sources of stress from a single event or activity. The second is exposure to a combination of stressors over the course of the organism's life. Both general scenarios are more likely to occur in locations where training and testing activities are concentrated. The key difference between the two scenarios is the amount of time between exposures to stressors. Time is an important factor because some stressors develop over a long period, while others occur and pass quickly (e.g., dissolution of secondary stressors into the sediment versus physical disturbance). Similarly, time is an important factor for the organism because subsequent disturbances or injuries often increase the time needed for the organism to recover to baseline behavior/physiology, extending the time that the organism's fitness is impacted.

Marine invertebrates are susceptible to multiple stressors (see Section 3.8.2.3, General Threats), and susceptibilities of many species are enhanced by additive or synergistic effects of multiple stressors. The global decline of corals, for example, is driven primarily by synergistic impacts of pollution, ecological consequences of overfishing, and climate change. As discussed in the analyses above, marine invertebrates are not particularly susceptible to energy, entanglement, or ingestion stressors resulting from Navy activities (see Section 3.8.3.2, Energy Stressors; Section 3.8.3.4, Entanglement Stressors; and Section 3.8.3.5, Ingestion Stressors); therefore, the opportunity for Navy stressors to result in additive or synergistic consequences is most likely limited to acoustic, physical strike and disturbance, and secondary stressors.

Despite uncertainty in the nature of consequences resulting from combined impacts, the location of potential combined impacts can be predicted with more certainty because combinations are much more likely in locations where training and testing activities are concentrated. However, analyses of the nature of potential consequences of combined impacts of all stressors on marine invertebrates remain largely qualitative and speculative. Where multiple stressors coincide with marine invertebrates, the likelihood of a negative consequence is elevated, but it is not feasible to predict the nature of the consequence or its likelihood because not enough is known about potential additive or synergistic interactions. Even for shallow-water coral reefs, an exceptionally well-studied resource, predictions of the consequences of multiple stressors are semi-quantitative and generalized predictions remain qualitative (Hughes and Connell 1999; Jackson 2008; Norström et al. 2009). It is also possible that Navy stressors will combine with non-Navy stressors, and this is qualitatively discussed in Chapter 4 (Cumulative Impacts).

### 3.8.4.2 Essential Fish Habitat Determinations

Pursuant to the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the use of sonar and other acoustic sources; vessel noise; weapons firing noise; vessel movement; in-water devices; and metal, chemical, or other material contaminants would have no adverse effect on sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern. The use of explosives, electromagnetic sources, military expended materials, seafloor devices, and explosives and explosive byproduct contaminants may have an adverse effect on EFH by reducing the quality and quantity of sedentary invertebrate beds or reefs that constitute EFH or Habitat Areas of Particular Concern. The EFHA states that individual stressor impacts were all either no effect, or minimal and ranged in duration from temporary to permanent, depending on the stressor.

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# 3.9 Fish

## TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES

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## 3.9 FISH

**FISH SYNOPSIS**

The United States Department of the Navy considered all potential stressors and the following have been analyzed for fish:

- Acoustic (sonar and other active acoustic sources; underwater explosives; weapons firing, launch, and impact noise; vessel noise; and aircraft noise)
- Energy (electromagnetic devices)
- Physical disturbance and strike (vessels, in-water devices, military expended materials, and seafloor devices)
- Entanglement (fiber optic cables, guidance wires, and decelerator/parachutes)
- Ingestion (munitions and military expended material other than munitions)
- Secondary (indirect impacts associated with habitat quality)

**Preferred Alternative (Alternative 1)**

- Acoustics: Pursuant to the Endangered Species Act (ESA), the use of sonar and other non-impulsive sources during training and testing activities may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species; and would have no effect on any species' critical habitat. The use of explosives and other impulsive sources during training and testing activities may affect, and is likely to adversely affect, the following Evolutionarily Significant Units (ESUs) or Distinct Population Segments (DPS) in the Study Area: Chinook, coho, chum, and sockeye salmon, steelhead (from the Puget Sound DPS, Upper Columbia River DPS, Middle Columbia River DPS, Lower Columbia River DPS, Upper Willamette River DPS, and Snake River Basin DPS), bull trout, Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), and Pacific eulachon (Southern DPS); may affect, but is not likely to adversely affect, steelhead (from the Northern California DPS, California Central Valley DPS, Central California Coast DPS, South-Central California Coast DPS, and Southern California DPS), and green sturgeon; critical habitat for two salmonid species (Puget Sound Chinook Salmon ESU and Hood Canal summer-run Chum ESU), and would have no effect on critical habitat for the remaining salmonids, rockfish, and the Pacific eulachon.
- Energy: Pursuant to the ESA, the use of electromagnetic devices during training activities may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species; may affect, but is not likely to adversely affect, critical habitat for salmonid species; and would have no effect on critical habitat for bull trout, rockfish species, Pacific eulachon, and green sturgeon.
- Physical Disturbance and Strike: Pursuant to the ESA, the use of vessels and in-water devices may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species; may affect, but is not likely to adversely affect critical habitat for salmonids; and would have no effect on rockfish, Pacific eulachon, and green sturgeon critical habitat. The use of military expended materials would have no effect on Pacific eulachon and their associated critical habit; may affect, but is not likely to adversely affect, ESA-listed salmonid species, rockfish species, and green sturgeon; and may affect, but is not likely to adversely affect, critical habitat for salmonid and green sturgeon. The use of seafloor devices may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species; may affect, but is not likely to adversely affect, critical habitat for salmonids and green sturgeon; and would have no effect on critical habitat for rockfish and Pacific eulachon.

**FISH SYNOPSIS (continued)**

- Entanglement: Pursuant to the ESA, the use of fiber optic cables, guidance wires, and decelerator/parachutes during training and testing activities may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species; would have no effect on critical habitat for rockfish and Pacific eulachon; and may affect, but is not likely to adversely affect, critical habitat for salmonids. The use of fiber optic cables and guidance wires would have no effect on green sturgeon, rockfish, and bull trout critical habitat. The use of decelerator/parachutes may affect, but is not likely to adversely affect, green sturgeon critical habitat.
- Ingestion: Pursuant to the ESA, the use of munitions and military expended material other than munitions may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species. Ingestion sources may affect, but are not likely to adversely affect, critical habitat for salmonids and green sturgeon; and would have no effect on critical habitat for bull trout, rockfish, and Pacific eulachon.
- Secondary Stressors: Pursuant to the ESA, secondary stressors from training and testing activities would have no effect on ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species, and would have no effect on critical habitat for salmonid, rockfish, Pacific eulachon, and green sturgeon.

### 3.9.1 INTRODUCTION AND METHODS

This section analyzes the potential impacts of the Proposed Action on fishes found in the Northwest Training and Testing (NWTT) Study Area (Study Area). Section 3.9 (Fish) provides a synopsis of the United States (U.S.) Department of the Navy's (Navy's) determinations of the impacts of the Proposed Action on fishes. Section 3.9.1 (Introduction and Methods) introduces the species and taxonomic groups known to occur in the Study Area. Section 3.9.2 (Affected Environment) discusses the baseline affected environment. The complete analysis of environmental consequences is in Section 3.9.3 (Environmental Consequences), and the potential impacts of the Proposed Action on fishes are summarized in Section 3.9.4 (Summary of Potential Impacts on Fish).

For this Environmental Impact Statement (EIS), marine and anadromous fishes are evaluated as groups of species characterized by distribution, body type, or behavior relevant to the stressor being evaluated. Activities are evaluated for their potential impact on all fishes in general, by taxonomic groupings, and the 35 fish in the Study Area listed under the Endangered Species Act (ESA).

Fish species listed under the ESA, along with major taxonomic groups in the Study Area, are described in this section. Marine fish species that are regulated under the Magnuson-Stevens Fishery Conservation and Management Act are discussed in Section 3.9.2.4 (Federally Managed Fisheries). Additional general information on the biology, life history, distribution, and conservation of marine and anadromous fishes can be found on the websites of the following agencies and organizations, as well as many others:

- National Marine Fisheries Service (NMFS), Office of Protected Resources (including ESA-listed species distribution maps)
- Regional Fishery Management Councils
- International Union for Conservation of Nature

- Essential Fish Habitat Text Descriptions

Fishes are not distributed uniformly throughout the Study Area but are closely associated with a variety of habitats. Some species, such as large sharks, tuna, and billfishes, range across thousands of square miles (thousands of square kilometers), while others have small home ranges and restricted distributions (Helfman et al. 2009a). The movements of some open-ocean species may never overlap with coastal species that spend their lives within several hundred feet (a few hundred meters) of the shore. Even within species, the distribution and specific habitats in which individuals occur may be influenced by age, developmental stage, size, sex, reproductive condition, health, and other factors.

#### 3.9.1.1 Endangered Species Act Species

There are 34 fish species listed as either threatened or endangered under the ESA (Table 3.9-1 and Section 3.9.2.3, Endangered Species Act-Listed Species) that occur in the Study Area.

NMFS has listed 28 species of salmon and steelhead, three rockfish species, Pacific eulachon, and green sturgeon on the west coast, all of which occur within the Study Area. The U.S. Fish and Wildlife Service has listed bull trout throughout its range which overlaps with the Study Area. In addition, three candidate species and nine species of concern occur within the Study Area. Candidate species are any species that are undergoing a status review that NMFS has announced through a Federal Register notice (71 FR 61022). Species of Concern are identified by NMFS when there is concern regarding species status, but for which insufficient information is available to indicate a need to list the species (69 FR 19975). Candidate species and Species of concern do not carry any procedural or substantive protections under the ESA (71 FR 61022). The emphasis on species-specific information in the following profiles will be on the ESA protected species because any threats or potential impacts on those species are subject to consultation with regulatory agencies.

**Table 3.9-1: Status and Presence of Endangered Species Act-Listed Fish Species, Candidate Species, and Species of Concern Found in the Northwest Training and Testing Study Area**

| Species and Regulatory Status | | | | Presence in Study Area | | |
|---|---|---|---|---|---|---|
| **Common Name (Scientific Name)** | **Distinct Population Segment (DPS)[1]/ Evolutionarily Significant Unit (ESU)[2]** | **Federal Status** | **Critical Habitat Designation** | **Offshore Area** | **Inland Waters** | **Western Behm Canal, Alaska** |
| **Salmonid Species** | | | | | | |
| Chinook Salmon (*Oncorhynchus tshawytscha*) | Puget Sound ESU | T | Designated (Inland Waters) | ✓ | ✓ | |
| | Upper Columbia River Spring-Run ESU | E | Designated (not in Study Area) | ✓ | | |
| | Lower Columbia River ESU | T | Designated (not in Study Area) | ✓ | | |
| | Upper Willamette River ESU | T | Designated (not in Study Area) | ✓ | | |
| | Snake River Spring-Summer ESU | T | Designated (not in Study Area) | ✓ | | |
| | Snake River Fall-Run ESU | T | Designated (not in Study Area) | ✓ | | |
| | California Coastal ESU | T | Designated (not in Study Area) | ✓ | | |
| | Central Valley, Fall and Late-Fall Run ESU | SOC[3] | Not Designated | ✓ | | |
| | Central Valley Spring-Run ESU | T | Designated (not in Study Area) | ✓ | | |
| | Sacramento River Winter-Run | E | Designated (not in Study Area) | ✓ | | |
| Coho Salmon (*Oncorhynchus kisutch*) | Lower Columbia ESU | T | Proposed | ✓ | | |
| | Oregon Coast ESU | T | Designated (not in Study Area) | ✓ | | |
| | Southern Oregon/Northern California Coast ESU | T | Designated (not in Study Area) | ✓ | | |
| | Puget Sound/Strait of Georgia ESU | SOC[3] | Not Designated | ✓ | ✓ | |
| | Central California Coast | E | Designated (not in Study Area) | ✓ | | |

**Table 3.9-1: Status and Presence of Endangered Species Act-Listed Fish Species, Candidate Species, and Species of Concern Found in the Northwest Training and Testing Study Area (continued)**

| Species and Regulatory Status | | | | Presence in Study Area | | |
|---|---|---|---|---|---|---|
| **Common Name (Scientific Name)** | **Distinct Population Segment (DPS)[1]/ Evolutionarily Significant Unit (ESU)[2]** | **Federal Status** | **Critical Habitat Designation** | **Offshore Area** | **Inland Waters** | **Western Behm Canal, Alaska** |
| **Salmonid Species (continued)** | | | | | | |
| Chum Salmon (*Oncorhynchus keta*) | Hood Canal Summer-Run ESU | T | Designated (Inland Waters) | ✓ | ✓ | |
| | Columbia River ESU | T | Designated (not in Study Area) | ✓ | | |
| Sockeye Salmon (*Oncorhynchus nerka*) | Ozette Lake ESU | T | Designated (not in Study Area) | ✓ | | |
| | Snake River ESU | E | Designated (not in Study Area) | ✓ | | |
| Steelhead (*Oncorhynchus mykiss*) | Puget Sound DPS | T | Proposed | ✓ | ✓ | |
| | Upper Columbia River DPS | T | Designated (not in Study Area) | ✓ | | |
| | Middle Columbia River DPS | T | Designated (not in Study Area) | ✓ | | |
| | Lower Columbia River DPS | T | Designated (not in Study Area) | ✓ | | |
| | Upper Willamette River DPS | T | Designated (not in Study Area) | ✓ | | |
| | Snake River Basin DPS | T | Designated (not in Study Area) | ✓ | | |
| | Northern California Coast DPS | T | Designated (not in Study Area) | ✓ | | |
| | Oregon Coast DPS | SOC[3] | Not Designated | ✓ | | |
| | California Central Valley DPS | T | Designated (not in Study Area) | ✓ | | |
| | Central California Coast DPS | T | Designated (not in Study Area) | ✓ | | |
| | South-Central California Coast DPS | T | Designated (not in Study Area) | ✓ | | |
| | Southern California DPS | E | Designated (not in Study Area) | ✓ | | |

**Table 3.9-1: Status and Presence of Endangered Species Act-Listed Fish Species, Candidate Species, and Species of Concern Found in the Northwest Training and Testing Study Area (continued)**

| Species Name and Regulatory Status | | | | Presence in Study Area | | |
|---|---|---|---|---|---|---|
| **Common Name (Scientific Name)** | **Distinct Population Segment (DPS)[1]/ Evolutionarily Significant Unit (ESU)[2]** | **Federal Status** | **Critical Habitat Designation** | **Offshore Area** | **Inland Waters** | **Western Behm Canal, Alaska** |
| Bull Trout (*Salvelinus confluentus*) | Coastal Puget Sound DPS | T | Designated (Offshore and Inland Waters) | ✓ | ✓ | |
| **Rockfish Species** | | | | | | |
| Bocaccio Rockfish (*Sebastes paucispinis*) | Puget Sound/Georgia Basin DPS | E | Designated (Inland Waters) | | ✓ | |
| | Southern DPS (Northern California to Mexico) | SOC[3] | Not Designated | ✓ | | |
| Canary Rockfish (*Sebastes pinniger*) | Puget Sound/Georgia Basin DPS | T | Designated (Inland Waters) | | ✓ | |
| Cowcod Rockfish (*Sebastes levis*) | Central Oregon to central Baja California and Guadalupe Island, Mexico ESU | SOC[3] | Not Designated | ✓ | | |
| Yelloweye Rockfish (*Sebastes ruberrimus*) | Puget Sound/Georgia Basin DPS | T | Designated (Inland Waters) | | ✓ | |
| **Other Marine Fish Species** | | | | | | |
| Basking shark (*Cetorhinus maximus*) | Eastern North Pacific DPS | SOC[3] | Not Designated | ✓ | | |
| Bigeye thresher shark (*Alopias superciliosus)* | Eastern Pacific (Canada to Mexico) | CS[3] | Not Designated | ✓ | | |
| Common thresher shark (*Alopias vulpinus*) | Eastern Pacific (Canada to Mexico) | CS[3] | Not Designated | ✓ | | |
| Green Sturgeon (*Acipenser medirostris*) | Southern DPS | T | Designated (Offshore and Inland Waters) | ✓ | ✓ | |
| | Northern DPS | SOC[3] | Not Designated | ✓ | ✓ | |
| Pacific Cod (*Gadus macrocephalus*) | Salish Sea | SOC[3] | Not Designated | | ✓ | |
| Pacific Eulachon (*Thaleichthys pacificus*) | Southern DPS | T | Designated (not in Study Area) | ✓ | ✓ | |

**Table 3.9-1: Status and Presence of Endangered Species Act-Listed Fish Species, Candidate Species, and Species of Concern Found in the Northwest Training and Testing Study Area (continued)**

| Species Name and Regulatory Status | | | | Presence in Study Area | | |
|---|---|---|---|---|---|---|
| Common Name (Scientific Name) | Distinct Population Segment (DPS)[1]/ Evolutionarily Significant Unit (ESU)[2] | Federal Status | Critical Habitat Designation | Offshore Area | Inland Waters | Western Behm Canal, Alaska |
| Pacific Hake (*Merluccius productus*) | Georgia Basin (Canada to Washington State) DPS | SOC[3] | Not Designated | | ✓ | |
| Smooth hammerhead shark (*Sphyma zygaena*) | Northern California to Mexico | CS[3] | Not Designated | ✓ | | |

[1] A species with more than one distinct population segment can have more than one ESA listing status, as individual distinct population segments can be either not listed under the ESA or can be listed as endangered, threatened, or a candidate species.
[2] Evolutionarily significant unit is a population of organisms that is considered distinct for purposes of conservation.
[3] Species of Concern and Candidate Species status does not carry any procedural or substantive protections under the ESA, but these species are included in Table 3.9-1 for informational purposes
Notes: Federal Status: E = Endangered, T = Threatened, CS = Candidate Species, SOC = Species of Concern

### 3.9.1.2 Taxonomic Groups

Taxonomic groupings of marine and anadromous fishes are listed in Table 3.9-2 and are described further in Section 3.9.2 (Affected Environment). To ensure inclusion of all fishes representative of the Study Area, these taxonomic groups are presented to supplement the approach used for the ESA-protected species in this document.

**Table 3.9-2: Taxonomic Groups of Fishes within the Northwest Training and Testing Study Area**

| Taxonomic Groups[1] | | Distribution Within Study Area | | |
|---|---|---|---|---|
| (Taxonomic Grouping | Description | Offshore Area | Inland Waters | Southeast Alaska |
| Hagfish and lamprey (orders Myxiniformes and Petromyzontiformes) | Primitive and jawless with an eel-like body shape that feed on dead fishes or are parasitic | Water column, seafloor | Seafloor | Seafloor |
| Sharks, rays, and chimaeras (class Chondrichthyes) | Cartilaginous (non-bony) fishes, some of which are open ocean predators | Surface, water column, seafloor | Surface, water column, seafloor | Surface, water column, seafloor |
| Eels and spiny eels (order Anguilliformes, order Elopiformes) | Undergo a unique larval stage with a small head and elongated body; very different from other fishes | Surface, water column, seafloor | Surface, water column, seafloor | Surface, water column, seafloor |
| Sturgeons (order Acipenseriformes) | Cartilaginous skeleton, anadromous, and long lived | Water column, seafloor | Water column, seafloor | Water column, seafloor |
| Herring, Eulachon, and Salmonids (Orders Clupeiformes, Osmeriformes, Esociformes, and Salmoniformes) | Some are anadromous while others are migratory between the ocean, bays, estuaries, and rivers | Surface | Surface, water column | Surface, water column |
| Lanternfishes (order Myctophiformes) | Largest group of deepwater fishes, most possess adaptations for low-light conditions | Water column | Not Present | Not Present |
| Lizardfishes and lancetfishes (order Aulopiformes) | Possess both primitive and advanced features of marine fishes | Seafloor | Water column, seafloor | Water column, seafloor |
| Cods, Hakes and Brotulas(orders Gadiformes and Ophidiiformes) | Important commercial fishery resources, associated with bottom habitats | Water column, seafloor | | Water column, seafloor |
| Toadfishes (order Batrachoidiformes) | Temperate and tropical a lie-in-wait predator | Seafloor | Seafloor | Seafloor |
| Pacific saury and Silversides and Pacific saury (orders Atheriniformes and Beloniformes) | Small-sized nearshore/coastal fishes, primarily feed on organic debris; also includes the surface-oriented flyingfishes | Surface | Surface, water column | Surface, water column |
| Opahs and Ribbonfishes, (order Lampridiformes) | Primarily open ocean or deepwater fishes | Surface, water column | Surface, water column | Surface, water column |

**Table 3.9-2: Taxonomic Groups of Marine Fishes within the Northwest Training and Testing Study Area (continued)**

| Taxonomic Groups[1] | | Distribution Within Study Area | | |
|---|---|---|---|---|
| **Common Name (Taxonomic Group)** | **Description** | **Offshore Area** | **Inland Waters** | **Southeast Alaska** |
| Pipefish (order Gasterosteiformes) | Small mouth with tubular snout and armor like scales; shows a high level of parental care | None | Surface | Surface |
| Rockfishes (order Scorpaeniformes) | Bottom dwelling with modified pectoral fins to rest on the bottom | Seafloor | Seafloor | Surface, water column, seafloor |
| Gobies (order Perciformes: family Gobiidae) | Gobies are the largest and most diverse family of marine fishes, mostly found in bottom habitats of coastal areas | | Surface | Surface |
| Jacks, tunas, and Mackerals, (order Perciformes: families Carangidae, Scombridae) | Highly migratory predators found near the surface; they make up a major component of fisheries | Surface | Surface, water column | Surface, water column |
| Flounders (order Pleuronectiformes) | Occur in bottom habitats throughout the world where they are well camouflaged | Seafloor | Seafloor | Seafloor |
| Ocean sunfish (molas) (order Tetraodontiformes) | Unique body shapes and characteristics to avoid predators | Surface, water column | Surface, water column, | Surface, water column |

[1] Taxonomic groups are based on the following commonly accepted references: Hart 1973; Helfman et al. 1997; Moyle and Cech 1996; Nelson 2006.

### 3.9.2 Affected Environment

The distribution and abundance of fishes depends greatly on the physical and biological conditions of the marine environment, such as salinity, temperature, dissolved oxygen, population dynamics, predator and prey interaction oscillations, seasonal movements, reproduction strategy, life length, and recruitment success (Helfman et al. 1997). A single factor is rarely responsible for the distribution of fish species; more often, a combination of factors is accountable. For example, open ocean species optimize their growth, reproduction, and survival by tracking gradients of temperature, oxygen, or salinity (Helfman et al. 1997). Another major component of species distribution is the location of highly productive regions, such as frontal zones. These areas concentrate various prey species and their predators, such as tuna, and provide visual cues for the location of target species for commercial fisheries (National Marine Fisheries Service 2001).

#### 3.9.2.1 Hearing and Vocalization

Fish can have two sensory systems to detect sound in the water: the inner ear, which functions very much like the inner ear in other vertebrates, and the lateral line, which consists of a series of receptors along the fish's body (Popper 2008). The inner ear generally detects relatively higher-frequency sounds, while the lateral line detects water motion at low frequencies (below a few hundred Hertz [Hz]) (Hastings and Popper 2005).

Many researchers have investigated hearing and vocalizations in fish species (e.g., Astrup 1999; Astrup and Mohl 1993; Casper et al. 2003a; Casper and Mann 2006a; Coombs and Popper 1979a; Dunning et al. 1992; Egner and Mann 2005a; Gregory and Clabburn 2003; Hawkins and Johnstone 1978a; Higgs et al. 2004; Iversen 1967, 1969; Jorgensen et al. 2005; Kenyon 1996a; Mann et al. 2001; Mann et al. 2005a; Mann and Lobel 1997; Meyer et al. 2010; Myrberg 2001; Nestler et al. 2002; Popper 2008; Popper and Carlson 1998; Popper and Tavolga 1981; Ramcharitar et al. 2006a; Ramcharitar et al. 2001; Ramcharitar and Popper 2004a; Ramcharitar and Popper 2004b; Remage-Healey et al. 2006b; Ross et al. 1996; Sisneros and Bass 2003b; Song et al. 2006; Wright et al. 2007; Wright et al. 2005). Although direct measurements of hearing ability exist for fewer than 100 of the 32,000 fish species, current data suggest that most species of fish detect sounds from 50 to 1,000 Hz, with only a few fishes capable of detecting sounds above 4 kilohertz (kHz) (Popper and Hastings 2009a; Popper 2008). It is believed that most fishes have their best hearing sensitivity from 100 to 400 Hz (Popper 2003). Some clupeid species (e.g., shad in the subfamily Alosinae) are an exception and have demonstrated the ability to detect higher frequency sounds, even into the ultrasonic range of frequencies (i.e., sounds above 100 kHz) (Astrup 1999). Despite this capability, the best hearing sensitivity for clupeids is generally at frequencies less than 1 kHz (Popper and Fay 2010; Popper and Schilt 2008; Mann et al. 2001).

The inner ears of fish are directly sensitive to acoustic particle motion rather than acoustic pressure (for a more detailed discussion of particle motion versus pressure, see Section 3.0.4, Introduction to Acoustics). Although a propagating sound wave contains pressure and particle motion components, particle motion is most significant at low frequencies (less than a few hundred Hz) and closer to the sound source. However, a fish's gas-filled swim bladder can enhance sound detection by converting acoustic pressure into localized particle motion, which may then be detected by the inner ear. Fish with swim bladders generally have better sensitivity and better high-frequency hearing than fish without swim bladders (Popper and Fay 2010). Some fish also have specialized structures such as small gas bubbles or gas-filled projections that terminate near the inner ear. In reality many fish species possess a continuum of anatomical specializations that may enhance their sensitivity to pressure changes (versus particle motion), and thus higher frequencies and lower intensities (Popper and Fay 2010).

Past studies indicated that hearing specializations in marine fish were quite rare (Amoser and Ladich 2005; Popper 2003b). However, more recent studies have shown that there are more fish species than originally investigated by researchers, such as deep sea fish, that may have evolved structural adaptations to enhance hearing capabilities (Buran et al. 2005; Deng et al. 2011). Marine fish families Holocentridae (squirrelfish and soldierfish), Pomacentridae (damselfish), Gadidae (cod, hakes, and grenadiers), and Sciaenidae (drums, weakfish, and croakers) have some members that can potentially hear sound up to a few kHz. There is also evidence, based on the structure of the ear and the relationship between the ear and the swim bladder, that at least some deep-sea species, including myctophids, may have hearing specializations and thus be able to hear higher frequencies (Deng et al. 2011; Popper 1977; Popper 1980), although it has not been possible to do actual measures of hearing on these fish from great depths.

Several species of reef fish tested have shown sensitivity to higher frequencies (i.e., over 1,000 Hz). The hearing of the shoulderbar soldierfish (*Myripristis kuntee*) has a higher-frequency auditory range extending toward 3 kHz (Coombs and Popper 1979b), while other species tested in this family have been demonstrated to lack this high frequency hearing ability (e.g., Hawaiian squirrelfish [*Adioryx xantherythrus*] and saber squirrelfish [*Sargocentron spiniferum*]). Some damselfish can hear frequencies of up to 2 kHz, but with best sensitivity well below 1 kHz (Egner and Mann 2005b; Kenyon 1996b; Wright et al. 2005; Wright et al. 2007).

Sciaenid research by Ramcharitar et al. (2006b) investigated the hearing sensitivity of weakfish (*Cynoscion regalis*). Weakfish were found to detect frequencies up to 2 kHz. The sciaenid with the greatest hearing sensitivity discovered thus far is the silver perch (*Bairdiella chrysoura*), which has responded to sounds up to 4 kHz (Ramcharitar et al. 2004). Other species tested in the family Sciaenidae have been demonstrated to lack this higher frequency sensitivity.

It is possible that the Atlantic cod (*Gadus morhua*) is also able to detect high-frequency sounds (Astrup and Mohl 1993). However, in Astrup and Mohl's (1993) study it is feasible that the cod was detecting the stimulus using touch receptors that were over driven by very intense fish-finding sonar emissions (Astrup 1999, Ladich and Popper 2004). Nevertheless, Astrup and Mohl (1993) indicated that cod have high frequency thresholds of up to 38 kHz at 185 to 200 decibels (dB) relative to (re) 1 micropascal (μPa), which likely only allows for detection of odontocete's clicks at distances no greater than 33 to 98 feet (ft.) (10 to 30 meters [m]) (Astrup 1999). Experiments on several species of the Clupeidae (i.e., herrings, shads, and menhadens) have obtained responses to frequencies between 40 kHz and 180 kHz (Astrup 1999); however, not all clupeid species tested have demonstrated this very high-frequency hearing. Mann et al. (1998) reported that the American shad can detect sounds from 0.1 to 180 kHz with two regions of best sensitivity: one from 0.2 to 0.8 kHz, and the other from 25 kHz to 150 kHz. This shad species has relatively high thresholds (about 145 decibels referenced to 1 micropascal [1 dB re 1 μPa]), which should enable the fish to detect odontocete clicks at distances up to about 656 ft. (200 m) (Mann et al. 1997). In contrast, the Clupeidae bay anchovy (*Anchoa mitchilli*), scaled sardine (*Harengula jaguana*), and Spanish sardine (*Sardinella aurita*) did not respond to frequencies over 4 kHz (Gregory and Clabburn 2003; Mann et al. 2001b). Mann et al. (2005b) found hearing thresholds of 0.1 kHz to 5 kHz for Pacific herring (*Clupyea pallasii*).

Two other groups to consider are the jawless and the cartilaginous fishes. While there are lampreys in the marine environment, virtually nothing is known about their hearing capability. They do have ears, but these are relatively primitive compared to the ears of other vertebrates, and it is unknown whether they can detect sound (Popper and Hoxter 1987). While there have been some studies on the hearing of cartilaginous fishes, these have not been extensive. However, available data suggest detection of sounds from 20 to 1,000 Hz, with best sensitivity at lower ranges (Casper et al. 2003b; Casper and Mann 2006b; Casper and Mann 2009; Myrberg 2001). It is speculated that elasmobranchs only detect low-frequency sounds because they lack a swim bladder or other pressure detector.

Most other marine species investigated to date lack higher-frequency hearing (i.e., greater than 1,000 Hz). This notably includes sturgeon species tested to date that could detect sound up to 400 or 500 Hz (Lovell et al. 2005; Meyer et al. 2010 )and Atlantic salmon that could detect sound up to about 500 Hz (Hawkins and Johnstone 1978b; Kane et al. 2010).

Bony fish can produce sounds in a number of ways and use them for a number of behavioral functions (Ladich 2008). Over 30 families of fish are known to use vocalizations in aggressive interactions, and over 20 families are known to use vocalizations in mating (Ladich 2008). Sound generated by fish as a means of communication is generally below 500 Hz (Slabbekoorn et al. 2010a). Although fish can produce sounds in a number of ways, typically the air in the swim bladder is vibrated by the sound-producing structures (often muscles that are integral to the swim bladder wall) and radiates sound into the water (Zelick et al. 1999). Sprague and Luczkovich (2004) calculated that silver perch can produce drumming sounds ranging from 128 to 135 dB re 1μ Pa (root mean square [rms]). Female midshipman fish apparently use the auditory sense to detect and locate vocalizing males during the breeding season (Sisneros and Bass 2003a).

### 3.9.2.2 General Threats

This section covers the existing condition of marine fishes as a resource and presents some of the major threats within the Study Area. Species-specific threats are addressed for each of the ESA-listed species. Human-made impacts are widespread throughout the world's oceans, such that very few habitats remain unaffected by human influence (Halpern et al. 2008). These human-induced influences, or stressors have shaped the condition of marine fish populations, particularly those species with large body sizes and late maturity ages, making these species especially vulnerable to habitat losses and fishing pressure (Reynolds et al. 2005). This trend is evidenced by the world's shark species, which make up 60 percent of the marine fishes of conservation concern (International Union for Conservation of Nature and Natural Resources 2009). Furthermore, the conservation status of only 3 percent of the world's marine fish species has been evaluated, so the threats to the remaining species are largely unknown at this point (Reynolds et al. 2005).

Overfishing is the most serious threat that has led to the listing of ESA-protected marine species (Crain et al. 2009; Kappel 2005), with habitat loss also contributing to extinction risk (Cheung et al. 2007; Dulvy et al. 2003; Jonsson et al. 1999; Limburg and Waldman 2009; Musick et al. 2000). Overfishing occurs when fishes are harvested in quantities above a sustainable level. Overfishing impacts targeted species, and non-targeted species (or "bycatch" species) that often are prey for other fishes and marine organisms. Bycatch may also include seabirds, turtles, and marine mammals. Additionally, in recent decades the marine fishes being targeted have changed such that when higher-level predators become scarce, different organisms on the food chain are subsequently targeted; this has negative implications for entire marine food webs (Crain et al. 2009; Pauly and Palomares 2005). Other factors, such as fisheries-induced evolution and intrinsic vulnerability to overfishing, have been shown to reduce the abundance of some populations (Kauparinen and Merila 2007). Fisheries-induced evolution describes a change in genetic composition of the population that results from intense fishing pressure, such as a reduction in the overall size and growth rates of fish in a population. Intrinsic vulnerability describes certain life history traits (e.g., large body size, late maturity age, low growth rate) that result in a species being more susceptible to overfishing than others (Cheung et al. 2007).

Pollution primarily impacts coastal fishes that occur near the sources of pollution. However, global oceanic circulation patterns result in a considerable amount of marine pollutants and debris scattered throughout the open ocean (Crain et al. 2009). Pollutants in the marine environment that may impact marine fishes include organic pollutants (e.g., pesticides, herbicides, polycyclic aromatic hydrocarbons, flame retardants, and oil), inorganic pollutants (e.g., heavy metals), and debris (e.g., plastics and wastes from dumping at sea) (Pew Oceans Commission 2003). High chemical pollutant levels in marine fishes may cause behavioral changes, physiological changes, or genetic damage in some species (Goncalves et al. 2008; Moore 2008; Pew Oceans Commission 2003; van der Oost et al. 2003). Bioaccumulation of pollutants (e.g., metals and organic pollutants) is also a concern, particularly in terms of human health, because people consume top predators with high pollutant loads. Bioaccumulation is the net buildup of substances (e.g., chemicals or metals) in an organism directly from contaminated water or sediment through the gills or skin, from ingesting food containing the substance (Newman 1998), or from ingestion of the substance itself (Moore 2008). Entanglement in abandoned commercial and recreational fishing gear has also caused pollution-related declines for some marine fishes; some species are more susceptible to entanglement by marine debris than others (Musick et al. 2000).

Other human-caused stressors on marine fishes are the introduction of non-native species, climate change, aquaculture, energy production, vessel movement, and underwater noise:

- Non-native fishes and invertebrates pose threats to native fishes when they are introduced into an environment lacking natural predators and then compete with, and prey upon, native marine fishes for resources (Crain et al. 2009).
- Global climate change is contributing to a shift in fish distribution from lower to higher latitudes (Brander 2010; Brander 2007; Dufour et al. 2010; Glover and Smith 2003; Limburg and Waldman 2009; Wilson et al. 2010).
- The threats of aquaculture operations on wild fish populations are reduced water quality, competition for food, predation by escaped or released farmed fishes, spread of disease, and reduced genetic diversity (Kappel 2005). These threats become apparent when escapees enter the natural ecosystem (Hansen and Windsor 2006; Ormerod 2003). As a result, the National Oceanic and Atmospheric Administration developed an aquaculture policy aimed at promoting sustainable marine aquaculture (National Oceanic and Atmospheric Administration 2011a).
- Energy production and offshore activities associated with power-generating facilities results in direct and indirect fish injury or mortality from two primary sources; cooling water withdrawal that results in entrainment mortality of eggs and larvae and impingement mortality of juveniles and adults (U.S. Environmental Protection Agency 2004), and offshore wind energy development that results in acoustic impacts (Madsen et al. 2006).
- Vessel strikes pose threats to some large, slow-moving fishes at the surface. Whale sharks, basking sharks, ocean sunfish, and manta rays are vulnerable to ship strikes, and numerous collisions have been recorded (National Marine Fisheries Service 2010; Rowat et al. 2007b; Stevens 2007).
- Underwater noise may affect some marine fishes. However, the physiological and behavioral responses of marine fishes to underwater noise (Codarin et al. 2009; Popper 2003; Slabbekoorn et al. 2010b; Wright et al. 2010) have been investigated for only a limited number of species (Popper and Hastings 2009a, b). In addition to vessels, other sources of underwater noise include seismic survey activity, pile driving, and offshore energy projects such as hydrokinetic and wind farm structures (Popper and Hastings 2009a). Information on fish hearing is provided in Section 3.9.2.1 (Hearing and Vocalization), with further discussion in Section 3.9.3.1 (Acoustic Stressors).

#### 3.9.2.3 Endangered Species Act-Listed Species

This section describes ESA-listed species that are present within the Study Area, and critical habitat that has been designated or proposed within the Study Area that might conceivably be affected by the proposed action. Information on the spatial and temporal distribution, life history, and ecological requirements of species known to occur in the Study Area is presented below. Critical habitat and the associated Primary Constituent Elements (PCEs), if applicable, within the Study Area are identified and described. Potential impacts to critical habitat were assessed by determining the effects of the project on the PCEs of the critical habitat. Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time of listing, if those areas contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. PCEs are defined as sites or habitat components that support one or more life stages deemed essential to the conservation of the species. Critical habitat maps were only provided for species in which the critical habitat extended into the Study Area.

#### 3.9.2.3.1 Salmonid Species

Juveniles and adults of all anadromous salmonid ESUs and DPSs in the Study Area traverse through estuaries en route to and from the Pacific Ocean. The time spent in a given river or estuary is determined by species, a combination of environmental conditions (i.e., river discharge, water temperature, food availability), intrinsic biological differences (sex and population), and physiological and energetic status (overall health). There is extensive variation in migration behavior among individuals, sexes, and populations.

Adult salmonids may move into estuaries throughout the year and may remain for several weeks prior to migrating upstream for spawning. Juveniles may also be present in estuaries throughout the year. Different species, size classes, and life history types continually move downstream and enter tidal waters on their migration to the ocean. The juvenile salmonid species, such as sockeye or steelhead, may move quickly through an estuary. Whereas chum and ocean-type Chinook salmon (which immigrate to the ocean as sub-yearling smolts), are smaller in size and generally select shallower, slower water habitats along river margins, thus inhabiting an estuary longer.

Salmonids in the ocean tend to remain over the continental shelf, which is typically defined as waters from the shore seaward to the 200 m depth contour. In the Offshore Area, the continental shelf is typically within 50 nm of the shore. Off of Washington in the Olympic Coast National Marine Sanctuary, the continental shelf extends from 7-35 nm offshore. In southern Washington and Oregon, the continental shelf ranges in width from 8-36 nm and in northern California the shelf remains similar to the profile in Oregon. Species specific information on depth preference is provided in the species specific write ups.

The quantity and quality of critical habitat are evaluated by reference to PCEs, defined as those sites and habitat components that support one or more life stages and are deemed essential for the conservation of the species. The PCEs for nearshore marine areas and offshore marine areas are listed below. Bull trout have different PCEs, which are discussed in Section 3.9.2.3.1.6 (Bull Trout [*Salvelinus confluentus*]).

- **Nearshore marine areas** free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels. As in the case with freshwater migration corridors and estuarine areas, nearshore marine features are essential to conservation because without them juveniles cannot successfully transition from natal streams to offshore marine areas. NMFS focused the designation of this PCE on nearshore areas in Puget Sound because of its unique and relatively sheltered fjord-like setting. There are two salmonid species (Chinook and chum) with nearshore marine area PCEs in the Study Area (Figure 3.9-1 and Figure 3.9-2).
- **Offshore marine areas** with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation. These features are essential for conservation because without them juveniles cannot forage and grow to adulthood. However, it is difficult to identify specific areas containing this PCE as well as human activities that may affect the PCE condition in those areas. Therefore, NMFS has not designated any specific areas based on this PCE but instead has identified it because it is essential to the species' conservation and specific offshore areas may be identified in the future (70 Federal Register [FR] 52630–52858). Therefore, since this PCE has not yet been designated, it will not be considered in this analysis.

## Chinook Salmon (*Oncorhynchus tshawytscha*)

### Occurrence in the Study Area

Chinook salmon ESUs may occur in the all portions of the Study Area. The Puget Sound ESU will occur in the Offshore Area and the Inland Waters. The Upper Columbia River spring-run, Lower Columbia River, Upper Willamette River, Snake River spring/summer-run, Snake River fall-run, California Coastal, Central Valley spring-run and Sacramento River winter-run ESUs will only occur in the Offshore Area (see Table 3.9-1). Chinook from the Columbia River tend to have a distribution with greater concentrations north of the mouth of the Columbia River (Yu et al. 2012).

### Status and Management

Of the 9 ESA-listed Chinook salmon ESUs, 2 are listed as endangered and 7 are listed as threatened (National Marine Fisheries Service 2012b).

Critical habitat for 9 Chinook salmon ESUs has been designated (National Marine Fisheries Service 2012b). Critical habitat and PCEs for the Puget Sound ESU have been designated in the Study Area (Figure 3.9-1). All other critical habitat is outside the Study Area. Fishery management of Pacific salmon is through the Pacific Fishery Management Council. The Commission was formed by the governments of Canada and the United States to implement the Pacific Salmon Treaty. The Commission does not regulate the salmon fisheries but does provide regulatory advice and recommendations.

#### Puget Sound ESU

On 28 June 2005, the Puget Sound Chinook Salmon ESU was listed as threatened (70 FR 37160–37204). This ESU includes all wild (naturally spawned) populations of Chinook salmon from rivers and streams flowing into Puget Sound, including the Strait of Juan de Fuca from the Elwha River, eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound, and the Strait of Georgia in Washington, and 26 artificial propagation programs. These programs include Kendal Creek Hatchery, Marblemount Hatchery (fall, spring yearlings, spring subyearlings, and summer run), Harvey Creek Hatchery, Whitehorse Springs Pond, Wallace River Hatchery (yearlings and subyearlings), Tulalip Bay, Issaquah Hatchery, Soos Creek Hatchery, Icy Creek Hatchery, Keta Creek Hatchery, White River Hatchery, White Acclimation Pond, Hupp Springs Hatchery, Voights Creek Hatchery, Diru Creek, Clear Creek, Kalama Creek, George Adams Hatchery, Rick's Pond Hatchery, Hamma Hamma Hatchery, Dungeness/Hurd Creek Hatchery, and Elwha Channel Hatchery.

#### Upper Columbia River ESU

The Upper Columbia River Spring-Run Chinook ESU was listed as endangered on 28 June 2005 (70 FR 37160–37204). This ESU includes all naturally spawned populations of spring Chinook salmon in all river reaches accessible to spring Chinook salmon in Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam in Washington, and six artificial propagation programs. These propagation programs include Twisp River, Chewuch River, Methow Composite, Winthrop National Fish Hatchery, Chiwawa River, and White River.

#### Lower Columbia River ESU

On June 28, 2005, the Lower Columbia River Chinook Salmon ESU was listed as threatened (70 FR 37160–37204). This ESU includes all naturally spawned populations of Chinook salmon from the Columbia River and its tributaries from its mouth at the Pacific Ocean, upstream to a transitional point between Washington and Oregon east of the Hood River and the White Salmon River, and includes the Willamette River to Willamette Falls, Oregon, exclusive of spring-run Chinook salmon in the Clackamas River and 17 artificial propagation programs.

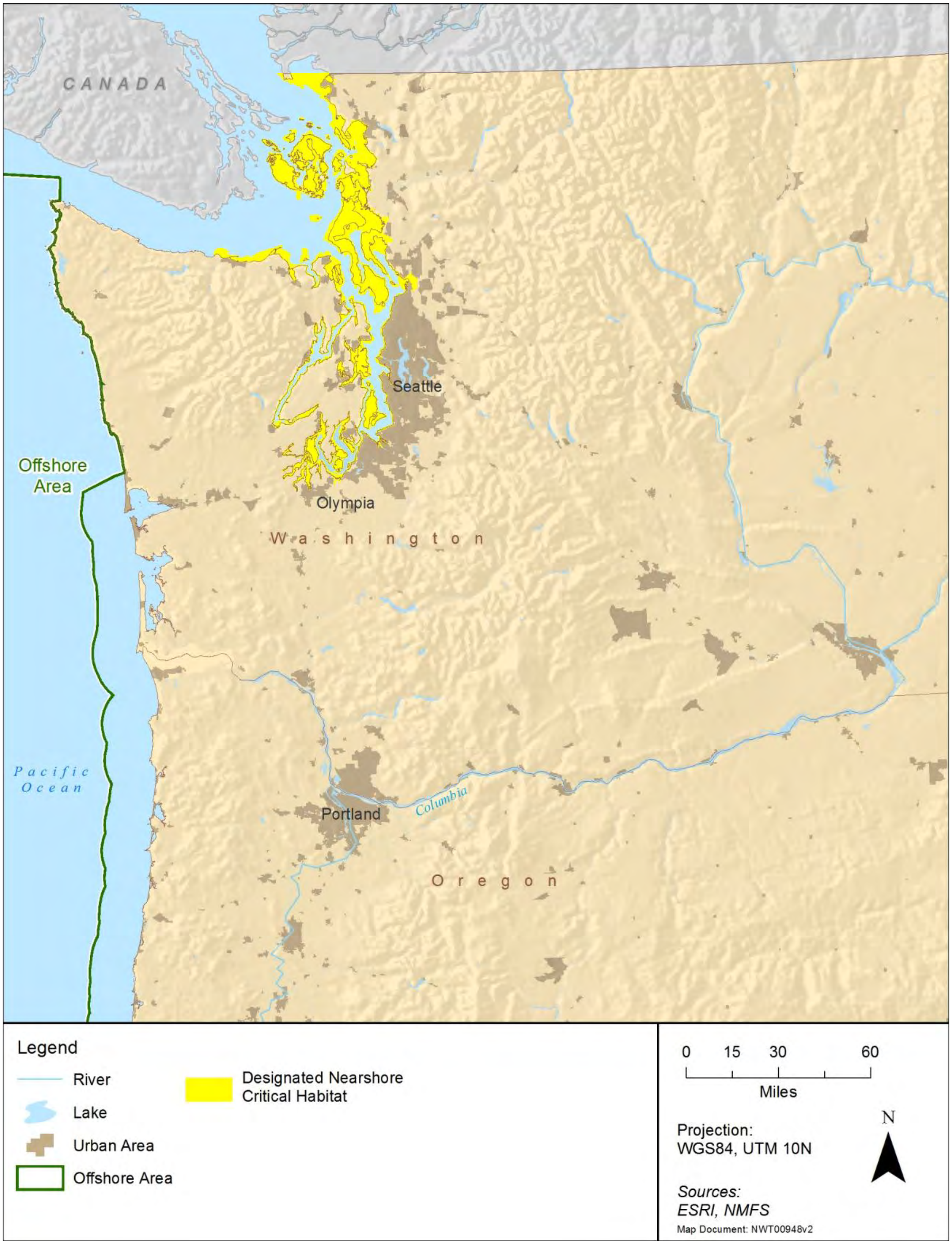


**Figure 3.9-1: Critical Habitat for the Puget Sound Chinook Salmon ESU in the Study Area**

#### Upper Willamette River ESU

The Willamette River Chinook Salmon ESU was listed as threatened on 28 June 2005 (70 FR 37160–37204). This ESU includes all naturally spawned populations of spring-run Chinook salmon in the Clackamas River and Willamette River, and its tributaries, above Willamette Falls, Oregon, and seven artificial propagation programs. The artificial propagation programs are the McKenzie River Hatchery (Oregon Department of Fish and Wildlife [ODFW] stock #24), Marion Forks/North Fork Santiam River (ODFW stock #21), South Santiam Hatchery (ODFW stock #23) in the South Fork Santiam River, South Santiam Hatchery in the Calapooia River, South Santiam Hatchery in the Mollala River, Willamette Hatchery (ODFW stock #22), and Clackamas hatchery (ODFW stock #19).

#### Snake River Spring/Summer Run ESU

On 28 June 2005, the Snake River Chinook Salmon Spring/Summer-Run ESU was listed as threatened (70 FR 37160–37204). This ESU includes all naturally spawned populations of spring/summer-run Chinook salmon in the mainstem Snake River and the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins, and 15 artificial propagation programs. These artificial propagation programs include the Tucannon River conventional Hatchery, Tucannon River Captive Broodstock Program, Lostine River, Catherine Creek, Lookingglass Hatchery, Upper Grande Ronde, Imnaha River, Big Sheep Creek, McCall Hatchery, Johnson Creek Artificial Propagation Enhancement, Lemhi River Captive Rearing Experiment, Pahsimeroi Hatchery, East Fork Captive Rearing Experiment, West Fork Yankee Fork Captive Rearing Experiment, and Sawtooth Hatchery.

#### Snake River Fall Run ESU

The Snake River Chinook Salmon Fall-Run ESU was listed as threatened on 28 June 2005 (70 FR 37160–37204). This ESU includes all naturally spawned populations of fall-run Chinook salmon in the mainstem Snake River below Hells Canyon Dam, and in the Tucannon River, Grande Ronde River, Imnaha River, Salmon River, and Clearwater River, and four artificial propagation programs: the Lyons Ferry Hatchery, Fall Chinook Acclimation Ponds Program, Nez Perce Tribal Hatchery, and Oxbow Hatchery fall-run Chinook hatchery programs.

#### California Coastal ESU

On 16 September 1999 the California Coastal Chinook Salmon ESU was listed as threatened, and it was reaffirmed 28 June 2005 (70 FR 37160). This ESU includes all naturally spawned populations of Chinook salmon from rivers and streams south of the Klamath River to the Russian River, and seven artificial propagation programs that were considered part of the ESU at the time of listing: the Humboldt Fish Action Council, Yager Creek, Redwood Creek, Hollow Tree, Van Arsdale Fish Station, Mattole Salmon Group, and Mad River Hatchery fall-run Chinook hatchery programs. The Mad River Hatchery no longer rears or produces any Chinook salmon.

#### Central Valley Spring-Run ESU

On 16 September 1999 the Central Valley Spring-Run Chinook Salmon ESU was listed as threatened (64 FR 50394). This ESU includes all naturally spawned populations of spring-run Chinook salmon from the Sacramento River and its tributaries in California, including the Feather River. One artificial propagation program is considered part of the ESU, the Feather River hatchery spring-run Chinook program.

#### Sacramento River Winter Run ESU

On 4 January 1994 the Sacramento River Winter Run Chinook Salmon ESU was listed as endangered (59 FR 10104). This ESU includes all naturally spawned populations of winter-run Chinook salmon in the

Sacramento River and its tributaries in California. It also includes two artificial propagation programs: winter-run Chinook from the Livingston Stone National Fish Hatchery, and winter-run Chinook in a captive broodstock program maintained at Livingston Stone National Fish Hatchery and the University of California Bodega Marine Laboratory.

#### Population and Abundance

Most of the ESUs for Chinook salmon have a low abundance relative to historical levels. NMFS has reported population sizes from individual ESUs, but because all of these units occur together while at sea, it is difficult to estimate the marine population numbers in the Study Area. Specific population numbers, based on freshwater returns, within each of the ESUs is found in Good et al. (2005) and Pacific Fishery Management Council (2014).

#### Life History

The general life history of anadromous Chinook salmon includes both freshwater and ocean phases of development. Incubation, hatching, and emergence occur in fresh water, followed by seaward migration to the ocean, which is preceded by the onset of smoltification. After several years at sea, maturation is initiated and adults return to freshwater habitats to spawn in their natal streams. Stream-type Chinook salmon spend extended periods in fresh water before smoltification, in contrast to the ocean-type that emigrates to the ocean as sub-yearling smolts.

Coastal streams are dominated by the ocean-type, whereas the stream-type are mainly found in the headwater streams of larger river systems (National Marine Fisheries Service 2012b). The Puget Sound Chinook Salmon ESU entering the Inland Waters of the Study Area are predominantly ocean-type fish. Like other species of Pacific salmon, Chinook salmon die after spawning and are therefore not able to spawn more than once.

#### Habitat and Geographic Range

The present distribution of Chinook salmon extends from Hokkaido Island in Japan, east to Alaska, and south to central California, although the species' historical range extended to the Ventura River in California (National Marine Fisheries Service 2012b). Because of their large body size, Chinook salmon tend to use deeper water and larger size substrate (gravel and cobble) to spawn than other salmonids. Catch data from commercial fishing records indicate that maturing Chinook salmon are found in the highest concentrations along the continental shelf within 32 nm (60 kilometers [km]) of the Washington, Oregon, and California coast lines at depths ranging from 30 to 70 meters. Since spawning occurs exclusively in freshwater systems outside of the Study Area, spawning habitats are not described here. However, information on freshwater habitats and spawning areas can be found in Groot and Margolis (1991) and Good et al. (2005).

#### Predator/Prey Interactions

Predators of Chinook salmon vary across life stage and habitat. Juveniles and smolts are common season prey of birds, such as gulls, pelicans, ospreys, and bald eagles, and aquatic mammals such as river otters. Smolts and adults are commonly preyed on by marine mammals, such as sea lions, harbor seals, and Southern Resident Killer Whales, especially within coastal areas (Groot and Margolis 1991; National Marine Fisheries Service 2012b). Juveniles in fresh water feed mostly on insects, amphipods, and crustaceans, while adults feed on other fish (National Marine Fisheries Service 2012b).

#### Migration

Adult Chinook salmon migrate from the ocean to reach their natal spawning streams, sometimes located in high elevation tributary headwaters. Although adult Chinook salmon can be found entering rivers throughout the year, the majority return from April to December. Fall-run Chinook are most abundant, followed by spring-run Chinook. Populations originating north of Cape Blanco, Oregon, migrate north to the Gulf of Alaska, while populations originating south of Cape Blanco migrate south and west into the waters off California and Oregon. Chinook salmon spawning in rivers south of the Rogue River in Oregon rear in marine waters off California and Oregon, whereas salmon spawning in rivers north of the Rogue River migrate north and west along the Pacific coast. Open ocean migration zones of juvenile Chinook salmon are generally within 55 km of the Washington, Oregon, and California coasts, with a vast majority of those fish less than 28 km offshore (Fisher et al. 1984, Fisher and Pearcy 1995).

#### Species-Specific Threats

There are many threats to the survival of Chinook salmon ESUs found within the Study Area, which vary with life stage and location. Principal threats include, but are not limited to, alteration of stream flow patterns and habitat degradation; barriers to fish passages; channel alterations; water quality problems; non-native fish, invertebrates, and plants; and climate change. These threats pose a serious challenge to the persistence of Chinook salmon. Chinook salmon ocean fisheries bycatch, which include other salmon species along with undersized Chinook salmon, have a greater than 25 percent mortality rate (Wertheimer 1997).

### Coho Salmon (Oncorhynchus kisutch)

#### Occurrence in the Study Area

Coho salmon may occur in the all portions of the Study Area. The Puget Sound/Strait of Georgia ESU will occur in the Offshore Area and Inland Waters. The Lower Columbia River, Oregon Coast, Southern Oregon and Northern California Coast, and Central California Coast ESUs will occur in the Offshore Area (see Table 3.9-1).

#### Status and Management

Of the four ESA-listed coho ESUs, one is listed as endangered and three are listed as threatened (National Marine Fisheries Service 2012e).

Critical habitat has been designated for three of the coho salmon ESUs (Oregon Coast ESU, Southern Oregon/Northern California Coast ESU, and Central California Coast ESU) (National Marine Fisheries Service 2012e); however, it does not overlap with the Study Area. Critical habitat is proposed for the Lower Columbia River ESU for freshwater and estuarine habitat outside of the Study Area.

#### Lower Columbia ESU

The Lower Columbia Coho Salmon ESU was listed as threatened on 28 June 2005 (70 FR 37106–37204). This ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers, and includes the Willamette River to Willamette Falls, Oregon, and 25 artificial propagation programs. These programs include Grays River, Sea Resources Hatchery, Peterson Coho Project, Big Creek Hatchery, Astoria High School (STEP) Coho Program, Warrenton High School (STEP) Coho Program, Elochoman Type-S Coho Program, Elochoman Type-N Coho Program, Cathlamet High School FFA Type-N Coho Program, Cowlitz Type-N Coho Program in the Upper and Lower Cowlitz Rivers, Cowlitz Game and Anglers Coho Program, Friends of the Cowlitz Coho Program, North Fork Toutle River Hatchery, Kalama River Type-N Coho Program, Kalama River Type-S Coho Program, Washougal Hatchery Type-N Coho Program, Lewis River Type-N Coho Program, Lewis River Type-S Coho Program, Fish First Wild Coho Program, Fish First Type-N Coho Program, Syverson Project Type-N Coho Program, Eagle Creek National Fish Hatchery, Sandy Hatchery, and Bonneville/Cascade/Oxbow complex.

#### Oregon Coast ESU

On 20 June 2011, the Oregon Coast Coho salmon ESU was listed as threatened (76 FR 35755–35771). This ESU includes all naturally spawned populations of Coho salmon in Oregon coastal streams south of the Columbia River and north of Cape Blanco, including the Cow Creek (ODFW stock #37) Coho hatchery program.

#### Southern Oregon and Northern California ESU

The Southern Oregon and Northern California Coho Salmon ESU was listed as threatened on 28 June 2005 (70 FR 37160). This ESU includes all naturally spawned populations of Coho salmon in coastal streams between Cape Blanco, Oregon, and Punta Gorda, California, and three artificial propagation programs. These programs are Cole Rivers Hatchery (ODFW stock #52), Trinity River Hatchery, and Iron Gate Hatchery.

#### Central California Coast ESU

The Central California Coast Coho Salmon ESU was listed as endangered on 2 April 2012 (77 FR 19552). This ESU all naturally spawned populations of coho salmon from Punta Gorda in northern California south, to and including the San Lorenzo River in central California. It also includes populations in tributaries to San Francisco Bay, excluding the Sacramento-San Joaquin River system. Four artificial propagation programs are part of this ESU: the Don Clausen Fish Hatchery Captive Broodstock Program, the Scott Creek/Kind Fisher Flats Conservation Program, the Scott Creek Captive Broodstock Program, and the Noyo River Fish Station egg-take Program.

### Population and Abundance

Most of the ESUs have a low abundance relative to historical levels and have seen decreases in recent years (National Marine Fisheries Service 2012e). NMFS has reported population sizes from individual ESUs, but because all of these units occur together while at sea, it is difficult to estimate the marine population numbers. Specific population numbers, based on freshwater returns, within each of the ESUs is found in Good et al. (2005) and Pacific Fishery Management Council (2014).

### Life History

Coho salmon are on a relatively fixed life cycle compared with other salmonids, spending approximately 18 months in freshwater and another 18 months in the ocean. Like other species of Pacific salmon, coho salmon die after spawning and are therefore not able to spawn more than once. Eggs incubate during winter in the gravel, and in spring the juveniles emerge. Juveniles reside in rivers and streams for a year or more before smolting and emigrating to the ocean. After spending 18 months at sea, mature coho return to their natal stream.

Puget Sound populations are generally found in the Strait of Juan de Fuca and the coastal waters of Vancouver Island during the summer months (Pacific Fishery Management Council 2000). As populations leave Puget Sound, smolts can be found migrating northward along the east or west coast of Vancouver Island and out into the Pacific Ocean (Pacific Fishery Management Council 2000). Coho migrating from Oregon streams may initially be found south of their natal streams due to strong southerly currents (Pacific Fishery Management Council 2000). These currents weaken during the winter months and the smolts move northward (Pacific Fishery Management Council 2000).

#### Habitat and Geographic Range

The historic distribution of coho salmon extended from Hokkaido Island in Japan, east to Alaska, and south to central California; however, some populations are now considered extinct (National Marine Fisheries Service 2012e). Since spawning occurs exclusively outside of the Study Area, spawning habitats are not described here. However, information on freshwater habitats and spawning areas can be found in Good et al. (2005).

Coho salmon stocks from Washington, Oregon, and northern California are found in the Pacific Ocean and the Gulf of Alaska north of 44 degrees (°) N latitude to 57° N latitude, extending westward and southward along the Aleutian chain to the Emperor Sea Mounts area near 43° N latitude and 175° E longitude. Coho migrating from Oregon streams may initially be found south of their natal streams due to strong southerly currents (Pacific Fishery Management Council 2000). These currents weaken during the winter months, and the salmon migrate northward (Pacific Fishery Management Council 2000). Juvenile coho salmon are found in high concentrations with 32 nm (60 km) of the Washington, Oregon, and California coast with a majority of those fish found within 20 nm (37 km) of the coast [Pearcy and Fisher 1990, Pearcy 1992]).

#### Predator/Prey Interactions

Predators of coho salmon vary across life stage and habitat. Juveniles and smolts are common season prey of birds such as cormorants, mergansers, gulls, pelicans, ospreys, bald eagles, kingfishers and aquatic mammals such as river otters. Adults are commonly preyed on by sea lions, harbor seals, and Southern Resident Killer Whales, especially within coastal areas (National Marine Fisheries Service 2012b), while returning adults are eaten by bears during their upstream migration. Juveniles in fresh water feed mostly on insects, amphipods, and crustaceans, while adults feed on other fish (National Marine Fisheries Service 2012b) such as herring, anchovies, sardines, and juvenile rockfishes (e.g., Bocaccio).

#### Migration

Within the Study Area most adult coho salmon migrate north from their respective freshwater habitats (Pacific Fishery Management Council 2000). Coho salmon from Oregon streams have been collected in offshore waters near Kodiak Island in the northern Gulf of Alaska (Hartt and Dell 1986, Myers et al. 1996). Tag, release, and recovery studies suggests that coho salmon of California origin can be found as far north as southeast Alaska and populations from Oregon and Washington migrate as far north as the northern Gulf of Alaska (Pacific Fishery Management Council 2000). Recently it has been observed that some salmonid species in southeast Alaska, including coho, have been migrating earlier than historically, possibly due to warmer water temperatures (Kovach et al. 2014).

#### Species-Specific Threats

There are many threats to the survival of coho salmon ESUs, which vary by life stage, found within the Study Area. Principal threats include, but are not limited to, alteration of stream flow patterns and habitat degradation; barriers to passages; channel alterations; water quality problems; non-native fishes, invertebrates, and plants; and climate change.

### Chum Salmon (Oncorhynchus keta)

#### Occurrence in the Study Area

Chum salmon may occur in all portions of the Study Area. The Hood Canal summer-run ESU will occur in both the Offshore Area and Inland Waters portions of the Study Area. The Columbia River ESU will only occur in the Offshore Area.

## Status and Management

Both ESA-listed chum ESUs were listed as threatened on 28 June 2005 (70 FR 37160).

Critical habitat has been designated for both of the chum salmon ESUs; however only critical habitat for the Hood Canal summer-run ESU occurs within the Study Area (Figure 3.9-2).

### Hood Canal Summer-Run ESU

The Hood Canal Summer-Run ESU was listed as threatened on 28 June 2005 (70 FR 37160). This ESU includes all naturally spawned populations of summer-run chum salmon in Hood Canal and its tributaries, plus populations in Olympic Peninsula rivers between Hood Canal and Dungeness Bay, Washington, and eight artificial propagation programs. These programs include the Hamma Hamma Fish Hatchery, Lilliwaup Creek Fish Hatchery, Union River/Tahuya, Big Beef Creek Fish Hatchery, Salmon Creek Fish Hatchery, Chimacum Creek Fish Hatchery, and the Jimmycomelately Creek Fish Hatchery.

### Columbia River ESU

On 28 June 2005, the Columbia River Chum Salmon ESU was listed as threatened (70 FR 37160). This ESU includes all naturally spawned populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon, and three artificial propagation programs: the Chinook River (Sea Resources Hatchery), Grays River, and Washougal River/Duncan Creek chum hatchery programs.

The recreational and commercial salmon fishing seasons for chum are set in the same manner as other salmon fisheries. This method reviews the pre-season forecast of abundance and then designs fisheries that open in areas and during times when healthy stock predominate and weak stocks are relatively unaffected. Hood Canal Summer-Run Chum are of special concern because of their threatened status under the ESA. Consequently, fishing for chum salmon is prohibited in Hood Canal and Admiralty Inlet through the summer and early fall. The fall and winter chum runs in Puget Sound are very healthy. If these test fisheries indicate the run is either much larger or much smaller than predicted in the pre-season forecast then commercial seasons are adjusted accordingly. Because the recreational harvest of chum is still relatively small, in-season adjustments to recreational fishing seasons focused on chum are rare (Washington Department of Fish and Wildlife 2012a). The Pacific Coast Salmon Recovery Fund was established by Congress in 2000 to support the restoration of salmon species (National Marine Fisheries Service 2012d).

## Life History

Chum salmon are second only to Chinook in dependence upon estuaries (Groot and Margolis 1991). Chum salmon usually spawn in the lowest reaches of streams, and juveniles move out into the estuaries almost immediately after emerging from their spawning gravel. Ocean migration of juveniles is correlated with increasing water temperature and plankton blooms. This means survival and growth of juveniles depends less on river habitat conditions and more on favorable estuarine and ocean conditions. Chum salmon are mostly found within the continental shelf, juveniles are found at depths less than 40 meters while adults are typically epipelagic (Quinn and Myrs 2004). After spending between 1 and 5 years in the ocean, chum salmon mature and return to their home freshwater stream to spawn. In most areas, maturity is reached at 4 years of age (Groot and Margolis 1991). Like other species of Pacific salmon, chum salmon die after spawning and are not able to spawn more than once.

Age at maturity appears to follow a latitudinal trend in which a greater number mature at a later age in the northern portion of the species' range. Most chum salmon mature and return to their birth stream to spawn between 3 and 5 years of age, with 60–90 percent maturing at 4 years of age.

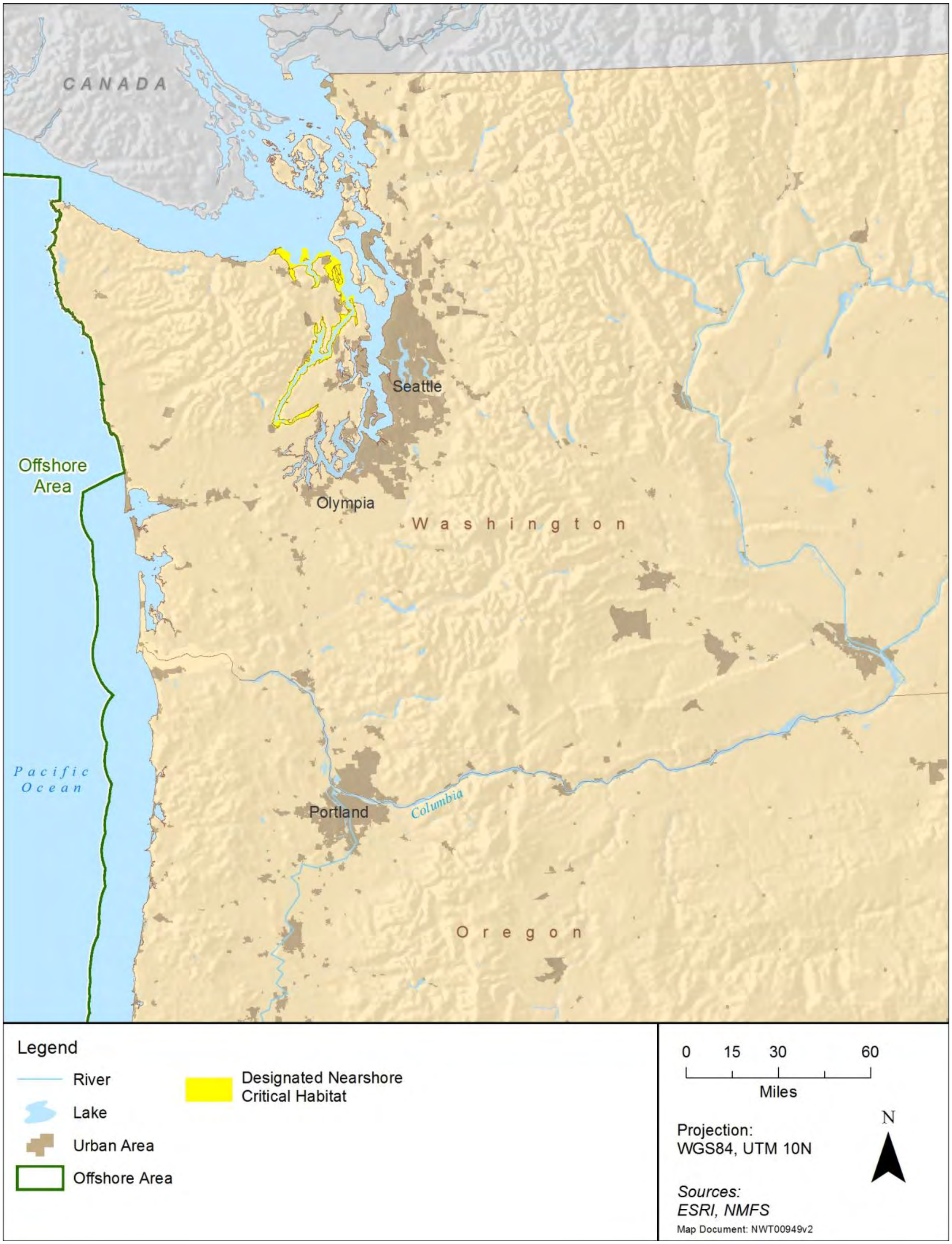


**Figure 3.9-2: Critical Habitat for the Hood Canal Summer-run Chum ESU in the Study Area**

#### Population and Abundance

Over the past 50 years, the average population of chum has been a few thousand a year, whereas historically populations reached hundreds of thousands to a million adults each year (National Marine Fisheries Service 2012c). Specific population numbers within each ESU can be found in Ford (2011) and Pacific Fishery Management Council (2014).

#### Habitat and Geographic Range

Chum salmon have the widest natural geographic and spawning distribution of Pacific salmonid and, prior to the influences of harvest, probably the greatest biomass of any of the salmon species in the Pacific Ocean (Groot and Margolis 1991; National Marine Fisheries Service 2012c). Its range extends along the shores of the Arctic Ocean farther than other salmonids. Spawning populations are known from Korea and Japan and into the far north of Russia. Major spawning populations on the west coast of the United States occur from Alaska only as far south as Coquille River, Oregon.

Chum salmon range from the shores of the Arctic Ocean, and spawning populations are found from Korea and Japan and into the far north of Russia. In North America, chum salmon were historically documented throughout western Canada and U.S. coastal regions and as far south as Monterey, California. However, considerable doubt exists that the early surveys (1881–1908) identifying chum juveniles and adults in California were correct (Johnson et al. 2012).

#### Predator/Prey Interactions

Predation on chum salmon occurs by fishes and birds when juvenile, and large fishes and marine mammals as adults. Predation on juveniles does not normally threaten the success of the populations unless they are subjected to unusually high predation rates. Hatchery releases are a common reason for large predator aggregations and, in some situations, this practice has been shown to negatively impact the survival of juveniles (Washington Department of Fish and Wildlife 2012a). Juveniles feed on insects and aquatic invertebrates in estuaries and copepods and amphipods after they move to the ocean. Adults’ diets consists of copepods, fishes, mollusks, squid larvae, and tunicates (National Marine Fisheries Service 2012c).

#### Migration

Chum salmon juveniles emerge during nighttime hours and promptly migrate downstream near the surface of the river to estuaries where they remain until the smolting process is completed. Time spent migrating is dependent on distance between the spawning redd and the estuary. In shorter rivers, the migration is over in about 30 days, and prolonged in longer rivers. Migration timing varies from early spring to midsummer by latitude, stream length, timing of spawning of parental stock, and interactions with other species, particularly pink salmon. More juveniles migrate to estuaries when the stream temperature rises to 60 degrees and to the ocean when the temperature exceeds 17 degrees. Juveniles begin to move into shallow waters of the ocean in late spring and to deeper (60–130 ft.) habitat over summer. By late summer, juveniles move from nearshore coastal waters near their natal streams out to 100 miles (mi.) offshore in the Gulf of Alaska, where they school with juvenile sockeye and pink salmon. Juveniles move south of the Gulf of Alaska in late fall and eastward over winter and then return in late spring and early summer. From late spring to early summer, maturing chum salmon move from offshore to nearshore habitats with the length of distance to natal streams dictating the onset of their spawning migration (Groot and Margolis 1991). Recently it has been observed that some salmonid species in southeast Alaska, including chum, have been migrating earlier than historically, possibly due to warmer water temperatures (Kovach et al. 2014).

### Species-Specific Threats

There are many threats to the survival of the Hood Canal Chum Summer-Run ESU. Principal threats include alteration of stream flow and habitat degradation, barriers to passages, channel alterations, poor water quality, non-native species, and climate change. These threats pose a serious challenge to the persistence of Pacific Northwest chum salmon.

## Sockeye Salmon (Oncorhynchus nerka)

### Occurrence in the Study Area

Sockeye salmon from the Ozette Lake and Snake River ESUs may occur in the Offshore portion of the Study Area (Table 3.9-1).

### Status and Management

Of the two ESA-listed sockeye ESUs, the Ozette Lake ESU is listed as threatened (70 FR 37160) and the Snake River ESU is listed as endangered (56 FR 58619). Critical habitat was designated for the Ozette Lake ESU on 2 September 2005 and for the Snake River ESU on 28 December 1993 (National Marine Fisheries Service 2013b). However, no critical habitat occurs in the Action Area.

**Ozette Lake ESU**

The Ozette Lake Sockeye Salmon ESU was listed as threatened on 28 June 2005 (70 FR 37160). This ESU includes all naturally spawned populations of sockeye salmon in Ozette Lake and streams and tributaries flowing into Ozette Lake, Washington, and two artificial propagation programs. The programs are Umbrella Creek and Big River.

The historical abundance of Ozette Lake Sockeye, located in the Olympic National Park in Washington, is poorly documented, but is believed to have declined substantially from historical levels. In the 1940s the first estimates of escapement (returning adults) of Ozette Lake sockeye salmon were approximately several thousand fish. These counts appear to be roughly double the current mean abundance. Recent year escapement estimates have averaged below 1,000 adults per year, with low years dropping to only a few hundred fish.

The listed sockeye salmon ESU includes all naturally spawned sockeye salmon that reside below impassable natural barriers in Ozette Lake and its tributaries. The sockeye salmon reared at the Makah Tribe’s Umbrella Creek Hatchery are also considered part of the unit but not considered essential for recover of the unit. There have been no harvests of Ozette Lake sockeye salmon for the past 16 years. There are currently no known marine area harvest impacts on the Ozette Lake sockeye salmon (Washington Department of Fish and Game 2012b). The Pacific Coast Salmon Recovery Fund was established by Congress in 2000 to support the restoration of salmon species (National Marine Fisheries Service 2012d).

**Snake River ESU**

On November 20, 1991, the Snake River Sockeye ESU was listed as endangered (56 FR 58619). This ESU includes all anadromous and residual sockeye salmon from the Snake River Basin, Idaho, and artificially propagated sockeye salmon from the Redfish Lake captive propagation program.

### Population and Abundance

Sockeye salmon are the third most abundant of the seven species of Pacific salmon after pink salmon and chum salmon (Groot and Margolis 1991). The Snake River ESU has remained at very low levels of only a few hundred fish, though recent hatchery reared fish have returned to spawn. Data quality for the Ozette Lake ESU makes differentiating between the number of hatchery and natural spawners difficult; however the size of the population is small, though possibly growing (National Marine Fisheries Service 2012d).

### Life History

Sockeye salmon exhibit a greater variety of life history patterns than other members of the genus *Oncorhynchus* (Groot and Margolis 1991). Sockeye salmon spawn in late summer and early fall on beach shoals along lake shores, typically in areas of upwelling groundwater that provides circulation through the redd which helps maintain adequate oxygen for the eggs. Spring-fed ponds, stream-connecting lakes, and side channels of rivers are also used for spawning. Emergence timing is correlated with water temperatures, with warmer temperatures resulting in shorter time. After emergence from the redd during night hours, juveniles may begin their downstream migration within a few days or exhibit a prolonged freshwater residence of one or more years before smoltification. Anadromous sockeye juveniles spend several months feeding prior to migration. After smoltification and migrating from their natal watershed, juvenile sockeye emigrate to the ocean where they reside for 1–4 years, usually 2–3 years before returning to spawn.

### Habitat and Geographic Range

Sockeye salmon inhabit riverine, marine, and lake environments from the Klamath River and its tributaries north and west to the Kuskokwim River in western Alaska. They generally require lakes for part of their life cycle; therefore, their distribution in river systems depends on the presence of usable lakes in the system, so their habitat can be more intermittent than for other Pacific salmon. While in the ocean, sockeye salmon remain over the continental shelf, adults are typically epipelagic.

### Predator/Prey Interactions

Sockeye smolts (juveniles turning into adults) migrate to sea in spring at a length of approximately 4–6 inches (in.) (15 centimeters [cm]) and are subjected to intense predation by a variety of fish and bird species. Pikeminnow and trout have been identified as especially significant predators during the freshwater and outmigration life phases, and gulls and grebes are some of the significant avian predators of sockeye smolts. In the near shore and open ocean environments, predation by fish, birds, and marine mammals, and competition for food resources with other fish species affects growth and survival of sockeye salmon (Washington Department of Fish and Wildlife 2012b). In fresh water, the sockeye salmon feeds on aquatic insects and plankton; however, in the ocean, they eat amphipods, copepods, squid, and some fishes.

### Migration

Juvenile sockeye are thought to have the most highly developed navigation abilities of all juvenile salmonids. Juveniles move toward or into nursery lakes and between lakes over summer and fall. Sockeye salmon spawn in or near lakes, where the juveniles rear for 1–3 years prior to migrating to sea. After spending between 2 and 4 years in the ocean, sockeye salmon return to their home freshwater lake to spawn.

### Species-Specific Threats

There are many threats to the survival of the Ozette Lake ESU of sockeye salmon. Principal threats include, but are not limited to, alteration of stream flow patterns and habitat degradation; barriers to fish passages; channel alterations; water quality problems; non-native fish, invertebrates, and plants; and climate change. These threats pose a serious challenge to the persistence of Pacific Northwest sockeye salmon.

### Steelhead (Oncorhynchus mykiss)

#### Occurrence in the Study Area

Steelhead may occur in all portions of the Study Area. The Puget Sound DPS will occur in the Inland Waters and Offshore portion of the Study Area. The Upper Columbia River, Middle Columbia River, Lower Columbia River, Upper Willamette River, Snake River Basin, Northern California, California Central Valley, Central California Coast, South-Central California Coast, and Southern California DPSs will occur in the Offshore Area (see Table 3.9-1).

#### Status and Management

Of the 11 ESA-listed steelhead DPSs, one is listed as endangered and 10 are listed as threatened (National Marine Fisheries Service 2010). Critical habitat has been designated for 10 of the 11 DPSs, all of which is in freshwater and estuarine habitats outside of the Study Area. Critical habitat is proposed for the Puget Sound steelhead DPS in freshwater and estuarine areas outside of the Study Area. Therefore, there is no critical habitat for steelhead in the Study Area.

**Puget Sound DPS**

The Puget Sound Steelhead DPS was listed as threatened on 11 May 2007 (72 FR 26722–26735). Critical habitat is proposed for the Puget Sound DPS. This DPS includes all naturally spawned anadromous winter-run and summer-run steelhead populations, in streams in the river basins of the Strait of Juan de Fuca and Puget Sound, Washington, bounded to the west by the Elwha River (inclusive) and to the north by the Nooksack River and Dakota Creek, and the Green River natural and Hamma Hamma winter-run steelhead hatchery stocks.

**Upper Columbia River DPS**

On 24 August 2009, the Upper Columbia River Steelhead DPS was listed as threatened (74 FR 42605–42606). Critical habitat has been designated for this DPS and is not located in the Study Area. This DPS includes all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S.-Canada border, and six artificial propagation programs. The artificial propagation programs included are the Wenatchee River, Wells Hatchery in the Methow and Okanogan Rivers, Winthrop National Fish Hatchery, Omak Creek, and Ringold.

**Middle Columbia River DPS**

The Middle Columbia River Steelhead DPS was listed as threatened on 5 January 2006 (71 FR 834–862). Critical habitat has been designated for this DPS and is not located in the Study Area. This DPS includes all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in streams from above the Wind River, Washington, and the Hood River, Oregon, upstream to, and including, the Yakima River, Washington, excluding steelhead from the Snake River Basin, and seven artificial propagation programs. The seven artificial propagation programs included are Touchet River Endemic, Yakima River Kelt Reconditioning Program in Satus Creek, Toppenish Creek, Naches River, and Upper Yakima River, as well as Umatilla River, and Deschutes River.

**Lower Columbia River DPS**

On 5 January 2006, the Lower Columbia River Steelhead DPS was listed as threatened (71 FR 834–862). Critical habitat has been designated for this DPS, but it is not located in the Study Area. This DPS includes all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in streams and tributaries to the Columbia River between the Cowlitz and Wind Rivers, Washington, and the Willamette and Hood Rivers, Oregon, and 10 artificial propagation programs. The ten artificial propagation programs include Cowlitz Trout Hatchery in the Cispus, Upper Cowlitz, Lower Cowlitz, and Tilton Rivers; the Kalama River Wild winter and summer run, Clackamas Hatchery, Sandy Hatchery, and the Hood River Hatchery winter and summer run. Populations excluded from this DPS are in the upper Willamette River Basin above Willamette Falls, Oregon, and from the Little and Big White Salmon Rivers, Washington.

**Upper Willamette River DPS**

The Upper Willamette River DPS was listed as threatened on 5 January 2006 (71 FR 834–862). Critical habitat has been designated for this DPS, but it is not located in the Study Area. This DPS includes all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in the Willamette River, Oregon, and its tributaries upstream from Willamette Falls to the Calapooia River.

**Snake River Basin DPS**

The Snake River Basin Steelhead DPS was listed as threatened on 5 January 2006 (71 FR 834–862). Critical habitat has been designated for this DPS, but it is not located in the Study Area. This DPS includes all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in streams in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho, and six artificial propagation programs. These artificial propagation programs are Tucannon River, Dworshak National Fish Hatchery, Lolo Creek, North Fork Clearwater, East Fork Salmon River, and Little Sheep Creek/Imnaha River.

**Northern California DPS**

The Northern California Steelhead DPS was listed as threatened on 7 June 2000, and reaffirmed on 5 January 2006 (71 FR 834–862). Critical habitat has been designated for this DPS, but it is not located in the Study Area. This DPS includes all naturally spawned populations of steelhead in California coastal river basins from Redwood Creek in Humboldt County southward to the Russian River in Sonoma County. Two artificial propagation programs are also considered part of the DPS, and they are the Yager Creek Hatchery and the North Fork Gualala River Hatchery.

**California Central Valley DPS**

The California Central Valley Steelhead DPS was listed as threatened on 5 January 2006 (71 FR 834–862). Critical habitat has been designated for this DPS, but it is not located in the Study Area. This DPS includes all naturally spawned populations of steelhead (and their progeny) in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco Bay and San Pablo Bays and their tributaries.

**Central California Coast DPS**

The Central California Coast Steelhead DPS was listed as threatened on 5 January 2006 (71 FR 834–862). Critical habitat has been designated for this DPS, but it is not located in the Study Area. This DPS includes all naturally spawned populations of steelhead (and their progeny) in streams from the Russian River to Aptos Creek, Santa Cruz County, California (inclusive). It also includes the drainages of San Francisco and San Pablo Bays.

**South-Central California Coast DPS**

The South-Central California Coast Steelhead DPS was listed as threatened on 5 January 2006 (71 FR 834–862). Critical habitat has been designated for this DPS, but it is not located in the Study Area. This DPS includes all naturally spawned populations of steelhead (and their progeny) in streams from the Pajaro River (inclusive), located in Santa Cruz County, California, to, but not including, the Santa Maria River, California.

**Southern California DPS**

The Southern California Steelhead DPS was listed as threatened on 5 January 2006 (71 FR 834–862). Critical habitat has been designated for this DPS, but it is not located in the Study Area. This DPS includes all naturally spawned anadromous steelhead populations below natural and man-made impassable barriers in streams from the Santa Maria River, San Luis Obispo County, California (inclusive) to the U.S.-Mexico Border.

**Population and Abundance**

Most of the DPSs have a low abundance relative to historical levels, and there is widespread occurrence of hatchery fish in naturally spawning populations (Good et al. 2005; National Marine Fisheries Service 2010). NMFS has reported population sizes from individual DPSs, but because all of these units occur together while at sea, it is difficult to estimate the marine population numbers. Specific population numbers, based on freshwater returns, within each of the DPSs is found in Good et al. (2005) and Pacific Fishery Management Council (2014).

**Life History**

Steelhead may exhibit either an anadromous lifestyle or they may spend their entire life in fresh water (McEwan and Jackson 1996). The name steelhead is used primarily for the anadromous form of this species. Steelhead exhibit one of the most complex suites of life-history traits of any species of Pacific salmonid. Unlike other salmonids, steelhead can spawn more than once (i.e., are iteroparous), whereas all other salmonids discussed here spawn once and then die (i.e., are semelparous). The anadromous steelhead may spend several years in fresh water before smoltification and up to 3 years in salt water before returning to spawn.

There is considerable variation in this life history pattern within the population. Steelhead can be divided into two basic reproductive types, based on the state of sexual maturity at the time of river entry and duration of spawning migration. The first is the stream-maturing (summer-run steelhead in the Pacific Northwest and northern California), which enters fresh water in a sexually immature condition between May and October, and requires several months to mature and spawn. The second is the ocean-maturing type (winter-run steelhead in the Pacific Northwest and northern California) which enters fresh water between November and April and, sexually mature, spawns shortly thereafter. Coastal streams are dominated by winter-run steelhead, whereas inland steelhead of the Columbia River Basin are almost exclusively summer-run steelhead (National Marine Fisheries Service 2012a).

**Habitat and Geographic Range**

The present distribution of steelhead extends from the Kamchatka Peninsula in Asia, east to Alaska, and south to Southern California, although the species' historical range extended at least to Mexico (Good et al. 2005).

Since spawning occurs exclusively in freshwater systems outside of the Study Area, spawning habitats are not described here. However, information on freshwater habitats and spawning areas can be found in Beauchamp et al. (1983), Emmett et al. (1991), and Pacific Fishery Management Council (2000).

Steelhead tend to move immediately offshore on entering the marine environment although, in general, steelhead tend to remain closer to shore than other Pacific salmon species (Beamish et al. 2005). They generally remain within the coastal waters of the California Current, with the largest catches seen at distances beyond 25 nm (46 km) offshore (Beamish et al. 2005; Quinn and Myers 2004).

**Predator/Prey Interactions**

Predators of steelhead include fish-eating birds, such as terns and cormorants, and pinnipeds, such as sea lions and harbor seals, especially within coastal areas (National Marine Fisheries Service 2010). Juveniles in fresh water feed mostly on zooplankton (small animals that drift in the water), while adults feed on aquatic and terrestrial insects, mollusks, crustaceans, fish eggs, minnows, and other small fishes, including other juvenile salmon depending on whether they are inhabiting streams or the ocean (National Marine Fisheries Service 2010).

**Migration**

Steelhead spawning migrations occur throughout the year, with seasonal peaks of activity in summer and fall. In a given river basin, there may be one or more peaks in migration activity. Large rivers, such as the Columbia River, might have migrating adult steelhead at all times of the year. In the Study Area, the primary rivers that steelhead migrate into are the Columbia, Willamette, Klamath, and Rogue Rivers although some of these rivers contain considerable migration barriers such as dams.

**Species-Specific Threats**

There are many threats to the survival of the steelhead DPSs in the Study Area. Principal threats include, but are not limited to, alteration of stream flow patterns and habitat degradation; barriers to fish passages; channel alterations; water quality problems; non-native species; and climate change. These threats pose a serious challenge to the persistence of Pacific Northwest steelhead.

### Bull Trout (Salvelinus confluentus)

**Occurrence in the Study Area**

The Coastal Puget Sound Bull Trout DPS will occur in the Offshore Area and the Inland Waters portions of the Study Area (Table 3.9-1).

**Status and Management**

On 1 November 1999, the Coastal-Puget Sound Bull Trout DPS was listed as threatened across five states in the coterminous United States (64 FR 58910). Bull trout are listed as a single DPS, but are managed via six biologically-based Recovery Units, of which only the Coastal Recovery Unit is adjacent to the Study Area (U.S. Fish and Wildlife Service 2010). The Coastal-Puget Sound Bull Trout DPS encompasses all Pacific Coast drainages within the United States north of the Columbia River in Washington, including those flowing into Puget Sound. This population is thought to contain the only anadromous form of bull trout in the United States.

Critical habitat for bull trout was originally designated on 26 September 2005 (70 FR 56212) and later revised on 18 October 2010 (75 FR 63898) (**Error! Reference source not found.**). There is minimal overlap of bull trout critical habitat with the Study Area. The areas of overlap occur in both the Offshore Area and in the Inland Waters and are described below:

- Offshore: Within the Quinault Range Site there is approximately one mile of near shore area at Pacific Beach.
- Inland Waters: Within the Dabob Bay Range Complex Site in Hood Canal there is overlap of the Study Area with critical habitat designated at the deltas of the Duckabush River and the Hamma Hamma River.

The quantity and quality of critical habitat are evaluated by reference to PCEs, defined as those sites and habitat components that support one or more life stages and are deemed essential for the conservation of the species. The U.S. Fish and Wildlife Service (USFWS originally designated nine PCEs; however, as part of the 2010 revised critical habitat designation, the USFWS updated the PCE definitions and only five are applicable to marine near shore waters. They are described below:

- Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers. This PCE is present in the Study Area.
- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish. This PCE is present in the Study Area.
- Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure. This PCE is present in the Study Area.
- Water temperatures ranging from 2 to 15 degrees Celsius (36 to 59 degrees Fahrenheit), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; streamflow; and local groundwater influence. This PCE is present in the Study Area.
- Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited. This PCE is present in the Study Area.

#### Population and Abundance

Bull trout populations are severely reduced throughout the Study Area and no longer occur in northern California. Bull trout have declined in overall range and numbers of fish. Though still widespread, there have been numerous local extirpations reported throughout the Columbia River basin. Bull trout generally occur as isolated sub-populations in headwater lakes or tributaries where migratory fish have been lost.

#### Life History

Bull trout are a native fish in western North America, inhabiting pristine cold-water streams. Unlike other salmonids, bull trout require colder water temperatures. They exhibit resident and migratory life history strategies throughout much of their current range. Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and mature. Migratory bull trout spawn in tributary streams where juveniles stay from 1 to 4 years before migrating to either a lake (adfluvial), river (fluvial), or in certain coastal areas to salt water (anadromous), where maturity is reached in one of the three habitats (63 FR 31647). In the ocean, bull trout will remain within 3 nm (5 km) of the shore.

There are four distinct types of bull trout: anadromous, adfluvial (migrating between lakes, rivers, or streams), fluvial (inhibiting a stream or river), and resident. Only the anadromous type migrates from fresh water habitats to ocean habitats.

#### Habitat and Geographic Range

The historic distribution of bull trout was throughout the Columbia River Basin, east to Montana south to northern California, and north to southeastern Alaska (U.S. Fish and Wildlife Service 1998). Currently, they are mainly found in upper tributary streams in Montana, Idaho, Oregon, and Washington (U.S. Fish and Wildlife Service 1998). The Coastal Puget Sound Bull Trout DPS will occur in the Offshore Area out to 3 nautical miles offshore and in certain areas of the Inland Waters portions of the Study Area

**Predator/Prey Interactions**

Bull trout are opportunistic feeders, with food habits primarily a function of size and life history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro-zooplankton, and small fish (Goetz 1989; Donald and Alger 1993). Adult migratory bull trout feed primarily on a wide variety of resident and anadromous fish species (Fraley and Shepard 1989; Brown 1992; Donald and Alger 1993; Guy et al. 2011). In coastal areas of western Washington, bull trout feed on forage fish species such as Pacific herring, Pacific sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*) in near shore marine areas and the ocean (Washington Department of Fish and Wildlife et al. 1997, Goetz et al. 2004).

**Migration**

Coastal-Puget Sound population of bull trout in the Study Area spawn in rivers and streams. Some sub-adult bull trout migrate to the ocean or Puget Sound to rear for part of the year (U.S. Fish and Wildlife Service 2013). Some bull trout in marine habitats in Puget Sound may be sub adults that will forage in these areas. Dams and diversion structures impede or limit migration and impair downstream habitat. Both resident bull trout, and migratory forms, may be found together, and either form may produce offspring that exhibit either resident or migratory behavior. Resident bull trout complete their entire life cycle in the tributary or nearby streams in which they spawn and rear. Migratory bull trout, however, spawn in tributary streams and remain there as juveniles for 1–4 years before migrating to either a lake, river, or saltwater to live as subadults or to live as adults (U.S. Fish and Wildlife Service 2004).

**Species-Specific Threats**

Threats to bull trout include habitat loss and fragmentation due to historically human-caused land and water management activities; overutilization for commercial, scientific, or educational purposes; disease or predation by native or nonnative/invasive species; inadequacy of existing regulatory mechanisms; fish passage issues; competition and hybridization; and climate change impacts such as warming climates, changing precipitation, and hydrologic regimes (U.S. Fish and Wildlife Service 2014).

### Dolly Varden (Salvelinus malma)

Dolly Varden are a species similar in appearance to bull trout, but are usually found in the upper watershed above fish barriers. Bull trout within Puget Sound are a migratory species and can be found with Dolly Varden in marine waters. The Dolly Varden is known to occur in the coastal waters off of Washington and the inland waters portion of the Study Area and is proposed as “threatened due to similarity of appearance” to the listed bull trout (66 FR 1628). The purpose of the listing is to regulate the intentional taking of Dolly Varden and to prevent the taking of bull trout species. The Dolly Varden is not biologically threatened in Washington and is not addressed further in this EIS.

#### 3.9.2.3.2 Rockfish Species

### Bocaccio (*Sebastes paucispinis*)

**Occurrence in the Study Area**

The Puget Sound/Georgia Basin DPS, listed as endangered, may occur in the Inland Waters of the Study Area (Table 3.9-1).

#### Status and Management

On 13 April 2011 the Puget Sound/Strait of Georgia DPS was listed as endangered under the ESA (74 FR 18516). On 11 February 2015 critical habitat was designated for the Puget Sound/Strait of Georgia DPS (79 FR 68042). This critical habitat is located in the Inland Waters portion of the Study Area. The quantity and quality of critical habitat are evaluated by reference to PCEs. Physical or biological features essential to the conservation of rockfish include:

- **Quantity, quality, and availability of prey species** to support individual growth, survival, reproduction, and feeding opportunities
- **Water quality** and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities
- **Structure and rugosity** that supports feeding opportunities and predator avoidance (adult canary rockfish and bocaccio, and adult and juvenile yelloweye rockfish only)

#### Population and Abundance

No decent population estimate exists for the Puget Sound/Georgia Basin DPS of bocaccio rockfish. Historic data has indicated that populations of bocaccio have always been low within the Puget Sound. It has been estimated that there were about 100 individual bocaccio in Puget Sound proper in the 1980s (Palsson et al. 2009). Although the population is not thought to be extirpated at this time, the last confirmed observations of bocaccio within Puget Sound/Georgia Basin was 2001 (National Marine Fisheries Service 2009).

#### Life History

Bocaccio and other rockfishes are unique among bony fishes in that the fertilization and embryo development is internal and they give birth to live larval young. Larval young are found in surface waters and may be distributed over a wide area. Larvae and small juvenile rockfish offshore may remain in open waters for several months, being passively dispersed by ocean currents. The retentive circulation patterns of currents within the Puget Sound make it likely that a significant fraction of larvae released by bocaccio there (especially in more inland portions of the Sound) are retained within the Sound (75 FR 22276). Approximately 50 percent of adult bocaccio mature in 4–6 years and may live as long as 50 years (National Marine Fisheries Service 2012g). They school with widow, yellowtail, vermillion, and speckled rockfishes (Love and York 2006) and occur in large aggregations under drifting kelp beds and over firm sand-mud bottoms.

#### Habitat and Geographic Range

The circulation patterns of currents within the Puget Sound limit the dispersal range of bocaccio. Although larval bocaccio do remain in the pelagic environment longer than some other rockfish species (approximately 155 days), it is likely that a significant fraction of larvae released by bocaccio are retained within the Sound, especially throughout the more inland portions of the Puget Sound (74 FR 18516). Although juvenile bocaccio have never been documented within the Puget Sound, habitats that feature rock and microalgae (kelp species) are most readily used by juvenile bocaccio along the coast (Garrison and Miller 1982; Love et al. 1991). As adults, densities of bocaccio are highest near rocky habitats (hard substrata), but they have also been documented along areas of high relief and non-rocky substrates such as sand, mud, and other unconsolidated substrates (Miller and Borton 1980). Rocky habitats are limited in the Puget Sound, with only 10 square km ($km^2$) (3.8 square miles [$mi.^2$]) of such habitat in Puget Sound Proper, and 207 $km^2$ (80 $mi.^2$) in North Puget Sound (Palsson et al. 2009). Adult bocaccio are most frequently found between 160 and 820 ft. (50 and 250 m) depth, but may be found as deep as 1,560 ft. (475 m) (Orr et al. 2000, Love et al. 2002). Bocaccio display greater pelagic behavior (willingness to occupy areas higher in the water column) and have more movement potential than other rockfish species (National Marine Fisheries Service 2009). In the Puget Sound, the highest concentrations of bocaccio are found south of Tacoma Narrows (National Marine Fisheries Service 2014a)

#### Predator/Prey Interactions

Larval rockfish feed on larval krill, diatoms, dinoflagellates, tintinnids, and cladocerans. Pelagic juveniles are opportunistic feeders, consuming fish larvae, copepods, krill and euphausiids of all life stages. Adults are primarily piscivores, eating other rockfishes, hake, sablefish, anchovies, lanternfishes, and squid (National Marine Fisheries Service 2009).

Predators of juvenile bocaccio include salmon; fish-eating birds, such as terns and cormorants; and harbor seals (Love et al. 2002). The main predators of adult bocaccio are pinnipeds, such as sea lions and harbor seals (The Committee on the Status of Endangered Wildlife in Canada 2002**).**

#### Migration

Although bocaccio are generally sedentary, juvenile bocaccio move to deeper water as they age. Tagging studies have recaptured juveniles between 1 and 148 km from their tagging location after 2 years (Hartmann 1987). In that same study, adults were recaptured at their tagging location as much as 827 days later. Acoustic tagging work has shown more complex behavior with most bocaccio staying around 200 to 400 hectares (ha) the majority of the time, but some fish have been known to utilize areas greater than 1,200 ha. Some individuals remain at fairly constant depths while others change depth by as much as 100 m, generally moving to more shallow depths during the day (Drake et al. 2010; Starr et al. 2002). Drake et al. (2010) has summarized information on migration and movements for the bocaccio rockfish.

#### Species-Specific Threats

Principal threats include, but are not limited to, alteration of stream flow patterns and habitat degradation and climate change. These threats pose a serious challenge to the persistence of Pacific Northwest bocaccio.

### Canary Rockfish (*Sebastes pinniger*)

#### Occurrence in the Study Area

The Puget Sound/Georgia Basin DPS, listed as threatened, may occur in the Inland Waters of the Study Area (Table 3.9-1).

#### Status and Management

On 23 April 2009, NMFS proposed that the canary rockfish be listed as threatened under the ESA, and the DPS in the Puget Sound/Georgia Basin was listed on 28 April 2010 (74 FR 22276). On 11 February 2015 critical habitat was designated for the Puget Sound/Strait of Georgia DPS (79 FR 68042). This critical habitat is located in the Inland Waters portion of the Study Area. In 2003, the retention of canary rockfish in Washington was banned because this species is slow growing, late to mature, and long-lived. Managers reduced trip/bag limits, implemented spatial closures, and created new gear restrictions intended to reduce trawling in rocky shelf habitats and coincident catch of rockfish in shelf flatfish trawls. These restrictions have greatly decreased the commercial and recreational fishing opportunities of canary rockfish; therefore, recent removals have been primarily due to bycatch. Current management practices remain the same for the threatened DPS of canary rockfish in the Puget Sound/Georgia Strait area. Populations are expected to increase slowly over the next few years (Wallace and Cope 2011).

### Population and Abundance

The canary rockfish population has declined since the early 1970s. The population size of age three and older canary rockfish in California was estimated to be approximately 4,700 tons in 1973; however, that decreased nearly 60 percent to 1,900 tons in 1998. The mean length of the canary rockfish has also declined 13 percent since 1980, which indicates the removal of larger, older fish from the population. In 1999, the entire canary rockfish resource off the entire U.S. west coast was declared overfished. Most recent analysis of population trends indicate that the population has gradually increased since 2002 although the future of this trend is uncertain (Wallace and Cope 2011).

### Life History

Canary rockfish and other rockfishes are unique among bony fishes in that the fertilization and embryo development of their young is internal and they give birth to live larval young. Fecundity in female canary rockfish ranges from 260,000 to 1.9 million eggs, which is considerably more than many other rockfish species. The larval young are found in surface waters and may be distributed over a wide area. Larvae and small juvenile rockfish offshore may remain in open waters for several months, being passively dispersed by ocean currents. The retentive circulation patterns of currents within the Puget Sound make it likely that a significant fraction of larvae released by canary rockfish there (especially in more inland portions of the Sound) are retained within the Sound (75 FR 22276). Fifty percent of adult canary rockfish are mature at 14 in. (36 cm) total length, when they are about 5 to 6 years of age. They can live to be 75–84 years old (Love et al. 2002; National Marine Fisheries Service 2012f).

### Habitat and Geographic Range

Canary rockfish primarily inhabit waters 160 to 820 ft. (49 to 250 m) deep but may be found as deep as 1,400 ft. (427 m). Juveniles and sub adults tend to be more common than adults in shallow water and are associated with rocky reefs, kelp canopies, and artificial structures. As they increase in size and age, adults generally move into deeper water but usually have strong site fidelity to rocky bottoms and outcrops. Canary rockfish hover in loose groups just above the bottom of their rocky habitat and do not migrate. The species ranges between Punta Colnett, Baja California, and the western Gulf of Alaska (Love et al. 2002).

### Predator/Prey Interactions

Predation on canary rockfish is most severe during the pelagic larval and juvenile stages. Chinook salmon are a main predator of larval canary rockfish. Other predators of juveniles are other fishes, mammals, and seabirds. After the juveniles descend to their rocky bottom habitat as adults, they are much less vulnerable to predators.

Larval rockfish feed on diatoms, dinoflagellates, tintinnids, and cladocerans, while juveniles consume copepods and euphausiids of all life stages. Adults eat demersal invertebrates and small fishes, including other species of juvenile rockfish associated with kelp beds, rocky reefs, pinnacles, and sharp drop-offs (National Marine Fisheries Service 2012f).

### Migration

Although larval rockfish are dispersed passively throughout Puget Sound and offshore habitat, as adults, canary rockfish do not migrate (National Marine Fisheries Service 2012f); however some individuals move great distances as one tagged fish moved 435 mi. over 4 years (Love et al. 2002).

#### Species-Specific Threats

Canary rockfish are fished directly and are often caught as bycatch in other fisheries, such as the salmon fishery. Other threats include, but are not limited to, habitat degradation and climate change. These threats pose a serious challenge to the persistence of canary rockfish.

### Yelloweye Rockfish (*Sebastes ruberrimus*)

#### Occurrence in the Study Area

The Puget Sound/Georgia Basin DPS, listed as threatened, may occur in the Inland Waters of the Study Area (Table 3.9-1).

#### Status and Management

On 28 April 2010, Puget Sound/Georgia Basin DPS was listed as threatened under the ESA (75 FR 22276). On 11 February 2015 critical habitat was designated for the Puget Sound/Strait of Georgia DPS (79 FR 68042). This critical habitat is located in the Inland Waters portion of the Study Area. Because the species is slow growing, late to mature, and long-lived, recovery from threats will take many years, even if the threats are no longer affecting the species.

For management purposes in Alaska, the yelloweye are classified as a non-pelagic rockfish species. Under sport fishing regulations rockfish species are divided into two categories: pelagic and non-pelagic. Each group has specific bag limits and restrictions to account for the different characteristics of each species groups. Recreational fisheries involving yelloweye are managed by the State of Alaska both in state waters, and within the exclusive economic zone. Commercial fisheries are managed by the State of Alaska within state waters and by the North Pacific Fishery Management Council within the exclusive economic zone. In southeast Alaska, the State of Alaska manages the commercial yelloweye fishery as part of the federal demersal shelf rockfish assemblage with oversight from the north Pacific Fishery Management Council (Alaska Department of Fish and Game 2012). Managers have constrained catches by eliminating all retention of yelloweye rockfish in both commercial and recreational fisheries instituting broad spatial closures, and creating new gear restrictions intended to reduce trawling in rocky shelf habitats and the coincident catch of rockfish in shelf flatfish trawls (Taylor and Wetzel 2011).

#### Population and Abundance

From the mid-1970s to mid-1990s recreational catch and effort data suggests possible declines in yelloweye abundance. The number of angler trips increased substantially while there was a decline in the average number of rockfish caught per trip. This data suggests declines in the population over time when correlated together. Currently there is no survey data being collected for this species; however, few of these fish are caught by fishermen, which suggests low population abundance (National Marine Fisheries Service 2012h). California and Oregon have very similar estimates of spawning output at unexploited equilibrium, while Washington’s spawning output is considerably lower. Relative depletion also varies by state, with California estimated to be at 17.3 percent of unexploited conditions, Oregon 23.9 percent, and Washington 27.2 percent (Taylor and Wetzel 2011).

#### Life History

Yelloweye are among the largest rockfish species (Love et al. 2002). Yelloweye rockfish and other rockfishes are unique among bony fishes in that the fertilization and embryo development of their young is internal and they give birth to live larval young. Fecundity in female yelloweye rockfish ranges from 1.2 to 2.7 million young. Yelloweye larval release occurs between February and September. The larval young are found in surface waters and may be distributed over a wide area extending several hundred miles (several hundred kilometers) offshore. Their survival is affected by ocean conditions such as temperature, currents, and the availability of food. Larvae and small juvenile rockfish may remain in open waters for several months, being passively dispersed by ocean currents. Yelloweye rockfish juveniles, unlike bocaccio and canary rockfish, do not typically occupy shallow, intertidal areas, but settle in deeper, 300–590 ft. (91 to 180 m), waters (National Marine Fisheries Service 2012h). Approximately 50 percent of adult yelloweye rockfish are mature by 16 in. (41 cm) total length, which is about 6 years of age. Yelloweye rockfish are among the longest lived rockfishes and can live up to 118 years (National Marine Fisheries Service 2012h).

#### Habitat and Geographic Range

Yelloweye range from northern Baja California to the Aleutian Islands, Alaska, but are most common from Central California northward to the Gulf of Alaska. Juveniles and sub adults tend to be more common than adult fish in shallower water and are associated with rocky reefs, kelp canopies, and artificial structures. As yelloweye mature, they move to deeper water and increase in size, but usually exhibit strong site fidelity to rocky bottoms and outcrops. Yelloweye rockfish occur in waters 80–1,560 ft. (24–475 m), but are most commonly found between 300 and 590 ft. (91 and 180 m) (National Marine Fisheries Service 2012h). Adult yelloweye, like many species of non-pelagic rockfish, have small home ranges, and some of them may live their entire adult life on a single rock pile (Alaska Department of Fish and Game 2012).

#### Predator/Prey Interactions

Common predators of adult yelloweye include killer whales, seals, sharks, and dolphins. Juvenile yelloweye may be taken by birds, porpoises, and fishes such as other rockfish and lingcod. Larval rockfish feed on diatoms, dinoflagellates, tintinnids, and cladocerans, while juveniles consume copepods and euphausiids of all life stages. Adults eat demersal invertebrates and small fishes, including other species of juvenile rockfish associated with kelp beds, rocky reefs, pinnacles, and sharp drop-offs (National Marine Fisheries Service 2012h).

#### Migration

No real migration is known for adult yelloweye rockfish. Adult yelloweye, like many species of non-pelagic rockfish, have small home ranges, and some of them may live their entire adult life on a single rock pile (Alaska Department of Fish and Game 2012).

#### Species-Specific Threats

Non-pelagic rockfish, including the yelloweye, are extremely vulnerable to overfishing. Another contributing factor to the vulnerability of yelloweye, as well as with other rockfishes, is the lack of a vent on their swim bladder. Without venting, yelloweye brought up from depth can suffer injury as air in the swim bladder expands, which often leads to bulging eyes or the stomach protruding from the mouth, in addition to other unseen internal injuries. With an inflated swim bladder the yelloweye cannot submerge easily and if released are subject to predation while floating on the surface. Because of the low survival rates of released yelloweye, catch and release fishing is strongly discouraged (Alaska Department of Fish and Game 2012). More threats include, but are not limited to, bycatch, habitat degradation, and climate change. These threats pose a serious challenge to the persistence of Pacific Northwest and Alaskan yelloweye rockfish.

#### 3.9.2.3.3 Other Species

### Pacific Eulachon (*Thaleichthys pacificus*)

**Occurrence in the Study Area**

The ESA-listed southern DPS of Pacific eulachon may be present in both the inland and offshore waters of the Study Area (see Table 3.9-1).

**Status and Management**

Of the two Pacific eulachon DPSs, one is listed as threatened (National Marine Fisheries Service 2012i). The southern DPS was listed as threatened on 18 March 2010 (75 FR 13012), and critical habitat for the southern DPS was designated on 20 October 2011 (76 FR 65324) (National Marine Fisheries Service 2012i). The southern DPS of Pacific eulachon has 16 specific designated areas as critical habitat within the states of California, Oregon, and Washington. The designated areas are a combination of freshwater creeks and rivers and their associated estuaries, comprising approximately 335 mi. (539 km) of habitat (National Oceanic and Atmospheric Administration 2011b).

Different systems occupied by eulachon at specific stages of their life cycle serve distinct purposes and thus may contain different PCEs. Based on the best available scientific information, three PCEs covering freshwater, estuarine, nearshore, and offshore marine waters have been developed. Only one is present in the Study Area:

- **Nearshore and offshore marine foraging habitat** with water quality and available prey, supporting juveniles and adult survival. Eulachon prey on a wide variety of species, with larvae and juveniles consuming phytoplankton, copepods, mysids, ostracods, worm larvae, and eulachon larvae; and adults consuming euphausiids, copepods, and other planktonic organisms (Hay and McCarter, 2000; Washington Department of Fish and Wildlife and Oregon Department of Fish and Wildlife, 2001). These features are essential to conservation because they allow juvenile fish to survive, grow, and reach maturity, and they allow adult fish to survive and return to freshwater systems to spawn.

**Population and Abundance**

Both of the DPSs have a low abundance relative to historical levels (National Marine Fisheries Service 2012i). Since all of the DPSs occur together while at sea, it is difficult to estimate the marine population numbers; however, specific population numbers are based on freshwater returns. NMFS reports that the median commercial catch in the Columbia River decreased nearly 98 percent between 1938 to 1992 and 1993 to 2006 (National Marine Fisheries Service 2012i).

**Life History**

Similar to Pacific salmonids, Pacific eulachon are anadromous. Pacific eulachon hatch in freshwater streams. Adults spawn on sand or small gravel in coastal rivers. The larvae are carried downstream to the ocean where they dispersed by ocean currents. After approximately 3 years they return to their home freshwater stream to spawn from the late winter through mid-spring. Most Pacific eulachon adults die after spawning. The major spawning runs for Pacific eulachon occur in the Columbia River.

**Habitat and Geographic Range**

The present distribution of Pacific eulachon extends from the southeastern Bering Sea to northern California (National Marine Fisheries Service 2012i). Since spawning occurs exclusively in freshwater systems outside of the Study Area, spawning habitats are not described here. However, most of the

Pacific eulachon in the continental United States are from the Columbia River Basin; other areas in the United States where Pacific eulachon have been documented include Sacramento River, Russian River, Humboldt Bay and nearby smaller coastal rivers, and the Klamath River in California; the Rogue River and Umpqua Rivers in Oregon; and infrequently in coastal rivers and tributaries to Puget Sound, Washington (National Marine Fisheries Service 2012i). Designated critical habitat for the Pacific eulachon is mainly in the Columbia River and in a small portion of the Strait of Juan de Fuca in Puget Sound.

#### Predator/Prey Interactions

Predators of adult Pacific eulachon include fish-eating birds, sturgeon, Pacific halibut, pinnipeds, such as sea lions and harbor seals, and finback and killer whales especially within coastal areas (Hart 1973; Pacific States Marine Fisheries Commission 1996). Larvae are preyed upon by salmon and lingcod. Pacific eulachons feed primarily on plankton during all life stages (Pacific States Marine Fisheries Commission 1996).

#### Migration

Adult Pacific eulachon migrate from their ocean habitats to reach their freshwater spawning grounds. In the Study Area, the primary rivers that Pacific eulachon migrate into are in the Columbia River Basin.

#### Species-Specific Threats

Habitat loss and degradation, especially in the Columbia River basin due to hydroelectric dams that block access to historical eulachon spawning grounds, is a threat to pacific eulachon populations. Other threats include global climate change, especially in the southern portion of its range where ocean warming trends tend to be more pronounced; and the high levels of chemical pollutants that eulachon have been shown to carry, which may impact mortality rates or reproductive success (National Marine Fisheries Service 2012i).

### Green Sturgeon (*Acipenser medirostris*)

#### Occurrence in the Study Area

The Southern DPS of North American green sturgeon is present in the coastal waters of the Offshore Area and in the Inland Waters portion of the Study Area (Huff et al. 2012).

#### Status and Management

The North American green sturgeon Southern DPS was listed by NMFS as a threatened species under the ESA on 7 April 2006 (71 FR 17757). Critical habitat was designated on 9 October 2009 (74 FR 52300). Critical habitat for the Southern DPS is designated in the offshore and inland water portions of the Study Area (Figure 3.9-3).

Critical habitat has been designated in coastal U.S. marine waters within 60 fathoms (110 m) depth from Monterey Bay, CA (including the Bay), north to Cape Flattery, WA, including the Strait of Juan de Fuca, to the U.S. Canadian boundary; and the Sacramento-San Joaquin Delta and Suisun, San Pablo, and San Francisco bays in California; the lower Columbia River estuary; and certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor) (50 C.F.R. Part 226). Several of these areas overlap with the Study Area.


**Figure 3.9-3: Critical Habitat for the Green Sturgeon in the Northwest Training and Testing Study Area**

The quantity and quality of critical habitat are evaluated by reference to PCEs, defined as those sites and habitat components that support one or more life stages and are deemed essential for the conservation of the species. Different systems occupied by green sturgeon at specific stages of their life cycle serve distinct purposes and thus may contain different PCEs. Based on the best available scientific information, PCEs for freshwater riverine systems, estuarine areas, and nearshore marine waters have been developed, but only those for estuarine or marine waters may be present in the Study Area.

The specific PCEs essential for the conservation of the Southern DPS in estuarine areas include:

- **Food resources**. Abundant prey items within estuarine habitats and substrates for juvenile, subadult, and adult life stages. Prey species for juvenile, subadult, and adult green sturgeon within bays and estuaries primarily consist of benthic invertebrates and fishes, including crangonid shrimp, burrowing thalassinidean shrimp (particularly the burrowing ghost shrimp), amphipods, isopods, clams, annelid worms, crabs, sand lances, and anchovies.
- **Water flow**. Within bays and estuaries, sufficient flow into the bay and estuary to allow adults to successfully orient to the incoming flow and migrate upstream to spawning grounds.
- **Water quality**. Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages. Suitable water quality also includes water with acceptably low levels of contaminants (e.g., pesticides, organochlorines, elevated levels of heavy metals; acceptable low levels as determined by NMFS on a case-by-case basis) that may disrupt the normal development of juvenile life stages, or the growth, survival, or reproduction of subadult or adult stages.
- **Migratory corridor**. A migratory pathway necessary for the safe and timely passage of Southern DPS fish within estuarine habitats and between estuarine and riverine or marine habitats.
- **Water depth**. A diversity of depths necessary for shelter, foraging, and migration of juvenile, subadult, and adult life stages. Subadult and adult green sturgeon occupy a diversity of depths within bays and estuaries for feeding and migration.
- **Sediment quality**. Sediment quality (e.g., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages. This includes sediments free of elevated levels of contaminants (e.g., selenium, PAHs, and organochlorine pesticides) that can cause adverse effects on all life stages of green sturgeon.

The specific PCEs essential for the conservation of the Southern DPS in coastal marine areas include:

- **Migratory corridor**. A migratory pathway necessary for the safe and timely passage of Southern DPS fish within marine and between estuarine and marine habitats.
- **Water quality**. Coastal marine waters with adequate dissolved oxygen levels and acceptably low levels of contaminants (e.g., pesticides, organochlorines, heavy metals that may disrupt the normal behavior, growth, and viability of subadult and adult green sturgeon). Waters with acceptably low levels of such contaminants (as determined by NMFS on a case-by-case basis) are required for the normal development of green sturgeon for optimal survival and spawning success.
- **Food resources**. Abundant prey items for subadults and adults, which may include benthic invertebrates and fishes. Abundant food resources are important to support subadults and adults over long-distance migrations, and may be one of the factors attracting green sturgeon to habitats far to the north and to the south of their natal habitat.

## Population and Abundance

Green sturgeon from the Klamath and Rogue rivers are similar to each other but distinct from fish from San Pablo Bay, based on preliminary studies. Green sturgeon commonly occur in the lower Columbia River (Oregon–Washington) and genetic samples taken there appear to be a mixture of the other populations (St. Pierre 2006). A recent study estimates that the primary concentration of green sturgeon is located in the coastal waters of Washington, Oregon, and Vancouver Island, and near the San Francisco and Monterey Bays (Huff et al. 2012). NMFS has determined that, based on genetic evidence of discreteness, there are two DPSs for green sturgeon. The northern population ranges from the Eel River, California, to at least the Rogue River, Oregon. The southern population is principally comprised of the Sacramento River spawning stock.

Green sturgeon have been observed northwest of Graves Harbor, AK, and south of Monterey Bay, CA, but have not been identified as belonging to either the Northern or Southern distinct population segment. The geographical area occupied by the southern population encompasses all of the area from the Bering Sea, AK, to Ensenada, Mexico. The areas outside of the United States cannot be designated as critical habitat (50 C.F.R. 424.12(h)); therefore, the geographical area considered is limited to areas from the Bering Sea, AK (excluding Canadian waters), to the U.S.-California/Mexico border (National Oceanic and Atmospheric Administration 2009b).

Their wide distribution, large numbers observed seasonally in some areas, and projections based on demographic rates suggest that total green sturgeon numbers are at least in the tens of thousands (Beamesderfer and Webb 2002). The largest known spawning stock of green sturgeon is that of the Klamath River and its tributary. The Klamath River population is estimated to number up to 66,000 individuals of which 3,000 would be mature adults. Actual numbers of spawning females in the Klamath were estimated at 760–1,500 females per year based on average harvest and total mortality rates (Beamesderfer and Webb 2002).

Based on a review of recent tagging studies, harvest analyses, and stock assessments from many locations, Beamesderfer and Webb (2002) estimated that the total adult and sub-adult population size of green sturgeon is within the range of 34,000 to 160,000 fish. Of these, greatest abundance was recorded for the Columbia River estuary, and ocean and bay waters of Oregon and Washington (St. Pierre 2006).

## Life History

Green sturgeons hatch in fresh water and spend about 1–4 years in fresh and estuarine waters before widely dispersing into nearshore oceanic waters, bays, and estuaries. They remain there until they reach maturity at more than 15 years of age and over 4 ft. (1.3 m) in length. Adults return to fresh water to spawn beginning in late February and spawning occurs from April to June. Females produce 60,000–140,000 eggs. They are long-lived, slow-growing fish.

## Habitat and Geographic Range

Green sturgeon utilize both freshwater and saltwater habitat. They spawn in deep pools, or “holes” in large, turbulent, freshwater river main steams. Eggs are likely broadcast over large cobble substrates, but range from clean sand to bedrock substrates so that spawning habitat preferences are unclear. Cold, clean water is important for proper embryonic development. The adult fish live in oceanic waters, bays, and estuaries when they are not spawning. Green sturgeon are known to forage in estuaries and bays ranging from San Francisco Bay to British Columbia. They are found along the west coast of Mexico, the

United States, and Canada (Huff et al. 2012).They are also found in Eurasia and are the most broadly distributed, wide-ranging, and marine-oriented species within the sturgeon family.

The historical and current distribution of where this species spawns is unclear as the green sturgeon makes non-spawning movements into coastal lagoons and bays in the late summer to fall. Their original spawning distribution may have been reduced due to harvest and other anthropogenic effects. They are believed to spawn today in the Rogue River in Oregon, Klamath River Basin in Oregon, and the Sacramento River in California. Spawning is rare in the Oregon Umpqua River. Green sturgeon also appear to occasionally occupy the Eel River (National Oceanic and Atmospheric Administration 2012).

Critical habitat has been designated in coastal U.S. marine waters within 60 fathoms (110 m) depth from Monterey Bay, CA (including the Bay), north to Cape Flattery, WA, including the Strait of Juan de Fuca, to the U.S. Canadian boundary; and the Sacramento-San Joaquin Delta and Suisun, San Pablo, and San Francisco bays in California; the lower Columbia River estuary; and certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor) (50 Code of Federal Regulations Part 226) (Figure 3.9-3).

#### Migration

Green sturgeons are still found in large concentrations in coastal estuaries; however, their range in fresh water has been largely restricted due to dams. Historically they were observed hundreds of miles (hundreds of kilometers) upstream in the Sacramento and Columbia rivers, but are currently restricted in the Columbia River to the lower 37 mi. (60 km) downstream of the Bonneville Dam. Spawning is presently known to occur in only three rivers in North America, all of which are in the United States; the Rogue River in Oregon, and the Klamath and Sacramento river systems in California. Klamath and Rogue River populations appear to spawn within 260 mi. (160 km) of the ocean while the Sacramento population may travel over 200 mi. (320 km) upriver to spawn (St. Pierre 2006).

#### Species-Specific Threats

Threats to the green sturgeon species that contribute to their risk of extinction include the loss of spawning habitat; concentration of spawning into a single spawning river; entrainment or impingement by water project operations, dredging, power plant operations, or other in-water activities; bycatch of green sturgeon in other fisheries; and poor water quality conditions (Department of Commerce 2010). The main factor in the decline of the Southern DPS of green sturgeon is the reduction of the spawning area to a limited section of the Sacramento River. Other threats to the DPS include insufficient freshwater flow rates in spawning areas; contaminants (e.g., pesticides); bycatch of green sturgeon in other fisheries; potential poaching (for caviar); entrainment by water projects; influence of non-native species; small population size; impassable river barriers; and elevated water temperatures (National Oceanic and Atmospheric Administration 2012).

### 3.9.2.4 Federally Managed Fisheries

U.S. fisheries are managed within a framework of overlapping international, federal, state, interstate, and tribal authorities. Individual states and territories generally have jurisdiction over fisheries in marine waters within 3 nautical miles (nm) of their coast. Federal jurisdiction includes fisheries in marine waters inside the U.S. Exclusive Economic Zone, which encompasses the area from 3 nm to 200 nm offshore of any U.S. coastline (National Oceanic and Atmospheric Administration 1996).

The Magnuson-Stevens Fishery Conservation and Management Act and Sustainable Fisheries Act (see Section 3.0.1.1, Federal Statutes, for details) led to the formation of eight fishery management councils that share authority with the NMFS to manage and conserve the fisheries in federal waters. Essential Fish Habitat (EFH) is also identified and managed under this act. For analyses of impacts on those habitats included as EFH within the Study Area, refer to Sections 3.3 (Marine Habitats), 3.7 (Marine Vegetation), and 3.8 (Marine Invertebrates). Together with NMFS, the councils maintain fishery management plans for specific species or species groups to regulate commercial and recreational fishing within their geographic regions. There are two regional fishery management councils including the North Pacific Fishery Management Council and the Pacific Fishery Management Council within the Study Area.

Federally managed species of marine fishes are listed in Table 3.9-3. These species are considered, along with ESA-listed species and other taxonomic groupings, in the analysis of impacts in Section 3.9.3 (Environmental Consequences). The analysis of impacts on commercial and recreational fisheries is provided in Section 3.12 (Socioeconomic Resources). The analysis of impacts of fisheries in relation to Native American and Alaska Native Traditional uses are described in Section 3.11 (American Indian and Alaska Native Traditional Resources).

**Table 3.9-3: Federally Managed Fish Species within the Northwest Training and Testing Study Area**

| **Pacific Fishery Management Council** | |
|---|---|
| **Common Name** | **Scientific Name** |
| **Groundfish Management Unit Species** | |
| **Sharks and Skates** | |
| Big skate | *Raja binoculata* |
| California skate | *Raja inornata* |
| Leopard shark | *Triakis semifasciata* |
| Longnose skate | *Raja rhina* |
| Soupfin shark | *Galeorhinus zyopterus* |
| Spiny dogfish | *Squalus acanthias* |
| **Ratfish** | |
| Ratfish (also known as Spotted Ratfish) | *Hydrolagus colliei* |
| **Morids** | |
| Finescale codling (also known as Pacific Flatnose) | *Antimora microlepis* |
| **Grenadiers** | |
| Pacific rattail | *Coryphaenoides acrolepis* |
| **Roundfish** | |
| Cabezon | *Scorpaenichthys marmoratus* |
| Kelp greenling | *Hexagrammos decagrammus* |
| Lingcod | *Ophiodon elongatus* |
| Pacific cod | *Gadus macrocephalus* |
| Pacific whiting (hake) | *Merluccius productus* |
| Sablefish | *Anoplopoma fimbria* |
| **Rockfish**[1] | |
| Aurora rockfish | *Sebastes aurora* |
| Bank rockfish | *Sebastes rufus* |

**Table 3.9-3: Federally Managed Fish Species within the Northwest Training and Testing Study Area, Pacific Regional Fishery Management Council (continued)**

| Pacific Fishery Management Council | |
|---|---|
| **Common Name** | **Scientific Name** |
| **Groundfish Management Unit Species (continued)** | |
| **Rockfish[1] (continued)** | |
| Black rockfish | *Sebastes melanops* |
| Black and yellow rockfish | *Sebastes chrysomelas* |
| Blackgill rockfish | *Sebastes melanostomus* |
| Blue rockfish | *Sebastes mystinus* |
| Bocaccio | *Sebastes paucispinis* |
| Bronzespotted rockfish | *Sebastes gilli* |
| Brown rockfish | *Sebastes auriculatus* |
| Calico rockfish | *Sebastes dallii* |
| California scorpionfish | *Scorpaena gutatta* |
| Canary rockfish | *Sebastes pinniger* |
| Chameleon rockfish | *Sebastes phillipsi* |
| China rockfish | *Sebastes nebulosus* |
| Chilipepper | *Sebastes goodei* |
| Copper rockfish | *Sebastes caurinus* |
| Cowcod | *Sebastes levis* |
| Darkblotched rockfish | *Sebastes crameri* |
| Dusky rockfish | *Sebastes ciliatus* |
| Dwarf-red rockfish | *Sebastes rufinanus* |
| Flag rockfish | *Sebastes rubrivinctus* |
| Freckled rockfish | *Sebastes lentiginosus* |
| Gopher rockfish | *Sebastes carnatus* |
| Grass rockfish | *Sebastes rastrelliger* |
| Greenblotched rockfish | *Sebastes rosenblatti* |
| Greenspotted rockfish | *Sebastes chlorostictus* |
| Greenstriped rockfish | *Sebastes elongatus* |
| Halfbanded rockfish | *Sebastes semicinctus* |
| Harlequin rockfish | *Sebastes variegatus* |
| Honeycomb rockfish | *Sebastes umbrosus* |
| Kelp rockfish | *Sebastes atrovirens* |
| Longspine thornyhead | *Sebastolobus altivelis* |
| Mexican rockfish | *Sebastes macdonaldi* |
| Olive rockfish | *Sebastes serranoides* |
| Pink rockfish | *Sebastes eos* |
| Pinkrose rockfish | *Sebastes simulator* |
| Pygmy rockfish | *Sebastes wilsoni* |
| Pacific ocean perch | *Sebastes alutus* |

**Table 3.9-3: Federally Managed Fish Species within the Northwest Training and Testing Study Area, Pacific Regional Fishery Management Council (continued)**

| Pacific Fishery Management Council | |
|---|---|
| **Common Name** | **Scientific Name** |
| **Groundfish Management Unit Species (continued)** | |
| **Rockfish[1] (continued)** | |
| Quillback rockfish | *Sebastes maliger* |
| Redbanded rockfish | *Sebastes babcocki* |
| Redstripe rockfish | *Sebastes proriger* |
| Rosethorn rockfish | *Sebastes helvomaculatus* |
| Rosy rockfish | *Sebastes rosaceus* |
| Rougheye rockfish | *Sebastes aleutianus* |
| Sharpchin rockfish | *Sebastes zacentrus* |
| Shortbelly rockfish | *Sebastes jordani* |
| Shortraker rockfish | *Sebastes borealis* |
| Shortspine thornyhead | *Sebastolobus alascanus* |
| Silvergray rockfish | *Sebastes brevispinis* |
| Speckled rockfish | *Sebastes ovalis* |
| Splitnose rockfish | *Sebastes diploproa* |
| Squarespot rockfish | *Sebastes hopkinsi* |
| Starry rockfish | *Sebastes constellatus* |
| Stripetail rockfish | *Sebastes saxicola* |
| Swordspine rockfish | *Sebastes ensifer* |
| Tiger rockfish | *Sebastes nigrocinctus* |
| Treefish | *Sebastes serriceps* |
| Vermilion rockfish | *Sebastes miniatus* |
| Widow rockfish | *Sebastes entomelas* |
| Yelloweye rockfish | *Sebastes ruberimus* |
| Yellowmouth rockfish | *Sebastes reedi* |
| Yellowtail rockfish | *Sebastes flavidus* |
| **Flatfish** | |
| Arrowtooth flounder (turbot) | *Atheresthes stomias* |
| Butter sole | *Isopsetta isolepis* |
| Curlfin sole | *Pleuronichthys decurrens* |
| Dover sole | *Microstomus pacificus* |
| English sole | *Parophrys vetulus* |
| Flathead sole | *Hippoglossoides elassodon* |
| Pacific sanddab | *Citharichthys sordidus* |
| Petrale sole | *Eopsetta jordani* |
| Rex sole | *Glyptocephalus zachirus* |
| Rock sole | *Lepidopsetta bilineata* |
| Sand sole | *Psettichthys melanostictus* |
| Starry flounder | *Platichthys stellatus* |

**Table 3.9-3: Federally Managed Fish Species within the Northwest Training and Testing Study Area, Pacific Regional Fishery Management Council (continued)**

| Pacific Fishery Management Council | |
|---|---|
| **Common Name** | **Scientific Name** |
| **Coastal Pelagic Management Unit Species** | |
| Pacific sardine | *Sardinops sagax* |
| Pacific (chub) mackerel | *Scomber japonicus* |
| Northern anchovy, central and northern subpopulations | *Engraulis mordax* |
| Jack mackerel | *Trachurus symmetricus* |
| **Highly Migratory Species Management Unit Species** | |
| **Tunas** | |
| North Pacific albacore | *Thunnus alalunga* |
| Yellowfin tuna | *Thunnus albacares* |
| Bigeye tuna | *Thunnus obesus* |
| Skipjack tuna | *Katsuwonus pelamis* |
| Pacific bluefin tuna | *Thunnus orientalis* |
| **Sharks** | |
| Common thresher shark | *Alopias vulpinus* |
| Pelagic thresher shark | *Alopias pelagicus* |
| Bigeye thresher shark | *Alopias superciliosus* |
| Shortfin mako or bonito shark | *Isurus oxyrinchus* |
| Blue shark | *Prionace glauca* |
| **Billfish and Swordfish** | |
| Striped marlin | *Tetrapturus audax* |
| Swordfish | *Xiphias gladius* |
| **Other** | |
| Dorado or dolphinfish | *Coryphaena hippurus* |
| **Pacific Halibut Management Unit** | |
| Pacific halibut | *Hippoglossus stenolepis* |
| **Salmon Species Management Unit Species** | |
| Chinook salmon | *Oncorhynchus tshawytscha* |
| Coho salmon | *Oncorhynchus kisutch* |
| Pink salmon | *Oncorhynchus gorbuscha* |
| **North Pacific Fishery Management Council** | |
| **Salmon Fishery Management Unit Species (East Area)** | |
| Chinook salmon | *Oncorhynchus tshawytscha* |
| Coho salmon | *Oncorhynchus kisutch* |
| Pink salmon | *Oncorhynchus gorbuscha* |
| Sockeye salmon | *Oncorhynchus nerka* |
| Chum salmon | *Oncorhynchus keta* |

[1] The category "rockfish" includes all genera and species of the family Scopaenidae, even if not listed, that occur in the Washington, Oregon, and California area. The Scopaenidae genera are *Sebastes*, *Scorpaena*, *Sebastolobus*, and *Scorpaenodes*.
Source: Pacific Fishery Management Council 2008, North Pacific Fishery Management Council 2012.

### 3.9.2.5 Taxonomic Group Descriptions and Distribution

#### 3.9.2.5.1 Jawless Fishes (Orders Myxiniformes and Petromyzontiformes)

Hagfishes (Myxiniformes) occur exclusively in marine habitats and are represented by 70 species worldwide within temperate marine locations. This group feeds on dead or dying fishes and has very limited external features often associated with fishes, such as fins and scales (Helfman et al. 1997). The members of this group are important scavengers that recycle nutrients back through the ecosystem. Lampreys (Petromyzontiformes) include 39 species widely distributed in the Northern and Southern hemispheres, but virtually absent in tropical waters. The most striking feature of the lampreys is the oral disc mouth which they use to attach to other fishes and feed on their blood (Moyle and Cech 1996; Nelson 2006). A lamprey can exhibit two life histories. Anadromous lampreys, one type, spend most of their adult lives in the ocean and move to rivers to spawn. The other type completes its life cycle entirely in fresh water (Mansfield 2004).

## Offshore Area

Jawless fishes of the Orders Myxiniformes and Petromyzontiforme occur in the Offshore Area Black (*Eptatretus deani*) and Pacific (*Eptatretus stouti*) hagfishes are known to inhabit the Offshore Area (Hart 1973). They are most commonly found at the bottom of the ocean but inhabit a variety of depths below 82 ft. (25 m) (Moyle and Cech 1996; Powell et al. 2005). The Pacific (*Entosphenus tridentatus*) and river (*Lampetra ayresii*) lampreys are known to inhabit the offshore Study Area. Pacific and river lampreys are both parasitic and anadromous, with resident populations recorded (Hart 1973; Renaud 2011). Pacific lamprey spend 6 months to 3.5 years in the marine offshore environment (U.S. Fish and Wildlife 2010).

## Inland Waters

Both Pacific and river lamprey are known to inhabit the Inland Waters (Hart 1973; Renaud 2011) and use it as a migratory corridor between spawning (rivers) and rearing (ocean) habitats. The distribution and abundance of lampreys have been reduced by the construction of dams and diversions as well as degradation of spawning and maturing habitat upriver from Inland Waters such as the Puget Sound. Pacific lampreys return to spawn in fresh water primarily during spring and summer months. They often spend about 1 year in freshwater habitat before spawning, usually remaining under large substrates (e.g., large boulders, bedrock crevices) associated with low water velocities until the following spring, when they move to the spawning areas (U.S. Fish and Wildlife 2010).

## Western Behm Canal, Alaska

There are five species of lamprey found in Alaska. The Arctic lamprey (*Lampetra camtschatica*) is the most common lamprey in Alaska. Pacific lamprey (*L. tridentate*) is found along coastal areas and is anadromous. Alaskan brook lamprey (*L. alaskense*) is non-parasitic and found in streams, river basins, and some lakes. The American river lamprey (*L. ayresii*) is uncommon in Alaska; however, the species has been found in the southeast region which is included in the Study Area. The western brook lampreys (*L. richardsoni*) are freshwater and nonparasitic species that are found sparsely distributed in the Western Behm Canal portion of the Study Area (Mansfield 2004).

#### 3.9.2.5.2 Sharks, Rays, and Chimaeras (Class Chondrichthyes)

The cartilaginous (non-bony) marine fishes of the class Chondrichthyes are distributed throughout the world's oceans, occupying all areas of the water column. This group is mainly predatory and contains many of the apex predators found in the ocean (e.g., great white shark, mako shark, and tiger shark) (Helfman et al. 1997). The basking shark is a notable exception as it is a filter-feeder. Sharks and rays have some unique features among marine fishes such as no swim bladder; protective toothlike scales; unique sensory systems (electroreception, mechanoreception); and some species bear live young in a variety of life history strategies (Moyle and Cech 1996). The subclass Elasmobranchii contains more than 850 marine species, including sharks, rays and skates, spread across nine orders (Nelson 2006). Very little is known about the subclass Holocephali, which contains 58 marine species of chimaeras (Nelson 2006).

### Offshore Area

Sharks and rays are found in the Offshore Area (Paxton and Eshmeyer 1994). While most sharks occur in the water column, many rays occur on or near the seafloor. Chimaeras are cool-water marine fishes that can be found in depths between 260 and 8,500 ft. (79.2 and 2,590.8 m) (Nelson 2006), including the spotted ratfish (*Hydrolagus colliei*), which is found in the Offshore Area and Inland Waters.

### Inland Waters

Sharks and rays are found in the Inland Waters section of the Study Area (Paxton and Eshmeyer 1994). While most sharks occur in the water column, many rays occur on or near the seafloor. Chimaeras are cool-water marine fishes that are found at depths between 260 and 8,500 ft. (79.2 and 2,590.8 m) (Nelson 2006). Two elasmobranch species, sixgill sharks and dogfish, are common in the Puget Sound. Although their populations have declined, these species are found in areas overlapping with the Inland Waters portion of the Study Area (Fowler et al. 2005).

### Western Behm Canal, Alaska

Sharks and rays are found in the Western Behm Canal portion of the Study Area (Paxton and Eshmeyer 1994). While most sharks occur in the water column, many rays occur on or near the seafloor. Chimaeras are cool-water marine fishes that are found at depths between 260 and 8,500 ft. (79.2 and 2,590.8 m) (Nelson 2006). There are three species of sharks that are abundant in the Alaska portion of the Study Area including, the Pacific sleeper shark (*Somniosus pacificus)*, spiny dogfish (*Squalus suckleyi)*, and the salmon shark (*Lamna ditropis)*. Spiny dogfish have both local and migratory populations, while Pacific sleeper sharks are generally found as local populations that move vertically throughout the water column and salmon sharks are found in local coastal populations (Tribuzio et al. 2010).

#### 3.9.2.5.3 Sturgeons (Order Acipenseriformes)

Sturgeon are large, primitive fishes found in the Northern Hemisphere. Many species are restricted to freshwater, but several are anadromous (University of Washington Fish Collection 2015). The most significant commercial use of sturgeon is the harvest of their eggs for caviar. There are 24 species recognized in this order (University of Washington Fish Collection 2015), with two anadromous species, green (*Acipenser medirostris*) and white sturgeons (*Acipenser transmontanus*), present in parts of the Study Area. Green sturgeon range between southern California to the Gulf of Alaska, while white sturgeon are found from northern California to the Gulf of Alaska (Hart 1973; Eschmeyer et al. 1983).

### Offshore Area

The green and white sturgeons inhabit the Offshore area, but appear somewhat uncommon. In the fall, many tagged green sturgeon move northward along the continental shelf to or past northern Vancouver Island, where they appear to spend the winter. Many of these fish migrate southward again in the spring and are known to spend summers in rivers, bays, and estuaries (Erickson et al. 2002; Moser and Lindley 2007 as cited by Lindley et al. 2008).

### Inshore Waters

Green and white sturgeons are not frequently encountered in Puget Sound (University of Washington Fish Collection 2015); records exist showing both species inhabiting or migrating through the Inshore Waters.

### Western Behm Canal, Alaska

Eschmeyer et al. (1983) states that green surgeon range from Japan to Baja California, Mexico. Lindley et al. (2008) found that only one out of 213 acoustically tagged green sturgeon was detected on the southeast Alaska line, suggesting that this species is uncommon in the Western Behm Canal.

#### 3.9.2.5.4 Eels (Order Anguilliformes)

These fishes have a unique larval stage called leptocephalus ("thin head"). During the larval stage of leptocephalus, these transparent, leaf-like, or ribbon-shaped, larvae drift on ocean currents, feeding on dissolved organic molecules until they develop to their next life history stage, eventually returning to the sea bed to shrink and firm up their bodies and take on the coloring of their juvenile or adult stages (Paxton and Eschmeyer 1994). Eels have an elongated snakelike body. Most of the 780 eel species do not inhabit the deep ocean. Eels generally feed on other fishes or small bottom-dwelling invertebrates, but they also feed on larger organisms (Helfman et al. 1997).

### Offshore Area

Deep-water eels from the order Anguilliforme, such as crossthroat sawplate (*Serrivomer jesperseni*), spaced snipe eel (*Avocettina gilli*), closepine (*Avocettina infans*), and slender (*Nemichthys scolopaceus*) snipe eels may be found in the deep water portions of the Offshore Area (Hart 1973). Larval forms of both orders may be found throughout the water column of the Offshore Area due to their free floating nature and the ocean currents that disperse them (Paxton and Eshmeyer 1994).

### Inland Waters

Anguilliformes may be found in their larval stage throughout the water column of the Inland Waters portion of the Study Area due to their free floating nature and ocean currents (Paxton and Eshmeyer 1994). Adult eels are generally not found in the nearshore of the eastern Pacific and therefore are likely not present in the Inland Waters portion of the Study Area (Aoyama 2009).

### Western Behm Canal, Alaska

Due to their free floating nature and ocean currents the larval stage of Anguilliformes may be found throughout the water column of Western Behm Canal. Their adult forms, however, are likely not present in the Western Behm Canal portion of the Study Area (Aoyama 2009). There is one species, the slender snipe eel, recorded in the Western Behm portion of the Study Area (Miller and Lea 1972; Hart 1973).

#### 3.9.2.5.5 Herring, Eulachon, and Salmonids (Orders Clupeiformes, Osmeriformes, Esociformes, and Salmoniformes)

Clupeiformes are found virtually worldwide, though the largest number of species is found in the tropics. This is a large order whose members are mostly marine, with some species freshwater or anadromous. There are 320 species in this order, with only four recorded in portions of the Study Area. Northern anchovy (*Engraulis mordax*), Pacific herring, Pacific sardine (*Sardinops sagax*), and the introduced American shad (*Alosa sapidissima*) are all schooling fishes which usually feed on plankton. They are important food sources for a variety of fishes, aquatic and marine mammals, and birds.

Humans use anchovies and herring for food, bait, and oil (Hart 1973; University of Washington Fish Collection 2015).

Osmeriformes are marine, anadromous, or freshwater fishes of the Northern Hemisphere. Most are schooling fishes, and they feed on invertebrates and fishes. Some are commercially harvested, and many are important food sources for larger fishes and other animals. There are 13 species of smelt, with seven found in the Study Area. The species in the Study Area include whitebait (*Allosmerus elongates*), surf, rainbow (*Osmerys mordax denrex*), longfin (*Spirinchus thaleichthys*), and night (*Spirinchus starksi*) smelts and capelin (*Mallotus villosus*), eulachon (*Thaleichthys pacificus*).

Salmoniformes may be anadromous or reside in freshwater. All salmonids are native to the Northern Hemisphere, but have been introduced around the world. There are about 66 species with 11 recorded in the Study Area, and most belong to the genus *Oncorhynchus*. Salmonids are commercially important. The native species include Chinook (*Oncorhynchus tshawytscha*), chum (*Oncorhynchus gorbuscha*), coho (*Oncorhynchus kisutch*), cutthroat trout (*Oncorhynchus clarkia*), dolly varden, pink salmon (*Oncorhynchus gorbuscha*), sockeye (*Oncorhynchus nerka*), and steelhead (*Oncorhynchus mykiss*). The Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) are introduced species to the Study Area (Hart 1973; University of Washington Fish Collection 2015).

#### Offshore Area

Northern anchovy, Pacific herring, Pacific sardine, and whitebait, surf, longfin, and night smelts, eulachon, Chinook, chum, coho, cutthroat trout, dolly varden, pink, sockeye, steelhead, and the introduced American shad are found in the Offshore Area (Hart 1973; University of Washington Fish Collection 2015). In addition, Atlantic salmon that escaped from farm pens may be found in the Offshore Area; they are considered an invasive species but not expected to thrive in competition with native species.

#### Inland Waters

Northern anchovy, Pacific herring, Pacific sardine, and whitebait, surf, and longfin smelts, capelin, eulachon, Chinook, chum, coho, cutthroat trout, dolly varden, pink, sockeye, steelhead, and the introduced American shad and Atlantic salmon are all likely to occur in the Inland Waters of the Study Area (Hart 1973; University of Washington Fish Collection 2015). During their transition from fresh water to salt water, juvenile salmon occupy nearshore ecosystems in the Inland Waters portion of the Study Area. These species could be present throughout the Inland Waters of the Study Area (Fresh 2006).

#### Western Behm Canal, Alaska

Pacific herring, Pacific sardine, and longfin, and night smelts, eulachon, Chinook, chum, coho, cutthroat trout, dolly varden, pink, sockeye, and steelhead may be found in the Western Behm Canal (Hart 1973; University of Washington Fish Collection 2015). The Behm Canal serves as a migratory pathway, and juvenile habitat for the coho, Chinook, pink, sockeye, and chum salmonids (Alaska Department of Fish and Game 2013).

### 3.9.2.5.6 Lanternfishes (Order Myctophiformes)

The order Myctophiformes comprises one of the largest groups of the world's deepwater fishes, many of which are not very well described in the scientific literature (Nelson 2006). These fishes are known for their unique body forms (e.g., slender bodies, or disc-like bodies, often possessing light-producing capabilities) and adaptations that likely present some advantages within the deepwater habitats in which they occur (e.g., large mouths, sharp teeth, and sensitive lateral line (sensory) systems) (Haedrich 1996; Koslow 1996; Marshall 1996; Rex and Etter 1998; Warrant and Locket 2004). There are nine species found in Study Area: blue (*Tarletonbeania crenularis*), northern (*Stenobrachius leucopsarus*), dogtooth (*Ceratoscopelus townsendi*), pinpoint (*Lampanyctus regalis*), broadfin (*Lampanyctus* ritteri), patchwork (*Notoscopelus resplendens*), bigfin (*Symbolophorus californiense*)and bigeye (*Protomyctophum thompdoni*) lampfishes, and California headlightfish (*Diaphus theta*) (Hart 1973; University of Washington Fish Collection 2015).

### Offshore Area

Lanternfishes occur in deep ocean waters, ranging from 3,280 to 16,000 ft. (1,000 to 4,900 m), and sometimes make diurnal migrations to shallower regions in search of nutrients within the Offshore Area (Froese and Pauly 2010; Paxton and Eshmeyer 1994). Blue, northern, dogtooth, pinpoint, broadfin, patchwork, bigfin, and bigeye lampfishes and California headlightfish are recorded in the Offshore Area (Hart 1973; Eschmeyer et al. 1983).

### Inland Waters

Lanternfishes are found in the Inland Waters portion of the Study Area in the water column and on the seafloor at depths of 630 ft. (200 m) and below. Their larvae are found in the inland portion of the Study Area as part of plankton (Paxton and Eshmeyer 1994). Blue and northern lanternfishes and California headlightfish are uncommon, but recorded in the Inland Waters (Hart 1973; University of Washington Fish Collection 2015).

### Western Behm Canal, Alaska

Lanternfishes are found in the Western Behm Canal portion of the Study Area in the water column and on the seafloor at depths of 630 ft. (200 m) and below. Their larvae are found in the Western Behm Canal portion of the Study Area as part of plankton (Paxton and Eshmeyer 1994). Northern, pinpoint, and bigeye lampfishes are recorded in the Western Behm Canal (Miller and Lea 1972; Hart 1973).

#### 3.9.2.5.7 Lizardfishes and Lancetfishes (Order Aulopiformes)

Aulopiformes are a very diverse order. Some species are found in warm, shallow seas, while other species are distributed in Arctic to Antarctic waters. Fishes in this order prey upon a diversity of species including deepwater fishes, crustaceans, molluscs, octopuses, squids, and other invertebrates. Of the approximately 113 species placed in this order, only 3 occur in the Study Area, and all are rare. These species include ribbon barracudina (*Notolepis rissoi*), slender barracudina (*Lestidium ringens*), and longnose lancetfish (*Alepisaurus ferox*).

#### 3.9.2.5.8 Offshore Area

Longnose lancetfish, and slender and ribbon barracudinas are recorded, but rare in the Offshore Area (Hart 1973; Eschmeyer et al. 1983).

#### 3.9.2.5.9 Inland Waters

Longnose lancetfish, slender and ribbon barracudinas are recorded, but rare in the Inland Waters (Hart 1973; University of Washington Fish Collection 2015).

#### 3.9.2.5.10 Western Behm Canal, Alaska

Longnose lancetfish, slender and ribbon barracudinas are recorded, but rare in the Western Behm Canal (Hart 1973).

#### 3.9.2.5.11 Cods, Hakes, and Brotulas (Orders Gadiformes and Ophidiiformes)

The cods and hake are target species of commercial fisheries. The cods, or groundfish, account for approximately half of the world's commercial fishery landings (Food and Agriculture Organization of the United Nations 2005). Gadiforms, such as cods, are almost exclusively marine fishes, and occupy seafloor habitats in temperate, arctic, and Antarctic regions. There are two families and five species in the Study Area, including Pacific cod (*Gadus macrocephalus*), Pacific tomcod (*Microgadus proximus*), walleye pollock (*Theragra chalcogramm*a), Pacific flatnose (*Antimora microlepis*), and Pacific hake (*Merluccius productus*).

The order Ophidiiformes includes brotulas, which have long eel-like tapering bodies and are distributed in deepwater areas throughout tropical and temperate oceans. The characteristics of ophidiiforms are similar to those of the other deepwater groups. Only the red brotula (*Brosmophycis marginata*), is recorded in the Study Area, and typically dwells in caves and crevices at depths from 160 to 660 ft. (50 to 200 m) (Hart 1973; University of Washington Fish Collection 2015).

### Offshore Area

Pacific cod, Pacific tomcod, walleye pollock, Pacific flatnose, Pacific hake, and red brotulas have been recorded in the Offshore Area (Hart 1973).

### Inland Waters

Pacific cod, Pacific tomcod, walleye Pollock, and Pacific hake are common in the Inland Waters. Red brotulas are present, but rarely collected (Hart 1973; University of Washington Fish Collection 2015).

### Western Behm Canal, Alaska

Pacific cod, Pacific tomcod, walleye pollock, Pacific flatnose, Pacific hake, and red brotulas have been recorded in the Western Behm Canal (Hart 1973).

#### 3.9.2.5.12 Toadfishes (Order Batrachoidiformes)

Toadfishes are found in temperate and tropical waters. Most are marine but some species live in fresh or brackish water. There are 69 species in this family, with only one, the plainfin midshipman (*Porichthys notatus*) inhabiting the Study Area. The plainfin midshipman typically lives on sandy or muddy substrate near the shore. This fish possesses a gasbladder which it uses to produce humming, grunting, and growling noises. Plainfin midshipmen feed on other fishes and crustaceans, and are in turn eaten by seals, sea lions, and birds (Hart 1973; University of Washington Fish Collection 2015).

### Offshore Area

The plainfin midshipman inhabits the Offshore Area (Hart 1973).

### Inland Waters

The plainfin midshipman inhabits the Inland Waters of the Study Area (Hart 1973; University of Washington Fish Collection 2015).

### Western Behm Canal, Alaska

The plainfin midshipman presence has not been confirmed in the Western Behm Canal (Hart 1973).

#### 3.9.2.5.13 Silversides and Pacific Saury (Order Atheriniformes and Beloniformes)

Atherinidae is a large order that includes a wide variety of families including silversides. Beloniformes are close relatives of Atherinidae, and include flyingfish and Pacific saury (*Cololabis saira*). Fishes from these orders have tendencies toward internal fertilization, although many species in these orders are known egg-layers, more and more species are discovered to be internal fertilizers. Atherinids characteristically have flattened dorsums, pectoral fins inserted high on the sides and near the top of the gill opening, widely separated dorsal fins, cycloid scales, and a metallic silvery streak along their side, lending to their common name, that is silverside. Most silversides are small fishes, under 5 in. (125 millimeters [mm]) in length, but a few species, such as the jack smelt (*Atherinopsis californiensis*) and topsmelt (*Atherinops affinis*) of the eastern Pacific may attain 20 in. (500 mm) or more and are important to fisheries. Silversides typically school by the thousands, and are also important food for other fish (Ethier and Starnes 1993). The Pacific saury is in the Order Beloniformes, and feeds on small crustaceans as well as the eggs and larvae of other fishes. Pacific saurys produce eggs that are attached to one another and floating objects by filaments on the egg surface. This species is a highly migratory species with a range extending from Korea and Japan, eastward to the Gulf of Alaska, and South to Mexico (Froese and Pauly 2011).

### Offshore Area

Pacific saury are a species of the order Beloniformes that occurs in the Offshore Area. As adults, they are generally found near the surface and in schools. As juveniles they are associated with drifting seaweed near the sea surface (Froese and Pauly 2011). Another species from the Beloniformes that occurs in the Offshore Area is the California flyingfish (*Cheilopogon pinnatibarbatus californicus*). Silversides are not likely to occur in the Offshore Area as they are typically located in coastal waters (Froese and Pauly 2011).

### Inland Waters

Beloniformes are not likely to occur in the Inland Waters portion of the Study Area. Atheriniformes such as the topsmelt silverside (*Atherinops affinis*) are common to bays, muddy and rocky areas, kelp beds, and estuarine areas, and would be likely to occur in the Inland Waters portion of the Study Area. Jack silversides (*Atherinopsis californiensis*) may be found in the Inland Waters of the southern portion of the Study Area; however, they are not likely to occur in the Puget Sound portion of the Study Area (Froese and Pauly 2011).

### Western Behm Canal, Alaska

Atheriniformes, such as topsmelt silversides and jack silversides, are not likely to be found in the Western Behm Canal portion of the Study Area, as they are generally not found that far north. The Pacific saury from the Beloniformes order may occur in the Western Behm Canal portion of the Study Area, on or near the surface of the water. Adult Pacific saury are generally found in offshore areas near the surface of the water; however, they may be found in the Western Behm Canal, as they are a highly migratory species (Froese and Pauly 2011).

#### 3.9.2.5.14 Opahs and Ribbonfishes (Order Lampridiformes)

The order Lampridiformes includes rare, pelagic, and deep fishes of various shapes and sizes, mostly large, that remain unstudied. There are six families, although there is disagreement about taxonomy, and species are found worldwide. Two of the 20 known species are recorded in the Study Area, the opah (*Lampris guttatus*) and King-of-the-Salmon (*Trachipterus altivelis*). Opahs feed on cephalopods, crustaceans, and fishes. King-of-the-Salmon juveniles feed on copepods, annelid worms, and fish larvae, while adults are known to prey upon euphasids, small pelagic fishes, and cephlapods (Hart 1973; University of Washington Fish Collection 2015).

### Offshore Area

Opah and King-of-the-Salmon are very rare, but recorded in the Offshore Area (Hart 1973).

### Inland Waters

Opah and King-of-the-Salmon are very rare, but recorded in the Inland Waters (Hart 1973; University of Washington Fish Collection 2015).

### Western Behm Canal, Alaska

Opah and King-of-the-Salmon are very rare, but recorded in the Western Behm Canal (Hart 1973; Eschmeyer et al. 1983).

#### 3.9.2.5.15 Pipefishes (Order Gasterosteiformes)

Gasterosteiformes include sticklebacks, tubesnouts, and pipefishes. Sticklebacks and pipefish are common within the Study Area. These species are likely to occur within the Study Area: the tubesnout (*Aulorhynchus flavidus*), threespine stickleback (*Gasterosteus aculeatus*), and bay pipefish (*Syngnathus leptorhynchus*). Most of these species are found in brackish water throughout the world (Nelson 2006) and occur in surface, water column, and seafloor habitats. Small mouths on a long snout and armorlike scales are characteristic of this group. As most of these species exhibit a high level of parental care (e.g., sticklebacks build nests), survival of young is high compared to most other fish species, so relatively few young need to be produced to sustain populations (Helfman et al. 1997).

### Offshore Area

Tube-snouts may be found in the Offshore Area near the surface in dense schools (Froese and Pauly 2011). These pipefishes may be found sparsely distributed throughout the offshore section of the Study Area on or near the surface of the water (Paxton and Eshmeyer 1994). Three-spined sticklebacks are associated with floating mats of seaweed as juveniles in the Offshore Area; however, as adults they move into inshore regions (Froese and Pauly 2011).

### Inland Waters

Tubesnouts, threespine sticklebacks, and bay pipefish are very common in the Inland Water Study Area (Hart 1973; University of Washington Fish Collection 2015).

### Western Behm Canal, Alaska

Threespine sticklebacks and bay pipefish are present in the shallow nearshore habitat, but their habitat does not overlap with the Western Behm Canal.

#### 3.9.2.5.16 Rockfishes (Order Scorpaeniformes)

The order Scorpaeniformes is a diverse group of more than 1,400 marine species, all with bony plates or spines near the head. This group contains the scorpionfishes, waspfishes, rockfishes, velvetfishes, pigfishes, sea robins, gurnards, sculpins, snailfishes, and lumpfishes (Froese and Pauly 2010; Moyle and Cech 1996; Paxton and Eshmeyer 1994). Many of these fishes are adapted for inhabiting the seafloor of the marine environment (e.g., modified pectoral fins or suction discs), where they feed on smaller crustaceans and fishes. Sea robins are capable of generating sounds with their swim bladders (Moyle and Cech 1996).

### Offshore Area

Most of these fishes occur in depths less than 330 ft. (100 m), but others are found in deepwater habitat, down to 7,000 ft. (2,130 m). The deepest living scorpaenids are the idiotfishes (*Sebastolobus alascanus*), and are found throughout the deeper portions of the offshore segment of the Study Area. Rock cods, stonefishes, velvetfishes, sea robins, flatheads, sablefishes, skilfishes, greenlings, combfishes, and lingcod will be dispersed throughout the offshore region in the water column and on the seafloor of the Study Area (Paxton and Eshmeyer 1994).

### Inland Waters

Scorpionfishes are widely distributed at all depths in the Inland Waters of the Study Area. Most occur in depths less than 330 ft. (100 m) but others are found in deepwater habitat to 7,000 ft. (2,100 m). Sculpins are a large division of Scorpaeniformes and are found in shallow water to moderate depths and are dominant in tide pools. Some sculpin species live in fresh water. Sculpins, fatheads, and poachers are present in the Inland Waters section of the Study Area (Paxton and Eshmeyer 1994).

### Western Behm Canal, Alaska

Scorpionfishes are widely distributed at all depths in the Western Behm Canal portion of the Study Area. Most occur in depths less than 330 ft. (100 m), but others are found in deepwater habitat to 7,000 ft. (2,130 m). Scorpaenifomes such as sablefish (*Anoplopoma fimbria*), skilfish (*Erilepis zonifer*), greenlings (*Hexagrammidae*), combfish (*Coris picta*), and lingcod (*Ophiodon elongatus*) are likely to occur in the Western Behm Canal portion of the Study Area. Sculpins (*Cottoidea*) and poachers (*Agonidae*) may also be present in the Western Behm Canal portion of the Study Area (Paxton and Eshmeyer 1994).

#### 3.9.2.5.17 Gobies (Family Gobiidae)

The Gobiidae family is huge with 1,875 species which live in saltwater, brackish water, and freshwater, mostly in the tropics and subtropics. There are more marine species in the Gobiidae than in any other fish family, hence its inclusion. Some gobies exhibit parental care, and some show sequential hermaphroditism (an individual goes through both a male phase and a female phase during its life). There are only three species of goby inhabiting the Study Area. They are all less than 12 cm long and benthic and include Arrow (*Clevelandia ios*), Blackeye (*Coryphopterus nicholsii*), and Bay (*Lepidogobius lepidus*) gobies (Hart 1973; Eschmeyer et al. 1988; University of Washington Fish Collection 2015).

### Offshore Area

Arrow, Blackeye, and Bay gobies are recorded in the shallow habitat of the Offshore Area (Hart 1973; Eschmeyer et al. 1983).

### Inland Waters

Arrow, Blackeye, and Bay gobies are recorded in the shallow habitat of the Inland Waters (Eschmeyer et al. 1988; University of Washington Fish Collection 2015).

### Western Behm Canal, Alaska

Gobies are not recorded in the Western Behm Canal (Hart 1973; Eschmeyer et al. 1983).

#### 3.9.2.5.18 Jacks, Tunas, and Mackerels (Families Carangidae and Scombridae)

The Carangidae is a large family of moderately sized fishes whose 140 species are found in the Pacific, Atlantic, and Indian oceans. The Jack Mackerel (*Trachurus symmetricus*) is the only species which occurs in the Study Area. It is a pelagic species which can be found near the surface or at depths up to 180 meters or more. It often schools and feeds on a variety of pelagic invertebrates and small fishes (Hart 1973; Eschmeyer et al. 1988; University of Washington Fish Collection 2015).

The Scombridae is a family of fast-swimming, wide-ranging pelagic fishes. They have a number of special adaptations for this lifestyle, including a streamlined body form and recessible dorsal and anal fins. Some species are partly endothermic, maintaining a higher body temperature in the swimming muscles. Scombrids schools and prey on other fishes. Many species are very important as sport and in commercial harvests. This family includes 49 species, with 5 species considered rarely recorded in the Study Area. These species includes Skipjack Tuna (*Euthynnus pelanis*), Pacific Bonito (*Sarda chiliensis*), Pacific Mackerel (*Scomber japonicus*), Bluefin Tuna (*Thunnus thynnus*), and Albacore (*Thunnus alalunga*) (Hart 1973; Eschmeyer et al. 1988; University of Washington Fish Collection 2015).

### Offshore Area

Jack Mackerel, Skipjack Tuna, Pacific Bonito, Pacific Mackerel, Bluefin Tuna, and Albacore have been recorded in the Offshore Area, but are considered very rare (Hart 1973; Eschmeyer et al. 1988; University of Washington Fish Collection 2015).

### Inland Waters

Jack Mackerel, Pacific Bonito, Pacific Mackerel have been recorded in the Inland Waters, but are considered very rare (University of Washington Fish Collection 2015).

### Western Behm Canal, Alaska

Jack Mackerel, Pacific Bonito, Pacific Mackerel Albacore, and Bluefin Tuna are pelagic, thus likely do not enter the Western Behm Canal, but have been recorded in southeastern Alaska Waters and are considered very rare (Hart 1973; Eschmeyer et al. 1988; University of Washington Fish Collection 2015).

#### 3.9.2.5.19 Flounders (Order Pleuronectiformes)

The order Pleuronectiformes includes flatfishes (flounders, dabs, soles, and tonguefishes) that are found in all marine seafloor habitats throughout the world (Nelson 2006). Fishes in this group have eyes on either the left side or the right side of the head as larvae mature and are not symmetrical like most other fishes (Saele et al. 2004). All flounder species are ambush predators, feeding mostly on other fishes and bottom-dwelling invertebrates (Drazen and Seibel 2007; Froese and Pauly 2010).

#### Offshore Area

Arrowtooth Flounder (*Atheresthes stomias*), Deepsea Sole (*Embassichthys bathybius*), Petrale Sole (*Eopsetta jordani*), Rex Sole (*Glyptocephalus zachirus*), Flathead Sole *Hippoglossoides elassodon*), Pacific Halibut (*Hippoglossus stenolepis*), Butter Sole (*Isopsetta isolepis*), Rock Sole(*Lepidopsetta bilineata*) Slender Sole (*Lyopsetta exilis*), Dover Sole (*Microstomus pacificus*), English Sole (*Parophrys vetulus*), Starry Flounder (*Platichthys stellatus*), C-O Turbot (*Pleuronichthys coenosus*), Curlfin Turbot (*Pleuronichthys decurrens*), and Sand Sole (*Psettichthys melanostictus*), and California Tonguefish (*Symphurus atricauda*), are recorded in the Offshore Area (Hart 1973; Eschmeyer et al. 1988).

#### Inland Waters

Arrowtooth Flounder, Petrale Sole, Rex Sole, Flathead Sole, Pacific Halibut, Butter Sole, Rock Sole, Slender Sole, Dover Sole, English Sole, Starry Flounder, C-O Turbot, Curlfin Turbot, Sand Sole, and California Tonguefish are recorded in the Inland Waters (University of Washington Fish Collection 2015).

#### Western Behm Canal, Alaska

Arrowtooth Flounder, Deepsea Sole, Yellowfin Sole, Petrale Sole, Rex Sole, Flathead Sole, Pacific Halibut, Butter Sole, Slender Sole, Dover Sole, English Sole, Starry Flounder, C-O Turbot, Curlfin Turbot, and Sand Sole are recorded in the Western Behm Canal (Hart 1973; Eschmeyer et al. 1988).

### 3.9.2.5.20 Ocean Sunfishes (Molas) (Order Tetraodontiformes)

The fishes in the order Tetraodontiformes are the most advanced group of modern bony fishes. This order includes ocean sunfishes. Like the flounders, this group exhibits body shapes unique among marine fishes, including modified spines or other structures advantageous in predator avoidance. The unique body shapes also require the use of a tail swimming style because some species lack the muscle structure and body shape of other fishes. Most of these fishes are active during the daytime and exhibit a variety of strategies for catching prey, such as ambushing (Wainwright and Richard 1995). The ocean sunfishes (*Mola* species) are the largest bony fish and the most prolific vertebrate species, with females producing more than 300 million eggs in a breeding season (Moyle and Cech 1996). The ocean sunfishes occur very close to the surface. They are slow swimming and feed on a variety of plankton, such as jellyfish, crustaceans, and fishes (Froese and Pauly 2010). Their only natural predators are sharks, orcas, and sea lions (Helfman et al. 1997).

#### Offshore Area

Molas are recorded in the open waters of the Offshore Area and are particularly concentrated in depths less than 330 ft. (100 m) (Hart 1973; Eschmeyer et al. 1988).

#### Western Behm Canal, Alaska

Molas are not recorded in the Western Behm Canal (Eschmeyer et al. 1988).

## 3.9.3 Environmental Consequences

This section evaluates how and to what degree the activities described in Chapter 2 (Description of Proposed Action and Alternatives) potentially impact marine fishes known to occur within the Study Area. Tables 2.8-1 through 2.8-3 present the baseline and proposed training and testing activity locations for each alternative (including number of activities and ordnance expended). The stressors vary in intensity, frequency, duration, and location within the Study Area. The stressors applicable to marine fish in the Study Area and analyzed below include the following:

- Acoustic (sonar and other active acoustic sources; underwater explosives; weapons firing, launch, and impact noise; vessel noise; and aircraft noise)
- Energy (electromagnetic devices)
- Physical disturbance and strike (vessel and in-water device strikes, military expended materials, and seafloor devices)
- Entanglement (fiber optic cables and guidance wires, decelerator/parachutes)
- Ingestion (munitions and military expended materials other than munitions)
- Secondary stressors

Each of these components was analyzed for potential impacts on fishes within the stressor categories defined in this section. The specific analysis of the training and testing activities considers these components within the context of geographic location and overlap of marine fish resources. Training activities are not proposed in the Western Behm Canal; therefore, only the Offshore Area and the Inland Waters will be analyzed under Training Activities. Table 3.9-4 presents the stressor categories and components of those stressors that are applicable to fish and are used in the analysis of training and testing activities. In addition to the analysis here, the details of all training and testing activities, stressors, components that cause the stressor, and geographic occurrence within the Study Area, are included in Section 3.0.5.3 (Identification of Stressors for Analysis).

**Table 3.9-4: Stressors for Fish in the Northwest Training and Testing Study Area**

| Components | Area | Number of Components or Events | | | | | |
|---|---|---|---|---|---|---|---|
| | | No Action Alternative | | Alternative 1 | | Alternative 2 | |
| | | Training | Testing | Training | Testing | Training | Testing |
| **Acoustic Stressors** | | | | | | | |
| Sonar and other active acoustic sources | Offshore Area | See Table 3.0-10 | | | | | |
| | Inland Waters | | | | | | |
| | W. Behm Canal | | | | | | |
| Explosives | Offshore Area | 210 | 0 | 142 | 148 | 142 | 164 |
| | Inland Waters | 4 | 0 | 42 | 0 | 42 | 0 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Weapons firing, launch, and impact noise | Offshore Area | QUALITATIVE | | | | | |
| | Inland Waters | | | | | | |
| | W. Behm Canal | | | | | | |
| Activities including vessel noise | Offshore Area | 996 | 37 | 1,108 | 138 | 1,108 | 162 |
| | Inland Waters | 4 | 337 | 310 | 582 | 310 | 640 |
| | W. Behm Canal | 0 | 28 | 0 | 60 | 0 | 83 |
| Activities including aircraft noise | Offshore Area | 5,414 | 2 | 8,140 | 80 | 8,140 | 92 |
| | Inland Waters | 166 | 2 | 117 | 20 | 117 | 25 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Energy Stressors** | | | | | | | |
| Activities including electromagnetic devices | Offshore Area | 0 | 0 | 0 | 0 | 0 | 0 |
| | Inland Waters | 0 | 0 | 1 | 0 | 1 | 0 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 3.9-4: Stressors for Fish in the Northwest Training and Testing Study Area (continued)**

| Components | Area | Number of Components or Events | | | | | |
|---|---|---|---|---|---|---|---|
| | | No Action Alternative | | Alternative 1 | | Alternative 2 | |
| | | Training | Testing | Training | Testing | Training | Testing |
| **Physical Disturbance and Strike Stressors** | | | | | | | |
| Activities including vessels | Offshore Area | 1,003 | 39 | 1,116 | 158 | 1,116 | 187 |
| | Inland Waters | 4 | 339 | 310 | 602 | 310 | 665 |
| | W. Behm Canal | 0 | 28 | 0 | 60 | 0 | 83 |
| Activities including in-water devices | Offshore Area | 387 | 38 | 493 | 134 | 493 | 158 |
| | Inland Waters | 0 | 377 | 1 | 628 | 1 | 691 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Military expended materials | Offshore Area | 189,815 | 604 | 198,028 | 3,922 | 198,028 | 4,325 |
| | Inland Waters | 8 | 442 | 3,085 | 513 | 3,085 | 563 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Activities including seafloor devices | Offshore Area | 0 | 5 | 0 | 6 | 0 | 7 |
| | Inland Waters | 2 | 210 | 16 | 225 | 16 | 239 |
| | W. Behm Canal | 0 | 0 | 0 | 5 | 0 | 15 |
| **Entanglement Stressors** | | | | | | | |
| Fiber optic cables and guidance wires | Offshore Area | 2 | 16 | 0 | 131 | 0 | 153 |
| | Inland Waters | 0 | 105 | 1 | 245 | 1 | 314 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Decelerator/parachutes | Offshore Area | 8,381 | 0 | 8,952 | 1,210 | 8,952 | 1,331 |
| | Inland Waters | 0 | 0 | 0 | 0 | 0 | 0 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Ingestions Stressors** | | | | | | | |
| Military expended materials from munitions | Offshore Area | 177,926 | 200 | 183,374 | 1,946 | 183,374 | 2,139 |
| | Inland Waters | 4 | 6 | 3,042 | 6 | 3,042 | 6 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Military expended materials other than munitions | Offshore Area | 11,889 | 404 | 9,654 | 2,057 | 9,654 | 2,275 |
| | Inland Waters | 4 | 436 | 43 | 630 | 43 | 738 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Secondary Stressors** | | | | | | | |
| Habitat (sediments and water quality; air quality) | Offshore Area | QUALITATIVE | | | | | |
| | Inland Waters | | | | | | |
| | W. Behm Canal | | | | | | |

### 3.9.3.1 Acoustic Stressors

The following sections analyze potential impacts on fish from proposed activities that involve acoustic stressors (non-impulsive and impulsive).

#### 3.9.3.1.1 Analysis Background and Framework

This section is largely based on a technical report prepared for the Navy: *Effects of Mid- and High-Frequency Sonars on Fish* (Popper 2008). Additionally, Popper and Hastings (2009) and Popper et al. (2014) provide a critical overview of some of the most recent research regarding potential effects of anthropogenic sound on fish.

Studies of the effects of human-generated sound on fish have been reviewed in numerous places (e.g., National Research Council 1994, 2003; Popper 2003; Popper et al. 2004; Hastings and Popper 2005; Popper 2008; Popper and Hastings 2009a, 2009b). Most investigations, however, have been in the gray literature (non-peer-reviewed reports—see Hastings and Popper 2005; Popper 2008; and Popper and Hastings 2009b for extensive critical reviews of this material). Studies have been published assessing the effect on fish of short-duration, high-intensity signals such as might be found near high-intensity sonar, pile driving, or seismic air guns. The investigators in such studies examined short-term effects that could result in death to the exposed fish, as well as hearing loss and long-term consequences (Doksæter et al. 2009; Govoni et al. 2003; McCauley et al. 2003; Popper et al. 2005, 2007).

The potential acoustic effects of anthropogenic sound on fish can be broken down into four categories: (1) direct injury, (2) hearing loss, (3) auditory masking, and (4) physiological stress and behavioral reactions. A summary of the literature related to each type of effect is provided in subsequent sections and forms the basis for the analysis in assessing the impact of the Navy's Proposed Action on fish.

## Direct Injury

### Non-Impulsive Sound Sources

Sonar and other non-impulsive sound sources have not been known to cause mortality, mortal injury, or recoverable injury in fish in the wild due to lack of fast rise times, lack of high peak pressures, and lack of high acoustic impulse associated with some impulsive sounds (e.g., explosives). Exposure to low-frequency sonar has been tested at received sound pressure levels (SPLs) of 193 dB re 1µPa (rms) for 324 and 648 seconds (cumulative sound exposure level ($SEL_{cum}$) of 218 dB and 220 dB re $1\mu Pa^2 \cdot s$, respectively) and has not been shown to cause mortality or any injury in fish with swim bladders (Popper et al. 2007, Kane et al. 2010). Exposure to mid-frequency sonar has been tested at received SPLs of 210 dB re 1µPa (rms) for 15 seconds ($SEL_{cum}$ of 221 dB re $1\mu Pa^2 \cdot s$ or greater) and has not been shown to cause mortality or any injury in fish with swim bladders (Popper et al. 2007, Kane et al. 2010). When necropsied and examined after test exposures, Kane et al. (2010) found that none of the subjects showed signs of direct exposure related injury such as hemorrhaging of the swim bladder or other air filled organs, nor was any tissue damage noticed. Even lesser potential for injurious effects would be expected for fish without swim bladders. Therefore, direct injury is extremely unlikely to occur from exposure to non-impulsive sources such as sonar, vessel noise, or subsonic aircraft noise. Other potential effects from exposure to sonar and other non-impulsive sound sources include sonar-induced acoustic resonance, bubble formation, neurotrauma, and lateral line system injury. Each of these theories are discussed below. These phenomena are difficult to recreate under real-world conditions and are therefore very unlikely to occur in the natural environment.

Two unpublished reports examined the effects of mid-frequency sonar-like signals (1.5–6.5 kHz) on larval and juvenile fish of several species (Jørgensen et al. 2005; Kvadsheim and Sevaldsen 2005). No studies have indicated any physiological damage to adult fish from mid-frequency active sonar. In the first study, Kvadsheim and Sevaldsen (2005) showed that intense sonar activities in herring spawning areas affected less than 0.3 percent of the total juvenile stock. The second study, Jørgensen et al. (2005)

exposed larval and juvenile fish to various sounds in order to investigate potential effects on survival, development, and behavior. The study used herring (*Clupea harengus*) (standard lengths 0.75–2 in. [2‑5 cm]), Atlantic cod (*Gadus morhua*) (standard length 0.75–2.4 in. [2–6 cm]), saithe (*Pollachius virens*) (1.6 in. [4 cm]), and spotted wolffish (*Anarhichas minor*) (1.6 in. [4 cm]) at different developmental stages. The researchers placed the fish in plastic bags 10 ft. (3 m) from the sound source and exposed them to 1-second sound pulses that varied in number of pulses (between 4 and 100 pulses) frequencies (1.5, 4, and 6.5 kHz), and SPL (150–190 dB re 1µPa [rms]). Sound exposure performed at these frequencies, with sound simulating real sonar-signals, did not result in any significant direct mortality among the fish larvae or juveniles exposed, except for two (of a total of 42) experiments repeated on juvenile herring where significant mortality (20–30 percent) was observed. Among fish kept in tanks 1–4 weeks after sound exposure, no significant differences in mortality or growth related parameters (length, weight and condition) between exposed groups and unexposed groups were observed. Studies of organs and tissues from selected herring experiments did not reveal obvious differences between unexposed and exposed groups (Jorgensen et al. 2005).

Of the two trials that showed some differences in mortality, both groups were composed of herring, a species with hearing specializations, and were tested with SPLs of 189 dB re 1 µPa (rms), which resulted in a post-exposure mortality of 20–30 percent. In the remaining 80 tests, there were no observed effects on behavior, growth (length and weight), or the survival of fish that were kept as long as 34 days post exposure. While statistically significant losses were documented in the two groups impacted, the researchers only tested that particular sound level once, so it is not known if this increased mortality was due to the level of the test signal, duration of the signal, or to other unknown factors.

Swim bladder resonance is a function of the size and geometry of the air cavity, depth of the fish, and frequency of the transmitted signal. Wavelengths associated with mid-frequency sounds are shorter than wavelengths associated with lower frequency sounds. It is the lower frequencies that are expected to produce swim bladder resonance in adult fishes. Resonance frequencies for juvenile fish are 1–8 kHz and can escalate physiological impact (Løvik and Hovem 1979; Kvadsheim and Sevaldsen 2005).

High SPLs may cause bubbles to form from micronuclei in the blood stream or other tissues of animals, possibly causing embolism damage (Ketten 1998). Fish have small capillaries where these bubbles could be caught and lead to the rupturing of the capillaries and internal bleeding. It has also been speculated that this phenomena could also take place in the eyes of fish due to potentially high gas saturation within the fish's eye tissues (Popper and Hastings 2009a).

As reviewed in Popper and Hastings (2009b), Hastings (1991, 1995) found "acoustic stunning" (loss of consciousness) in blue gouramis (*Trichogaster trichopterus*) following an 8-minute exposure to a 150 Hz pure tone with a SPL of 198 dB re 1 µPa. This species of fish has an air bubble in the mouth cavity directly adjacent to the animal's braincase that may have caused this injury. Hastings (1991, 1995) also found that goldfish (*Carassius auratus*) exposed to two hours of continuous wave sound at 250 Hz with sound pressure levels of 204 dB re 1 µPa, and fathead minnows (*Pimephales promelas*) exposed to 0.5 hours of 150 Hz continuous wave sound at a SPL of 198 dB re 1 µPa did not survive. However, these studies are examples of the highest known SELs tested on fish with extremely long durations compared to actual sonar events. In addition, fish in these studies were held within close range of the signal itself and unable to avoid the sound source. Species that may be exposed to sonar in their natural habitat would have the opportunity to move away from the source.

The only study on the effect of exposure of the lateral line system to continuous wave sound (conducted on one freshwater species) suggests no effect on these sensory cells by intense pure tone signals (Hastings et al. 1996).

**Explosions and Other Impulsive Sound Sources**

The greatest potential for direct, non-auditory tissue effects is primary blast injury and barotrauma following exposure to explosions. Primary blast injury refers to those injuries that result from the initial compression of a body exposed to a blast wave. Primary blast injury is usually limited to gas-containing structures (e.g., swim bladder) and the auditory system, although, with increased proximity, even non-gas filled structures could be damaged. Barotrauma refers to injuries caused when the swim bladder or other gas-filled structures vibrate in response to the signal, particularly if there is a relatively sharp rise-time and the walls of the structure strike near-by tissues and damage them.

An underwater explosion generates a shock wave that produces a sudden, intense change in local pressure as it passes through the water (U.S. Department of the Navy 1998, 2001a). Pressure waves extend to a greater distance than other forms of energy produced by the explosion (i.e., heat and light) and are therefore the most likely source of negative effects to marine life from underwater explosions (Craig 2001; Scripps Institution of Oceanography 2005; U.S. Department of the Navy 2006).

The shock wave from an underwater explosion is lethal to fish at close range (see Section 3.0.5.3.1.2, Explosives, for a discussion of ranges for mortality dependent on charge size), causing massive organ and tissue damage and internal bleeding (Keevin and Hempen 1997). At greater distance from the detonation point, the extent of mortality or injury depends on a number of factors including fish size, body shape, orientation, and species (Keevin and Hempen 1997; Wright 1982). Additional factors include the current physical condition of the fish and the presence of a swim bladder. At the same distance from the source, larger fish are generally less susceptible to death or injury, elongated forms that are round in cross-section are less at risk than deep-bodied forms, and fish oriented sideways to the blast suffer the greatest impact (Edds-Walton and Finneran 2006; O'Keeffe 1984; O'Keeffe and Young 1984; Wiley et al. 1981; Yelverton et al. 1975). Species with gas-filled organs have higher mortality than those without them (Continental Shelf Associates Inc. 2004; Goertner et al. 1994).

Two aspects of the shock wave appear most responsible for injury and death to fish: the received peak pressure and the time required for the pressure to rise and decay (Dzwilewski and Fenton 2002). Higher peak pressure and abrupt rise and decay times are more likely to cause acute pathological effects (Wright and Hopky 1998). Rapidly oscillating pressure waves might rupture the kidney, liver, spleen, and sinus and cause venous hemorrhaging (Keevin and Hempen 1997). They can also generate bubbles in blood and other tissues, possibly causing embolism damage (Ketten 1998). Oscillating pressure waves might also burst gas-containing organs. The swim bladder, the gas-filled organ used by most fish to control buoyancy, is the primary site of damage from explosives (Wright 1982; Yelverton et al. 1975). Gas-filled swim bladders resonate at different frequencies than surrounding tissue and can be torn by rapid oscillation between high- and low-pressure waves (Goertner 1978). Swim bladders are a characteristic of many bony fish but are not present in sharks, rays, and flatfishes (e.g. flounder and halibut).

Studies that have documented fish killed during planned underwater explosions indicate that most fish that die do so within one to four hours, and almost all die within a day (Hubbs and Rechnitzer 1952; Yelverton et al. 1975). Fitch and Young (1948) found that the type of fish killed changed when blasting was repeated at the same marine location within 24 hours of previous blasting. They observed that most fish killed on the second day were scavengers, presumably attracted by the victims of the previous day's blasts. However, fishes collected during these types of studies have mostly been recovered floating on the water's surface. Gitschlag et al. (2001) collected both floating fish and those that were sinking or lying on the bottom after explosive removal of nine oil platforms in the northern Gulf of Mexico. They found that 3 to 87 percent (46 percent average) of the specimens killed during a blast might float to the surface. Other impediments to accurately characterizing the magnitude of fish mortality included currents and winds that transported floating fishes out of the sampling area and predation by seabirds or other fishes.

There have been few studies of the impact of underwater explosions on early life stages of fishes (eggs, larvae, juveniles). Fitch and Young (1948) reported the demise of larval anchovies exposed to underwater blasts off California, and Nix and Chapman (1985) found that anchovy and eulachon larvae died following the detonation of buried charges. It has been suggested that impulsive sounds, such as that produced by seismic airguns, may cause damage to the cells of the lateral line in fish larvae and fry when in close proximity (15 ft. [5 m]) to the sound source (Booman et al. 1996). Similar to adult fishes, the presence of a swim bladder contributes to shock wave-induced internal damage in larval and juvenile fishes (Settle et al. 2002). Shock wave trauma to internal organs of larval pinfish and spot from shock waves was documented by Govoni et al. (2003, 2008). These were laboratory studies, however, and have not been verified in the field.

### Hearing Loss

Exposure to high intensity sound can cause hearing loss, also known as a noise-induced threshold shift, or simply a threshold shift (Miller 1974). A temporary threshold shift (TTS) is a temporary, recoverable loss of hearing sensitivity. A TTS may last several minutes to several weeks and the duration may be related to the intensity of the sound source and the duration of the sound (including multiple exposures). A permanent threshold shift (PTS) is non-recoverable, results from the destruction of tissues within the auditory system, and can occur over a small range of frequencies related to the sound exposure. As with temporary threshold shift, the animal does not become deaf but requires a louder sound stimulus (relative to the amount of PTS) to detect a sound within the affected frequencies; however, in this case, the effect is permanent.

Permanent hearing loss, or permanent threshold shift has not been documented in fish. The sensory hair cells of the inner ear in fish can regenerate after they are damaged, unlike in mammals where sensory hair cells loss is permanent (Lombarte et al. 1993; Smith et al. 2006). As a consequence, any hearing loss in fish may be as temporary as the timeframe required to repair or replace the sensory cells that were damaged or destroyed (e.g., Smith et al. 2006).

#### Non-Impulsive Sound Sources

Studies of the effects of long-duration sounds with sound pressure levels below 170–180 dB re 1 µPa (rms) indicate that there is little to no effect of long-term exposure on species that lack notable anatomical hearing specialization (Amoser and Ladich 2003; Scholik and Yan 2001; Smith et al. 2004a, b; Wysocki et al. 2007). The longest of these studies exposed young rainbow trout (*Onorhynchus mykiss*), to a level of noise equivalent to one that fish would experience in an aquaculture facility (e.g., on the order of 150 dB re 1 µPa [rms]) for about 9 months. The investigators found no effect on hearing (i.e., TTS) as compared to fish raised at 110 dB re 1 µPa (rms).

In contrast, studies on fish with hearing specializations (i.e., greater sensitivity to lower sound pressures and higher frequencies) have shown that there is some hearing loss after several days or weeks of exposure to increased background sounds, although the hearing loss seems to recover (e.g., Scholik and Yan 2002; Smith et al. 2006; Smith et al. 2004a). Smith et al. (2006; 2004b) exposed goldfish to noise at 170 dB re 1 µPa (rms) and found a clear relationship between the amount of hearing loss (TTS) and the duration of exposure until maximum hearing loss occurred after 24 hours of exposure. A 10-minute exposure resulted in a 5 dB TTS, whereas a 3-week exposure resulted in a 28 dB TTS that took over 2 weeks to return to pre-exposure baseline levels (Smith et al. 2004a) (Note: recovery time not measured by investigators for shorter exposure durations).

Similarly, Wysocki and Ladich (2005) investigated the influence of noise exposure on the auditory sensitivity of two freshwater fish with notable hearing specializations, the goldfish and the lined Raphael catfish (*Platydoras costatus*), and on a freshwater fish without notable specializations, the pumpkinseed sunfish (*Lepomis gibbosus*). Baseline thresholds showed greatest hearing sensitivity around 0.5 kHz in the goldfish and catfish and at 0.1 kHz in the sunfish. For the goldfish and catfish, continuous white noise of approximately 130 dB re 1 µPa (rms) at 1 m resulted in a significant TTS of 23 to 44 dB. In contrast, the auditory thresholds in the sunfish declined by 7 to 11 dB. The duration of exposure and time to recovery was not addressed in this study. Scholik and Yan (2001) demonstrated TTS in fathead minnows after a 24-hour exposure to white noise (0.3–2.0 kHz) at 142 dB re 1 µPa (rms) that did not recover as long as 14 days post exposure.

Studies have also examined the effects of the sound exposures from Surveillance Towed Array Sensor System Low-Frequency Active sonar on fish hearing (Kane et al. 2010; Popper et al. 2007). Hearing was measured both immediately post exposure and for several days thereafter. Maximum received sound pressure levels were 193 dB re 1 µPa (rms) for 324 or 628 seconds (cumulative SEL of 218 or 220 dB re 1µ$Pa^2$·s, respectively). Catfish and some specimens of rainbow trout showed 10 – 20 dB of hearing loss immediately after exposure to the low-frequency active sonar when compared to baseline and control animals; however, another group of rainbow trout showed no hearing loss. Recovery in trout took at least 48 hours, but studies were not completed. The different results between rainbow trout groups is difficult to understand, but may be due to developmental or genetic differences in the various groups of fish. Catfish hearing returned to, or close to, normal within about 24 hours after exposure to low-frequency active sonar. Furthermore, examination of the inner ears of the fish during necropsy (note: maximum time fish were held post exposure before sacrifice was 96 hours) revealed no differences from the control groups in cilliary bundles or other features indicative of hearing loss (Kane et al. 2010). More recently, Halvorsen et al. (2013) exposed three fish species, largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), and yellow perch (*Perca flavescens*) to low-frequency sonar with received sound pressure levels of approximately 195 dB re 1 µPa (cumulative SEL of 210 to 215 dB re 1µ$Pa^2$·s). The two species without hearing specializations, largemouth bass and yellow perch, showed no loss in hearing sensitivity from sound exposure neither immediately after the test nor 24 hours later. Channel catfish, which do have anatomical specializations allowing them greater sensitivity to higher frequencies, did show a small threshold shift up to 24 hours after the experiment.

The study of mid-frequency active sonar by the same investigators also examined potential effects on fish hearing and the inner ear (Halvorsen et al. 2012; Kane et al. 2010). Out of the four species tested (rainbow trout, channel catfish, largemouth bass, and yellow perch) only one group of channel catfish, tested in December, showed any hearing loss after exposure to mid-frequency active sonar. The signal consisted of a 2 second long, 2.8–3.8 kHz frequency sweep followed by a 3.3 kHz tone of 1 second duration. The stimulus was repeated five times with a 25 second interval. The maximum received sound pressure level was 210 dB re 1 µPa (rms) (cumulative SEL of 220 dB re 1µ$Pa^2$·s). These animals, which have the widest hearing range of any of the species tested, experienced approximately 10 dB of threshold shift that recovered within 24 hours. Channel catfish tested in October did not show any hearing loss. The investigators speculated that the difference in hearing loss between catfish groups might have been due to the difference in water temperature of the lake where all of the testing took place (Seneca Lake, New York) between October and December. Alternatively, the observed hearing loss differences between the two catfish groups might have been due to differences between the two stocks of fish (Halvorsen et al. 2012). Any effects on hearing in channel catfish due to sound exposure appear to be transient (Halvorsen et al. 2012; Kane et al. 2010). Investigators observed no damage to cilliary bundles or other features indicative of hearing loss in any of the other fish tested including the catfish tested in October (Kane et al. 2010).

Popper et al. (2014) summarized in a technical report the outcome of a working group session that evaluated the sound detection capabilities of fishes, which were organized into broad groups based on how they detect sound. The technical report presents sound exposure guidelines for assessing how a variety of natural and anthropogenic sound sources may affect fish. Sivle et al. (2015) reported on possible population-level effects to Atlantic herring from active naval sonar. The herring were exposed to source levels up 235 dB re 1 μPa at 1 m for durations exceeding 24 hours with frequencies of 1–2 kHz. The authors concluded that the use of naval sonar poses little risk to populations of herring even when the herring are aggregated during sonar exposure. In a related study, herring were exposed to both low-frequency (1–2 kHz) and mid-frequency (6–7 kHz) sonar as well as killer whale feeding calls (Sivle et al. 2012). The results were similar to Sivle et al. (2015) in that the herring did not respond to either the low- or mid-frequency sonar, but did show obvious avoidance behavior (diving) when exposed to the killer whale feeding sounds, which were at lower received sound pressure levels than the sonar (150 dB re 1 μPa for the killer whale calls, 176 dB re 1 μPa for the low-frequency sonar, and 162 dB re 1 μPa for the mid-frequency sonar).

Some studies have suggested that there may be some loss of sensory hair cells due to high intensity sources; however, none of these studies concurrently investigated effects on hearing. Enger (1981) found loss of cilliary bundles of the sensory cells in the inner ears of Atlantic cod following 1–5 hours of exposure to pure tone sounds between 50 and 400 Hz with a sound pressure level of 180 dB re 1 µPa (rms). Hastings (1995) found auditory hair-cell damage in a species with notable anatomical hearing specializations, the goldfish (*Carassius auratus*) exposed to 250 Hz and 500 Hz continuous tones with maximum sound pressure levels of 204 dB re 1 µPa and 197 dB re 1 µPa, respectively, for about 2 hours. Similarly, Hastings et al. (1996) demonstrated damage to some sensory hair cells in oscars (*Astronotus ocellatus*) following a 1-hour exposure to a pure tone at 300 Hz with a sound pressure level of 180 dB re 1 µPa. In none of the studies was the hair cell loss more than a relatively small percent (less than a maximum of 15 percent) of the total sensory hair cells in the hearing organs.

#### Explosions and Other Impulsive Sound Sources

Popper et al. (2005) examined the effects of a seismic airgun array on a fish with hearing specializations, the lake chub (*Couesius plumbeus*), and two species that lack notable specializations, the northern pike (*Esox lucius*) and the broad whitefish (*Coregonus nasus*) (a salmonid). In this study the average received exposure levels were a mean peak pressure level of 207 dB re 1 µPa; sound pressure level of 197 dB re 1 µPa (rms); and single-shot SEL of 177 dB re 1 $\mu Pa^2$-s. The results showed temporary hearing loss for both lake chub and northern pike to both 5 and 20 airgun shots, but not for the broad whitefish. Hearing loss was approximately 20 to 25 dB at some frequencies for both the northern pike and lake chub, and full recovery of hearing took place within 18 hours after sound exposure. Examination of the sensory surfaces of the ears by an expert on fish inner ear structure showed no damage to sensory hair cells in any of the fish from these exposures (Song et al. 2008).

McCauley et al. (2003) showed loss of a small percent of sensory hair cells in the inner ear of the pink snapper (*Pagrus auratus*) exposed to a moving airgun array for 1.5 hours. Maximum received SELs exceeded 180 dB re 1 µPa$^2$-s for a few shots. The loss of sensory hair cells continued to increase for up to at least 58 days post exposure to 2.7 percent of the total cells. It is not known if this hair cell loss would result in hearing loss since fish have tens or even hundreds of thousands of sensory hair cells in the inner ear (Popper and Hoxter 1984; Lombarte and Popper 1994) and only a small portion were affected by the sound. The question remains as to why McCauley et al. (2003) found damage to sensory hair cells while Popper et al. (2005) did not. There are many differences between the studies, including species, precise sound source, and spectrum of the sound that it is hard to speculate.

Hastings et al. (2008) exposed the pinecone soldierfish (*Myripristis murdjan*), a fish with anatomical specializations to enhance their hearing; and three species without notable specializations: the blue green damselfish (*Chromis viridis*), the saber squirrelfish, and the bluestripe seaperch (*Lutjanus kasmira*) to an airgun array. Fish in cages in 16 ft. (4.9 m) of water were exposed to multiple airgun shots with a $SEL_{cum}$ of 190 dB re 1 µPa$^2$-s. The authors found no hearing loss in any fish following exposures.

As with other impulsive sound sources, it is assumed that sound from pile driving may cause hearing loss in fish located near the site (Popper and Hastings 2009c). Casper et al. (2013) found that fish may be more susceptible to barotrauma than auditory injury when exposed to simulated pile driving; the authors state that the exposure levels used in the study ($SEL_{cum}$ of 216 dB re 1 µPa$^2$·s) may represent the exposure at which onset auditory injury begins.

### Auditory Masking

Auditory masking refers to the presence of a noise that interferes with a fish's ability to hear biologically relevant sounds. Fish use sounds to detect predators and prey, and for schooling, mating, and navigating, among other uses (Myrberg 1980; Popper et al. 2003). Masking of sounds associated with these behaviors could have impacts to fish by reducing their ability to perform these biological functions.

Any noise (i.e., unwanted or irrelevant sound, often of an anthropogenic nature) detectable by a fish can prevent the fish from hearing biologically important sounds including those produced by prey or predators (Myrberg 1980; Popper et al. 2003). Auditory masking may take place whenever the noise level heard by a fish exceeds ambient noise levels, the animal's hearing threshold, and the level of a biologically relevant sound. Masking is found among all vertebrate groups, and the auditory system in all vertebrates, including fish, is capable of limiting the effects of masking noise, especially when the frequency range of the noise and biologically relevant signal differ (Fay 1988; Fay and Megela-Simmons 1999).

The frequency of the sound is an important consideration for fish because many marine fish are limited to detection of the particle motion component of low frequency sounds at relatively high sound intensities (Amoser and Ladich 2005). The frequency of the acoustic stimuli must first be compared to the animal's known or suspected hearing sensitivity to establish if the animal can potentially detect the sound.

One of the problems with existing fish auditory masking data is that the bulk of the studies have been done with goldfish, a freshwater fish with well-developed anatomical specializations that enhance hearing abilities. The data on other species are much less extensive. As a result, less is known about masking in marine species, many of which lack the notable anatomical hearing specializations. However, Wysocki and Ladich (2005) suggest that ambient sound regimes may limit acoustic communication and orientation, especially in animals with notable hearing specializations.

Tavolga (1974a, b) studied the effects of noise on pure-tone detection in two species without notable anatomical hearing specializations, the pin fish (*Lagodon rhomboids*) and the African mouth-breeder (*Tilapia macrocephala*), and found that the masking effect was generally a linear function of masking level, independent of frequency. In addition, Buerkle (1968, 1969) studied five frequency bandwidths for Atlantic cod in the 20 to 340 Hz region and showed masking across all hearing ranges. Chapman and Hawkins (1973b) found that ambient noise at higher sea states in the ocean has masking effects in cod, *Gadus morhua* (L.), haddock, *Melanogrammus aeglefinus* (L.), and pollock, *Pollochinus pollachinus* (L.), and similar results were suggested for several sciaenid species by Ramcharitar and Popper (2004c).Thus, based on limited data, it appears that for fish, as for mammals, masking may be most problematic in the frequency region near the signal with lower probability of masking occurring farther from the signal source (Popper et al., 2014).

There have been a few field studies that may suggest masking could have an impact on wild fish. Gannon et al. (2005) showed that bottlenose dolphins (*Tursiops truncatus*) move toward acoustic playbacks of the vocalization of Gulf toadfish (*Opsanus beta*). Bottlenose dolphins employ a variety of vocalizations during social communication including low-frequency pops. Toadfish may be able to best detect the low-frequency pops since their hearing is best below 1 kHz, and there is some indication that toadfish have reduced levels of calling when bottlenose dolphins approach (Remage-Healey et al. 2006a). Silver perch have also been shown to decrease calls when exposed to playbacks of dolphin whistles mixed with other biological sounds (Luczkovich et al. 2000). Results of the Luczkovich et al. (2000) study, however, must be viewed with caution because it is not clear what sound may have elicited the silver perch response (Ramcharitar et al. 2006b). Astrup (1999) and Mann et al. (1998) hypothesized that high frequency detecting species (e.g., clupeids) may have developed sensitivity to high frequency sounds to avoid predation by odontocetes. Therefore, the presence of masking noise may hinder a fish's ability to detect predators and therefore increase predation.

Of considerable concern is that human-generated sounds could mask the ability of fish to use communication sounds, especially when the fish are communicating over some distance. In effect, the masking sound may limit the distance over which fish can communicate, thereby having an impact on important components of their behavior. For example, the sciaenids, which are primarily inshore species, are one of the most active sound producers among fish, and the sounds produced by males are used to "call" females to breeding sights (Ramcharitar et al. 2001) reviewed in (2006b). If the females are not able to hear the reproductive sounds of the males, there could be a significant impact on the reproductive success of a population of sciaenids. Since most sound production in fish used for communication is generally below 500 Hz (Slabbekoorn et al. 2010a), sources with significant low-frequency acoustic energy could affect communication in fish.

Also potentially vulnerable to masking is navigation by larval fish, although the data to support such an idea are still exceedingly limited. There is indication that larvae of some reef fish (species not identified in study) may have the potential to navigate to juvenile and adult habitat by listening for sounds emitted from a reef (either due to animal sounds or non-biological sources such as surf action) (e.g., Higgs 2005). In a study of an Australian reef system, the sound signature emitted from fish choruses was between 0.8 and 1.6 kHz (Cato 1978) and could be detected by hydrophones 3–4 nm from the reef (McCauley and Cato 2000). This bandwidth is within the detectable bandwidth of adults and larvae of the few species of reef fish, such as the damselfish, *Pomacentrus partitus,* and bicolor damselfish, *Eupomacentrus partitus,* that have been studied (Kenyon 1996b; Myrberg 1980). At the same time, it has not been demonstrated conclusively that sound, or sound alone, is an attractant of larval fish to a reef, and the number of species tested has been very limited. Moreover, there is also evidence that larval fish may be using other kinds of sensory cues, such as chemical signals, instead of, or alongside of, sound (Atema et al. 2002).

### Physiological Stress and Behavioral Reactions

As with masking, a fish must first be able to detect a sound above its hearing threshold for that particular frequency and the ambient noise before a behavioral reaction or physiological stress can occur. There are little data available on the behavioral reactions of fish, and almost no research conducted on any long-term behavioral effects or the potential cumulative effects from repeated exposures to loud sounds (Popper and Hastings 2009c).

Stress refers to biochemical and physiological responses to increases in background sound. The initial response to an acute stimulus is a rapid release of stress hormones into the circulatory system, which may cause other responses such as elevated heart rate and blood chemistry changes. Although an increase in background sound has been shown to cause stress in humans, only a limited number of studies have measured biochemical responses by fish to acoustic stress (Remage-Healey et al. 2006a; Smith et al. 2004b; Wysocki et al. 2007; Wysocki et al. 2006) and the results have varied. There is evidence that a sudden increase in sound pressure level or an increase in background noise levels can increase stress levels in fish (Popper and Hastings 2009c). Exposure to acoustic energy has been shown to cause a change in hormone levels (physiological stress) and altered behavior in some species such as the goldfish (Pickering 1981; Smith et al. 2004a, b), but not all species tested to date, such as the rainbow trout (Wysocki et al. 2007).

Behavioral effects to fish could include disruption or alteration of natural activities such as swimming, schooling, feeding, breeding, and migrating. Sudden changes in sound level can cause fish to dive, rise, or change swimming direction. There is a lack of studies that have investigated the behavioral reactions of unrestrained fish to anthropogenic sound, especially in the natural environment. Studies of caged fish have identified three basic behavioral reactions to sound: startle, alarm, and avoidance (McCauley et al. 2000; Pearson et al. 1992; Scripps Institution of Oceanography and Foundation. 2008). Changes in sound intensity may be more important to a fish's behavior than the maximum sound level. Sounds that fluctuate in level tend to elicit stronger responses from fish than even stronger sounds with a continuous level (Schwartz 1985).

#### Non-Impulsive Sound Sources

Remage-Healey et al. (2006a) found elevated cortisol levels, a stress hormone, in Gulf toadfish exposed to low frequency bottlenose dolphin sounds. Additionally, the toadfish' call rates dropped by about 50 percent, presumably because the calls of the toadfish, a primary prey for bottlenose dolphins, give away the fish's location to the dolphin. The researchers observed none of these effects in toadfish exposed to an ambient control sound (i.e., low-frequency snapping shrimp "pops").

Smith et al. (2004b) found no increase in corticosteroid, a stress hormone, in goldfish exposed to a continuous, band-limited noise (0.1 to 10 kHz) with a sound pressure level of 170 dB re 1 µPa (rms) for 1 month. Wysocki et al. (2007) exposed rainbow trout to continuous band-limited noise with a sound pressure level of about 150 dB re 1 µPa (rms) for 9 months with no observed stress effects. Growth rates and effects on the trout's immune system were not significantly different from control animals held at sound pressure level of 110 dB re 1 µPa (rms).

Gearin et al. (2000) studied responses of adult sockeye salmon and sturgeon (*Acipenser* sp.) to pinger sounds produced by acoustic devices designed to deter marine mammals from gillnet fisheries. The pingers produced sounds with broadband energy with peaks at 2 kHz or 20 kHz. They found that fish did not exhibit any reaction or behavior change to the pingers, which demonstrated that the alarm was either inaudible to the salmon and sturgeon, or that neither species was disturbed by the mid-frequency sound (Gearin et al. 2000). Based on hearing threshold data, it is highly likely that the salmonids did not hear the sounds.

Culik et al. (2001) did a very limited number of experiments to determine the catch rate of herring in the presence of pingers producing sounds that overlapped with the frequency range of hearing for herring (2.7 kHz to over 160 kHz). They found no change in catch rates in gill nets with or without the higher frequency (greater than 20 kHz) sounds present, although there was an increase in the catch rate with the signals from 2.7 kHz to 19 kHz (a different source than the higher frequency source). The results could mean that the fish did not "pay attention" to the higher frequency sound or that they did not hear it, but that lower frequency sounds may be attractive to fish. At the same time, it should be noted that there were no behavioral observations on the fish, and so how the fish actually responded when they detected the sound is not known.

Doksæter et al. (2009) studied the reactions of wild, overwintering herring to Royal Netherlands Navy experimental mid-frequency active sonar and killer whale feeding sounds. The behavior of the fish was monitored using upward looking echosounders. The received levels from the 1 to2 kHz and 6 to 7 kHz sonar signals ranged from 127 to 197 dB re 1 µPa (rms) and 139 to 209 dB re 1 µPa (rms), respectively. Escape reactions were not observed upon the presentation of the mid-frequency active sonar signals; however, the playback of the killer whale sounds elicited an avoidance reaction. The authors concluded that mid-frequency sonar could be used in areas of overwintering herring without substantially affecting the fish. Similarly, Doksæter et al. (2012) studied reactions of herring to mid-frequency sonar (1.0 – 1.5 kHz) at received sound pressure levels up to 168 dB re 1µPa (rms) in Spring, Summer, and Fall with no significant reactions noted. Significant reactions were noted at lower received sound levels to two-stroke engine (boat motor) noise showing the experimental design was sensitive to observing changes in behavior.

There is evidence that elasmobranchs respond to human-generated sounds. Myrberg and colleagues did experiments in which they played back sounds and attracted a number of different shark species to the sound source (e.g., Myrberg et al. 1969; Myrberg et al. 1976; Myrberg et al. 1972; Nelson and Johnson 1972). The results of these studies showed that sharks were attracted to low-frequency sounds (below several hundred Hz), in the same frequency range of sounds that might be produced by struggling prey. However, sharks are not known to be attracted by continuous signals or higher frequencies (which they presumably cannot hear).

Studies documenting behavioral responses of fish to vessels show that Barents Sea capelin may exhibit avoidance responses to engine noise, sonar, depth finders, and fish finders (Jørgensen et al. 2004). Avoidance reactions are quite variable depending on the type of fish, its life history stage, behavior, time of day, and the sound propagation characteristics of the water (Schwartz 1985). Misund (1997a) found that fish ahead of a ship that showed avoidance reactions did so at ranges of 160–490 ft. (48.8–149.4 m). When the vessel passed over them, some species of fish responded with sudden escape responses that included lateral avoidance or downward compression of the school.

In a study by Chapman and Hawkins (1973b) the low-frequency sounds of large vessels or accelerating small vessels caused avoidance responses by herring. Avoidance ended within 10 seconds after the vessel departed. Twenty-five percent of the fish groups habituated to the sound of the large vessel and 75 percent of the responsive fish groups habituated to the sound of small boats.

**Explosions and Other Impulsive Sound Sources**

Pearson et al. (1992) exposed several species of rockfish (*Sebastes spp.*) to a seismic airgun. The investigators placed the rockfish in field enclosures and observed the fish's behavior while firing the airgun at various distances for 10 minute trials. Dependent upon the species, rockfish exhibited startle or alarm reactions between peak to peak sound pressure level of 180 dB re 1 µPa and 205 dB re 1 µPa. The authors reported the general sound level where behavioral alterations became evident was at about 161 dB re 1 µPa for all species. During all of the observations, the initial behavioral responses only lasted for a few minutes, ceasing before the end of the 10-minute trial.

Similarly, Skalski et al. (1992) showed a 52 percent decrease in rockfish (*Sebastes* sp.) caught with hook-and-line (as part of the study—fisheries independent) when the area of catch was exposed to a single airgun emission at 186–191 dB re 1 µPa (mean peak level) (See also Pearson et al. 1987, 1992). They also demonstrated that fish would show a startle response to sounds as low as 160 dB re 1 µPa, but this level of sound did not appear to elicit decline in catch. Wright (1982) also observed changes in fish behavior as a result of the sound produced by an explosion, with effects intensified in areas of hard substrate.

Wardle et al. (2001) used a video system to examine the behaviors of fish and invertebrates on reefs in response to emissions from seismic airguns. The researchers carefully calibrated the airguns to have a peak level of 210 dB re 1 µPa at 16 m and 195 dB re 1 µPa at 109 m from the source. There was no indication of any observed damage to the marine organisms. They found no substantial or permanent changes in the behavior of the fish or invertebrates on the reef throughout the course of the study, and no marine organisms appeared to leave the reef.

Engås et al. (1996) and Engås and Løkkeborg (2002) examined movement of fish during and after a seismic airgun study by measuring catch rates of haddock and Atlantic cod as an indicator of fish behavior using both trawls and long-lines as part of the experiment. These investigators found a significant decline in catch of both species that lasted for several days after termination of airgun use. Catch rate subsequently returned to normal. The conclusion reached by the investigators was that the decline in catch rate resulted from the fish moving away from the airgun sounds at the fishing site. However, the investigators did not actually observe behavior, and it is possible that the fish just changed depth.

The same research group showed, more recently, parallel results for several additional pelagic species including blue whiting and Norwegian spring spawning herring (Slotte et al. 2004). However, unlike earlier studies from this group, the researchers used fishing sonar to observe behavior of the local fish schools. They reported that fish in the area of the airguns appeared to go to greater depths after the airgun exposure compared to their vertical position prior to the airgun usage. Moreover, the abundance of animals 18–31 mi. (29–50 km) away from the ensonification increased, suggesting that migrating fish would not enter the zone of seismic activity.

Alteration in natural behavior patterns due to exposure to pile driving noise has not been well studied. However, one study (Mueller-Blenkle et al. 2010), which took place with fish enclosed in a mesocosm (an enclosure providing a limited body of water with close to natural conditions), demonstrated behavioral reactions of cod and Dover sole (*Solea solea*) to pile driving sounds. Sole showed a significant increase in swimming speed. Cod reacted, but not significantly, and both species showed directed movement away from the sources with signs of habituation after multiple exposures. For sole, reactions were seen with peak sound pressure levels of 144–156 dB re 1 µPa; and cod showed altered behavior at peak sound pressure levels of 140–161 dB re 1 µPa. For both species, this corresponds to a peak particle motion between $6.51 \times 10^{-3}$ and $8.62 \times 10^{-4}$ meters per second squared ($m/s^2$).

#### 3.9.3.1.2 Criteria and Thresholds for Predicting Acoustic and Explosive Impacts on Fish

Since the development of the draft NWTTOverseas Environmental Impact Statement EIS/OEIS, the Navy, the NMFS, and the USFWS through the ESA consultation process, jointly developed criteria and thresholds to quantitatively assess the impacts of sonar and explosive sources on ESA-listed fish. The studies from which these criteria and thresholds were developed were previously discussed and considered in the NWTT Draft EIS/OEIS, and effects were evaluated qualitatively and quantitatively as the data allowed. However, a more detailed level of analysis is required under the ESA, including the quantification of take down to the level of individual fish (or their surrogate) from which to make the jeopardy determination.

##### Criteria and Thresholds for Sonar and Other Active Acoustic Sources

Threshold criteria were not developed high-frequency sonar sources. Only a few species of shad within the Clupeidae family (herrings) are known to be able to detect high-frequency sonar and other active acoustic sources greater than 10,000 Hz. The species considered within the Study Area would not detect these sounds and would therefore experience no stress, behavioral disturbance, or auditory masking. High-frequency sonar is not anticipated to cause mortality or injury due to the lack of fast rise times, lack of high peak pressures, and the lack of high acoustic impulse. Also, similar to low and mid-frequency sonar, mortality or injury has not been shown to occur from exposure to high frequency sonar sources. For these reasons, the potential effects of high frequency active sonar will not be discussed further in this document.

**Table 3.9-5: Criteria and Thresholds for Sonar and Other Active Acoustic Sources**

| Low-Frequency Navy Sonar ( < 1 kHz) | | | | | |
|---|---|---|---|---|---|
| | **Mortality & mortal injury** | **Recoverable injury** | **TTS** | **Masking** | **Behavior** |
| Fish – no SB (swim bladder) | >> 218 dB $SEL_{cum}$ | > 218 dB $SEL_{cum}$ | > 218 dB $SEL_{cum}$ | (N) Low (I) Low (F) Low | (N) Low (I) Low (F) Low |
| Fish w/SB not involved in hearing (particle motion detection) | >> 218 dB $SEL_{cum}$ | > 218 dB $SEL_{cum}$ | 210 dB $SEL_{cum}$ | (N) Low (I) Low (F) Low | (N) Low (I) Low (F) Low |
| Fish w/SB used in hearing (pressure detection) | >> 218 dB $SEL_{cum}$ | > 218 dB $SEL_{cum}$ | 210 dB $SEL_{cum}$ | (N) Mod (I) Low (F) Low | > 197 dB $SPL_{rms}$ |
| | **Mortality & mortal injury** | **Recoverable injury** | **TTS** | **Masking** | **Behavior** |
| Fish – no SB | >> 221 dB $SEL_{cum}$ | > 221 dB $SEL_{cum}$ | n/a | n/a | n/a |
| Fish w/SB not involved in hearing (particle motion detection) | >> 221 dB $SEL_{cum}$ | > 221 dB $SEL_{cum}$ | n/a | n/a | n/a |
| Fish w/SB used in hearing (pressure detection) | >> 221 dB $SEL_{cum}$ | > 221 dB $SEL_{cum}$ | 220 dB $SEL_{cum}$ | (N) Low (I) Low (F) Low | 200 dB $SPL_{rms}$ |

## Mortality, Mortal Injury, and Recoverable Injury

Sonar has not been known to cause mortality, mortal injury, or recoverable injury in the wild due to lack of fast rise times, lack of high peak pressures, and lack of high acoustic impulse associated with some impulsive sounds (e.g., explosives).

Low-Frequency Sonars

Long duration exposures (up to 2 hours) of low-frequency sonar to fish in laboratory settings has caused stunning and mortality in some cases, but these exposures were much longer than any exposure a fish would normally encounter in the wild due to NWTT proposed activities. In addition, the subjects exposed in the lab were held in a cage for the duration of the exposure, unable to avoid the source (Hastings 1991, Hastings 1995). Exposure to low-frequency sonar has been tested at sound pressure levels of up to 193 dB re 1μPa (rms) for 324 seconds (equivalent to a cumulative sound exposure level [$SEL_{cum}$] of 218 dB re 1μ$Pa^2$·s) and has not been shown to cause mortality or any injury in fish with swim bladders (Popper et al. 2007, Kane et al. 2010). Lesser potential for injurious effects would be expected for fish without air cavities (i.e., swim bladders). Therefore the recommended threshold would be >>218 dB re 1μ$Pa^2$·s for mortality and $SEL_{cum}$ of >218 dB re 1μ$Pa^2$·s for recoverable injury.

Mid- Frequency Sonars

Exposure to mid-frequency sonar has been tested and has not been shown to cause mortality or any injury in fish with swim bladders (Popper et al. 2007, Kane et al. 2010). Lesser potential for injurious effects would be expected for fish without air cavities (i.e., swim bladders). Therefore the recommended threshold would be an $SEL_{cum}$ >>221 dB re 1µ$Pa^2$·s for mortality and >221 dB re 1µ$Pa^2$·s for recoverable injury.

### Temporary Threshold Shift (TTS)

Low Frequency Sonars

Exposure to low-frequency sonar has not been shown to induce TTS in fish species without swim bladders (Popper et al. 2014). Exposure to sonar above 1 kHz has been known to induce TTS in some fish species with swim bladders (Popper et al. 2007, Halvorsen et al. 2013). Subjects from Popper (2007) may have undergone varying husbandry treatments or possessed different genetics, which may have resulted in higher than normal shifts. Criteria provided in Popper (2014) were reported in SPL dB re 1µPa (rms). This criteria was converted to sound exposure level (SEL) based on the signal durations reported in Popper (2007) and Halvorsen (2013) (i.e. 193 dB re 1µPa + 10 * log (324 sec) = 218 dB re 1µ$Pa^2$·s) and was rounded down (from 218 dB to 210 dB re 1µ$Pa^2$·s) from the lowest SEL as a conservative measure.

Mid-Frequency Sonars

Exposure to mid-frequency sonar has not been known to induce TTS in fish species without swim bladders or in fish with swim bladders that are not involved in hearing (Halvorsen et al. 2012). In addition fish without swim bladders involved in hearing (i.e. close connections to the inner ear) do not sense pressure well and cannot hear at frequencies above 1 kHz.

Exposure to mid-frequency sonar has been known to induce TTS in some fish species with swim bladders and better hearing capabilities (Halvorsen et al. 2012). Criteria form Popper (2014) was originally listed as > 210 dB SPLrms. As previously stated, TTS criteria reported as $SEL_{cum}$ accounts for the duration of the exposure as well. Therefore, the criteria originally presented in the technical report was converted to this metric using the duration of the signal reported from the experiments (i.e., 210 dB re 1µPa + 10 * log (15 sec) = 221 dB re 1µ$Pa^2$·s) and was rounded down (from 221dB to 220 dB re 1µ$Pa^2$·s) as a conservative measure (Halvorsen et al. 2012).

### Masking

Low Frequency Sonars

No data are available on masking by sonar, but it is unlikely that sonar would mask important sounds for fish. For fish without swim bladders or whose swim bladders are not involved in hearing, the risk of significant masking occurring within any distance from the source is low (Popper et al. 2014). For fish with swim bladders used in hearing, the risk is moderate near the source and low at intermediate and far distances from the source (Popper et al. 2014); The narrow bandwidth of most sonar would result in only a limited range of frequencies being masked (Popper et al. 2014). Furthermore most sonars are intermittent (i.e., low duty cycle) which further lowers the probability of any masking effects.

Mid-Frequency Sonars

Most mid-frequency sonars are above the hearing range of most fish species and almost all marine fish species (including salmonids). Therefore, for fish without swim bladders or whose swim bladders are not involved in hearing the potential for masking is not considered possible. There is no data available on masking by mid-frequency sonar for fish with swimbladders used in hearing, but it is unlikely that sonar would mask important sounds for fish. The risk is considered low within any distance from the source (Popper et al. 2014). The narrow bandwidth of most sonar would result in only a limited range of frequencies being masked (Popper et al. 2014). Furthermore, most sonars are intermittent (i.e., low duty cycle) which further lowers the probability of any masking effects.

### Behavioral Responses

Low Frequency Sonars

No data are available on behavioral reactions to low-frequency sonar. Fish without a mechanism to sense pressure are unlikely to sense sound beyond the near-field (i.e., within a few tens of meters from the sound source). The risk that sonar would result in a behavioral response within near, intermediate, or far distances from sonar is low (Popper et al. 2014). For fish with swim bladders involved in hearing, no reactions were seen in fish exposed to 1–2 kHz, sonar which is categorized as mid-frequency sonar, not low-frequency sonar. Criteria used for behavioral reactions to low-frequency sonar was set at > 197 dB re 1µPa, as derived in Popper et al. (2014) from Doksaeter et al. (2009, 2012).

Mid-Frequency Sonars

Fish without swim bladders or without swim bladders involved in hearing would not be able to hear mid-frequency sonar; therefore, behavioral reactions would not occur. For fish with swim bladders involved in hearing, no reactions were seen in herring exposed to 1–2 and 6–7 kHz sonar (Doksaeter et al. 2009, Doksæter et al. 2012). Therefore, this criterion was set to 200 dB re 1µPa as a conservative measure. This criterion only applies to mid-frequency sonars up to 2.5 kHz since even fish with swim bladders with connections to the inner ear cannot hear above these frequencies, with the exception of fish in the genus *Alosa* (e.g., herring). While improbable (see Doksaeter et al. 2009, Doksæter et al. 2012), *Alosa* spp. could have behavioral reactions over the full bandwidth of mid-frequency sonar (1–10 kHz).

**Table 3.9-6: Criteria and Thresholds for Navy Explosive Sources**

| | Mortality & mortal injury[1] | TTS | Masking | Behavior |
|---|---|---|---|---|
| Fish – no SB | 229 dB $SPL_{peak}$ and NA[2] | >>186 dB $SEL_{cum}$ | n/a | (N) High (I) Mod (F) Low |
| Fish w/SB not involved in hearing (particle motion detection) | 229 dB $SPL_{peak}$ and Range equation | >186 dB $SEL_{cum}$ | n/a | (N) High (I) High (F) Low |
| Fish w/SB used in hearing (pressure detection) | 229 dB $SPL_{peak}$ and Range equation | 186 dB $SEL_{cum}$ | n/a | (N) High (I) High (F) Low |

n/a = No data available or threshold is not applicable to fish
(N) = near (i.e. tens of meters from the source)
(I) = intermediate (i.e. 100s of meters from the source)
(F) = far (thousands of meters form the source)
High, Mod (moderate), and Low = Probability of the effect occurring. For any cell containing these designations please see Popper et al. (2014) for meaning.
[1] 1% Mortality and No Injury = Survivability Curve equation is presented in Young (1991) and adjusted using data from Yelverton et al. (1975). 'No injury' relates to data in which no injuries were observed; onset of injury (i.e., LD1) would be at some higher exposure. These criteria are based on the acoustic impulse metric with units (Pa-s).
[2] Sufficient data to derive 1% mortality and no injury thresholds for fish without swimbladders is not available. Fish without swimbladders are very resistant to underwater explosions. 10% mortality for charges up to 1,000 lbs. TNT equivalent are about 20 feet for small flatfish (e.g. flounder and sole) based on Young (1991).

$SEL_{cum}$ units are dB re 1µ$Pa^2$·s

$SPL_{peak}$ units are dB re 1µPa

### Mortality and Mortal Injury

The proposed criteria is from Popper et al. (2014) which stated that the guidelines are based on Hubbs and Rechnitzer (1952) which represents the lowest amplitude that caused consistent mortality. Hubbs and Rechnitzer (1952) used dynamite as a source on a variety of marine species and showed minimum amplitude of 40 – 70 psi (peak pressure) that resulted in mortality. This is equivalent to 276–482 kPa or 229–234 dB re 1 µPa. Debusschere et al. (2014) was reviewed with regard to mortality from pile driving events; however, the levels tested did not reach those of the proposed criteria (a peak sound pressure level of 210–211 dB re 1µPa, or an $SeL_{cum}$ of 215–222 dB re $1µPa^2·s$ ) and largely confirmed mortality results of previous lab experiments.

Maximum range to effect at any depth is provided in Young (1991) for 10 percemt mortality (i.e. 90 percent survivability) based on O'Keeffe (1984). Yelverton et al. (1975) shows the relationship between impulse and percent mortality or no injury; Young's equation is modified to predict ranges to the 1 percent Mortality and No Injury zones based on the relationships between fish mass, impulse, and injury found in Yelverton et al. (1975).

Therefore, the Navy is using a dual criteria to predict onset mortality in fish: a peak sound pressure level of 229 dB re 1µPa or an equation using acoustic impulse based on Young (1991) and modified using data from Yelverton (1975). The criteria for 'no injury' is an equation using acoustic impulse based on Young (1991) and modified using data from Yelverton (1975).

### Temporary Threshold Shift (TTS)

Data on TTS from explosions are not available. The threshold for assessing TTS is based upon data from Popper et al. (2005) which examined the effects of exposure to a seismic airgun array on three species of fish—a fish with hearing specializations, the lake chubb (*Couesius plumbeus*), and two fishes without known hearing specializations, the northern pike (*Esox lucius*), and the broad whitefish (*Coregonus nasus*). Fish were exposed to either 5 or 20 seismic pulses from a 730 $in.^3$ airgun array and their hearing was measured immediately post-exposure to determine changes in sensitivity. The cumulative 186 dB re $1µPa^2·s$ threshold value was accumulated over five seismic pulses within about 5 minutes and resulted in up to 20 dB of TTS in the lake chub at different frequencies (Popper et al. 2014). About 20 dB of TTS also occurred in the adult northern pike, but only at 400 Hz. TTS did not occur at other frequencies, nor at any frequencies testing in juvenile northern pike. Broad whitefish showed no TTS to sounds after exposure at the same level. In all cases, fish that showed TTS recovered to normal hearing levels within 18–24 hours (Popper et al. 2014). Therefore, the Navy is using 186 dB re $1µPa^2·s$ as the threshold to determine onset of TTS in fish due to explosions, although this threshold should be much higher for fishes without hearing specializations and for fishes without swimbladders (e.g., halibut and sharks).

### Masking

Explosive sounds are brief in duration, lasting for only fractions of a second. Those generated by Navy training and testing are intermittent and infrequent in a given location. Therefore, auditory masking is unlikely due to explosive sounds from Navy training and testing.

### Behavioral Responses

Explosive sounds are brief in duration, lasting for only fractions of a second. Those generated by Navy training and testing are intermittent and infrequent in a given location. No data are available on behavioral reactions to explosives. The risk that explosives would result in a behavioral response decreases as the distance from the source increases. Popper et al. (2014) describes the probability of a behavioral response from a fish with no swim bladder exposed to an explosive at near ranges (tens of meters) as high, intermediate ranges (hundreds of meters) as moderate, and at far ranges (>1000 m) as low. Popper et al. (2014) describes the probability of a behavioral reaction by fish with swim bladders to explosives at near ranges (tens of meters) as high, intermediate ranges (hundreds of meters) as high, and at far ranges (>thousands of meters) as low. This would be highly dependent on the size of the explosive charge and the resulting magnitude of the sound. However, any behavioral reactions that would occur, such as startle responses, are anticipated to brief and minor due to the transient and infrequent nature of Navy explosive activities.

#### 3.9.3.1.3 Impacts from Sonar and Other Active Acoustic Sources

Non-impulsive sources from the Proposed Action include sonar and other active acoustic sources. Potential acoustic effects to fish from these sources may be considered in four categories, as detailed in Section 3.9.3.1.1 (Analysis Background and Framework): (1) direct injury, (2) hearing loss, (3) auditory masking, and (4) physiological stress and behavioral reactions.

As discussed in Section 3.9.3.1.1.1 (Direct Injury), mortality or direct injury to fish has not been reported in the scientific literature to date (Popper et al 207; Kane et al. 2010). While criteria for mortality, mortal injury, and recoverable injury are presented from exposure to low and mid-frequency sonar, these effects are extremely unlikely to occur. The values presented in Table 3.9-5 represent the highest sound exposure levels which have been tested to date, none of which have resulted in any injury (or mortality) to fish with swim bladders involved in hearing, which would be the types of fish most sensitive to the effects of sonar. Sonar is not anticipated to cause mortality or injury due to the lack of fast rise times, lack of high peak pressures, and lack of high acoustic amplitude.

Table 3.9-7 shows the predicted range to effects for each sonar source bin used in the NWTT Study Area, based on the criteria and thresholds previously outlined. The distances for mortality and recoverable injury are based on the highest levels tested; although, as discussed above no injury (or mortality) was demonstrated at those levels. Given the extremely small sizes of these zones and that injury or mortality have never been documented at levels that would occur at these distances, the potential for these effects to occur is so unlikely as to be discountable. Therefore, mortality or direct injury to fish as a result of exposure to sonar and other active acoustic sources is not discussed further in this analysis.

**Table 3.9-7: Predicted Range to Effects for Sonar Source bins used in NWTT (distances in meters)**

| Sonar Bin | No Swim Bladder | | | Swim Bladder (Not involved in hearing) | | | Swim Bladder (Involved in hearing) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mortality and Injury | Recoverable Injury | TTS | Mortality and Injury | Recoverable Injury | TTS | Mortality and Injury | Recoverable Injury | TTS | Behavioral Harrassment |
| LF4 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 9 |
| LF5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| ASW2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 6 |
| MF1 | <<12 | <12 | CH | <<12 | <12 | CH | <<12 | <12 | 14 | 138 |
| MF3 | <<2 | <2 | CH | <<2 | <2 | CH | <<2 | <2 | 2 | 24 |
| MF4 | 0 | 0 | CH | 0 | 0 | CH | 0 | 0 | 0 | 8 |
| MF5 | 0 | 0 | CH | 0 | 0 | CH | 0 | 0 | 0 | 0 |
| MF6 | 0 | 0 | CH | 0 | 0 | CH | 0 | 0 | 0 | 0 |
| MF8 | <<15 | <15 | CH | <<15 | <15 | CH | <<15 | <15 | 17 | 361 |
| MF9 | 0 | 0 | CH | 0 | 0 | CH | 0 | 0 | 0 | 9 |
| MF10 | 0 | 0 | CH | 0 | 0 | CH | 0 | 0 | 0 | 0 |
| MF11 | <<6 | <6 | CH | <<6 | <6 | CH | <<6 | <6 | 7 | 69 |
| MF12 | <<5 | <5 | CH | <<5 | <5 | CH | <<5 | <5 | 5 | 52 |
| ASW4 | <<1 | <1 | CH | <<1 | <1 | CH | <<1 | <1 | 1 | 15 |
| M3 | 0 | 0 | CH | 0 | 0 | CH | 0 | 0 | 0 | 4 |

Note: CH = cannot hear

A value of “0” indicates that the source level is below the criteria threshold even after the accumulation of multiple pings.

MF5, MF6, and MF10 pose no risk to fish according to this assessment. Also, recall that for Mortality and recoverable injury the effect occurs at a distance either much less than the number provided or less than the number provided, respectively.

Research discussed in Section 3.9.3.1.1.2 (Hearing Loss), indicates that exposure of fish to transient, non-impulsive sources is unlikely to result in any hearing loss. Most sonar sources are outside of the hearing range of most marine fish, and noise sources such as vessel movement and aircraft overflight lack the duration and intensity to cause hearing loss. Furthermore, permanent hearing loss has not been demonstrated in fish as they have been shown to regenerate lost sensory hair cells. Table 3.9-7 shows the predicted range to effects based on the criteria and thresholds previously outlined for each sonar source bin used in the NWTT Study Area. The distances presented are where the onset temporary threshold shifts (TTS) could theoretically occur. Given the extremely small sizes of these zones and that the loudest sources move at a speeds of 10–14 knots, the potential for these effects to occur is so unlikely as to be discountable. Therefore, hearing loss as a result of exposure to sonar and other active acoustic sources is not discussed further in this analysis.

The potential for auditory masking and physiological stress and behavioral reactions in fishes due to exposure to sonar and other active acoustic sources is discussed below for each alternative.

### No Action Alternative

As described in Chapter 2 (Description of Proposed Action and Alternatives), Table 2.8-1, and Section 3.0.5.3.1.1 (Sonar and Other Active Acoustic Sources), training activities under the No Action Alternative include activities that produce in-water noise in the Offshore Area from the use of sonar and other active acoustic sources. Sonar and other active acoustic sources proposed for use are transient in most locations, as active sonar activities pass through the Study Area. Annual levels of sonar and other active acoustic sources are shown for each source class (bin) in Table 3.0-10. The amounts in Table 3.0-10 are given for each alternative, and separated by training and testing.

**Mid Frequency**

Most marine fish species are not expected to be able to detect sounds in the mid-frequency range of operational sonar. The fish species that are known to detect mid-frequencies (some sciaenids [drum], most clupeids [herring, sardines], and potentially deep-water fish such as myctophids [lanternfish]) do not have their best sensitivities in the range of operational sonar. Thus, these fish may only detect the most powerful systems, such as hull-mounted sonar, within a few kilometers, and most other, less powerful mid-frequency sonar systems, for a kilometer or less. Due to the limited time of exposure due to the moving sound sources, most mid-frequency active sonar used in the Study Area would not have the potential to substantially mask key environmental sounds or produce sustained physiological stress or behavioral reactions. Furthermore, although some species may be able to produce sound at higher frequencies (greater than 1 kHz), vocal marine fish, such as sciaenids, largely communicate below the frequency ranges used by mid-frequecny sonars. Other marine species probably cannot detect mid-frequency sonar (1,500–10,000 Hz) and therefore behavioral impacts are not expected for these fish (Popper 2008, Popper et al. 2014). However, any such effects on behavior would be temporary and infrequent as a vessel operating mid-frequency sonar transits an area. Some mid-frequency active sonar use is proposed while ships are pierside and not transiting. However, these sources are outside the hearing range of most fish species; therefore, even pierside sonar use is unlikely to impact fish species. Long-term population level impacts due to exposure to mid-frequency sonar and other active acoustic sources are not expected.

**Low Frequency**

A large number of marine fish species, including cartilaginous fish, may be able to detect low-frequency sonar and other active acoustic sources. However, the potential for masking would only occur within a limited range of frequencies due to the narrow bandwidth of most sonar signals as well as the short, intermittent duration of the signal itself. Behavioral or physiological stress responses to sonar have not been observed in recent literature. As outlined in Table 3.9-5, the best scientific judgment (Popper et al. 2014) indicates the potential for masking and behavioral effects from low frequency sonar is expected to be low at all distances from the source for fish without swim bladders or fish whose swim bladders is not involved in hearing. The potential for masking and behavioral effects for fish whose swim bladder is used in hearing is moderate within a few tens of meters from the source, but low at any distances beyond that (Popper et al. 2014).

Low-frequency active sonar usage is rare and most low-frequency training activities are conducted in deeper waters, usually beyond the continental shelf break. The majority of fish species, including those that are the most highly vocal, exist on the continental shelf and within nearshore, estuarine areas. Fish within a few tens of kilometers around a low-frequency active sonar could experience brief periods of masking, physiological stress, and behavioral disturbance while the system is used, with effects most pronounced closer to the source. However, overall effects would be localized and infrequent.

## Training Activities

### Offshore Area

The majority of fish species exposed to non-impulsive sources would likely have no reaction or mild behavioral reactions. Overall, long-term impacts for individual fish are unlikely in most cases because acoustic exposures are intermittent and unlikely to repeat over short periods. Since long-term impacts for most individuals are unlikely, long-term population level impacts are not expected.

The ESA-listed salmonid species (bull trout, Chinook salmon, coho salmon, chum salmon, sockeye salmon, and steelhead), green sturgeon, and Pacific eulachon, as summarized in Section 3.9.2.3 (ESA-Listed Species), are anadromous and spend a portion of their lives in the Offshore Area of the Study Area. These species have the potential to be exposed to non-impulsive sound associated with training activities under the No Action Alternative in the coastal areas of the Study Area. Since salmonid species, Pacific eulachon, and green sturgeon spawn in rivers and the early life stages of the fish occur in riverine and estuarine environments, eggs and larvae would not be exposed to sounds produced from non-impulsive sound sources during training activities.

It is believed that salmonid species, which are anatomically similar to Atlantic salmon, are unable to detect the sound produced by mid- or high-frequency sonar and other active acoustic sources (Section 3.9.2.1, Hearing and Vocalization). Therefore, acoustic impacts from these sources are not expected. While some activities would overlap with bull trout (Coastal Puget Sound DPS) critical habitat, adverse effects to the habitat are not anticipated.

Low-frequency active sonar and other active acoustic sources are not typically operated in coastal or nearshore waters, where salmonids, rockfish, Pacific eulachon, and green sturgeon are typically located. If low-frequency sources are used in these areas, then these species could be exposed to sound within their hearing range within these areas. If this did occur, these species could experience behavioral reactions, physiological stress, and auditory masking, although these impacts would be expected to be short-term and infrequent based on the low probability of co-occurrence between the activity and these species. Long-term population level impacts would not be expected. While the activities would overlap green sturgeon (Southern DPS) and bull trout (Coastal Puget Sound DPS) critical habitat, adverse effects to the habitat are not anticipated.

Available data on cartilaginous fish hearing (e.g., sharks, skates, and rays) suggests the detection of sounds from 20 to 1,000 Hz, with best sensitivity at lower ranges (Myrberg 2001; Casper et al. 2003b; Casper and Mann 2006b and 2009). However, it is likely that elasmobranchs only detect low-frequency sounds because they lack a swim bladder or other pressure detectors.

### Inland Waters

As described in Chapter 2 (Description of Proposed Action and Alternatives), Table 2.8-1, and Section 3.0.5.3.1.1 (Sonar and Other Active Acoustic Sources), training activities under the No Action Alternative include activities that produce in-water noise from the use of sonar and other active acoustic sources, and could occur throughout the Study Area. Sonar and other active acoustic sources proposed for use are transient in most locations as active sonar activities pass through the Study Area. A few activities involving sonar and other active acoustic sources occur in inshore water (within bays and estuaries), specifically at pierside locations.

The salmonid species, as summarized in Section 3.9.2 (Affected Environment), are anadromous and spend a portion of their lives in riverine and estuarine systems. Similarly, the Pacific Eulachon and green sturgeon may occur in the Inland Waters. The ESA-listed DPSs of rockfish species (bocaccio, canary rockfish, yelloweye rockfish), as summarized in Section 3.9.2.3 (Endangered Species Act-Listed Species), spend their lives in the waters of Puget Sound. Bocaccio and canary rockfish juveniles and subadults of these species tend to favor shallow water habitats associated with kelp forests and rocky reefs, whereas juvenile yelloweye rockfish generally prefer slightly deeper water. The adult rockfish favor rocky bottoms in deeper waters. Salmonid species, Pacific Eulachon, green sturgeon, and the rockfish species have the potential to be exposed to non-impulsive sound associated with training activities under the No Action Alternative in the Inland Waters.

Based on the lack of low-frequency sonar for training and the fact that the majority of mid-frequency sonar and other active acoustic sources are outside the hearing range of most fish species, long-term population level impacts are not expected. While the activities would overlap with Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU), bull trout (Coastal Puget Sound DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), and green sturgeon (Southern DPS) critical habitat, no adverse effects to water quality, habitat structure, or prey availability are anticipated.

*Pursuant to the ESA, the use of sonar and other active acoustic sources during training activities under the No Action Alternative may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*The use of sonar and other active acoustic sources during training activities under the No Action Alternative would have no effect on critical habitat for Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU), bull trout (Coastal Puget Sound DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), or green sturgeon (Southern DPS).*

#### Testing Activities

As described in Chapter 2 (Description of Proposed Action and Alternatives), Tables 2.8-2 and 2.8-3, and in Section 3.0.5.3.1 (Acoustic Stressors), testing activities under the No Action Alternative include activities that use sonar and other active acoustic sources that produce underwater sound. Proposed testing activities under the No Action Alternative that involve sonar and other active acoustic sources differ in number and location from training activities under the No Action Alternative; however, the types and severity of impacts would not be discernable from those described under the No Action Alternative – Training Activities.

Annual levels of testing sonar and other active acoustic sources for the No Action Alternative are shown for each source class (bin) in Table 3.0-10. Based on the low level and short duration of potential exposure to low-frequency sonar for testing and the fact that the majority of mid-frequency sonar and other active acoustic sources are outside the hearing range of most fish species, long-term population level impacts are not expected.

#### Offshore Area

Potential impacts to fish due to sonar and other active acoustic sources used in the Offshore Area are expected to be limited to short-term, minor behavioral reactions. Long-term population level impacts would not be expected. Predicted impacts to ESA-listed species and any designated critical habitat would not be discernable from those described in No Action Alternative – Training Activities.

#### Inland Waters

Potential impacts to fish due to sonar and other active acoustic sources used in the Inland Waters are expected to be limited to short-term, minor behavioral reactions. Long-term population level impacts would not be expected. Predicted impacts to ESA-listed species and any designated critical habitat would not be discernable from those described in No Action Alternative – Training Activities.

#### Western Behm Canal, Alaska

The majority of fish species exposed to non-impulsive sources would likely have no reaction or mild behavioral reactions. Overall, long-term impacts for individual fish are unlikely in most cases because acoustic exposures are intermittent and unlikely to repeat over short periods. Since long-term impacts for most individuals are unlikely, long-term population level impacts are not expected.

The ESA-listed species, as summarized in Section 3.9.2.3 (Endangered Species Act-Listed Species), do not overlap with the Western Behm Canal portion of the Study Area.

Therefore, acoustic impacts to ESA-listed species from activities in this portion of the Study Area are not expected. Effects to designated critical habitat would not occur as activities do not overlap in Western Behm Canal.

*Pursuant to the ESA, the use of sonar and other active acoustic sources during testing activities under the No Action Alternative may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*The use of sonar and other active acoustic sources during testing activities under the No Action Alternative would have no effect on critical habitat for Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU), bull trout (Coastal Puget Sound DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), or green sturgeon (Southern DPS).*

### Alternative 1

#### <u>Training Activities</u>

#### Offshore Area

The number of annual training activities that produce in-water noise from the use of sonar and other active acoustic sources under Alternative 1 would increase from approximately 332 hours of use to 551 hours of use over the No Action Alternative, as indicated in Table 3.0-10 of Chapter 3 (Affected Environment and Environmental Consequences).

Despite the increase in activity, the potential effects of training activities involving sonar and other active acoustic sources under Alternative 1 on fish species would be similar to those described above for training activities under the No Action Alternative, and are expected to be limited to short-term, minor behavioral reactions. Effects to fish populations would not occur as a result of non-impulsive sounds associated with training activities under Alternative 1. Predicted impacts to ESA-listed species and designated critical habitat would not be discernable from those described in No Action Alternative – Training Activities.

#### Inland Waters

As described in Chapter 2 (Description of Proposed Action and Alternatives), Table 2.8-1 and Section 3.0.5.3.1.1 (Sonar and Other Active Acoustic Sources), the number of annual training activities that produce in-water noise from the use of sonar and other active acoustic sources under Alternative 1 would increase Training activities in the Inland Waters would increase to approximately 407 hours of in-water noise from the use of sonar and other active acoustic sources. The use of vessels would increase from 4 activities under the No Action Alternative to 310 under Alternative 1 (see Table 3.9-4). In comparison to the No Action Alternative, the increased use of sonar, vessels, and aircraft associated with training under Alternative 1 would increase the likelihood of exposure of fish to non-impulsive underwater sounds.

The majority of fish species exposed to non-impulsive sources would likely have no reaction or mild behavioral reactions. Overall, long-term impacts for individual fish are unlikely in most cases because acoustic exposures are intermittent and unlikely to repeat over short periods. Despite the increase in activity, the expected impacts to fish would be similar to the No Action Alternative. However, due to the increased exposure, there may be the potential for additional impacts. For the same reasons as stated above in No Action Alternative, impacts to fish are expected to be limited to short-term, minor behavioral reactions. Effects to fish populations would not occur as a result of non-impulsive sounds associated with training activities under Alternative 1. Predicted impacts to ESA-listed species and designated critical habitat would not be discernable from those described in No Action Alternative – Training Activities.

*Pursuant to the ESA, the use of sonar and other active acoustic sources during training activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*The use of sonar and other active acoustic sources during training activities under Alternative 1 would have no effect on critical habitat for Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU), bull trout (Coastal Puget Sound DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), and yelloweye rockfish (Puget Sound/Georgia Basin DPS), or green sturgeon (Southern DPS).*

## Testing Activities

### Offshore Area

Under Alternative 1, fish would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources during testing activities. Testing activities in the Offshore Area would increase to approximately 977 hours of in-water noise from the use of sonar and other active acoustic sources, and 943 items that produce in-water acoustic noise would be used. The use of vessels would increase, from 37 activities under the No Action Alternative to 138 under Alternative 1 (see Table 3.9-4).

Despite the increase in activity, the expected impacts to fish would be similar to the No Action Alternative. However, due to the increased exposure, there may be the potential for additional impacts. For the same reasons as stated above in No Action Alternative, impacts to fish are expected to be limited to short-term, minor behavioral reactions. Effects to fish populations would not occur as a result of non-impulsive sounds associated with testing activities under Alternative 1. Predicted impacts to ESA-listed species and designated critical habitat would not be discernable from those described in No Action Alternative – Training Activities.

### Inland Waters

As described in Chapter 2 (Description of Proposed Action and Alternatives), Tables 2.8-2 and 2.8-3, and Section 3.0.5.3.1 (Acoustic Stressors), the number of annual testing activities that produce in-water sound from the use of sonar and other active acoustic sources analyzed under Alternative 1 would increase over what was analyzed for the No Action Alternative. Testing activities in the Inland Waters would increase to approximately 5,448 hours of in-water noise from the use of sonar and other active acoustic sources, and 1,308 items that produce in-water acoustic noise would be used. The use of vessels would increase from 337 activities under the No Action Alternative to 582 under Alternative 1 (see Table 3.9-4). The majority of fish species exposed to non-impulsive sources would likely have no reaction or mild behavioral reactions. Overall, long-term impacts for individual fish are unlikely in most cases because acoustic exposures are intermittent and unlikely to repeat over short periods. In comparison to the No Action Alternative, the increased use of sonar, vessels, and aircraft associated with testing under Alternative 1 would increase the likelihood of exposure of fish species to non-impulsive underwater sounds. The expected impacts to fish species would be similar to those described above for training activities under the No Action Alternative, and are expected to be limited to short-term, minor behavioral reactions. Effects to fish populations would not occur as a result of non-impulsive sounds associated with testing activities under Alternative 1. Predicted impacts to ESA-listed species and designated critical habitat would not be discernable from those described in Section 3.9.3.1.2.1 (No Action Alternative – Training Activities).

#### Western Behm Canal, Alaska

Under Alternative 1, fish would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources during testing activities. Testing activities in the Western Behm Canal would result in approximately 2,762 hours of in-water noise from the use of sonar and other active acoustic sources. The use of vessels would increase from 28 activities under the No Action Alternative to 60 under Alternative 1 (see Table 3.9-4).

The majority of fish species exposed to non-impulsive sources would likely have no reaction or mild behavioral reactions. Overall, long-term impacts for individual fish are unlikely in most cases because acoustic exposures are intermittent and unlikely to repeat over short periods. Since long-term impacts for most individuals are unlikely, long-term population level impacts are not expected.

The ESA-listed species, as summarized in Section 3.9.2.3 (Endangered Species Act-Listed Species), do not overlap with the Western Behm Canal portion of the Study Area. Therefore, acoustic impacts to ESA-listed species from activities in this portion of the Study Area are not expected. Effects to designated critical habitat would not occur as activities do not overlap in Western Behm Canal.

*Pursuant to the ESA, the use of sonar and other active acoustic sources during testing activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*The use of sonar and other active acoustic sources during testing activities under Alternative 1 would have no effect on critical habitat for Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU), bull trout (Coastal Puget Sound DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), or green sturgeon (Southern DPS).*

## Alternative 2

### Training Activities

#### Offshore Area

Under Alternative 2, fish would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources during training activities. Training activities in the Offshore Area would increase to approximately 551 hours of in-water noise from the use of sonar and other active acoustic sources, and 1,616 items that produce in-water acoustic noise would be used. The use of vessels would remain the same as under Alternative 1 (i.e., an increase from 996 under the No Action Alternative to 1,108 under Alternative 1 in the offshore portion of the Study Area [see Table 3.9-4]).

Despite the increase in activity, the potential effects of training activities involving sonar and other active acoustic sources under Alternative 2 on fish species would be similar to those described above for training activities under the No Action Alternative, and are expected to be limited to short-term, minor behavioral reactions. Effects to fish populations would not occur as a result of non-impulsive sounds associated with training activities under Alternative 2. Predicted impacts to ESA-listed species and designated critical habitat would not be discernable from those described in No Action Alternative – Training Activities.

#### Inland Waters

As described in Chapter 2 (Description of Proposed Action and Alternatives), Table 2.8-1, and Section 3.0.5.3.1.1 (Sonar and Other Active Acoustic Sources), the number of annual training activities that produce in-water noise from the use of sonar and other active acoustic sources under Alternative 2 would increase. Training activities in the Inland Waters would increase to approximately 407 hours of in-water noise from the use of sonar and other active acoustic sources. The use of vessels would remain the same as under Alternative 1 (i.e., an increase from 4 activities under the No Action Alternative to 310 under Alternative 1 in the Inland Waters of the Study Area [see Table 3.9-4]). The only difference from Alternative 1 is the addition of the Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise.

Despite the increase in activity, the potential effects of training activities involving sonar and other active acoustic sources under Alternative 2 on fish species would be similar to those described above for training activities under the No Action Alternative, and are expected to be limited to short-term, minor behavioral reactions. Effects to fish populations would not occur as a result of non-impulsive sounds associated with training activities under Alternative 2. Predicted impacts to ESA-listed species and designated critical habitat would not be discernable from those described in No Action Alternative – Training Activities.

*Pursuant to the ESA, the use of sonar and other active acoustic sources during training activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*The use of sonar and other active acoustic sources during training activities under Alternative 2 would have no effect on critical habitat for Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU), bull trout (Coastal Puget Sound DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), or green sturgeon (Southern DPS).*

## Testing Activities

### Offshore Area

Under Alternative 2, fish would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources during testing activities. The number of annual testing activities that produce in-water noise from the use of sonar and other active acoustic sources under Alternative 1 would increase. Testing activities in the Offshore Area would increase to approximately 1,073 hours of in-water noise from the use of sonar and other active acoustic sources, and 1,024 items that produce in-water acoustic noise would be used, for an increase of approximately 24 hours and 364 items under the No Action Alternative. The use of vessels would increase from 37 activities under the No Action Alternative to 162 under Alternative 1 (see Table 3.9-4). These activities would happen in the same general locations under Alternative 2 as described under Alternative 1.

In comparison to the No Action Alternative and Alternative 1, the increased use of sonar, vessels, and aircraft associated with testing under Alternative 2 would increase the likelihood of exposure of fish species to non-impulsive underwater sounds. Despite the increase in activity, the potential effects of testing activities involving sonar and other active acoustic sources under Alternative 2 on fish species would be similar to those described above for training activities under the No Action Alternative, and are expected to be limited to short-term, minor behavioral reactions. Effects to fish populations would not occur as a result of non-impulsive sounds associated with testing activities under Alternative 2. Predicted impacts to ESA-listed species and designated critical habitat would not be discernable from those described under Alternative 1.

### Inland Waters

As described in Chapter 2 (Description of Proposed Action and Alternatives), Tables 2.8-2 and 2.8-3, and Section 3.0.5.3.1 (Acoustic Stressors), the number of annual testing activities that produce in-water sound from the use of sonar and other active acoustic sources analyzed under Alternative 2 would increase over what was analyzed for the No Action Alternative. Testing activities in the Inland Waters would increase to approximately 5,939 hours of in-water noise from the use of sonar and other active acoustic sources, and 1,410 items that produce in-water acoustic noise would be used. The use of vessels would increase from 337 activities under the No Action Alternative to 640 under Alternative 2 (Table 3.9-4). These activities would happen in the same general locations under Alternative 2 as described under the No Action Alternative – Training Activities.

Despite the increase in activity, the potential effects of testing activities involving sonar and other active acoustic sources under Alternative 2 on fish species would be similar to those described above for training activities under the No Action Alternative, and are expected to be limited to short-term, minor behavioral reactions. Effects to fish populations would not occur as a result of non-impulsive sounds associated with testing activities under Alternative 2. Predicted impacts to ESA-listed species and designated critical habitat would not be discernable from those described in No Action Alternative – Training Activities.

### Western Behm Canal, Alaska

Under Alternative 2, fish would be exposed to low-, mid-, and high-frequency sonar and other acoustic sources during testing activities. Testing activities in the Western Behm Canal would result in approximately 3,838 hours of in-water noise from the use of sonar and other active acoustic sources, an increase from 28 hours under the No Action Alternative. The use of vessels would increase from 28 activities under the No Action Alternative to 83 under Alternative 2 (Table 3.9-4).

The majority of fish species exposed to non-impulsive sources would likely have no reaction or mild behavioral reactions. Overall, long-term impacts for individual fish are unlikely in most cases because acoustic exposures are intermittent and unlikely to repeat over short periods. Since long-term impacts for most individuals are unlikely, long-term population level impacts are not expected.

The ESA-listed species, as summarized in Section 3.9.2.3 (Endangered Species Act-Listed Species), do not overlap with the Western Behm Canal portion of the Study Area. Therefore, acoustic impacts to ESA-listed species from activities in this portion of the Study Area are not expected. Effects to designated critical habitat would not occur as activities do not overlap in Western Behm Canal.

*Pursuant to the ESA, the use of sonar and other active acoustic sources during testing activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*The use of sonar and other active acoustic sources during testing activities under Alternative 2 would have no effect on Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU), bull trout (Coastal Puget Sound DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), or green sturgeon (Southern DPS) critical habitat.*

#### 3.9.3.1.4 Impacts from Explosives and Other Impulsive Sound Sources

Explosions and other impulsive sound sources include explosions from underwater detonations and explosive ordnance, and noise from weapons firing, launch, and impact with the water's surface. Potential acoustic effects to fish from impulsive sound sources may be considered in four categories, as detailed in Section 3.9.3.1 (Acoustic Stressors): (1) direct injury, (2) hearing loss, (3) auditory masking, and (4) physiological stress and behavioral reactions.

The number of training events using explosives, weapons firing, launches, and non-explosive munitions and their proposed locations is presented in Table 2.8-1 of Chapter 2 (Description of Proposed Action and Alternatives). A discussion of explosives and the number of detonations in each source class is provided in Section 3.0.5.3.1.2 (Explosives). The types of noise produced during weapons firing, launches, and non-explosive munitions impact are discussed in Section 3.0.5.3.1.3 (Weapons Firing, Launch, and Impact Noise). Training activities involving explosions could be conducted throughout the Offshore Area, although activities do not normally occur within 50 nm of the shore.

**Table 3.9-8: Predicted Range to Effects for Explosive bins uded in NWTT (distances in meters)**

| Explosive BIN | Depth of charge[1] | | Puget Sound Rockfish | | Chum | | | Chinook | | | Coho | | Sockeye | | Steelhead | | Eulachon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Life Stage | Larvae | Juvenile | Juvenile (Puget Sound) | Juvenile (offshore) | Adult | Juvenile (Puget Sound) | Juvenile (offshore) | Adult | Juvenile | Adult | Juvenile | Adult | Juvenile | Adult | Adult |
| | | Weight (g) | 0.005 | 0.37 | 0.38 | 3.8 | 340 | 8.2 | 11 | 3000 | 15 | 1500 | 15 | 440 | 31 | 360 | 37 |
| E3 off shore | 30 | 1% Mort | n/a | n/a | n/a | 245 | 140 | n/a | 214 | 109 | 209 | 119 | 208 | 139 | 193 | 143 | 188 |
| | | Onset injury | n/a | n/a | n/a | 445 | 307 | n/a | 403 | 248 | 394 | 262 | 394 | 303 | 377 | 311 | 369 |
| E3 inland | 8 | 1% Mort | 406 | 234 | 233 | n/a | 99 | 158 | n/a | 79 | n/a | | n/a | | 135 | 101 | 132 |
| | | Onset injury | 661 | 385 | 384 | n/a | 179 | 268 | n/a | 153 | n/a | | n/a | | 231 | 181 | 227 |
| E4 | 20 | 1% Mort | n/a | n/a | n/a | 262 | 152 | n/a | 229 | 119 | 221 | 129 | 221 | 150 | 203 | 154 | 198 |
| | | Onset injury | n/a | n/a | n/a | 447 | 283 | n/a | 396 | 244 | 384 | 247 | 383 | 279 | 356 | 287 | 351 |
| E5 | 1 | 1% Mort | n/a | n/a | n/a | 160 | 89 | n/a | 140 | 71 | 136 | 75 | 136 | 88 | 124 | 90 | 121 |
| | | Onset injury | n/a | n/a | n/a | 263 | 155 | n/a | 231 | 133 | 228 | 137 | 228 | 153 | 208 | 157 | 203 |
| E8 | 35 | 1% Mort | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 514 | 380 | n/a |
| | | Onset injury | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 849 | 636 | n/a |
| E10 | 1 | 1% Mort | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 362 | 263 | n/a |
| | | Onset injury | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 582 | 426 | n/a |
| E11 | 35 | 1% Mort | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 860 | 631 | n/a |
| | | Onset injury | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 1404 | 1032 | n/a |
| E12 | 1 | 1% Mort | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 435 | 319 | n/a |
| | | Onset injury | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 703 | 514 | n/a |

[1]Energy loss into air for surface detonations is considered. See Swisdak, M. (1978). Explosion effects and properties, Part II: Explosion effects in water. Naval Surface Warfare Center/White Oak Laboratory (NSWC/WOL) Technical Report TR 76-116.
n/a = Range to effects were not presented where there is not expected to be co-occurrence between the explosive bin and the species/life stage.

## Explosives

Concern about potential fish mortality associated with the use of at-sea explosives led military researchers to develop mathematical and computer models that predict safe ranges for fish and other animals from explosions of various sizes (e.g., Yelverton et al. 1975, Goertner 1982, Goertner et al. 1994). Young (1991) provides equations that allow estimation of the potential effect of underwater explosions on fish possessing swim bladders using a damage prediction method developed by Goertner (1982). Young's parameters include the size of the fish and its location relative to the explosive source, but are independent of environmental conditions (e.g., depth of fish and explosive shot frequency). An example of such model predictions is shown in Table 3.9-9, which lists estimated explosive effects ranges using Young's (1991) method for fish possessing swim bladders exposed to explosions that would typically occur during training exercises. Fish without swimbladders are very resistant to underwater explosions. 10 percent mortality for charges up to 1,000 lbs. TNT equivalent are about 20 feet for small flatfish (e.g. flounder and sole) based on Young (1991). The 10 percent mortality range is the distance beyond which 90 percent of the fish present would be expected to survive.

Fish not killed or driven from a location by an explosion might change their behavior, feeding pattern, or distribution. Changes in behavior of fish have been observed as a result of sound produced by explosives, with effect intensified in areas of hard substrate (Wright 1982). Stunning from pressure waves could also temporarily immobilize fish, making them more susceptible to predation.

The number of fish killed by an underwater explosion would depend on the population density in the vicinity of the blast, as well as factors discussed above such as net explosive weight, depth of the explosion, depth of the fish, and fish size. For example, if an explosion occurred in the middle of a dense school of menhaden, herring, or other schooling fish, a large number of fish could be killed.

**Table 3.9-9: Estimated Explosive Effects Ranges for Fish with Swim Bladders**

| Representative Ordnance | Explosive Bin[1] | Depth of Explosion (ft.) | 10% Mortality Range, ft.(m) | | |
|---|---|---|---|---|---|
| | | | 1 oz. Fish | 1 lb. Fish | 30 lb. Fish |
| SUS Buoy | E3 (>0.5–2.5 lb. NEW) | 98 | 483 (147) | 337 (103) | 216 (66) |
| IEER Buoy | E4 (>2.5–5 lb. NEW) | 66 | 537 (164) | 375 (114) | 241 (73) |
| Torpedo (MK-46/54) | E8 (>60-100 lb. NEW) | 115 | 1405 (428) | 980 (299) | 630 (192) |

Notes: NEW = Net Explosive Weight, lb. = pound, ft. = foot/feet, oz. = ounce, UNDET = underwater detonation

[1] Range for maximum NEW in bin shown, which may be greater than the NEW of the representative ordnance shown.

**Table 3.9-10: Average Approximate Range to Temporary Threshold Shift from Explosions for Fish**

| Criteria Threshold | Average Approximate Range (meters) to Effects for Sample Explosive Bins | | | |
|---|---|---|---|---|
| | Bin E3 (>0.5–2.5 lb. NEW) | Bin E5 (>5–10 lb. NEW) | Bin E10 (>250–500 lb. NEW) | Bin E12 (>650–1,000 lb. NEW) |
| 186 SEL (dB re 1µPa$^2$·s) | 172 | 35 | 280 | 394 |

Notes: lb. = pound, NEW = net explosive weight, Sounds from explosions could cause hearing loss in nearby fish (dependent upon charge size). Table 3.9-9 shows example predicted range to Temporary Threshold Shift for explosives used in Navy training and testing activities based on criteria thresholds presented in Popper et al. (2014). Permanent hearing loss has not been demonstrated in fish, as lost sensory hair cells can be replaced unlike in mammals. However, fish that do experience hearing loss could miss opportunities to detect predators or prey, or reduce interspecific communication. If an individual fish were repeatedly exposed to sounds from underwater explosions that caused alterations in natural behavioral patterns or physiological stress, these impacts could lead to long-term impacts for the individual such as reduced survival, growth, or reproductive capacity. However, the time scale of individual explosions is very limited, and training exercises involving explosions are dispersed in space and time. Consequently, repeated exposure of individual fish to sounds from underwater explosions is not likely and most acoustic effects are expected to be short-term and localized. Long-term population level impacts would not be expected.

There are no training or testing activities involving explosions or other impulsive sound sources proposed in the Western Behm Canal portion of the Study Area under the No Action Alternative, Alternative 1, or Alternative 2. Therefore, Western Behm Canal is not included in this portion of the analysis.

### No Action Alternative

#### <u>Training</u>

#### Offshore Area

As described in Chapter 2 (Description of Proposed Action and Alternatives), Table 2.8-1, and Section 3.0.5.3.1.2 (Explosives), training activities under the No Action Alternative would use underwater detonations and explosive ordnance.

Potential impacts on fish from explosions and impulsive acoustic sources can range from no impact, brief acoustic effects, tactile perception, and physical discomfort; to slight injury to internal organs and the auditory system; to death of the animal (Keevin et al. 1997). Occasional behavioral reactions to intermittent explosions and impulsive acoustic sources are unlikely to cause long-term impacts for fish populations.

Fish that experience hearing loss (permanent or temporary threshold shift) as a result of exposure to explosives and impulsive acoustic sources may have a reduced ability to detect relevant sounds such as predators, prey, or social vocalizations. It is uncertain whether some permanent hearing loss over a part of a fish's hearing range would have long-term impacts for that individual. If this did affect the fitness of a few individuals, it is unlikely to have long-term population level impacts.

It is possible for fish to be injured or killed by explosives; however, long-term impacts from a loss of a few individuals is unlikely to have measureable effects on overall stocks or populations. Therefore, long-term impacts to fish populations would not be expected.

The ESA-listed salmonid species (steelhead trout, Chinook salmon, chum salmon, coho salmon, sockeye salmon, and bull trout), green sturgeon, and Pacific eulachon, as summarized in Section 3.9.2.3 (Endangered Species Act-Listed Species), are anadromous and spend a portion of their lives in the Offshore Area of the Study Area. Since the salmonid species, Pacific eulachon, and green sturgeon spawn in rivers and the early lifestages of the fish occur in riverine and estuarine environments, eggs and larvae would not be exposed to impulsive acoustic sources produced by explosives, weapons firing, launch, and non-explosive ordnance impact with the water's surface during training activities in the Offshore Area.

Salmonid species, Pacific Eulachon, and green sturgeon have the potential to be exposed to explosive energy and sound associated with training activities under the No Action Alternative in the Offshore Area. Training activities involving impulsive acoustic sources in Offshore Area have the possibility to affect the ESA-listed species present, potentially resulting in short-term behavioral or physiological responses, hearing loss, injury, or mortality. However, given the infrequent nature of training activities involving impulsive acoustic sources, the likelihood of these species encountering an explosive activity taking place anywhere within the Offshore Area is remote. Explosive activities occur at sea generally more than 50 nm from shore. Although salmonid species are not common outside 40 nm from shore, there is a potential for overlap between explosive activities and salmonid species. Additionally, no explosives are used with in the Olympic Coast National Marine Sanctuary. Effects to Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU), and bull trout (Coastal Puget Sound DPS) designated critical habitat would not occur as activities do not overlap. There is the potential for effects to green sturgeon (Southern DPS) designated critical habitat; however, it is unlikely due to the limited spatial overlap of the critical habitat with the Study Area and since training activities involving impulsive acoustic sources are not likely to occur that close to shore in the Offshore Area.

#### Inland Waters

Under the No Action Alternative, fish species would be exposed to explosions at or beneath the water during training activities. Noise could be produced by explosions and weapons firing in the Inland Waters of the Study Area.

Each explosive events under the No Action Alternative would consist of a single explosion. Some marine fish close to a detonation would likely be killed, injured, damaged, or displaced. The detonations would occur in Hood Canal and Crescent Harbor. It is possible for fish to be injured or killed by explosives; however, long-term impacts from a loss of a few individuals is unlikely to have measureable effects on overall stocks or populations. Therefore, long-term impacts to fish populations would not be expected. Training activities involving impulsive acoustic sources in the Inland Waters have the possibility to affect the ESA-listed species present (Chinook [Puget Sound ESU], Chum [Hood Canal Summer-Run ESU], steelhead [Puget Sound DPS], Bocaccio rockfish [Puget Sound/Georgia Basin DPS], canary rockfish [Puget Sound/Georgia Basin DPS], yelloweye rockfish [Puget Sound/Georgia Basin DPS], and Pacific eulachon [Southern DPS]), potentially resulting in short-term behavioral or physiological responses, hearing loss, injury, or mortality. There is the potential for effects to Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU) designated critical habitat; however, it is unlikely that training activities involving impulsive acoustic sources would occur in portions of the Inland Waters designated as critical habitat.

*Pursuant to the ESA, the use of explosives during training activities under the No Action Alternative may affect and is likely to adversely affect, ESA-Listed Chinook, coho, chum, and sockeye salmonids, steelhead (Puget Sound DPS, Upper Columbia River DPS, Middle Columbia River DPS, Lower Columbia River DPS, Upper Willamette River DPS, and Snake River Basin DPS), bull trout, Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), and Pacific eulachon (Southern DPS).*

*The use of explosives during training activities under the No Action Alternative may affect, but is not likely to adversely affect, steelhead (Northern California Coast DPS, California Central Valley DPS, Central California Coast DPS, South-Central California Coast DPS, and Southern California DPS), and green sturgeon.*

*The use of explosives during training activities under the No Action Alternative may affect, but is not likely to adversely affect, critical habitat for Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU),and green sturgeon (Southern DPS); and there would be no effect to bull trout (Coastal Puget Sound DPS), green sturgeon (Southern DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), or yelloweye rockfish (Puget Sound/Georgia Basin DPS) critical habitat.*

#### Testing Activities

Under the No Action Alternative, no testing activities involving explosives would occur in the Offshore Area, Inland Waters, or the Western Behm Canal, Alaska. Therefore, fish would not be exposed to explosions during testing activities.

*Pursuant to the ESA, the use of explosives during testing activities under the No Action Alternative would have no effect on ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*The use of explosives during testing activities under the No Action Alternative would have no effect on critical habitat for salmonid species, green sturgeon, or rockfish critical habitat.*

### Alternative 1

#### Training Activities

##### Offshore Area

As described in Chapter 2 (Description of Proposed Action and Alternatives), Table 2.8-1, and Section 3.0.5.3.1.2 (Explosives), the number of annual training activities that use explosions under Alternative 1 would increase, due to an increase in the Gunnery Exercises (GUNEX), even though the SINKEX is removed. Although the number of explosives used in training activities would increase by about 39 percent compared to training activities under the No Action Alternative, these activities would generally occur in the same areas as under the No Action Alternative, and severity of impacts would not be discernable from those described in No Action Alternative – Training Activities.

As discussed for the No Action Alternative, potential impacts on fish from explosions and impulsive sound sources can range from no effect, brief acoustic effects, tactile perception, and physical discomfort, to slight injury to internal organs and the auditory system, to death of the animal (Keevin and Hempen 1997). Occasional behavioral reactions to intermittent explosions and impulsive sound sources are unlikely to cause long-term impacts for individual fish or populations. It is possible for fish to be injured or killed by explosives; however, long-term impacts from a loss of a few individuals is unlikely to have measureable effects on overall stocks or populations. Therefore, despite the increase in activities under Alternative 1, impacts from at-sea explosion from training activities would be temporary and localized since the activities are infrequent and widely dispersed throughout the Study Area, and the distribution of potentially affected fishes also varies.

Training activities involving impulsive acoustic sources in Offshore Area have the possibility to affect the ESA-listed species present, potentially resulting in short-term behavioral or physiological responses, hearing loss, injury, or mortality. However, given the infrequent nature of training activities involving impulsive acoustic sources, the likelihood of these species encountering an explosive activity taking place anywhere within Offshore Area is remote. Explosive activities occur at sea generally more than 50 nm from shore. Although salmonid species are not common outside 40 nm from shore, there is a potential for overlap between explosive activities and salmonid species. Additionally, no explosives are used with in the Olympic Coast National Marine Sanctuary. Effects to chum, Chinook, and bull trout designated critical habitat would not occur as activities do not overlap. There is the potential for effects to green sturgeon designated critical habitat; however, it is unlikely since training activities involving impulsive acoustic sources are not likely to occur that close to shore in the Offshore Area.

#### Inland Waters

As described in Chapter 2 (Description of Proposed Action and Alternatives), Table 2.8-1, and Section 3.0.5.3.1.2 (Explosives), the number of annual training activities that use explosions under Alternative 1 would increase. Under Alternative 1, the total number of explosive training events would increase relative to the No Action Alternative, from the additional use of 18 shock wave action generators (SWAGs) in Crescent Harbor and 18 SWAGs in Hood Canal. The mine neutralization exercises would increase from two 1.5-pound (lb.) (0.68 kg) mine neutralization charges to three 2.5 lb. (1.13 kg) charges in Hood Canal and from two to three 2.5 lb. (1.13 kg) mine neutralization exercises in Crescent Harbor.

As discussed for the No Action Alternative, potential impacts on fish from explosions and impulsive sound sources can range from no effect, brief acoustic effects, tactile perception, and physical discomfort, to slight injury to internal organs and the auditory system, to death of the animal (Keevin and Hempen 1997). Occasional behavioral reactions to intermittent explosions and impulsive sound sources are unlikely to cause long-term impacts for individual fish or populations. While serious injury or mortality to individual fish would be expected if they were present in the immediate vicinity of explosive ordnance use, despite the increase in activities under Alternative 1, impacts from training activities would be temporary and localized since the activities are infrequent and widely dispersed throughout the Study Area, and the distribution of potentially affected fishes also varies.

Training activities involving impulsive acoustic sources in the Inland Waters have the possibility to affect the ESA-listed species present, potentially resulting in short-term behavioral or physiological responses, hearing loss, injury, or mortality. It is possible for fish to be injured or killed by explosives; however, long-term impacts from a loss of a few individuals is unlikely to have measureable effects on overall stocks or populations. Therefore, long-term impacts to fish populations would not be expected. There is the potential for effects to Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU) critical habitat, however training activities involving impulsive acoustic sources would occur in designated portions of the Inland Waters away from the critical habitat.

*Pursuant to the ESA, the use of explosives during training activities under Alternative 1 may affect and is likely to adversely affect, Chinook, coho, chum, and sockeye salmonids, steelhead (Puget Sound DPS, Upper Columbia River DPS, Middle Columbia River DPS, Lower Columbia River DPS, Upper Willamette River DPS, and Snake River Basin DPS), bull trout, Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), and Pacific eulachon (Southern DPS).*

*The use of explosives during training activities under Alternative 1 may affect, but is not likely to adversely affect steelhead (Northern California Coast DPS, California Central Valley DPS, Central California Coast DPS, South-Central California Coast DPS, and Southern California Coast DPS), and green sturgeon.*

*The use of explosives during training activities under Alternative 1 may affect, but is not likely to adversely affect, critical habitat for Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and there would be no effect to critical habitat for bull trout (Coastal Puget Sound DPS), green sturgeon (Southern DPS), or Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), and yelloweye rockfish (Puget Sound/Georgia Basin DPS).*

## Testing Activities

### Offshore Area

Under Alternative 1, fish would be exposed to explosions at or beneath the water surface during testing activities conducted by Naval Sea Systems Command (NAVSEA) and Naval Air Systems Command (NAVAIR) (Tables 2.8-2 and 2.8-3). The only explosives that would be used in offshore areas (beyond 12 nm from shore) due to testing activities would be sonobuoys, torpedoes, and subsurface targets. The number of explosives used in testing activities would decrease from 209 in the No Action Alternative to 142 in Alternative 1.

As discussed for the No Action Alternative, potential impacts on fish from explosions and impulsive sound sources can range from no effect, brief acoustic effects, tactile perception, and physical discomfort, to slight injury to internal organs and the auditory system, to death of the animal (Keevin and Hempen 1997). Occasional behavioral reactions to intermittent explosions and impulsive sound sources are unlikely to cause long-term impacts for individual fish or populations. It is possible for fish to be injured or killed by explosives; however, long-term impacts from a loss of a few individuals are unlikely to have measureable effects on overall stocks or populations. Therefore, activities under Alternative 1, impacts from at-sea explosion from testing activities would be temporary and localized since the activities are infrequent and widely dispersed throughout the Study Area, and the distribution of potentially affected fishes also varies.

Testing activities involving impulsive acoustic sources in Offshore Area have the possibility to affect the ESA-listed species present, potentially resulting in short-term behavioral or physiological responses, hearing loss, injury, or mortality. It is possible for fish to be injured or killed by explosives; however, long-term impacts from a loss of a few individuals is unlikely to have measureable effects on overall stocks or populations. However, given the infrequent nature of testing activities involving impulsive acoustic sources, the likelihood of these species encountering an explosive activity taking place anywhere within Offshore Area is remote. Explosive activities occur at sea generally more than 50 nm from shore. Although salmonid species are not common outside 40 nm from shore, there is a potential for overlap between explosive activities and salmonid species. Additionally, no explosives are used within the Olympic Coast National Marine Sanctuary. Effects to bull trout designated critical habitat would not occur as activities do not overlap. There is the potential for effects to green sturgeon designated critical habitat; however, it is unlikely that testing activities involving impulsive acoustic sources would occur that close to shore in the Offshore Area.

### Inland Waters

As described in Tables 2.8-2 and 2.8-3, testing activities under Alternative 1 would not involve explosions.

*Pursuant to the ESA, the use of explosives during testing activities under Alternative 1 may affect and is likely to adversely affect, Chinook, coho, chum, and sockeye salmonids, steelhead (Puget Sound DPS, Upper Columbia River DPS, Middle Columbia River DPS, Lower Columbia River DPS, Upper Willamette River DPS, and Snake River Basin DPS), Pacific eulachon, and rockfish species.*

*The use of explosives during testing activities under Alternative 1 may affect, but is not likely to adversely affect, steelhead (Norther California Coast DPS, California Central Valley DPS, Central California Coast DPS, South-Central California Coast DPS, and Southern California Coast DPS), and green sturgeon. There would be no effect on bull trout.*

*The use of explosives during testing activities under Alternative 1 may affect, but is not likely to adversely affect, green sturgeon critical habitat; and would have no effect on critical habitat for salmonid species, rockfish species, or bull trout.*

## Alternative 2

### Training Activities

#### Offshore Area

As described in Chapter 2 (Description of Proposed Action and Alternatives), Table 2.8-1, and Section 3.0.5.3.1.2 (Explosives), the number of annual training activities that use explosions under Alternative 2 would increase, due to an increase in the GUNEX, even though the SINKEX is removed. Although the number of explosives used in training activities would decrease compared to training activities under the No Action Alternative, these activities would generally occur in the same areas as under the No Action Alternative, and severity of impacts would not be discernable from those described in No Action Alternative – Training Activities.

As discussed for the No Action Alternative, potential impacts on fish from explosions and impulsive sound sources can range from no effect, brief acoustic effects, tactile perception, and physical discomfort, to slight injury to internal organs and the auditory system, to death of the animal (Keevin and Hempen 1997). Occasional behavioral reactions to intermittent explosions and impulsive sound sources are unlikely to cause long-term impacts for individual fish or populations. It is possible for fish to be injured or killed by explosives; however, long-term impacts from a loss of a few individuals is unlikely to have measureable effects on overall stocks or populations. Therefore, despite the increase in activities under Alternative 2, impacts from at-sea explosion from training activities would be temporary and localized because the activities are infrequent and widely dispersed throughout the Study Area, and the distribution of potentially affected fishes also varies.

Training activities involving impulsive acoustic sources in Offshore Area have the possibility to affect the ESA-listed species present, potentially resulting in short-term behavioral or physiological responses, hearing loss, injury, or mortality. However, given the infrequent nature of training activities involving impulsive acoustic sources, the likelihood of these species encountering an explosive activity taking place anywhere within Offshore Area is remote. Explosive activities occur at sea generally more than 50 nm from shore. Although salmonid species are not common outside 40 nm from shore, there is a potential for overlap between explosive activities and salmonid species. Additionally, no explosives are used with in the Olympic Coast National Marine Sanctuary. There is the potential for effects to green sturgeon and bull trout designated critical habitat; however, it is unlikely that training activities involving impulsive acoustic sources would occur that close to shore in the Offshore Area.

#### Inland Waters

As described in Chapter 2 (Description of Proposed Action and Alternatives), Table 2.8-1, and Section 3.0.5.3.1.2 (Explosives), the number of annual training activities that use explosions under Alternative 2 would increase compared to the No Action Alternative. Under Alternative 2, the total number of explosive training events would increase relative to the No Action Alternative, from the additional use of 18 SWAGs in Crescent Harbor and 18 SWAGs in Hood Canal. The mine neutralization exercises would increase from two 1.5 lb. (0.68 kg) mine neutralization charges to three 2.5 lb. (1.13 kg) charges in Hood Canal and from two to three 2.5 lb. (1.13 kg) mine neutralization exercises in Crescent Harbor.

As discussed for the No Action Alternative, potential impacts on fish from explosions and impulsive sound sources can range from no effect, brief acoustic effects, tactile perception, and physical discomfort, to slight injury to internal organs and the auditory system, to death of the animal (Keevin and Hempen 1997). Occasional behavioral reactions to intermittent explosions and impulsive sound sources are unlikely to cause long-term impacts for individual fish or populations. While serious injury or mortality to individual fish would be expected if they were present in the immediate vicinity of explosive ordnance use, despite the increase in activities under Alternative 2, impacts from at-sea explosion from training activities would be temporary and localized since the activities are infrequent and widely dispersed throughout the Study Area, and the distribution of potentially affected fishes also varies.

Training activities involving impulsive acoustic sources in the Inland Waters have the possibility to affect the ESA-listed species present, potentially resulting in short-term behavioral or physiological responses, hearing loss, injury, or mortality. There is the potential for effects to Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU) critical habitat; however, training activities involving impulsive acoustic sources would occur in designated portions of the Inland Waters away from the critical habitat.

*Pursuant to the ESA, the use of explosives during training activities under Alternative 2 may affect and is likely to adversely affect, Chinook, coho, chum, and sockeye salmonids, steelhead (Puget Sound DPS, Upper Columbia River DPS, Middle Columbia River DPS, Lower Columbia River DPS, Upper Willamette River DPS, and Snake River Basin DPS), bull trout,, Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), and Pacific eulachon (Southern DPS).*

*The use of explosives during training activities under Alternative 2 may affect, but is not likely to adversely affect, steelhead (Norther California Coast DPS, California Central Valley DPS, Central California Coast DPS, South-Central California Coast DPS, and Southern California Coast DPS), and green sturgeon.*

*The use of explosives during training activities under Alternative 2 may affect, but is not likely to adversely affect, critical habitat for Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and there would be no effect to critical habitat for bull trout (Coastal Puget Sound DPS), green sturgeon (Southern DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), and yelloweye rockfish (Puget Sound/Georgia Basin DPS).*

### Testing Activities

#### Offshore Area

Under Alternative 2, fish would be exposed to explosions at or beneath the water surface during testing activities conducted by NAVSEA and NAVAIR (Tables 2.8-2 and 2.8-3). The only explosives that would be used in offshore areas (beyond 12 nm from shore) due to testing activities would be sonobuoys and torpedoes. The number of explosives used in testing activities would decrease from 209 in the No Action Alternative to 142 in Alternative 2.

Proposed testing activities under Alternative 2 that involve explosives and other impulsive sources differ in number and location from training activities under the No Action Alternative; however, the types and severity of impacts would not be discernable from those described in the No Action Alternative – Training Activities.

Testing activities involving impulsive acoustic sources in Offshore Area have the possibility to affect the ESA-listed species present, potentially resulting in short-term behavioral or physiological responses, hearing loss, injury, or mortality. It is possible for fish to be injured or killed by explosives; however, long-term impacts from a loss of a few individuals is unlikely to have measureable effects on overall stocks or populations. However, given the infrequent nature of testing activities involving impulsive acoustic sources, the likelihood of these species encountering an explosive activity taking place anywhere within Offshore Area is remote. Explosive activities occur at sea generally more than 50 nm from shore. Although salmonid species are not common outside 40 nm from shore, there is a potential for overlap between explosive activities and salmonid species. Additionally, no explosives are used within the Olympic Coast National Marine Sanctuary. Effects to bull trout designated critical habitat would not occur as activities do not overlap. There is the potential for effects to green sturgeon designated critical habitat; however, it is unlikely that training activities involving impulsive acoustic sources would occur that close to shore in the Offshore Area.

**Inland Waters**

As described in Tables 2.8-2 and 2.8-3, testing activities under Alternative 2 would not involve explosions.

*Pursuant to the ESA, the use of explosives during testing activities under Alternative 2 may affect and is likely to adversely affect, Chinook, coho, chum, and sockeye salmonids, steelhead (Puget Sound DPS, Upper Columbia River DPS, Middle Columbia River DPS, Lower Columbia River DPS, Upper Willamette River DPS, and Snake River Basin DPS), Pacific eulachon, and rockfish species.*

*The use of explosives during testing activities under Alternative 2 may affect, but is not likely to adversely affect, steelhead (Norther California Coast DPS, California Central Valley DPS, Central California Coast DPS, South-Central California Coast DPS, and Southern California Coast DPS), and green sturgeon. There would be no effect on bull trout.*

*The use of explosives during testing activities under Alternative 2 may affect, but is not likely to adversely affect, green sturgeon critical habitat; and would have no effect on critical habitat for salmonid species, rock fish species, or bull trout.*

#### 3.9.3.1.5 Impacts from Vessel Noise

Fish may be exposed to noise from vessel movement. A detailed description of the acoustic characteristics and typical sound levels of vessel noise is in Section 3.0.5.3.1.4 (Vessel Noise). Vessel movements involved transits to and from ports to various locations within the Study Area, and many ongoing and proposed training and testing activities within the Study Area involve maneuvers by various types of surface ships, boats, and submarined (collectively referred to as vessels).

### No Action Alternative, Alternative 1, and Alternative 2 – Training Activities

As discussed in Chapter 2 (Description of the Proposed Action and Alternatives) training activities under the No Action Alternative, Alternative 1, and Alternative 2 include vessel movements in many events. Navy vessel traffic could occur anywhere within the Study Area; however, it would be concentrated near ports or naval installations and training ranges. Activities involving vessel movements occur intermittently and are variable in duration, ranging from a few hours up to 2 weeks. Additionally, a variety of smaller craft would be operated within the Study Area. These small craft types, sizes, and speeds vary, but in general, they will emit higher-frequency noise than larger ships. Training activities within the Study Area typically consist of a single vessel involved in unit-level activity for a few hours, or one or two small boats conducting testing. Navy vessels do contribute to the overall ambient noise in inland waters near Navy ports, although their contribution to the overall noise in these environments is minimal because these areas typically have large amounts of commercial and recreational vessel traffic.

Vessel noise has the potential to expose fish to sound and general disturbance, which could result in short-term behavioral or physiological responses (e.g., avoidance, stress, increased heart rate). Training activities involving vessel movements occur intermittently and range in duration from a few hours up to a few weeks. These activities are widely dispersed throughout the Study Area. While vessel movements have the potential to expose fish occupying the water column to sound and general disturbance, potentially resulting in short-term behavioral or physiological responses, such responses would not be expected to compromise the general health or condition of individual fish. In addition, most activities involving vessel movements are infrequent and widely dispersed throughout the Study Area. The exception is for pierside activities; although these areas are located in the Inland Waters, these are industrialized areas that are already exposed to high levels of anthropogenic noise due to numerous waterfront users (e.g., industrial and marinas). Therefore, impacts from vessel noise would be temporary and localized. Long-term population level impacts are not expected.

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*Pursuant to the ESA, vessel noise from training and testing activities under the No Action Alternative, Alternative 1, and Alternative 2 may affect but are not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, rockfish species, bull trout, or green sturgeon.*

*Vessel noise during training and testing activities under the No Action Alternative, Alternative 1, or Alternative 2 would have no effect on critical habitat for any ESA listed fish species.*

#### 3.9.3.1.6 Impacts from Aircraft Noise

Fish could be exposed to aircraft generated noise wherever aircraft overflights occur in the Study Area. Fixed and rotary-wing aircraft are used for a variety of training and testing activities throughout the Study Area. Certain portions of the Study Area, such as areas near Navy airfields, installations, and ranges are used more heavily by Navy aircraft than other portions. These activities would be spread across the coastal and open ocean areas designated within the Study Area. A detailed description of aircraft noise as a stressor is provided in Section 3.0.5.3.1.5 (Aircraft Noise).

### No Action Alternative, Alternative 1, and Alternative 2 – Training Activities

As discussed in Chapter 2 (Description of the Proposed Action and Alternatives) training activities under the No Action Alternative, Alternative 1, and Alternative 2 include fixed- and rotary-wing aircraft overflights as part of many events. Aircraft can produce extensive airborne noise from either turbofan or turbojet engines. A severe but infrequent type of aircraft noise is the sonic boom, produced when the aircraft exceeds the speed of sound. However, the altitude of fixed-wing aircraft flights within the NWTT Study Area is likely to preclude any impacts to fish.

Rotary-wing aircraft (helicopters) produce low-frequency sound and vibration (Pepper et al. 2003). Some species of fish could respond to noise associated with surface disturbance created by downdrafts from helicopters; however, sound is primarily transferred into the water from air in a narrow cone under the aircraft (See Section F.2.1.6, Air-Water Interface, in Appendix F, Acoustic and Explosives Primer). Aircraft overflights have the potential to affect surface waters and, therefore, to expose fish occupying those upper portions of the water column to sound and general disturbance, which could potentially result in short-term behavioral or physiological responses. There are no rotary wing aircraft overflights within the Inland waters or Western Behm Canal portions of the Study Area, and limited low overflights of rotary wing aircraft in the offshore waters. Wave and wind action in the offshore portion of the study area are likely to mask, or make noise from aircraft noise relatively indistinguishable from other sources of anthropogenic noise. Therefore, due to the low number, intermittent nature, and reduced sound transmission of in air sound to the underwater environment, reactions to aircraft noise are expected to be unlikely.

### No Action Alternative, Alternative 1, and Alternative 2 – Testing Activities

As discussed in Chapter 2 (Description of the Proposed Action and Alternatives) testing activities under the No Action Alternative, Alternative 1, and Alternative 2 include fixed- and rotary-wing aircraft overflights as part of many events. Aircraft can produce extensive airborne noise from either turbofan or turbojet engines. A severe but infrequent type of aircraft noise is the sonic boom, produced when the aircraft exceeds the speed of sound. However, the altitude of fixed-wing aircraft flights within the NWTT Study Area is likely to preclude any impacts to fish.

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*Pursuant to the ESA, aircraft noise from training and testing activities under the No Action Alternative, Alternative 1, and Alternative 2 would have no effect on ESA-listed salmonid species, Pacific eulachon, rockfish species, bull trout, or green sturgeon.*

*Aircraft noise during training and testing activities under the No Action Alternative, Alternative 1, or Alternative 2 would have no effect on critical habitat for any ESA listed fish species.*

### Summary of Effects to Marine Fish from Acoustic Stressors

Under the No Action Alternative, Alternative 1, or Alternative 2, no mortality or injury is expected to fish from exposure to sonar or other active acoustic sources. The potential impacts on fish from explosive stressors can range from no impact, brief acoustic effects, tactile perception, and physical discomfort; to slight injury to internal organs and the auditory system; to death of the animal (Keevin et al. 1997). While serious injury or mortality to individual fish would be expected if they were present in the immediate vicinity of explosive ordnance use, impacts would be localized since activities are infrequent and widely dispersed throughout the Study Area, and the number of affected fish is expected to be small relative to their total population. Occasional behavioral reactions to intermittent explosives and active acoustic sources are unlikely to cause long-term impacts for individual fish or populations.

*Pursuant to the ESA, the use of acoustic stressors under the No Action Alternative, Alternative 1, or Alternative 2 may affect and is likely to adversely affect, Chinook, coho, chum, and sockeye salmonids, steelhead (Puget Sound DPS, Upper Columbia River DPS, Middle Columbia River DPS, Lower Columbia River DPS, Upper Willamette River DPS, and Snake River Basin DPS), bull trout, Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), and Pacific eulachon (Southern DPS).*

*Pursuant to the ESA, the use of acoustic stressors under the No Action Alternative, Alternative 1, or Alternative 2 may affect, but is not likely to adversely affect, steelhead (Norther California Coast DPS, California Central Valley DPS, Central California Coast DPS, South-Central California Coast DPS, and Southern California Coast DPS), and green sturgeon.*

*Pursuant to the ESA, the use of acoustic stressors under the No Action Alternative, Alternative 1, or Alternative 2 may affect, but is not likely to adversely affect, critical habitat for Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and would have no effect on critical habitat for bull trout (Coastal Puget Sound DPS), green sturgeon (Southern DPS), or Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), and yelloweye rockfish (Puget Sound/Georgia Basin DPS).*

### 3.9.3.2 Energy Stressors

This section analyzes the potential impacts of energy stressors that can occur during training and testing activities within the Study Area, which only includes potential impacts from electromagnetic devices.

#### 3.9.3.2.1 Impacts from Electromagnetic Devices

Electromagnetic devices are used during training and testing activities. A discussion of the type, number, and location of activities using these devices under each alternative is presented in Section 3.0.5.3.2.1 (Electromagnetic).

A comprehensive review of information regarding the sensitivity of marine organisms to electric and magnetic impulses, including fishes comprising the subclass Elasmobranchii (sharks, skates, and rays; hereafter referred to as elasmobranchs), as well as other bony fishes, is presented in Normandeau et al. (2011). The synthesis of available data and information contained in this report suggests that while many fish species (particularly elasmobranchs) are sensitive to electromagnetic fields, further investigation is necessary to understand the physiological response and magnitude of the potential effects. Most examinations of electromagnetic fields on marine fishes have focused on buried undersea cables associated with offshore wind farms in European waters (Boehlert and Gill 2010; Gill 2005; Ohman et al. 2007).

Many fish groups including lamprey, elasmobranchs, eels, salmonids, stargazers, and others, have an acute sensitivity to electrical fields, known as electroreception (Bullock et al. 1983; Helfman et al. 2009b). Electroreceptors are thought to aid in navigation, orientation, and migration of sharks and rays (Kalmijn 2000). In elasmobranchs, behavioral and physiological response to electromagnetic stimulus varies by species and age, and appears to be related to foraging behavior (Rigg et al. 2009). Many elasmobranchs respond physiologically to electric fields of 10 nanovolts (nV) per cm and behaviorally at 5 nV per cm (Collin and Whitehead 2004). Electroreceptive marine fishes with ampullary (pouch) organs can detect considerably higher frequencies of 50 Hz to more than 2 kHz (Helfman et al. 2009b). The distribution of electroreceptors on the head of these fishes, especially around the mouth suggests that these sensory organs may be used in foraging. Additionally, some researchers hypothesize that the electroreceptors aid in social communication (Collin and Whitehead 2004). The ampullae of some fishes are sensitive to low frequencies (< 0.1–25 Hz) of electrical energy (Helfman et al. 2009b), which may be of physical or biological origin, such as muscle contractions. For example, the ampullae of the shovelnose sturgeon (*Scaphirhynchus platorynchus*) were shown to respond to electromagnetic stimuli in a way comparable to the well-studied elasmobranchs, which are sensitive to electric fields as low as 1 microvolt (μV) per cm with a magnetic field of 100 gauss (Bleckmann and Zelick 2009).

While elasmobranchs and other fishes can sense the level of the earth's electromagnetic field, the potential effects on fish resulting from changes in the strength or orientation of the background field are not well understood. When the electromagnetic field is enhanced or altered, sensitive fishes may experience an interruption or disturbance in normal sensory perception. Research on the electrosensitivity of sharks indicates that some species respond to electrical impulses with an apparent avoidance reaction (Helfman et al. 2009b; Kalmijn 2000). This avoidance response has been exploited as a shark deterrent to repel sharks from areas of overlap with human activity (Marcotte and Lowe 2008).

Experiments with electromagnetic pulses can provide indirect evidence of the range of sensitivity of fishes to similar stimuli. Two studies reported that exposure to electromagnetic pulses do not have any effect on fishes (Hartwell et al. 1991; Nemeth and Hocutt 1990). The observed 48-hour mortality of small estuarine fishes (sheepshead minnow [*Cyprinodon variegates*], mummichog [*Fundulus heteroclitus*], Atlantic menhaden [*Brevoorita tyrannus*], striped bass [*Morone saxatilis*], Atlantic silverside [*Menidia menidia*], fourspine stickleback [*Apeltes quadracus*], and rainwater killifish [*Lucania parva*]) exposed to electromagnetic pulses of 100 to 200 kilovolts (kV) per m (10 nanoseconds per pulse) from distances greater than 164 ft. (50 m) was not statistically different than the control group (Hartwell et al. 1991; Nemeth and Hocutt 1990). During a study of Atlantic menhaden, there were no statistical differences in swimming speed and direction (toward or away from the electromagnetic pulse source) between a group of individuals exposed to electromagnetic pulses and the control group (Hartwell et al. 1991; Nemeth and Hocutt 1990).

Both laboratory and field studies confirm that elasmobranchs (and some teleost [bony] fishes) are sensitive to electromagnetic fields, but the long-term impacts are not well-known. Electromagnetic sensitivity in some marine fishes (e.g., salmonids) is already well-developed at early life stages (Ohman et al. 2007), with sensitivities reported as low as 0.6 millivolt per cm in Atlantic salmon (Formicki et al. 2004); however, most of the limited research that has occurred focuses on adults. Some species appear to be attracted to undersea cables while others show avoidance (Ohman et al. 2007). Under controlled laboratory conditions, the scalloped hammerhead (*Sphyrna lewini*) and sandbar shark (*Carcharhinus plumbeus*) exhibited altered swimming and feeding behaviors in response to very weak electric fields (less than 1 µV per cm) (Kajiura and Holland 2002). In a test of sensitivity to fixed magnets, five Pacific sharks were shown to react to magnetic field strengths of 25–234 gauss at distances ranging between 0.85 and 1.90 ft. (0.26 and 0.58 m) and avoid the area (Rigg et al. 2009). A field trial in the Florida Keys demonstrated that southern stingray (*Dasyatis americana*) and nurse shark (*Ginglymostoma cirratum*) detected and avoided a fixed magnetic field producing a flux of 950 gauss (O'Connell et al. 2010).

Potential impacts of electromagnetic activity on adult fishes may not be relevant to early life stages (eggs, larvae, juveniles) due to ontogenic (lifestage-based) shifts in habitat utilization (Botsford et al. 2009; Sabates et al. 2007). Some skates and rays produce egg cases that occur on the bottom, while many neonate and adult sharks occur in the water column or near the water surface. Other species may have an opposite life history, with egg and larval stages occurring near the water surface, while adults may be demersal.

Based on current literature, only the fish groups identified above as capable of detecting electromagnetic fields (primarily elasmobranchs, salmonids, tuna, eels, and stargazers) will be carried forward in this analysis and the remaining taxonomic groups (from Table 3.9-2) will not be discussed further.

No in-water electromagnetic energy training or testing activities occur in the Offshore Area or the Western Behm Canal under any alternative. Therefore, these areas will not be further analyzed.

### No Action Alternative

#### Training Activities

#### Inland Waters

No electromagnetic energy activities occur under training activities in the Inland Waters of the Study Area under the No Action Alternative.

#### Testing Activities

#### Inland Waters

No electromagnetic energy activities occur under testing activities in the Inland Waters portion of the Study Area under the No Action Alternative.

*Pursuant to the ESA, the use of electromagnetic devices during training activities occurring under the No Action Alternative would have no effect on ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Electromagnetic activities under the No Action Alternative would have no effect on critical habitat for salmonid species, green sturgeon, or rockfish.*

### Alternative 1

#### Training Activities

#### Inland Waters

Table 3.0-15 lists the number and location of electromagnetic energy activities. Under Alternative 1, the Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise that involves purposefully creating an electromagnetic field underwater would occur once every other year within the Inland Waters and have the potential to expose fish to that energy stressor.

All of the ESA-listed fish occur in Inland waters and would have the potential to be exposed to the electromagnetic fields. Electromagnetic devices are used primarily during mine detection/neutralization activities, and in most cases, the devices simply mimic the electromagnetic signature of a vessel passing through the water. None of the devices include any type of electromagnetic "pulse." The towed body used for mine sweeping is designed to simulate a ship's electromagnetic signal in the water, and so would not be experienced by fishes as anything unusual. The static magnetic field generated by the electromagnetic systems is of relatively minute strength, typically 23 gauss at the cable surface and 0.002 gauss at a radius of 656 ft. (199.9 m). The strength of the electromagnetic field decreases quickly away from the cable down to the level of earth's magnetic field (0.5 gauss) at less than 13 ft. (4.0 m) from the source. In addition, training activities generally occur in the water column, where fishes with high mobility predominate and fish densities are relatively low, compared with nearshore benthic habitat. Because the towed body is continuously moving, most fishes are expected to move away from it or follow behind it, in ways similar to responses to a vessel.

For any electromagnetically sensitive fishes in close proximity to the source, the generation of electromagnetic fields during training activities has the potential to interfere with prey detection, navigation, and schooling behavior. They may also experience temporary disturbance of normal sensory perception or could experience avoidance reactions (Kalmijn 2000), resulting in alterations of behavior and avoidance of normal foraging areas or migration routes. Mortality from electromagnetic devices is not expected.

Therefore, the electromagnetic devices used would not cause any potential risk to fishes because (1) the range of impact (i.e., greater than earth's magnetic field) is small (i.e., 13 ft. [4.0 m] from the source); (2) the electromagnetic components of these activities are limited to simulating the electromagnetic signature of a vessel as it passes through the water; and (3) the electromagnetic signal is temporally variable and would cover only a small spatial range during each activity in the Study Area. Some fishes could have a detectable response to electromagnetic exposure, but any impacts would be temporary with no anticipated impact on an individual's growth, survival, annual reproductive success, or lifetime reproductive success (i.e., fitness). Fitness refers to changes in an individual's growth, survival, annual reproductive success, or lifetime reproductive success. Electromagnetic exposure of eggs and larvae of sensitive bony fishes would be low relative to their total ichthyoplankton biomass (Able and Fahay 1998) and; therefore, potential impacts on recruitment would not be expected.

The ESA-listed Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU), steelhead (Puget Sound DPS), Pacific eulachon (Southern DPS), green sturgeon (Southern DPS), bull trout (Coastal Puget Sound DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), and yelloweye rockfish (Puget Sound/Georgia Basin DPS) species generally occur in shallow nearshore and coastal waters, and therefore could encounter electromagnetic devices used in training activities in the Inland Waters of the Study Area. If located in the immediate area where electromagnetic devices are being used, ESA-listed species could experience temporary disturbance in normal sensory perception during migratory or foraging movements, or avoidance reactions (Kalmijn 2000).

The majority of the PCEs required by the salmonid species and Pacific Eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. Impacts to designated Hood Canal summer-run chum and Puget Sound Chinook nearshore critical habitat, including the nearshore marine PCEs, may occur in the Inland Waters of the Study Area; however, these impacts would be short term. Electromagnetic stressors could impact the critical habitat by temporarily disturbing foraging movements or avoidance reactions of the ESA-listed species prey. There would be no effect on the PCEs for bull trout and rockfish species critical habitat. Designated steelhead, coho, sockeye, green sturgeon, and Pacific eulachon critical habitat are not present in the Study Area and would not be impacted.

*Pursuant to the ESA, electromagnetic training activities occurring under Alternative 1 may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Electromagnetic activities under Alternative 1 may affect, but are not likely to adversely affect, critical habitat for Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU); and would have no effect on critical habitat for bull trout (Coastal Puget Sound DPS), and Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), or green sturgeon.*

## Testing Activities

### Inland Waters

No electromagnetic energy activities occur under testing activities in the Inland Waters portion of the Study Area under Alternative 1.

*No electromagnetic testing activities would occur under Alternative 1; therefore, pursuant to the ESA, there would be no effect on ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*There are no electromagnetic testing activities under Alternative 1; therefore, there would be no effect on critical habitat for salmonid species, green sturgeon, or rockfish.*

### Alternative 2

#### Training Activities

#### Inland Waters

Under Alternative 2, the Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise that involves purposefully creating an electromagnetic field underwater would occur annually within the Puget Sound and have the potential to expose fish to that energy stressor. The impacts would not be discernable from those described above in Alternative 1 – Training Activities.

*Pursuant to the ESA, electromagnetic training activities occurring under Alternative 2 may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Electromagnetic activities under Alternative 2 may affect, but are not likely to adversely affect, critical habitat for Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU); and would have no effect on critical habitat for bull trout (Coastal Puget Sound DPS), and Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), or green sturgeon.*

#### Testing Activities

#### Inland Waters

No electromagnetic energy activities occur under testing activities in the Inland Waters portion of the Study Area under Alternative 2.

*No electromagnetic testing activities would occur under Alternative 2; therefore, pursuant to the ESA, there would be no effect on ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*There are no electromagnetic testing activities under Alternative 2; therefore, there would be no effect on critical habitat for salmonid species, green sturgeon, or rockfish.*

### Summary and Conclusions of Energy Impacts

Under Alternative 1 or Alternative 2 in the Inland Waters, disturbance from activities using electromagnetic energy could be expected to elicit brief behavioral or physiological responses only in those exposed fishes with sensitivities/detection abilities within the corresponding portion of the electromagnetic spectrum that these activities use. For electromagnetic devices, the typical reaction would be for the fish to avoid (move away from) the signal upon detection. The impact of electromagnetic signals are expected to be inconsequential on fishes or fish populations because signals are similar to regular vessel traffic, and the electromagnetic signal would be continuously moving and cover only a small spatial area during use.

*Pursuant to the ESA, energy stressors under the No Action Alternative, Alternative 1, or Alternative 2 may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Energy stressors under the No Action Alternative, Alternative 1, or Alternative 2 may affect, but are not likely to adversely affect, critical habitat Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU),; and would have no effect on critical habitat for coho, steelhead, sockeye bull trout (Coastal Puget Sound DPS), and Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), or green sturgeon.*

#### 3.9.3.3 Physical Disturbance and Strike Stressors

This section evaluates the potential effects of various types of physical disturbance and strike stressors used by Navy during training and testing activities within the Study Area. Table 3.9-4 shows the location and frequency of occurrence within the Study Area of these stressors, by alternative.

Physical disturbance and strike stressors from vessels and in-water devices, military expended materials, and seafloor devices have the potential to affect all marine fish groups found within the Study Area (see Table 3.9-1 and Table 3.9-2), although some fish groups are more susceptible to strike potential than others. The potential responses to physical strikes are varied, but include behavioral changes such as avoidance, altered swimming speed and direction, physiological stress, and physical injury or mortality. Despite their ability to detect approaching vessels using a combination of sensory cues (sight, hearing, lateral line), larger slow-moving fishes (e.g., ocean sunfish, basking sharks, manta rays) cannot avoid all collisions, with some collisions resulting in mortality (Speed et al. 2008).

How a physical strike impacts a fish depends on the relative size of the object potentially striking the fish and the location of the fish in the water column. Before being struck by an object, Atlantic salmon for example, would sense a pressure wave through the water (Hawkins and Johnstone 1978a) and have the ability to swim away from the oncoming object. The movement generated by a large object moving through the water would simply displace small fishes in open water. Some fish might have time to detect the approaching object and swim away; others could be struck before they become aware of the object. An open-ocean fish that is displaced a small distance by movements from an object falling into the water nearby would likely navigate to its original path following the displacement event. However, a bottom-dwelling fish near a sinking object would likely be disturbed or injured, and may exhibit a general stress response. As in all vertebrates, the function of the stress response in fishes is to rapidly raise the blood sugar level to prepare the fish to flee or fight (Helfman et al. 2009b). This generally adaptive physiological response can become a liability to the fish if the stressor persists and the fish is not able to return to its baseline physiological state. When stressors are chronic, the fish may experience reduced growth, health, or survival (Wedemeyer et al. 1990). If the object hits the fish, direct injury (in addition to stress) or death may result.

Many fishes respond to a sudden physical approach or contact by darting quickly away from the stimulus. Some other species may respond by freezing in place and adopting cryptic coloration. Some other species may respond in an unpredictable manner. Regardless of the response, the individual must stop its current activity and divert its physiological and cognitive attention to responding to the stressor (Helfman et al. 2009b). The energy costs of reacting to a stressor depend on the specific situation, but in all cases the caloric requirements of stress reactions reduce the amount of energy available to the fish for other functions, such as predator avoidance, reproduction, growth, and maintenance (Wedemeyer et al. 1990).

The ability of a fish to return to its previous activity following a physical strike (or near-miss resulting in a stress response) is a function of a variety of factors. Some fish species are more tolerant of stressors than others and become re-acclimated more easily. Experiments with species for use in aquaculture have revealed the immense variability among species in their tolerance to physical stressors. Within a species, the rate at which an individual recovers from a physical strike may be influenced by its age, sex, reproductive state, and general condition. A fish that has reacted to a sudden disturbance by swimming at burst speed would tire after only a few minutes; its blood hormone and sugar levels (cortisol and glucose) may not return to normal for 24 hours or more. During its recovery period, the fish would not be able to attain burst speeds and would be more vulnerable to predators (Wardle 1986). If the individual were not able to regain a steady state following exposure to a physical stressor, it may suffer reduced immune function and even death (Wedemeyer et al. 1990).

Potential impacts of physical disturbance or strike to adults may be different than for other life stages (eggs, larvae, juveniles) because they have varying abilities to respond to disturbances. The numbers of eggs and larvae exposed to vessel movements would be low relative to total ichthyoplankton biomass (Able and Fahay 1998); therefore, measurable effects on fish recruitment would not be expected. Also, the early life stages of most marine fishes (excluding sharks and other livebearers) already have extremely high natural mortality rates (10 to 85 percent per day) from predation on these life stages (Helfman et al. 2009b), and, therefore, most eggs and larvae are not expected to survive to the next life stage, as demonstrated by equivalent adult modeling (Horst 1977).

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

The majority of the activities under all alternatives involve vessels, and a few of the activities involve the use of in-water devices. For a discussion of the types of activities that use vessels and in-water devices, where they are used, and how many activities would occur under each alternative, see Section 3.0.5.3.3 (Physical Disturbance and Strike Stressors). See Table 3.0-16 for a representative list of Navy vessel types, sizes, and speeds used in the Study Area. Vessels and in-water devices are covered together in this section because they both present similar potential impacts to fishes.

Vessels and in-water devices do not normally collide with adult fish that are not large, slow-moving, or found at the surface since it is expected that they are capable of detection and avoidance. One study on fishes' behavioral responses to vessels showed that most adults exhibit avoidance responses to engine noise, sonar, depth finders, and fish finders (Jørgensen et al. 2004), reducing the potential for vessel strikes. Misund (1997b) found that fishes ahead of a ship that showed avoidance reactions did so at ranges of 160–490 ft. (48.8–149.4 m). When the vessel passed over them, some fishes responded with sudden escape responses that included lateral avoidance or downward compression of the school. Conversely, Rostad et al. (2006) observed that some fishes are attracted to different types of vessels (e.g., research vessels, commercial vessels) of varying sizes, noise levels, and habitat locations. Fish behavior in the vicinity of a vessel is therefore quite variable, depending on the type of fish, its life history stage, behavior, time of day, and the sound propagation characteristics of the water (Schwarz 1985). Early life stages of most fishes could be displaced by vessels and not struck in the same manner as adults of larger species. However, a vessel's propeller movement or propeller wash could entrain early life stages. The low-frequency sounds of large vessels or accelerating small vessels caused avoidance responses among herring (Chapman and Hawkins 1973a), but avoidance ended within 10 seconds (s) after the vessel departed. Because a towed in-water device is continuously moving, most fishes are expected to move away from it or to follow behind it, in a manner similar to their responses to a vessel. When the device is removed, most fishes would simply move to another area.

There are a few notable exceptions to this assessment of potential vessel strike impacts on marine fish groups. Large slow-moving fish such as ocean sunfish, whale sharks, basking sharks, and manta rays occur near the surface in open-ocean and coastal areas, and are more susceptible to ship strikes, causing blunt trauma, lacerations, fin damage, or mortality. Speed et al. (2008) evaluated this specifically for whale sharks, but these other large slow-moving fishes are also likely to be susceptible because of their similar behavior and location in the water column. Increases in the numbers and sizes of shipping vessels in the modern cargo fleets make it difficult to gather mortality data because personnel on large ships are often unaware of whale shark collisions (Stevens 2007); therefore, the occurrence of whale shark strikes is likely much higher than has been documented by the few studies that have been conducted. The results of a whale shark study outside of the Study Area in the Gulf of Tadjoura, Djibouti, revealed that of the 23 whale sharks observed during a 5-day period, 65 percent had scarring from boat and propeller strikes (Rowat et al. 2007a). Based on the typical physiological responses described in Section 3.9.3.3 (Physical Disturbance and Strike Stressors), vessel movements are not expected to compromise the general health or condition of individual fishes, except for whale sharks, basking sharks, manta rays, and ocean sunfish.

Exposure of fishes to vessel strike stressors is limited to those fish groups identified in Section 3.9.1.2 (Taxonomic Groups) that are large, slow-moving, and may occur near the surface, such as ocean sunfish, whale sharks, and basking sharks. These species are distributed widely in offshore and nearshore portions of the Study Area. Any isolated cases of a Navy vessel striking an individual could injure that individual, impacting the fitness of an individual fish, but not to the extent that the viability of populations would be impacted. Vessel strikes would not pose a risk to most of the other marine fish groups because many fish can detect and avoid vessel movements, making strikes rare and allowing the fish to return to their normal behavior after the ship or device passes. As a vessel approaches a fish, they could have a detectable behavioral or physiological response (e.g., swimming away and increased heart rate) as the passing vessel displaces them. However, such reactions are not expected to have lasting effects on the survival, growth, recruitment, or reproduction of these marine fish groups at the population level.

Operational features of in-water devices and their use substantially limit the exposure of fish to potential strikes. First, in-water devices would not pose any strike risk to benthic fishes because the towed equipment is designed to stay off the bottom. Secondly, prior to deploying a towed in-water device, there is a standard operating procedure to search the intended path of the device for any floating debris (i.e., driftwood), marine life, or other potential obstructions, since they have the potential to cause damage to the device.

The likelihood of strikes by towed mine warfare devices on adult fish, which could result in injury or mortality, would be extremely low because these life stages are highly mobile. The use of in-water devices may result in short-term and local displacement of fishes in the water column. However, these behavioral reactions are not expected to result in substantial changes to an individual’s fitness or species recruitment, and are not expected to result in population-level impacts. Ichthyoplankton (fish eggs and larvae) in the water column could be displaced, injured, or killed by towed mine warfare devices. The numbers of eggs and larvae exposed to vessels or in-water devices would be extremely low relative to total ichthyoplankton biomass (Able and Fahay 1998); therefore, measurable changes on fish recruitment are negligible.

### No Action Alternative

#### Training Activities

#### Offshore Area

The number of annual Navy training activities including vessels and in-water devices under the No Action Alternative is shown in Table 3.9-4. As indicated in Section 3.0.5.3.3.1 (Vessels) and Section 3.0.5.3.3.2 (In-Water Devices), training activities involving in-water devices can occur anywhere in the Study Area. Navy vessel activity primarily occurs within the U.S. Exclusive Economic Zone and certain portions of the Study Area, such as areas near ports or naval installations and training ranges. These activities do not differ seasonally and could be widely dispersed throughout the Study Area. Species that do not occur near the surface within the Study Area would not be exposed to vessel strike potential. Species that occur near the surface within the Study Area—including the ESA-listed salmonid species and Pacific eulachon—could potentially be exposed to vessel strikes.

The risk of a strike from vessels and in-water devices used in training activities would be extremely low because (1) most fish can detect and avoid vessel and in-water device movements, and (2) the types of fish that are likely to be exposed to vessel and in-water device strike are limited and occur in low concentrations where vessels and in-water devices are used. Potential impacts from exposure to vessels and in-water devices are not expected to result in substantial changes to an individual's behavior, fitness, or species recruitment and are not expected to result in population-level impacts. Since impacts from strikes would be rare and for the reasons stated above, impacts on fish or fish populations under the No Action Alternative would be negligible.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal portions of the Offshore Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a) and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and therefore would not be in areas where they could collide with vessels and in-water devices. Therefore, while vessels and in-water devices could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, maturing sites, and migration corridors), and are outside the Study Area. Therefore, vessel device use in the Offshore Area would have no effect on the salmonid species and Pacific eulachon critical habitats. While there would be an overlap of the vessel use with green sturgeon critical habitat, it is unlikely that a vessel would impact the bottom substrate and critical habitat.

#### Inland Waters

As indicated in Section 3.0.5.3.3.1 (Vessels) and Section 3.0.5.3.3.2 (In-Water Devices), training activities involving vessels and in-water devices can occur anywhere in the Study Area. Navy vessel activity primarily occurs within the U.S. Exclusive Economic Zone and certain portions of the Study Area, such as areas near ports or naval installations and training ranges are used more heavily by vessels than other portions of the Study Area. There are no activities involving in-water devices proposed under training activities in the No Action Alternative in the Inland Waters portion of the Study Area. Species that occur near the surface within the Study Area—including the ESA-listed salmonid species and Pacific eulachon—would have the potential to be exposed to vessel device strikes.

The risk of a strike from vessels used in training activities under the No Action Alternative would be extremely low because (1) most fish can detect and avoid vessel device movements, and (2) the types of fish that are likely to be exposed to vessel strike are limited and occur in low concentrations where vessels are used. Potential impacts of exposure to vessels and in-water devices are not expected to result in substantial changes to an individual's behavior, fitness, or species recruitment and are not expected to result in population-level impacts. Since impacts from strikes would be rare, impacts on fish or fish populations would be negligible.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal areas of the Study Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a), and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and would therefore avoid collision with vessels. Therefore, while vessels could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Inland Waters portion of the Study Area. Impacts to designated Hood Canal summer-run chum and Puget Sound Chinook nearshore critical habitat, including the nearshore marine PCEs, may occur in the Inland Waters of the Study Area; however, these impacts would be temporary and short term. Vessel use could impact the critical habitat by temporarily disturbing the water column or avoidance reactions of the ESA-listed species' prey. Impacts to designated steelhead, coho, sockeye, bull trout, green sturgeon, and Pacific eulachon critical habitat would not occur as activities do not overlap.

*Pursuant to the ESA, the use of vessels and in-water devices during training activities under the No Action Alternative may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, rockfish species, and Pacific eulachon.*

*The use of vessels and in-water devices during training activities under the No Action Alternative may affect, but is not likely to adversely affect, nearshore designated critical habitat for green sturgeon, Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and there would be no effect on all other ESA-listed salmonid or rockfish species critical habitat.*

## Testing Activities

### Offshore Area

Under the No Action Alternative, 39 activities that include vessel movement and 38 activities that include in-water devices would occur during testing activities in the Offshore Area. Surf zone activities, including the use of crawlers, would occur in the Offshore Area of the Study Area at Pacific Beach in the Quinault Range Site, which extends north to south 5 nm along the eastern boundary of Warning Area 237A, approximately 3 nm to shore along the mean low water line, and encompasses 1 mi. (1.6 km) of shoreline at Pacific Beach, Washington. Proposed testing activities under the No Action Alternative that involve vessels and in-water devices differ in number and location from training activities under the No Action Alternative; however, the types and severity of impacts would not be discernable from those described under the No Action Alternative – Training Activities.

### Inland Waters

Under the No Action Alternative, 339 activities that include vessel movement and 377 activities that include in-water devices would occur during testing activities, and no activities using crawlers would occur in the Inland Waters.

Proposed testing activities under the No Action Alternative that involve vessels and in-water devices differ in number and location from training activities under the No Action Alternative; however, the types and severity of impacts would not be discernable from those described under the No Action Alternative – Training Activities.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal areas of the Study Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a), and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and would therefore avoid collision with vessels, and there would be no effect to designated rockfish critical habitat. Therefore, while vessels could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Inland Waters portion of the Study Area. Impacts to designated Hood Canal summer-run chum, Puget Sound Chinook and bull trout nearshore critical habitat, including the nearshore marine PCEs, may occur in the Inland Waters of the Study Area; however, these impacts would be temporary and short term. Vessel and in-water device use could impact the critical habitat by temporarily disturbing the water column or avoidance reactions of the ESA-listed species' prey. Impacts to designated steelhead, coho, sockeye, green sturgeon, and Pacific eulachon critical habitat would not occur as activities do not overlap.

#### Western Behm Canal, Alaska

Under the No Action Alternative, 28 annual testing activities that include vessel movement would occur in the Western Behm Canal. There are no in-water devices proposed for use in the Western Behm Canal.

The risk of a strike from vessels used in training activities under the No Action Alternative would be extremely low because (1) most fish can detect and avoid vessel device movements, and (2) the types of fish that are likely to be exposed to vessel strike are limited and occur in low concentrations where vessels are used. Potential impacts of exposure to vessels are not expected to result in substantial changes to an individual's behavior, fitness, or species recruitment and are not expected to result in population-level impacts. Since impacts from strikes would be rare, impacts on fish or fish populations would be negligible.

The ESA-listed species, as summarized in Section 3.9.2.3 (Endangered Species Act-Listed Species), do not overlap with the Western Behm Canal portion of the Study Area. Therefore, impacts from activities including vessel to ESA-listed species from activities in this portion of the Study Area are not expected. Effects to designated critical habitat would not occur as activities do not overlap in Western Behm Canal.

*Pursuant to the ESA, the use of vessels and in-water devices during testing activities under the No Action Alternative may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, rockfish species, and Pacific eulachon.*

*The use of vessels and in-water devices during testing activities under the No Action Alternative may affect, but is not likely to adversely affect, nearshore designated critical habitat for green sturgeon, bull trout (Coastal Puget Sound DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and there would be no effect on all other ESA-listed salmonid or rockfish species critical habitat.*

## Alternative 1

### Training Activities

#### Offshore Area

The vessels and in-water devices used during training activities under Alternative 1 would increase from 1,390 activities under the No Action Alternative to 1,609 activities. These activities would be widely dispersed throughout the Offshore Area of the Study Area (Table 3.9-4).

Proposed training activities under Alternative 1 that include vessels and in-water devices differ in number from training activities proposed under the No Action Alternative; however, the locations, types, and severity of impacts would not be discernable from those described in No Action Alternative – Training Activities.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal portions of the Offshore Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a), and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and would therefore not be in areas where they could collide with vessels and in-water devices. Therefore, while vessels and in-water devices could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, maturing sites, and migration corridors), and are outside the Study Area. Therefore, vessel device use in the Offshore Area would have no effect on the salmonid species and Pacific eulachon critical habitats. While there would be an overlap of the vessel use with green sturgeon critical habitat, it is unlikely that a vessel would impact the bottom substrate and critical habitat.

#### Inland Waters

Training activities including vessels in the Inland Waters are proposed to increase from 4 annual activities under the No Action Alternative to 310 under Alternative 1, while activities including in-water devices would increase from 0 to 1 every other year (Table 3.9-4). The increases are from an increase in small boat activity, the addition of precision anchoring exercises in which ships are at slow speeds or stopped, and the new Maritime Homeland Defense/Security Mine Countermeasures Exercise, conducted once every 2 years in the Puget Sound.

Proposed training activities under Alternative 1 that include vessels and in-water devices differ in number from training activities proposed under the No Action Alternative; however, the locations, types, and severity of impacts would not be discernable from those described in No Action Alternative – Training Activities.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal areas of the Study Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a), and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and would therefore avoid collision with vessels, and there would be no effect to designated rockfish critical habitat. Therefore, while vessels could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Inland Waters portion of the Study Area. Impacts to designated chum (Hood Canal Summer-Run ESU) and Chinook (Puget Sound ESU) nearshore critical habitat, including the nearshore marine PCEs, may occur in the Inland Waters of the Study Area; however, these impacts would be temporary and short term. Vessel use could impact the critical habitat by temporarily disturbing the water column or avoidance reactions of the ESA-listed species or their prey.

*Pursuant to the ESA, the use of vessels and in-water devices during training activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, rockfish species, and Pacific eulachon.*

*The use of vessels and in-water devices during training activities under Alternative 1 may affect, but is not likely to adversely affect, nearshore designated critical habitat for green sturgeon, bull trout (Coastal Puget Sound DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) ; and there would be no effect on all other ESA-listed salmonid, bull trout, or rockfish species critical habitat.*

## Testing Activities

### Offshore Area

Testing activities including vessels in the Offshore Area are proposed to increase from 39 annual activities under the No Action Alternative to 158 under Alternative 1, while activities including in-water devices would increase from 38 to 134 (Table 3.9-4).

Despite the increase in training activities over the No Action Alternative, the impact of vessels and in-water devices on fish would be inconsequential because (1) most fish can detect and avoid vessel device movements, and (2) the types of fish that are likely to be exposed to vessel strike are limited and occur in low concentrations where vessels are used. Potential impacts of exposure to vessels are not expected to result in substantial changes to an individual's behavior, fitness, or species recruitment and are not expected to result in population-level impacts. Since impacts from strikes would be rare, impacts on fish or fish populations would be negligible.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal portions of the Offshore Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a) and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and would therefore not be in areas where they could collide with vessels and in-water devices. Therefore, while vessels and in-water devices could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, maturing sites, and migration corridors), and are outside the Study Area. Therefore, vessel device use in the Offshore Area would have no effect on the salmonid species and Pacific eulachon critical habitats. While there would be an overlap of the vessel use with green sturgeon and bull trout critical habitat, it is unlikely that a vessel would impact the bottom substrate and critical habitat. While there would be an overlap of the in-water device use with green sturgeon and bull trout critical habitat, the potential to impact one of the PCEs would be localized, temporary, and would not prevent the PCEs from properly function to support the species.

#### Inland Waters

Testing activities including vessels in the Inland Waters are proposed to increase from 339 annual activities under the No Action Alternative to 602 under Alternative 1, while activities including in-water devices would increase from 377 to 628 (Table 3.9-4).

Proposed testing activities under Alternative 1 that include vessels and in-water devices differ in number from testing activities proposed under the No Action Alternative; however, the locations, types, and severity of impacts would not be discernable from those described in No Action Alternative – Testing Activities.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal areas of the Study Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a), and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and would therefore avoid collision with vessels, and there would be no effect to designated rockfish critical habitat. Therefore, while vessels could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Inland Waters portion of the Study Area. Impacts to designated Hood Canal summer-run chum, Puget Sound Chinook and bull trout nearshore critical habitat, including the nearshore marine PCEs, may occur in the Inland Waters of the Study Area; however, these impacts would be temporary and short term. Vessel and in-water device use could impact the critical habitat by temporarily disturbing the water column or avoidance reactions of the ESA-listed species or their prey.

#### Western Behm Canal, Alaska

Testing activities including vessels in the Western Behm Canal are proposed to increase from 28 annual activities under the No Action Alternative to 60 under Alternative 1, while there are no activities including in-water devices proposed for Alternative 1 (Table 3.9-4).

Proposed testing activities under Alternative 1 that include vessels differ in number from testing activities proposed under the No Action Alternative; however, the locations, types, and severity of impacts would not be discernable from those described in No Action Alternative – Testing Activities.

The ESA-listed species, as summarized in Section 3.9.2.3 (Endangered Species Act-Listed Species), do not overlap with the Western Behm Canal portion of the Study Area. Therefore, impacts from activities including vessel to ESA-listed species from activities in this portion of the Study Area are not expected. Effects to designated critical habitat would not occur as activities do not overlap in Western Behm Canal.

*Pursuant to the ESA, the use of vessels and in-water devices during testing activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, rockfish species, and Pacific eulachon.*

*The use of vessels and in-water devices during testing activities under Alternative 1 may affect, but is not likely to adversely affect, nearshore designated critical habitat for green sturgeon, bull trout (Coastal Puget Sound DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and there would be no effect on all other ESA-listed salmonid or rockfish species critical habitat.*

### Alternative 2

#### Training Activities

#### Offshore Area

Training activities including vessels in the Offshore Area are proposed to increase from 1,003 annual activities under the No Action Alternative to 1,116 under Alternative 2, while activities including in-water devices would increase from 387 to 493 (Table 3.9-4).

Proposed training activities under Alternative 2 that include vessels and in-water devices differ in number from training activities proposed under the No Action Alternative; however, the locations, types, and severity of impacts would not be discernable from those described in No Action Alternative – Training Activities.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal portions of the Offshore Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a) and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and would therefore not be in areas where they could collide with vessels and in-water devices. Therefore, while vessels and in-water devices could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, maturing sites, and migration corridors), and are outside the offshore portion of the Study Area. Therefore, vessel device use in the Offshore Area would have no effect on the salmonid species and Pacific eulachon critical habitats. While there would be an overlap of the vessel use with green sturgeon critical habitat, it is unlikely that a vessel would impact the bottom substrate and critical habitat.

#### Inland Waters

Training activities including vessels in the Inland Waters are proposed to increase from 4 annual activities under the No Action Alternative to 310 under Alternative 2, while activities including in-water devices would increase from 0 to 1 every year (Table 3.9-4). The increases are from an increase in small boat activity, the addition of precision anchoring exercises in which ships are at slow speeds or stopped, and the new Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise, conducted once per year in the Puget Sound.

Proposed training activities under Alternative 2 that include vessels and in-water devices differ in number from training activities proposed under the No Action Alternative; however, the locations, types, and severity of impacts would not be discernable from those described in No Action Alternative – Training Activities.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal areas of the Study Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a), and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and would therefore avoid collision with vessels, and there would be no effect to designated rockfish critical habitat. Therefore, while vessels could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Inland Waters portion of the Study Area. Impacts to designated Hood Canal summer-run chum and Puget Sound Chinook nearshore critical habitat, including the nearshore marine PCEs, may occur in the Inland Waters of the Study Area; however, these impacts would be temporary and short term. Vessel use could impact the critical habitat by temporarily disturbing the water column or avoidance reactions of the ESA-listed species or their prey. Impacts to designated steelhead, coho, sockeye, green sturgeon, and Pacific eulachon critical habitat would not occur as activities do not overlap.

*Pursuant to the ESA, the use of vessels and in-water devices during training activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, rockfish species, and Pacific eulachon.*

*The use of vessels and in-water devices during training activities under Alternative 2 may affect, but is not likely to adversely affect, nearshore designated critical habitat for green sturgeon, bull trout (Coastal Puget Sound DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and there would be no effect on all other ESA-listed salmonid, bull trout, or rockfish species critical habitat.*

#### Testing Activities

#### Offshore Area

Testing activities including vessels in the Offshore Area are proposed to increase from 39 annual activities under the No Action Alternative to 187 under Alternative 2, while activities including in-water devices would increase from 38 to 158 (Table 3.9-4).

Despite the increase in training activities over the No Action Alternative, the impact of vessels and in-water devices on fish would be inconsequential because (1) most fish can detect and avoid vessel device movements, and (2) the types of fish that are likely to be exposed to vessel strike are limited and occur in low concentrations where vessels are used. Potential impacts of exposure to vessels are not expected to result in substantial changes to an individual's behavior, fitness, or species recruitment and are not expected to result in population-level impacts. Since impacts from strikes would be rare, impacts on fish or fish populations would be negligible.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal portions of the Offshore Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a) and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and would therefore not be in areas where they could collide with vessels and in-water devices. Therefore, while vessels and in-water devices could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, maturing sites, and migration corridors), and are outside the Study Area. Therefore, vessel device use in the Offshore Area would have no effect on the salmonid species and Pacific eulachon critical habitats. While there would be an overlap of the vessel use with green sturgeon and bull trout critical habitat, it is unlikely that a vessel would impact the bottom substrate and critical habitat. While there would be an overlap of the in-water device use with green sturgeon and bull trout critical habitat, the potential to impact one of the PCEs would be localized, temporary, and would not prevent the PCEs from properly function to support the species.

#### Inland Waters

Testing activities including vessels in the Inland Waters are proposed to increase from 339 annual activities under the No Action Alternative to 665 under Alternative 2, while activities including in-water devices would increase from 377 to 691 (Table 3.9-4).

Despite the increase in training activities over the No Action Alternative, the impact of vessels and in-water devices on fish would be inconsequential because (1) most fish can detect and avoid vessel device movements, and (2) the types of fish that are likely to be exposed to vessel strike are limited and occur in low concentrations where vessels are used. Potential impacts of exposure to vessels are not expected to result in substantial changes to an individual’s behavior, fitness, or species recruitment and are not expected to result in population-level impacts. Since impacts from strikes would be rare, impacts on fish or fish populations would be negligible.

Based on the primarily nearshore distribution of all ESA-listed species and overlap of vessel use, potential strike risk would be greatest in the coastal areas of the Study Area. The salmonid ESA-listed species and Pacific eulachons can sense pressure changes in the water column and swim quickly (Baum 1997; Popper and Hastings 2009a), and are likely to escape collision with vessels. The rockfish species and green sturgeon are bottom-dwelling and would therefore avoid collision with vessels, and there would be no effect to designated rockfish critical habitat. Therefore, while vessels could overlap with the salmonid species and Pacific eulachon, the likelihood of a strike would be extremely low, with discountable effects. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Inland Waters portion of the Study Area. Impacts to designated Hood Canal summer-run chum, Puget Sound Chinook and bull trout nearshore critical habitat, including the nearshore marine PCEs, may occur in the Inland Waters of the Study Area; however, these impacts would be temporary and short term. Vessel and in-water device use could impact the critical habitat by temporarily disturbing the water column or avoidance reactions of the ESA-listed species or their prey.

#### Western Behm Canal, Alaska

Testing activities including vessels in the Western Behm Canal are proposed to increase from 28 annual activities under the No Action Alternative to 83 under Alternative 2, while there are no activities including in-water devices proposed for Alternative 2 (Table 3.9-4).

Proposed testing activities under Alternative 2 that include vessels differ in number from testing activities proposed under the No Action Alternative; however, the locations, types, and severity of impacts would not be discernable from those described in No Action Alternative – Testing Activities.

The ESA-listed species, as summarized in Section 3.9.2.3 (Endangered Species Act-Listed Species), do not overlap with the Western Behm Canal portion of the Study Area. Therefore, impacts from activities including vessel to ESA-listed species from activities in this portion of the Study Area are not expected. Effects to designated critical habitat would not occur as activities do not overlap in Western Behm Canal.

*Pursuant to the ESA, the use of vessels and in-water devices during testing activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, rockfish species, and Pacific eulachon.*

*The use of vessels and in-water devices during testing activities under Alternative 2 may affect, but is not likely to adversely affect, nearshore designated critical habitat for green sturgeon, bull trout (Coastal Puget Sound DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and there would be no effect on all other ESA-listed salmonid or rockfish species critical habitat.*

#### 3.9.3.3.2 Impacts from Military Expended Materials

Navy training and testing activities in the Study Area include firing a variety of weapons and employing a variety of explosive and non-explosive rounds including bombs, and small-, medium-, and large-caliber projectiles, or even sinking entire ship hulls during a sinking exercise (SINKEX). Sinking exercises are no longer planned to take place in the NWTT Study Area; therefore, future events are not included in Alternatives 1 or 2 of this EIS/OEIS. However, in order to consider impacts under the No Action Alternative, SINKEX will be analyzed. During these training and testing activities, various items may be introduced and expended into the marine environment and are referred to as military expended materials.

This section analyzes the strike potential to marine fish of the following categories of military expended materials: (1) non-explosive practice munitions, (2) fragments from high-explosive munitions, and (3) expended materials other than ordnance, such as sonobuoys, vessel hulls, and expendable targets. For a discussion of the types of activities that use military expended materials, where they are used, and how many activities would occur under each alternative, see Section 3.0.5.3.3.3 (Military Expended Material).

While disturbance or strike from any of these objects as they sink through the water column is possible, it is not very likely for most expended materials because the objects generally sink through the water slowly and can be avoided by most fishes. Therefore, with the exception of SINKEX, the discussion of military expended materials strikes focuses on strikes at the surface or in the upper water column from fragments (of high-explosives) and projectiles because those items have a greater potential for a fish strike as they hit the water, before slowing down as they move through the water column.

**Vessel Hull.** During a SINKEX, aircraft, ship, and submarine crews deliver ordnance on a seaborne target, usually a clean deactivated ship (see Section 3.1, Sediments and Water Quality), which is deliberately sunk using multiple weapon systems. Sinking exercises occur in specific open ocean areas, outside of the coastal range complexes, in waters exceeding 6,000 ft. (1,829 m) in depth. Direct ordnance strikes from the various weapons used in these exercises are a source of potential impact. However, these impacts are discussed for each of those weapons categories in this section and are not repeated here. Therefore, the analysis of SINKEX as a strike potential for benthic fishes is discussed in terms of the ship hull landing on the seafloor.

**Small-, Medium-, and Large-Caliber Projectiles.** Various types of projectiles could cause a temporary (seconds), localized impact when they strike the surface of the water. Current Navy training and testing in the Study Area, such as GUNEX, include firing a variety of weapons and using a variety of non-explosive training and testing rounds, including 5 in. (12.7 cm) naval gun shells, torpedoes, and small-, medium-, and large-caliber projectiles. See Table 3.0-20 for information regarding the number and location of activities involving small- and medium-caliber non-explosive practice munitions. The larger-caliber projectiles are primarily used in the open ocean beyond 20 nm. Direct ordnance strikes from firing weapons are potential stressors to fishes. There is a remote possibility that an individual fish at or near the surface may be struck directly if it is at the point of impact at the time of non-explosive ordnance delivery. Expended rounds may strike the water surface with sufficient force to cause injury or mortality. However, limited fish species swim right at, or near, the surface of the water (e.g., with the exception of pelagic sharks, herring, salmonids, flying fishes, jacks, tuna, mackerels, billfishes, ocean sunfishes, and other similar species).

Various projectiles would fall on soft or hard bottom habitats where they could either become buried immediately in the sediments or sit on the bottom for an extended time period. Except for the 5 in. (12.7 cm) and the 30 mm (1.18 in.) rounds, which are fired from a helicopter, all projectiles would be aimed at surface targets. These targets would absorb most of the projectiles' energy before they strike the surface of the water and sink. This factor would limit the possibility of high-velocity impacts with fish from the rounds entering the water. Furthermore, fish are likely to quickly and easily leave an area temporarily when vessels or helicopters approach. It is reasonable to assume, therefore, that fish would leave an area prior to, or just after the onset of, projectile firing and would return once tests are completed.

Most ordnance would sink through the water column and come to rest on the seafloor, stirring up sediment and possibly inducing a startle response, displacing, or injuring nearby fishes in extremely rare cases. Particular impacts on a given fish species would depend on the size and speed of the ordnance, the water depth, the number of rounds delivered, the frequency of training and testing, and the sensitivity of the fish.

**Bombs, Missiles, and Rockets.** Direct ordnance strikes from bombs, missiles, and rockets are potential stressors to fishes. Some individual fish at or near the surface may be struck directly if they are at the point of impact at the time of non-explosive ordnance delivery. However, most missiles hit their target or are disabled before hitting the water. Thus, most of these missiles and aerial targets hit the water as fragments, which quickly dissipates their kinetic energy within a short distance of the surface. A limited number of fishes swim at or near the surface of the water, as described for small-, medium-, and large-caliber projectiles.

As discussed in Appendix H (Statistical Probability Analysis for Estimating Direct Air Strike Impact and Number of Potential Exposures), statistical modeling conducted for the Study Area indicates that the probability of military expended materials striking marine mammals is extremely low. Statistical modeling could not be conducted to estimate the probability of military expended material strikes on fish because fish density data are not available at the scale of an OPAREA or testing range.

In lieu of strike probability modeling, the number, size, and area of potential impact (or "footprints") of each type of military expended material is presented in Tables 3.3-4 through 3.3-7. The application of this type of footprint analysis to fish follows the assumption that a fish occupying the impact area could be susceptible to potential impacts, either at the water surface (e.g., pelagic sharks, salmonids, flying fishes, jacks, tuna, mackerels, billfishes, and ocean sunfishes [see Table 3.9-2]) or as military expended material falls through the water column and settles to the bottom (e.g., flounders, skates, and other benthic fishes listed in Table 3.9-2). Furthermore, most of the projectiles fired during training and testing activities are fired at targets, and most projectiles hit those targets, so only a very small portion of those would hit the water with their maximum velocity and force. Of that small portion, a small number of fish at or near the surface (pelagic fishes) or near the bottom (benthic fishes) may be directly impacted if they are in the target area and near the expended item that hits the water surface (or bottom), but population-level effects would not occur.

Propelled fragments are produced by an exploding bomb or missile. Close to the explosion, fishes could potentially sustain injury or death from propelled fragments (Stuhmiller et al. 1990). However, studies of underwater bomb blasts have shown that fragments are larger than those produced during air blasts and decelerate much more rapidly (O'Keefe and Young 1984; Swisdak Jr. and Montaro 1992), reducing the risk to marine organisms.

Fish disturbance or strike could result from bomb fragments (after explosion) falling through the water column in very small areas compared to the vast expanse of the testing ranges, OPAREAs, range complexes, or the Study Area. The expected reaction of fishes exposed to this stressor would be to immediately leave the area where explosions are occurring, thereby reducing the probability of a fish strike after the initial expended materials hit the water surface. When a disturbance of this type concludes, the area would be repopulated and the fish stock would rebound with inconsequential impacts on the resource (Lundquist et al. 2010).

No training or testing activities that would result in military expended materials are proposed in the Western Behm Canal portion of the Study Area under any Alternative. Therefore, there would be no impacts to fish in the Western Behm Canal portion of the Study Area from military expended materials under any alternative.

## No Action Alternative

### Training Activities

### Offshore Area

Table 3.9-4 lists the number and location of military expended materials, most of which are small- and medium caliber projectiles. As indicated in Section 3.0.5.3.3.3 (Military Expended Material), under the No Action Alternative, military expended material use can occur throughout the Study Area.

Marine fish groups identified in Section 3.9.2.5 (Taxonomic Group Descriptions and Distribution) that are particularly susceptible to military expended material strikes are those occurring at the surface within the offshore and continental shelf portions of the range complexes (where the strike would occur). Those groups include pelagic sharks, salmonids, flying fishes, jacks, tuna, mackerels, billfishes, ocean sunfishes, and other similar species (see Table 3.9-2). Additionally, certain deep-sea fishes would be exposed to strike risk as a ship hull, expended during a SINKEX, settles to the seafloor. These groups include hagfishes, dragonfishes, lanternfishes, anglerfishes, and oarfishes.

Projectiles, bombs, missiles, rockets, and associated fragments have the potential to directly strike fish as they hit the water surface and below the surface to the point where the projectile loses its forward momentum. Fish at and just below the surface would be most susceptible to injury from strikes because velocity of these materials would rapidly decrease upon contact with the water and as it travels through the water column. Consequently, most water column fishes would have ample time to detect and avoid approaching munitions or fragments as they fall through the water column. The probability of strike based on the “footprint” analysis included in Tables 3.3-4 through 3.3-7 indicates that even for an extreme case of expending all small-caliber projectiles within a single gunnery box, the probability of any of these items striking a fish (even as large as bluefin tuna or whale sharks) is extremely low. Therefore, since most fishes are smaller than bluefin tuna or whale sharks and most military expended materials are less abundant than small-caliber projectiles, the risk of strike by these items is exceedingly low for fish overall. A possibility exists that a small number of fish at or near the surface may be directly impacted if they are in the target area and near the point of physical impact at the time of military expended material strike, but population-level impacts would not occur.

Sinking exercises occur in open-ocean areas, outside of the coastal range complexes. During each SINKEX, approximately 725 objects would be expended, including large bombs, missiles, large projectiles, torpedoes, and one target vessel. Therefore, during each SINKEX, approximately 272 objects per square mile (105 objects per square kilometer) would sink to the ocean floor. While serious injury or mortality to individual fish would be expected if they were present within range of high explosive activities (analyzed in Section 3.9.3.1, Acoustic Stressors), SINKEX under the No Action Alternative would not result in impacts on pelagic fish populations at the surface based on the low number of fish in the immediate area and the placement of these activities in deep, ocean areas where fish abundance is low or widely dispersed. Disturbances to benthic fishes from SINKEX would be highly localized. Any deep sea fishes located on the bottom where a ship hull would settle could experience displacement, injury, or death. However, population level impacts on the deep sea fish community would not occur because of the limited spatial extent of the impact and the wide dispersal of fishes in deep ocean areas.

The impact of military expended material strikes would be inconsequential due to the (1) limited number of species found directly at the surface where military expended material strikes could occur; (2), the rare chance that a fish might be directly struck at the surface by military expended materials, and; (3) the ability of most fish to detect and avoid an object falling through the water below the surface. The potential impacts of military expended material strikes would be short-term and localized disturbances of the water column (and seafloor areas within SINKEX locations).

While military expended materials use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low abundance of ESA-listed species in the Study Area, the small area of impacts from military expended materials in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, maturation sites, and migration corridors) and are outside the Offshore Area. Therefore, military expended materials use would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by the use of military expended materials in the Offshore Area, however, but impacts would be short-term and localized disturbances of the water column and displacement of sediments where objects would sink.

#### Inland Waters

Table 3.9-4 lists the number and location of military expended materials, most of which are mine shapes and underwater detonations. As indicated in Section 3.0.5.3.3.3 (Military Expended Material), under the No Action Alternative, military expended material use can occur throughout the Study Area.

The impact of military expended material strikes would be inconsequential due to the (1) limited number of species found directly at the surface where military expended material strikes could occur; (2) the rare chance that a fish might be directly struck at the surface by military expended materials, and; (3) the ability of most fish to detect and avoid an object falling through the water below the surface. The potential impacts of military expended material strikes would be short-term and localized disturbances of the water column (and seafloor areas within SINKEX locations).

While military expended materials use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low abundance of ESA-listed species in the Study Area, the small area of impacts from military expended materials in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. Military expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, military expended materials use would have no effect on coho, steelhead, bull trout, sockeye, rockfish, and Pacific eulachon critical habitat. Military expended materials use could affect designated nearshore critical habitat for Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU) in the Inland Waters, including disturbances of the water column and displacement of sediments where objects would sink. However, any impacts are expected to be localized and temporary.

*Pursuant to the ESA, military expended material strikes during training activities under the No Action Alternative may affect, but are not likely to adversely affect ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Military expended material strikes during training activities under the No Action Alternative may affect, but are not likely to adversely affect, critical habitat for green sturgeon (Southern DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids, bull trout, or rockfish species critical habitat.*

## Testing Activities

### Offshore Area

Under the No Action Alternative, the Navy proposes testing activities in the Offshore Area that would result in the expenditure of approximately 600 items, most of which are sonobuoys and smaller miscellaneous items related to torpedo testing (Table 3.9-4).

The potential impacts of military expended material strikes would be short-term and localized disturbances of the water surface and would be inconsequential for the same reasons stated under the analysis under the No Action Alternative for training activities.

While military expended materials use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low abundance of ESA-listed species in the Study Area, the small area of impacts from military expended materials in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. Military expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, military expended materials use would have no effect on salmonid species, and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by the use of military expended materials in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and displacement of sediments where objects would sink.

### Inland Waters

Table 3.9-4 lists the number of military expended materials used in the Inland Waters under the No Action Alternative, most of which are fiber optic cables, guidance wires, and miscellaneous items related to NAVSEA torpedo testing.

The potential impacts of military expended material strikes would be short-term and localized disturbances of the water surface and would be inconsequential for the same reasons stated under the analysis under the No Action Alternative for training activities.

While military expended materials use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low abundance of ESA-listed species in the Study Area, the small area of impacts from military expended materials in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. Military expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, military expended materials use would have no effect on coho, steelhead, bull trout, sockeye, green sturgeon, rockfish, and Pacific eulachon critical habitat. Military expended materials use could affect rockfish habitat and designated nearshore critical habitat for Chinook and chum in the Inland Waters. However, any impacts are expected to be localized and temporary disturbances of the water column and displacement of sediments where objects would sink.

*Pursuant to the ESA, military expended material strikes during testing activities under the No Action Alternative may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Military expended material strikes during testing activities under the No Action Alternative may affect, but are not likely to adversely affect, critical habitat for green sturgeon (Southern DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU and there would be no effect on all other ESA-listed salmonids, bull trout, or rockfish species critical habitat.*

## Alternative 1

### Training Activities

#### Offshore Area

Table 3.9-4 lists the number and location of military expended materials as indicated in Section 3.0.5.3.3.3 (Military Expended Material), under Alternative 1, military expended material use can occur throughout the Study Area. The overall number of military expended materials increases from 189,815 under the No Action Alternative to 198,028 under Alternative 1, mainly due to an increase in small caliber and chaff utilization.

The potential impacts of military expended material strikes would be short-term and localized disturbances of the water surface and would be inconsequential for the same reasons stated under the analysis under the No Action Alternative for training activities.

While military expended materials use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low abundance of ESA-listed species in the Study Area, the small area of impacts from military expended materials in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. Military expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, military expended materials use would have no effect on salmonid species, and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by the use of military expended materials in the Offshore Area.

However, any impacts would be short-term and localized disturbances of the water column and displacement of sediments where objects would sink.

#### Inland Waters

Table 3.9-4 lists the number and location of military expended materials, most of which are mine shapes and underwater detonations. As indicated in Section 3.0.5.3.3.3 (Military Expended Material), under Alternative 1, military expended material use can occur throughout the Study Area. The military expended materials would increase from 8 under the No Action Alternative to 3,085 for Alternative 1 (Table 3.9-4).

Compared to the No Action Alternative, the overall increase in military expended materials used under Alternative 1 would result in slightly increased exposure of fish to military expended materials. The potential impacts of military expended material strikes would be short-term and localized disturbances of the water surface (and seafloor areas within SINKEX locations) and would be inconsequential for the same reasons stated under the analysis under the No Action Alternative for training activities.

While military expended materials use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low abundance of ESA-listed species in the Study Area, the small area of impacts from military expended materials in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. Military expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, military expended materials use would have no effect on coho, steelhead, bull trout, sockeye, rockfish, green sturgeon, and Pacific eulachon critical habitat. Military expended materials use could affect designated nearshore critical habitat for Chinook and chum in the Inland Waters. However, any impacts are expected to be localized and temporary disturbances of the water column and displacement of sediments where objects would sink.

*Pursuant to the ESA, military expended material strikes during training activities under Alternative 1 may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Military expended material strikes during training activities under Alternative 1 may affect, but are not likely to adversely affect, critical habitat for green sturgeon (Southern DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids, bull trout, or rockfish species critical habitat.*

### Testing Activities

#### Offshore Area

As indicated in Table 3.9-4, military expended materials would increase from approximately 604 under the No Action Alternative to 3,922 under Alternative 1. Compared to the No Action Alternative, the overall increase in military expended materials used under Alternative 1 is due primarily to a large increase in sonobuoys and their decelerator/parachutes from NAVAIR sonobuoy testing. These changes would result in increased exposure of fish to military expended materials; however, the probability of strike based on the "footprint" analysis included in Table 3.3-4 indicates that the probability of any of these items striking a fish (even as large as bluefin tuna or whale sharks) is extremely low. Despite the increase in military expended materials under Alternative 1, the potential impacts of military expended material strikes would be short-term and localized disturbances of the water surface and would be inconsequential for the same reasons stated under the analysis under the No Action Alternative for testing activities.

While military expended materials use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low abundance of ESA-listed species in the Study Area, the small area of impacts from military expended materials in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. Military expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, military expended materials use would have no effect on salmonid species, and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by the use of military expended materials in the Offshore Area. However, any impacts would be short-term and localized disturbances of the water column and displacement of sediments where objects would sink.

#### Inland Waters

Table 3.9-4 lists the number of military expended materials used in the Inland Waters under Alternative 1, most of which are fiber optic cables, guidance wires, and miscellaneous items related to NAVSEA torpedo testing. The military expended materials would increase from 442 under the No Action Alternative to 513 for Alternative 1.

Compared to the No Action Alternative, the overall increase in military expended materials used under Alternative 1 is due to an increase in the same type and location of activities. These changes would result in increased exposure of fish to military expended materials; however, the probability of strike based on the "footprint" analysis included in Table 3.3-6 indicates that the probability of any of these items striking a fish is extremely low. The potential impacts of military expended material strikes would be short-term and localized disturbances of the water surface and would be inconsequential for the same reasons stated under the analysis under the No Action Alternative for training activities.

While military expended materials use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low abundance of ESA-listed species in the Study Area, the small area of impacts from military expended materials in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. Military expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, military expended materials use would have no effect on coho, steelhead, bull trout, sockeye, green sturgeon, rockfish, and Pacific eulachon critical habitat. Military expended materials use could affect rockfish habitat and designated nearshore critical habitat for Chinook and chum in the Inland Waters. However, any impacts are expected to be localized and temporary disturbances of the water column and displacement of sediments where objects would sink.

*Pursuant to the ESA, military expended material strikes during testing activities under Alternative 1 may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Military expended material strikes during testing activities under Alternative 1 may affect, but are not likely to adversely affect, critical habitat for green sturgeon (Southern DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids, bull trout, or rockfish species critical habitat.*

### Alternative 2

#### Training Activities

#### Offshore Area

Under Alternative 2, the Navy proposes the same type and tempo of activity resulting in the same quantity of military expended materials as described in Alternative 1. Therefore, the impacts of Alternative 2 training activities on fish would be the same as for Alternative 1.

#### Inland Waters

The number and location of training activities under Alternative 2 are identical to training activities under Alternative 1. Therefore, impacts and comparisons to the No Action Alternative would also be identical as described in Section 3.9.3.3.2.2 (Alternative 1).

*Pursuant to the ESA, military expended material strikes during training activities under Alternative 2 may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Military expended material strikes during training activities under Alternative 2 may affect, but are not likely to adversely affect, critical habitat for green sturgeon (Southern DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids, bull trout, or rockfish species critical habitat.*

#### Testing Activities

#### Offshore Area

As indicated in Table 3.9-4, military expended materials from testing activities would increase from approximately 604 under the No Action Alternative to 4,325 under Alternative 2. The overall increase in military expended materials used under Alternative 2 is due primarily to a large increase in sonobuoys and their decelerator/parachutes from NAVAIR sonobuoy testing. This equates to an approximately 10 percent increase in the numbers of military expended materials as described in Alternative 1. Therefore, the impacts of Alternative 2 testing activities on fish would be similar to Alternative 1.

#### Inland Waters

Table 3.9-4 lists the number of military expended materials used in the Inland Waters under Alternative 2, most of which are fiber optic cables, guidance wires, and miscellaneous items related to NAVSEA torpedo testing. The military expended materials would increase from 442 under the No Action Alternative to 563 for Alternative 2 (Table 3.9-4).

Compared to the No Action Alternative, the overall increase in military expended materials used under Alternative 2 is due to an increase in the same type and location of activities. These changes would result in increased exposure of fish to military expended materials; however, the probability of strike based on the "footprint" analysis included in Table 3.3-6 indicates that the probability of any of these items striking a fish is extremely low. The potential impacts of military expended material strikes would be short-term and localized disturbances of the water surface (and seafloor areas within SINKEX locations) and would be inconsequential for the same reasons stated under the analysis under the No Action Alternative for testing activities.

While military expended materials use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low abundance of ESA-listed species in the Study Area, the small area of impacts from military expended materials in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. Military expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, military expended materials use would have no effect on coho, steelhead, bull trout, sockeye, green sturgeon, rockfish, and Pacific eulachon critical habitat. Military expended materials use could affect rockfish habitat and designated nearshore critical habitat for Chinook and chum in the Inland Waters. However, any impacts are expected to be localized and temporary disturbances of the water column and displacement of sediments where objects would sink.

*Pursuant to the ESA, military expended material strikes during testing activities under Alternative 2 may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Military expended material strikes during testing activities under Alternative 2 may affect, but are not likely to adversely affect, critical habitat for green sturgeon (Southern DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids, bull trout, or rockfish species critical habitat.*

#### 3.9.3.3.3 Impacts from Seafloor Devices

For a discussion of the types of activities that use seafloor devices, where they are used, and how many activities would occur under each alternative, see Section 3.0.5.3.3.4 (Seafloor Devices). Seafloor devices include items that are placed on, dropped on, or moved along the seafloor such as mine shapes, anchor blocks, anchors, bottom-placed instruments, bottom-crawling unmanned undersea vehicles, and bottom-placed targets that are not expended. As discussed in the military expended materials strike section, objects falling through the water column would slow in velocity as they sink toward the bottom and could be avoided by most fish.

Seafloor devices with a strike potential for fish include those items temporarily deployed on the seafloor. The potential strike impacts of unmanned underwater vehicles, including bottom crawling types, are also included here. Some fishes are attracted to virtually any tethered object in the water column for food or refuge (Dempster and Taquet 2004) and could be attracted to an inert mine assembly. However, while a fish might be attracted to the object, their sensory abilities allow them to avoid colliding with fixed tethered objects in the water column (Bleckmann and Zelick 2009), so the likelihood of a fish striking one of these objects is implausible. Therefore, strike hazards associated with collision into other seafloor devices such as deployed mine shapes or anchored devices are highly unlikely to pose any strike hazard to fishes and are not discussed further. A possibility exists that a small number of fish at or near the surface or resting on the bottom may be directly impacted if they are in the target area and near the point of physical impact at the time of seafloor device strike. However, the likelihood of one of these objects striking a fish is improbable, and in the rare event that a strike occurred, population-level impacts would not occur.

Table 3.9-4 lists the number and location of activities that use seafloor devices. As indicated in Table 3.9-4, there are no training activities which use seafloor devices proposed in the Offshore Area or the Western Behm Canal under any Alternative; therefore, those areas will not be analyzed for impacts under training activities.

## No Action Alternative

### Training Activities

#### Inland Waters

As indicated in Table 3.9-4, there are two proposed training activities in the Inland Waters in which seafloor devices are used. Both of these activities are Explosive Ordnance Disposal (EOD) mine neutralization exercises where mine shapes may be anchored or moored to the ocean bottom at either Crescent Harbor or Hood Canal EOD Training Ranges. Following the exercise, the anchor is removed.

Seafloor devices have the potential to directly strike fish as they descend below the surface to the point where the anchor strikes the bottom. Fish at and just below the surface, as well as those on the bottom would be most susceptible to injury from strikes because velocity of these materials would rapidly decrease upon contact with the water and as it travels through the water column. Consequently, most water column fishes would have ample time to detect and avoid approaching devices as they fall through the water column. A possibility exists that a small number of fish resting on the bottom may be directly impacted if they are in the target area and near the point of physical impact at the time of seafloor device strike, but the likelihood of one of these objects striking a fish is improbable and in the rare event that a strike occurred, population-level impacts would not occur. Additionally, these activities occur in areas that are frequently used for similar activities, where the bottom type is known and previously disturbed.

While seafloor device use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low likelihood of ESA-listed species occurring in the immediate vicinity while seafloor devices are in use, the small area of impacts from seafloor devices in the nearshore areas, and the dispersed nature of the activity. The use of seafloor devices would not overlap with bull trout critical habitat. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. The use of seafloor devices would not affect water quality or prey availability as PCEs for salmonid species, rockfish species, and Pacific eulachon. Therefore, seafloor device use would have no effect on coho, steelhead, sockeye, rockfish, and Pacific eulachon critical habitat. Seafloor device use could affect designated nearshore critical habitat for Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU) in the Inland Waters. However, any impacts are expected to be localized and temporary disturbances of the water column and displacement of sediments where devices would be located.

*Pursuant to the ESA, the use of seafloor devices during training activities under the No Action Alternative may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon and rockfish species.*

*The use of seafloor devices during training activities under the No Action Alternative may affect, but is not likely to adversely affect, critical habitat for Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids, bull trout, or rockfish species critical habitat.*

## Testing Activities

### Offshore Area

As indicated in Table 3.9-4, there are five proposed testing activities in the Offshore Area in which seafloor devices are used. These activities involve the testing of unmanned underwater vehicles that crawl across the seafloor. These tests are conducted in the Quinault Range Site only in the surfzone area at Pacific Beach. The crawlers are slow moving and unlikely to impact fish as most fish would have ample time to detect and avoid approaching devices as they crawl across the seafloor. The slow movement of these vehicles and the ability of fish to sense the device in time to avoid it makes it unlikely that any fish would be impacted by these testing activities.

While seafloor device use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low abundance of ESA-listed species in the Study Area, the small area of impacts from seafloor devices in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. The use of seafloor devices would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, seafloor device use would have no effect on salmonid species, and Pacific eulachon critical habitat. Green sturgeon and bull trout critical habitat may be affected by the use of seafloor devices in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and displacement of sediments where seafloor devices would be used.

### Inland Waters

As indicated in Table 3.9-4, there are 210 proposed testing activities in the Inland Waters in which seafloor devices are used. These activities involve the testing of unmanned underwater vehicles that crawl across the seafloor, similar to those described above under Testing Activities – Offshore Area, and also involve tests in which instruments are placed on sea floor. The potential impacts of the unmanned underwater vehicles are the same as described above, and the impacts of the seafloor devices would be similar to those described above for bottom mooring anchors under Training Activities – Inland Waters.

While seafloor device use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low likelihood of ESA-listed species occurring in the immediate vicinity while seafloor devices are in use, the small area of impacts from seafloor devices in the nearshore areas, and the dispersed nature of the activity. The use of seafloor devices would not overlap with bull trout critical habitat. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. The use of seafloor devices would not affect water quality or prey availability as PCEs for salmonid species, rockfish species, and Pacific eulachon. Therefore, seafloor device use would have no effect on coho, steelhead, sockeye, and Pacific eulachon critical habitat. Seafloor device use could affect designated nearshore critical habitat for Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU) in the Inland Waters. However, any impacts are expected to be localized and temporary disturbances of the water column and displacement of sediments where devices would be located.

#### Western Behm Canal

As indicated in Table 3.9-4 there are no activities including seafloor devices proposed under the No Action Alternative in Western Behm Canal. Therefore, there would be no impacts to fish, and no effect to ESA-listed species and associated critical habitat.

*Pursuant to the ESA, the use of seafloor devices during testing activities under the No Action Alternative may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*The use of seafloor devices during testing activities under the No Action Alternative may affect, but is not likely to adversely affect, critical habitat for green sturgeon (Southern DPS), bull trout (Coastal Puget Sound DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids or rockfish species critical habitat.*

### Alternative 1

#### <u>Training Activities</u>

#### Inland Waters

As indicated in Table 3.9-4, there are 16 proposed training activities under Alternative 1 in the Inland Waters in which seafloor devices are used. The increase from two activities under the No Action Alternative reflects an increase of 4 in the number of EOD mine neutralization exercises in which moored mines might be used, and the addition of 10 precision anchoring exercises. The EOD mine neutralization exercises would be conducted as described above under the No Action Alternative. The precision anchoring exercises would be conducted in two locations; at Naval Station Everett, and at an anchorage site near Indian Island. Both of these locations are historically used for these activities. For the same reasons as described above under the No Action Alternative, it is unlikely that any fish would be impacted by these exercises.

While seafloor device use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low likelihood of ESA-listed species occurring in the immediate vicinity while seafloor devices are in use, the small area of impacts from seafloor devices in the nearshore areas, and the dispersed nature of the activity. The use of seafloor devices would not overlap with bull trout critical habitat. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. The use of seafloor devices would not affect water quality or prey availability as PCEs for salmonid species, rockfish species, and Pacific eulachon. Therefore, seafloor device use would have no effect on coho, steelhead, sockeye, rockfish, and Pacific eulachon critical habitat. Seafloor device use could affect designated nearshore critical habitat for Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU) in the Inland Waters. However, any impacts are expected to be localized and temporary disturbances of the water column and displacement of sediments where devices would be located.

*Pursuant to the ESA, the use of seafloor devices during training activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*The use of seafloor devices during training activities under Alternative 1 may affect, but is not likely to adversely affect, critical habitat for Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids, bull trout, or rockfish species critical habitat.*

## Testing Activities

### Offshore Area

As indicated in Table 3.9-4, there is an increase in testing activities in the Offshore Area in which seafloor devices are used, from five under the No Action Alternative to six under Alternative 1. These are the same activities as described under Testing Activities – No Action Alternative, and are conducted in the same location. Therefore, the impacts would be the same as described above.

While seafloor device use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low likelihood of ESA-listed species occurring in the immediate vicinity while seafloor devices are in use, the small area of impacts from seafloor devices in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species, and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. The use of seafloor devices would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, seafloor device use would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon and bull trout critical habitat may be affected by the use of seafloor devices in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and displacement of sediments where seafloor devices would be used.

### Inland Waters

As indicated in Table 3.9-4, there are 225 proposed testing activities in the Inland Waters in which seafloor devices are used, an increase of 15 over the No Action Alternative. The nature of these are the same activities as described under Testing Activities – No Action Alternative, and are conducted in the same locations. Therefore, the impacts would be the same as described above.

While seafloor device use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low likelihood of ESA-listed species occurring in the immediate vicinity while seafloor devices are in use, the small area of impacts from seafloor devices in the nearshore areas, and the dispersed nature of the activity. The use of seafloor devices would not overlap with bull trout critical habitat. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. The use of seafloor devices would not affect water quality or prey availability as PCEs for salmonid species, rockfish species, and Pacific eulachon. Therefore, seafloor device use would have no effect on coho, steelhead, sockeye, and Pacific eulachon critical habitat. Seafloor device use could affect designated nearshore critical habitat for Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU) in the Inland Waters. However, any impacts are expected to be localized and temporary disturbances of the water column and displacement of sediments where devices would be located.

#### Western Behm Canal, Alaska

Testing activities including seafloor devices in the Western Behm Canal are proposed to increase from zero annual activities under the No Action Alternative to five under Alternative 1 (Table 3.9-4).

Seafloor devices have the potential to directly strike fish as they descend below the surface to the point where the anchor strikes the bottom. Fish at and just below the surface, as well as those on the bottom would be most susceptible to injury from strikes because velocity of these materials would rapidly decrease upon contact with the water and as it travels through the water column. Consequently, most water column fishes would have ample time to detect and avoid approaching devices as they fall through the water column. A possibility exists that a small number of fish resting on the bottom may be directly impacted if they are in the target area and near the point of physical impact at the time of seafloor device strike, but the likelihood of one of these objects striking a fish is implausible and in the rare event that a strike occurred, population-level impacts would not occur.

The ESA-listed species, as summarized in Section 3.9.2.3 (Endangered Species Act-Listed Species), do not overlap with the Western Behm Canal portion of the Study Area. Therefore, impacts from seafloor devices to ESA-listed species from activities in this portion of the Study Area are not expected. Effects to designated critical habitat would not occur as activities do not overlap in Western Behm Canal.

*Pursuant to the ESA, the use of seafloor devices during testing activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon and rockfish species.*

*The use of seafloor devices during testing activities under Alternative 1 may affect, but is not likely to adversely affect, critical habitat for green sturgeon (Southern DPS), bull trout (Coastal Puget Sound DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids or rockfish species critical habitat.*

## Alternative 2

### Training Activities

#### Inland Waters

As indicated in Table 3.9-4, there are 16 proposed training activities under Alternative 2 in the Inland Waters in which seafloor devices are used. The increase from two activities under the No Action Alternative reflects an increase of 4 in the number of EOD mine neutralization exercises in which moored mines might be used, and the addition of 10 precision anchoring exercises. The EOD mine neutralization exercises would be conducted as described above under the No Action Alternative. The precision anchoring exercises would be conducted in two locations; at Naval Station Everett, and at an anchorage site near Indian Island. Both of these locations are historically used for these activities. For the same reasons as described above under the No Action Alternative, it is unlikely that any fish would be impacted by these exercises.

While seafloor device use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low likelihood of ESA-listed species occurring in the immediate vicinity while seafloor devices are in use, the small area of impacts from seafloor devices in the nearshore areas, and the dispersed nature of the activity. The use of seafloor devices would not overlap with bull trout critical habitat. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. The use of seafloor devices would not affect water quality or prey availability as PCEs for salmonid species, rockfish species, and Pacific eulachon. Therefore, seafloor device use would have no effect on coho, steelhead, sockeye, rockfish, and Pacific eulachon critical habitat. Seafloor device use could affect designated nearshore critical habitat for Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU) in the Inland Waters. However, any impacts are expected to be localized and temporary disturbances of the water column and displacement of sediments where devices would be located.

*Pursuant to the ESA, the use of seafloor devices during training activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*The use of seafloor devices during training activities under Alternative 2 may affect, but is not likely to adversely affect, critical habitat for Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids, bull trout, or rockfish species critical habitat.*

## Testing Activities

### Offshore Area

As indicated in Table 3.9-4, there is an increase in testing activities in the Offshore Area in which seafloor devices are used, from five under the No Action Alternative to seven under Alternative 2. The nature of these are the same activities as described under Testing Activities – No Action Alternative, and are conducted in the same location. Therefore, the impacts would be the same as described above.

While seafloor device use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low likelihood of ESA-listed species occurring in the immediate vicinity while seafloor devices are in use, the small area of impacts from seafloor devices in the nearshore areas, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species, and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. The use of seafloor devices would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, seafloor device use would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon and bull trout critical habitat may be affected by the use of seafloor devices in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and displacement of sediments where seafloor devices would be used.

### Inland Waters

As indicated in Table 3.9-4, there are 239 proposed testing activities in the Inland Waters in which seafloor devices are used, an increase of 29 over the No Action Alternative. These are the same activities as described under Testing Activities – No Action Alternative, and are conducted in the same locations. Therefore, the impacts would be the same as described above.

While seafloor device use could overlap with all of the ESA-listed species, the likelihood of a strike would be extremely low given the low likelihood of ESA-listed species occurring in the immediate vicinity while seafloor devices are in use, the small area of impacts from seafloor devices in the nearshore areas, and the dispersed nature of the activity. The use of seafloor devices would not overlap with bull trout critical habitat. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. The use of seafloor devices would not affect water quality or prey availability as PCEs for salmonid species, rockfish species, and Pacific eulachon. Therefore, seafloor device use would have no effect on coho, steelhead, sockeye, and Pacific eulachon critical habitat. Seafloor device use could affect designated nearshore critical habitat for Chinook (Puget Sound ESU) and chum (Hood Canal Summer-Run ESU) in the Inland Waters. However, any impacts are expected to be localized and temporary disturbances of the water column and displacement of sediments where devices would be located.

#### Western Behm Canal, Alaska

Testing activities including seafloor devices in the Western Behm Canal are proposed to increase from 0 annual activities under the No Action Alternative to 15 under Alternative 2 (Table 3.9-4).

Seafloor devices have the potential to directly strike fish as they descend below the surface to the point where the anchor strikes the bottom. Fish at and just below the surface, as well as those on the bottom would be most susceptible to injury from strikes because velocity of these materials would rapidly decrease upon contact with the water and as it travels through the water column. Consequently, most water column fishes would have ample time to detect and avoid approaching devices as they fall through the water column. A possibility exists that a small number of fish resting on the bottom may be directly impacted if they are in the target area and near the point of physical impact at the time of seafloor device strike, but the likelihood of one of these objects striking a fish is implausible and in the rare event that a strike occurred, population-level impacts would not occur.

The ESA-listed species, as summarized in Section 3.9.2.3 (Endangered Species Act-Listed Species), do not overlap with the Western Behm Canal portion of the Study Area. Therefore, impacts from seafloor devices to ESA-listed species from activities in this portion of the Study Area are not expected. Effects to designated critical habitat would not occur as activities do not overlap in Western Behm Canal.

*Pursuant to the ESA, the use of seafloor devices during testing activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*The use of seafloor devices during testing activities under Alternative 2 may affect, but is not likely to adversely affect, critical habitat for green sturgeon (Southern DPS), bull trout (Coastal Puget Sound DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) and there would be no effect on all other ESA-listed salmonids or rockfish species critical habitat.*

### Summary and Conclusions of Physical Disturbance and Strike Impacts

The greatest potential for combined impacts of physical disturbance and strike stressors under the Proposed Action would occur for SINKEX because of multiple opportunities for potential strike by vessel, ordnance, or other military expended material. However, SINKEX described under the No Action Alternative are not proposed under Alternative 1 or Alternative 2.

A less intensive example of potential impacts of combined strike stressors would be for cases where a fish could be displaced by a vessel in the water column during any number of activities utilizing bombs, missiles, rockets, or projectiles. As the vessel maneuvers during the exercise, any fishes displaced by that vessel movement could potentially be struck by munitions expended by that vessel during that same exercise. This would be more likely to occur in concentrated areas of this type of activity (e.g., a GUNEX exercise inside a gunnery box). However, the likelihood of this occurring is probably quite low anywhere else because most activities do not expend their munitions towards, or in proximity to, a training or testing vessel for safety reasons. While small-caliber projectiles are expended away from but often close to the vessel from which the projectiles are fired, this does not necessarily increase the risk of strike. During the initial displacement of the fish from vessel activity or after the first several projectiles are fired, most fishes would disperse widely and the probability of strike may actually be reduced in most cases. Also, the combination of these stressors would cease immediately when the activity ends; therefore, combination is possible but not reasonably foreseeable.

#### Summary of Physical Disturbance and Strike Stressors and General Conclusions

Exposures to physical disturbance and strike stressors occur primarily within the range complexes and operating areas associated with the Study Area. Research suggests that only a limited number of marine fish species are susceptible to being struck by a vessel. Most fishes would not respond to vessel disturbance beyond a temporary displacement from their normal activity, which would be discountable. The Navy identified and analyzed three physical disturbance or strike sub-stressors that have potential to impact fishes: vessel and in-water device strikes, military expended material strikes, and seafloor device strikes. While the potential for vessel strikes on fish can occur anywhere vessels are operated, most fishes are highly mobile and capable of avoiding vessels, expended materials, or objects in the water column. For the larger slower-moving species (e.g., basking shark, manta ray, and ocean sunfish) the potential for a vessel or military expended material strike increases, as discussed in the analysis. The potential for a seafloor device striking a fish is very low because the sensory capabilities of most fishes allow them to detect and avoid underwater objects. For rockfish and green sturgeon species that are bottom dwellers, seafloor devices may have an adverse effect; however, it is still unlikely due to the fish's sensory capabilities.

*Pursuant to the ESA, physical disturbance and strikes under the No Action Alternative, Alternative 1, or Alternative 2 may affect, but is not likely to adversely affect*, *ESA-listed salmonid species, Pacific eulachon, green sturgeon and rockfish species.*

*Physical disturbance and strikes under the No Action Alternative, Alternative 1, or Alternative 2 may affect, but are not likely to adversely affect, critical habitat for green sturgeon (Southern DPS), bull trout (Coastal Puget Sound DPS), Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU). There would be no effect on rockfish critical habitat.*

### 3.9.3.4 Entanglement Stressors

This section evaluates potential entanglement impacts of various types of expended materials used by the Navy during training and testing activities within the Study Area. The likelihood of fish being affected by an entanglement stressor is a function of the physical properties, location, and buoyancy of the object and the behavior of the fish. Two types of military expended materials are considered here: (1) fiber optic cables and guidance wires and (2) decelerator/parachutes.

Most entanglement observations involve abandoned or discarded nets, lines, and other materials that form loops or incorporate rings (Derraik 2002; Keller et al. 2010; Laist 1987; Macfadyen et al. 2009). A 25-year dataset assembled by the Ocean Conservancy reported that fishing line, rope, and fishing nets accounted for approximately 68 percent of fish entanglements, with the remainder due to encounters with various items such as bottles, cans, and plastic bags (Ocean Conservancy 2010). No occurrences involving military expended materials were documented.

Fish entanglement occurs most frequently at or just below the surface or in the water column where objects are suspended. A smaller number involve objects on the seafloor, particularly abandoned fishing gear designed to catch bottom fish or invertebrates (Ocean Conservancy 2010). More fish species are entangled in coastal waters and the continental shelf than elsewhere in the marine environment because of higher concentrations of human activity (e.g., fishing, sources of entangling debris), higher fish abundances, and greater species diversity (Helfman et al. 2009b; Macfadyen et al. 2009).

The impacts of entanglement range from temporary and inconsequential to major physiological stress or mortality. Some fish are more susceptible to entanglement in derelict fishing gear and other marine debris, compared to other fish groups. Physical features, such as rigid or protruding snouts of some elasmobranchs (e.g., the wide heads of hammerhead sharks), increase the risk of entanglement compared to fish with smoother, more streamlined bodies (e.g., lamprey and eels). Most other fish, except for jawless fish and eels that are too smooth and slippery to become entangled, are susceptible to entanglement gear specifically designed for that purpose (e.g., gillnets); however, the Navy does not expend any items that are designed to function as entanglement objects.

The overall effects of entanglement are highly variable, ranging from temporary disorientation to mortality due to predation or physical injury. The evaluation of a species' entanglement potential should consider the size, location, and buoyancy of an object as well as the behavior of the fish species.

The following sections seek to identify entanglement potential due to military expended material. Where appropriate, specific geographic areas (open ocean areas, range complexes, testing ranges, and bays and Inland Waters) of potential impact are identified.

#### 3.9.3.4.1 Impacts from Fiber Optic Cables and Guidance Wires

Fiber optic cables and guidance wires are used during training and testing activities. A discussion of the types of activities, physical characteristics, location of use, and the number of items expended under each alternative is presented in Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires).

Marine fish groups identified in Section 3.9.2 (Affected Environment) that could be susceptible to entanglement in expended fiber optic cables and guidance wires are those with elongated snouts lined with tooth-like structures that easily snag on other similar marine debris, such as derelict fishing gear (Macfadyen et al. 2009). Species occurring outside the specified areas within the range complexes would not be exposed to fiber optic cables or guidance wires.

Once a guidance wire is released, it is likely to sink immediately and remain on the seafloor. In some cases, the wire may snag on a hard structure near the bottom and remain partially or completely suspended. The types of fish that encounter any given wire would depend, in part, on its geographic location and vertical location in the water column. In any situation, the most likely mechanism for entanglement would involve fish swimming through loops in the wire that tighten around it; however, loops are unlikely to form in guidance wire (Environmental Sciences Group 2005).

Because of their physical characteristics, guidance wires and fiber optic cables pose a potential, though unlikely, entanglement risk to susceptible fish. Potential entanglement scenarios are based on fish behavior in abandoned monofilament, nylon, and polypropylene lines used in commercial nets. Such derelict fishing gear is abundant in the ocean (Macfadyen et al. 2009) and poses a greater hazard to fish than the very thin wire expended by the Navy. Fishing gear materials often have breaking strengths that can be up to orders of magnitude greater than that of guidance wire and fiber optic cables (Environmental Sciences Group 2005) and are far more prone to tangling, as discussed in Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires). Fiber optic cables do not easily form loops, are brittle, and break easily if bent, so they pose a negligible entanglement risk. Additionally, the encounter rate and probability of impact from guidance wires and fiber optic cables are low, as few are expended and, therefore, have limited overlap with sturgeon.

No training or testing activities with fiber optic cables and guidance wires would be proposed in the Western Behm Canal portion of the Study Area under any alternative. Therefore, there would be no impacts from fiber optic cables and guidance wires under any alternative.

### No Action Alternative

#### <u>Training Activities</u>

#### Offshore Area

Table 3.9-4 lists the number and locations of expended fiber optic cables and guidance wires. As indicated in Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires), under the No Action Alternative, two activities that expend fiber optic cables or expended guidance wires would occur in the Offshore Area. While individual fish susceptible to entanglement could encounter guidance wires and cables, the long-term impacts of entanglement are unlikely for either individuals or populations because (1) the encounter rate is low given the low number of items expended, (2) the types of fish that are susceptible to these items is limited in this area, (3) the restricted overlap with susceptible fish, and (4) the properties of guidance wires and fiber optic cables reduce entanglement risk to fish. Potential impacts of exposure to guidance wires and fiber optic cables are not expected to result in substantial changes to an individual’s behavior, fitness, or species recruitment, and are not expected to result in population-level impacts.

While expended fiber optic cables and guidance wires could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, the properties of guidance wires and fiber optic cables reduce entanglement risk to fish, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. The sink rates of these guidance wires would rule out the possibility of it drifting great distances into nearshore and coastal areas where the ESA-listed species are found or into designated river or estuarine critical habitat. Therefore, fiber optic cables and guidance wires would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by fiber optic cables and guidance wires in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and displacement of sediments where fiber optic cables and guidance wires land.

#### Inland Waters

As shown in Table 3.9-4, no fiber optic cables or guidance wires would be expended under the No Action Alternative in the Inland Waters of the Study Area for training activities. Therefore, there would be no impacts from fiber optic cables or guidance wires from the No Action Alternative in the Inland Waters of the Study Area.

*Pursuant to the ESA, the use of fiber optic cables and guidance wires for training activities under the No Action Alternative may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*The use of fiber optic cables and guidance wires for training activities under the No Action Alternative may affect, but is not likely to adversely affect, critical habitat for green sturgeon; and would have no effect on critical habitat for chum, Chinook, bull trout, or rockfish.*

**<u>Testing Activities</u>**

**Offshore Area**

Table 3.9-4 lists the number and locations of expended fiber optic cables and guidance wires. All expenditures of fiber optic cables and guidance wires (16 total) in the Offshore Area result from NAVSEA torpedo testing.

While individual fish susceptible to entanglement could encounter guidance wires and cables, the long-term impacts of entanglement are unlikely for either individuals or populations because (1) the encounter rate is low given the low number of items expended, (2) the types of fish that are susceptible to these items is limited, (3) the restricted overlap with susceptible fish, and (4) the properties of guidance wires and fiber optic cables reduce entanglement risk to fish. Potential impacts of exposure to guidance wires and fiber optic cables are not expected to result in substantial changes to an individual's behavior, fitness, or species recruitment, and are not expected to result in population-level impacts.

While expended fiber optic cables and guidance wires could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, the properties of guidance wires and fiber optic cables reduce entanglement risk to fish, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. The sink rates of these guidance wires would rule out the possibility of it drifting great distances into nearshore and coastal areas where the designated river or estuarine critical habitat is located. Therefore, fiber optic cables and guidance wires would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by fiber optic cables and guidance wires in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and displacement of sediments where fiber optic cables and guidance wires land.

**Inland Waters**

Table 3.9-4 lists the number and locations of expended fiber optic cables and guidance wires. All expenditures of fiber optic cables and guidance wires in the Inland Waters result from NAVSEA torpedo testing. Under the No Action Alternative, 105 fiber optic cables and guidance wires would be expended in the Inland Waters.

While individual fish susceptible to entanglement could encounter guidance wires and cables, the long-term impacts of entanglement are unlikely for either individuals or populations because (1) the encounter rate is low given the low number of items expended, (2) the types of fish that are susceptible to these items is limited, (3) the restricted overlap with susceptible fish, and (4) the properties of guidance wires and fiber optic cables reduce entanglement risk to fish. Potential impacts of exposure to guidance wires and fiber optic cables are not expected to result in substantial changes to an individual's behavior, fitness, or species recruitment, and are not expected to result in population-level impacts.

While expended fiber optic cables and guidance wires could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, the properties of guidance wires and fiber optic cables reduce entanglement risk to fish, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. The sink rates of these guidance wires would rule out the possibility of it drifting great distances into the designated river or estuarine critical habitat. Expended fiber optic cables and guidance wires would not affect water quality or prey availability as PCEs for salmonid species, bull trout, rockfish species, and Pacific eulachon. Therefore, expended fiber optic cables and guidance wires would have no effect critical habitat for salmonid species, bull trout, rockfish species, and Pacific eulachon.

*Pursuant to the ESA, the use of fiber optic cables and guidance wires for testing activities under the No Action Alternative may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*The use of fiber optic cables and guidance wires for testing activities under the No Action Alternative may affect, but is not likely to adversely affect, critical habitat for green sturgeon and would have no effect on critical habitat for salmonid species, bull trout, or rockfish species.*

## Alternative 1

### Training Activities

#### Offshore Area

As shown in Table 3.9-4, no fiber optic cables or guidance wires would be expended in the Offshore Area under Alternative 1; therefore, there would be no impact to fish.

#### Inland Waters

Table 3.9-4 lists the number and locations of expended fiber optic cables and guidance wires. As indicated in Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires), under Alternative 1, there would be one fiber optic cables or guidance wire expended in the Inland Waters. Under Alternative 1, the Maritime Homeland Defense/Security Mine Countermeasures Exercise that would occur once every other year within the Inland Waters would result in the expenditure of a fiber optic cable.

While individual fish susceptible to entanglement could encounter guidance wires and cables, the long-term impacts of entanglement are unlikely for either individuals or populations because (1) the encounter rate is low given the low number of items expended, (2) the types of fish that are susceptible to these items is limited, (3) the restricted overlap with susceptible fish, and (4) the properties of guidance wires and fiber optic cables reduce entanglement risk to fish. Potential impacts of exposure to guidance wires and fiber optic cables are not expected to result in substantial changes to an individual's behavior, fitness, or species recruitment, and are not expected to result in population-level impacts.

While expended fiber optic cables and guidance wires could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, the properties of guidance wires and fiber optic cables reduce entanglement risk to fish, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. The sink rates of these guidance wires would rule out the possibility of it drifting great distances into the designated river or estuarine critical habitat. Expended fiber optic cables and guidance wires would not affect water quality or prey availability as PCEs for coho, steelhead, sockeye, rockfish, bull trout, rockfish species, and Pacific eulachon. Therefore, expended fiber optic cables and guidance wires would have no effect on critical habitat for salmonid species, bull trout, rockfish species, and Pacific eulachon.

*Pursuant to the ESA, the use of fiber optic cables and guidance wires for training activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*The use of fiber optic cables and guidance wires for training activities in the Inland Waters of the Study Area under Alternative 1 would have no effect on critical habitat for salmonid species, bull trout, or rockfish species.*

## Testing Activities

### Offshore Area

Table 3.9-4 lists the number and locations of expended fiber optic cables and guidance wires. All expenditures of fiber optic cables and guidance wires in the Offshore Area result from NAVSEA torpedo testing. Under Alternative 1, 131 fiber optic cables and guidance wires would be expended in the Offshore Area, an increase of four from the No Action Alternative.

The potential impacts of expended fiber optic cables and guidance wires would be short term and temporary for the same reasons stated under the analysis under the No Action Alternative for testing activities.

While expended fiber optic cables and guidance wires could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, the properties of guidance wires and fiber optic cables reduce entanglement risk to fish, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. The sink rates of these guidance wires would rule out the possibility of it drifting great distances into nearshore and coastal areas where the designated river or estuarine critical habitat is located. Therefore, fiber optic cables and guidance wires would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by fiber optic cables and guidance wires in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and displacement of sediments where fiber optic cables and guidance wires land.

### Inland Waters

Table 3.9-4 lists the number and locations of expended fiber optic cables and guidance wires. All expenditures of fiber optic cables and guidance wires in the Inland Waters result from NAVSEA torpedo testing. Under the Alternative 1, 245 fiber optic cables and guidance wires would be expended in the Inland Waters, compared to 105 under the No Action Alternative.

The potential impacts of expended fiber optic cables and guidance wires would be short term and temporary for the same reasons stated under the analysis under the No Action Alternative for testing activities.

While expended fiber optic cables and guidance wires could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, the properties of guidance wires and fiber optic cables reduce entanglement risk to fish, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors), and are outside the Study Area. The sink rates of these guidance wires would rule out the possibility of it drifting great distances into the designated river or estuarine critical habitat. Expended fiber optic cables and guidance wires would not affect water quality or prey availability as PCEs for salmonid species, bull trout, rockfish species, and Pacific eulachon. Therefore, expended fiber optic cables and guidance wires would have no effect on critical habitat for salmonid species, bull trout, rockfish species, and Pacific eulachon.

*Pursuant to the ESA, the use of fiber optic cables and guidance wires for testing activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*The use of fiber optic cables and guidance wires for testing activities under Alternative 1 may affect, but is not likely to adversely affect, nearshore critical habitat critical habitat for green sturgeon,; and would have no effect on critical habitat for salmonid species, bull trout, or rockfish species.*

## Alternative 2

### Training Activities

#### Offshore Area

As shown in Table 3.9-4, no fiber optic cables or guidance wires would be expended in the Offshore Area under Alternative 2; therefore, there would be no impact to fish.

#### Inland Waters

Table 3.9-4 lists the number and locations of expended fiber optic cables and guidance wires. As indicated in Section 3.0.5.3.4.1 (Fiber Optic Cables and Guidance Wires), under Alternative 2, there would be one activity that expend either fiber optic cables or guidance wires in the Inland Waters. Under Alternative 2, the Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise that would occur once every year within the Inland Waters would result in the expenditure of a fiber optic cable. This is an increase of one fiber optic cable per year; therefore, impacts under Alternative 2 would be similar to those described in Alternative 1. The risk of entanglement resulting from proposed training activities would be low as described in the analysis for Alternative 1.

While expended fiber optic cables and guidance wires could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, the properties of guidance wires and fiber optic cables reduce entanglement risk to fish, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. The sink rates of these guidance wires would rule out the possibility of it drifting great distances into nearshore and coastal areas where the designated river or estuarine critical habitat is located. Expended fiber optic cables and guidance wires would not affect water quality or prey availability as PCEs for coho, steelhead, sockeye, rockfish, bull trout, rockfish species, and Pacific eulachon. Therefore, expended fiber optic cables and guidance wires would have no effect on critical habitat for salmonid species, bull trout, rockfish species, and Pacific eulachon.

*Pursuant to the ESA, the use of fiber optic cables and guidance wires for training activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*The use of fiber optic cables and guidance wires for training activities under Alternative 2 would have no effect on critical habitat for salmonid species, bull trout, or rockfish species.*

## Testing Activities

### Offshore Area

Table 3.9-4 lists the number and locations of expended fiber optic cables and guidance wires. All expenditures of fiber optic cables and guidance wires in the Offshore Area result from NAVSEA torpedo testing. Under Alternative 2, 153 fiber optic cables and guidance wires would be expended in the Offshore Area, an increase of eight from the No Action Alternative.

The potential impacts of expended fiber optic cables and guidance wires would be short term and temporary for the same reasons stated under the analysis under the No Action Alternative for testing activities.

While expended fiber optic cables and guidance wires could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, the properties of guidance wires and fiber optic cables reduce entanglement risk to fish, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. The sink rates of these guidance wires would rule out the possibility of it drifting great distances into nearshore and coastal areas where the designated river or estuarine critical habitat is located. Therefore, fiber optic cables and guidance wires would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by fiber optic cables and guidance wires in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and displacement of sediments where fiber optic cables and guidance wires land.

### Inland Waters

Table 3.9-4 lists the number and locations of expended fiber optic cables and guidance wires. All expenditures of fiber optic cables and guidance wires in the Inland Waters result from NAVSEA torpedo testing. Under Alternative 2, 314 fiber optic cables and guidance wires would be expended in the Inland Waters, compared to 105 under the No Action Alternative.

The potential impacts of expended fiber optic cables and guidance wires would be short term and temporary for the same reasons stated under the analysis under the No Action Alternative for testing activities.

While expended fiber optic cables and guidance wires could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, the properties of guidance wires and fiber optic cables reduce entanglement risk to fish, and the dispersed nature of the activity. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. The sink rates of these guidance wires would rule out the possibility of it drifting great distances into nearshore and coastal areas where the designated river or estuarine critical habitat is located. Expended fiber optic cables and guidance wires would not affect water quality or prey availability as PCEs for salmonid species, bull trout, rockfish species, and Pacific eulachon. Therefore, expended fiber optic cables and guidance wires would have no effect on critical habitat for salmonid species, bull trout, rockfish species, and Pacific eulachon.

*Pursuant to the ESA, the use of fiber optic cables and guidance wires for testing activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*The use of fiber optic cables and guidance wires for testing activities under Alternative 2 may affect, but is not likely to adversely affect, nearshore critical habitat for green sturgeon; and would have no effect on critical habitat for salmonid species, bull trout, or rockfish species.*

#### 3.9.3.4.2 Impacts from Decelerator/Parachutes

Decelerator/parachutes of varying sizes are used during training and testing activities. The types of activities that use decelerator/parachutes, physical characteristics and size of decelerator/parachutes, locations where decelerator/parachutes are used, and the number of decelerator/parachute activities proposed under each alternative are presented in Section 3.0.5.3.4.2 (Decelerator/parachutes).

Fish face many potential entanglement scenarios in abandoned monofilament, nylon, polypropylene line, and other derelict fishing gear in the nearshore and offshore marine habitats of the Study Area (Macfadyen et al. 2009; Ocean Conservancy 2010). Abandoned fishing gear is dangerous to fish because it is abundant, essentially invisible, strong, and easily tangled. In contrast, decelerator/parachutes are rare, highly visible, and not designed to capture fish. The combination of low encounter rates and weak entangling features reduce the risk that salmonid species would be adversely impacted by decelerator/parachutes.

Once a decelerator/parachute has been released to the water, it poses a potential entanglement risk to fish. The Naval Ocean Systems Center identified the potential impacts of torpedo air launch accessories, including decelerator/parachutes, on fish (U.S. Department of the Navy 1996). Unlike other materials in which fish become entangled (such as gill nets and nylon fishing line), the decelerator/parachute is relatively large and visible, reducing the chance that visually oriented fish would accidentally become entangled in it. No cases of fish entanglement have been reported for decelerator/parachutes (Ocean Conservancy 2010; U.S. Department of the Navy 2001a). Entanglement in a newly-expended decelerator/parachute while it is in the water column is unlikely because fish generally react to sound and motion at the surface with a behavioral reaction by swimming away from the source (see Section 3.9.3.3.2, Impacts from Military Expended Materials) and would detect the oncoming decelerator/parachute in time to avoid contact. While the decelerator/parachute is sinking, fish would have ample opportunity to swim away from the large moving object. Once the decelerator/parachute is on the bottom; however, it is feasible that a fish could become entangled in the decelerator/parachute or its suspension lines while diving and feeding, especially in deeper waters where it is dark. If the decelerator/parachute dropped in an area of strong bottom currents, it could billow open and pose a short-term entanglement threat to large fish feeding on the bottom. Benthic fish with elongated spines could become caught on the decelerator/parachute or lines. Most sharks and other smooth-bodied fish are not expected to become entangled because their soft, streamlined bodies can more easily slip through potential snares. A fish with spines or protrusions (e.g., some sharks, billfish, sturgeon, or sawfish) on its body that swam into the decelerator/parachute or a loop in the lines and then struggled could become bound tightly enough to prevent escape. Although this scenario is possible based on the structure of the materials and the shape and behavior of fish, it is not considered a likely event.

Aerial-launched sonobuoys are deployed with a decelerator/parachute. The sonobuoy itself is not considered an entanglement hazard upon deployment (Environmental Sciences Group 2005), but its components may pose an entanglement hazard once released into the ocean. Sonobuoys contain cords, electronic components, and plastic mesh that may entangle fish (Environmental Sciences Group 2005). Open-ocean filter feeding species, such as basking sharks, whale sharks, and manta rays could become entangled in these items, whereas smaller species could become entangled in the plastic mesh in the same manner as a small gillnet. Since most sonobuoys are expended in offshore areas, many coastal fish would not encounter or have any opportunity to become entangled in materials associated with sonobuoys, apart from the risk of entanglement in decelerator/parachutes described above.

No training or testing activities with decelerator/parachutes would be proposed in the Western Behm Canal under any alternative. Therefore, there would be no impact from decelerator/parachutes in the Western Behm Canal under any Alternative.

## No Action Alternative

### Training Activities

### Offshore Area

Table 3.9-4 lists the number and locations of expended decelerator/parachutes. Under the No Action Alternative, the Navy proposes to conduct training activities that would result in the expenditure of approximately 8,400 decelerator/parachutes. This expenditure of decelerator/parachutes is almost entirely due to training in which sonobuoys and their accompanying decelerator/parachutes are deployed. The number and footprint of decelerator/parachutes are detailed in Table 3.3-4. As indicated in Section 3.0.5.3.4.2 (Decelerator/parachutes) under the No Action Alternative, activities involving decelerator/parachute use would occur in the open ocean portions of Offshore Area of the Study Area. Given the size of the range complexes and the widely scattered use of decelerator/parachutes (0.02 per $nm^2$), it would be very unlikely that fishes would encounter and become entangled in any decelerator/parachutes or sonobuoy accessories. If a fish were to encounter and become entangled in any of these items, the growth, survival, annual reproductive success, or lifetime reproductive success of populations would not be impacted directly or indirectly.

While decelerator/parachutes could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, and the density of decelerator/parachutes expended. However, if an expended decelerator/parachute drifted into an area where these species were encountered, the salmonid species and Pacific eulachon are strong swimmers with streamlined bodies that are unlikely to become entangled in decelerator/parachutes or lines. The green sturgeon could become entangled in a decelerator/parachute; however, based on the analysis in Section 3.9.3.4.2 (Impacts from Decelerator/parachutes), and the location of expended decelerator/parachutes for training activities, such an event is unlikely. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. The decelerator/parachutes would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, decelerator/parachutes would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by decelerator/parachutes in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and covering of habitats where decelerator/parachutes settle.

#### Inland Waters

No training activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under the No Action Alternative. Therefore, decelerator/parachutes would have no impact on fish under the No Action Alternative.

*Pursuant to the ESA, the use of decelerator/parachutes for training activities under the No Action Alternative may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon; and no effect on rockfish species.*

*The use of decelerator/parachutes for training activities under the No Action Alternative may affect, but is not likely to adversely affect, critical habitat for green sturgeon; and would have no effect on critical habitat for Chinook, chum, bull trout, or rockfish.*

#### <u>Testing Activities</u>

#### Offshore Area

No testing activities with decelerator/parachutes are proposed in the Offshore Area under the No Action Alternative. Therefore, decelerator/parachutes would have no impact on fish under the No Action Alternative.

#### Inland Waters

No testing activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under the No Action Alternative. Therefore, decelerator/parachutes would have no impact on fish under the No Action Alternative.

*Pursuant to the ESA, the use of decelerator/parachutes for testing activities under the No Action Alternative would have no effect on ESA-listed salmonid species, green sturgeon, Pacific eulachon, or rockfish species*

*The use of decelerator/parachutes for testing activities under the No Action Alternative would have no effect on critical habitat ESA-listed salmonid species, green sturgeon, or rockfish species.*

### Alternative 1

#### <u>Training Activities</u>

#### Offshore Area

The number of expended decelerator/parachutes used would increase from approximately 8,400 under the No Action Alternative to approximately 8,900 under Alternative 1. Given the size of the range complex and the widely scattered use of decelerator/parachutes (0.02 per $nm^2$), it would be very unlikely that fishes would encounter and become entangled in any decelerator/parachutes or sonobuoy accessories. If a fish were to encounter and become entangled in any of these items, the growth, survival, annual reproductive success, or lifetime reproductive success of populations would not be impacted directly or indirectly.

While decelerator/parachutes could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, and the density of decelerator/parachutes expended. However, if an expended decelerator/parachute drifted into an area where these species were encountered, the salmonid species and Pacific eulachon are strong swimmers with streamlined bodies that are unlikely to become entangled in decelerator/parachutes or lines. The green sturgeon could become entangled in a decelerator/parachute; however, based on the analysis in Section 3.9.3.4.2 (Impacts from Decelerator/Parachutes), and the location of expended decelerator/parachutes for training activities, such an event is unlikely. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. The decelerator/parachutes would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, decelerator/parachutes would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by decelerator/parachutes in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and covering of habitats where decelerator/parachutes settle.

#### Inland Waters

No training activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under Alternative 1. Therefore, decelerator/parachutes would have no impact on fish under Alternative 1.

*Pursuant to the ESA, the use of decelerator/parachutes for training activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, and Pacific eulachon; and no effect on rockfish species.*

*The use of decelerator/parachutes for testing activities under Alternative 1 may affect, but is not likely to adversely affect, critical habitat for green sturgeon; and would have no effect on critical habitat for chinook, chum, bull trout, or rockfish.*

### <u>Testing Activities</u>

#### Offshore Area

Table 3.9-4 lists the number and locations of expended decelerator/parachutes. Under Alternative 1, the Navy proposes to conduct testing activities that would result in the expenditure of approximately 1,210 decelerator/parachutes. This is due to the addition of NAVAIR sonobuoy testing activities (Table 2.8-3), which would typically occur in deep waters offshore. Given the size of the range complexes and the resulting widely scattered decelerator/parachutes (0.03 per $nm^2$), it would be very unlikely that fishes would encounter and become entangled in any decelerator/parachutes or sonobuoy accessories. If a fish were to encounter and become entangled in any of these items, the growth, survival, annual reproductive success, or lifetime reproductive success of populations would not be impacted directly or indirectly.

While decelerator/parachutes could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, and the density of decelerator/parachutes expended. However, if an expended decelerator/parachute drifted into an area where these species were encountered, the salmonid species and Pacific eulachon are strong swimmers with streamlined bodies that are unlikely to become entangled in decelerator/parachutes or lines. The green sturgeon could become entangled in a decelerator/parachute; however, based on the analysis in Section 3.9.3.4.2 (Impacts from Decelerator/parachutes), and the location of expended decelerator/parachutes for testing activities, such an event is unlikely. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. The decelerator/parachutes would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, decelerator/parachutes would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by decelerator/parachutes in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and covering of habitats where decelerator/parachutes settle.

#### Inland Waters

No testing activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under Alternative 1. Therefore, decelerator/parachutes would have no impact on fish under Alternative 1.

*Pursuant to the ESA, the use of decelerator/parachutes for testing activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon; and no effect on rockfish species.*

*The use of decelerator/parachutes for testing activities under Alternative 1 may affect, but is not likely to adversely affect, critical habitat for green sturgeon; and would have no effect on critical habitat for chinook, chum, bull trout, or rockfish.*

## Alternative 2

### Training Activities

#### Offshore Area

The number of expended decelerator/parachutes used under Alternative 2 would be the same as those used under Alternative 1, and would therefore have the same impacts as described under the No Action Alternative.

While decelerator/parachutes could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, and the density of decelerator/parachutes expended. However, if an expended decelerator/parachute drifted into an area where these species were encountered, the salmonid species and Pacific eulachon are strong swimmers with streamlined bodies that are unlikely to become entangled in decelerator/parachutes or lines. The green sturgeon could become entangled in a decelerator/parachute; however, based on the analysis in Section 3.9.3.4.2 (Impacts from Decelerator/parachutes), and the location of expended decelerator/parachutes for training activities, such an event is unlikely. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. The decelerator/parachutes would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, decelerator/parachutes would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by decelerator/parachutes in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and covering of habitats where decelerator/parachutes settle.

#### Inland Waters

No training activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under Alternative 2. Therefore, decelerator/parachutes would have no impact on fish under Alternative 2.

*Pursuant to the ESA, the use of decelerator/parachutes for training activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon; and no effect on rockfish species.*

*The use of decelerator/parachutes for training activities under Alternative 2 may affect, but is not likely to adversely affect, critical habitat for green sturgeon; and would have no effect on critical habitat for Chinook, chum, bull trout, or rockfish.*

### Testing Activities

#### Offshore Area

Table 3.9-4 lists the number and locations of expended decelerator/parachutes. Under Alternative 2, the Navy proposed to conduct testing activities that would result in the expenditure of approximately 1,331 decelerator/parachutes. This increase is due to the addition of NAVAIR sonobuoy testing activities (Table 2.8-3), which would typically occur in deep waters offshore.

Given the size of the range complexes and the resulting widely scattered decelerator/parachutes (0.03 per $nm^2$), it would be very unlikely that fishes would encounter and become entangled in any decelerator/parachutes or sonobuoy accessories. If a fish were to encounter and become entangled in any of these items, the growth, survival, annual reproductive success, or lifetime reproductive success of populations would not be impacted directly or indirectly.

While decelerator/parachutes could overlap with all of the ESA-listed species, the likelihood of entanglement would be extremely low given the low abundance of ESA-listed species in the Study Area, and the density of decelerator/parachutes expended. However, if an expended decelerator/parachute drifted into an area where these species were encountered, the salmonid species and Pacific eulachon are strong swimmers with streamlined bodies that are unlikely to become entangled in decelerator/parachutes or lines. The green sturgeon could become entangled in a decelerator/parachute; however, based on the analysis in Section 3.9.3.4.2 (Impacts from Decelerator/parachutes), and the location of expended decelerator/parachutes for training activities, such an event is unlikely. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. The decelerator/parachutes would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, decelerator/parachutes would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by decelerator/parachutes in the Offshore Area; however, any impacts would be short-term and localized disturbances of the water column and covering of habitats where decelerator/parachutes settle.

#### Inland Waters

No testing activities with decelerator/parachutes are proposed in the Inland Waters portion of the Study Area under Alternative 2. Therefore, decelerator/parachutes would have no impact on fish under Alternative 2.

*Pursuant to the ESA, the use of decelerator/parachutes for testing activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon; and no effect on rockfish species.*

*The use of decelerator/parachutes for testing activities under Alternative 2 may affect, but is not likely to adversely affect, critical habitat for green sturgeon; and would have no effect on critical habitat for Chinook, chum, bull trout, or rockfish.*

#### 3.9.3.4.3 Summary and Conclusions of Entanglement Impacts

While most fish species are susceptible to entanglement in fishing gear that is designed to entangle a fish by trapping a fish by its gills or spines (e.g., gill nets), only a limited number of fish species that possess certain features such as an irregular shaped or rigid rostrum (snout) (e.g., billfish) are susceptible to entanglement by military expended materials.

### Combined Entanglement Stressors

An individual fish could experience the following impacts of entanglement stressors: displacement, stress, avoidance response, behavioral changes, increased predation, entanglement causing injury, and entanglement causing mortality. If entanglement results in mortality, it cannot act in combination because mortal injuries occur with the first instance. Therefore, there is no possibility for the occurrence of this consequence to increase if sub-stressors are combined.

Sub-lethal impacts may result in delayed mortality because they cause irrecoverable injury or alter the individual's ability to feed or detect and avoid predation. Sub-lethal effects resulting in mortality could be more likely if the activities occurred in essentially the same location and occurred within the individual's recovery time from the first disturbance. This circumstance is only likely to arise during training and testing activities that cause frequent and recurring entanglement stressors to essentially the same location (e.g., torpedoes expended at the same location as sonobuoys). In these specific circumstances, the potential impacts to fishes from combinations of entanglement stressors may be greater than the sum of their individual impacts.

These specific circumstances that could multiply the impacts of entanglement stressors are highly unlikely to occur for two reasons. First, it is highly unlikely that torpedo guidance wires and sonobuoy decelerator/parachutes would impact essentially the same space and the same individual fish because most of these sub-stressors are widely dispersed in time and space. Because the risk of injury or mortality is extremely low for each sub-stressor independently, the combined impact of these sub-stressors does not increase the risk in a meaningful way. Furthermore, while it is conceivable that interaction between sub-stressors could magnify their combined risks, the necessary circumstances are highly unlikely to overlap.

Interaction between entanglement sub-stressors is likely to have neutral impacts for fishes. There is no potential for these entangling objects to combine in a way that would multiply their impact, as is the case with derelict (abandoned or discarded) fishing nets that commonly occur in the Study Area (Macfadyen et al. 2009) and entangle fish by design. Fish entangled in derelict nets attract scavengers and predators that may themselves become entangled in an ongoing cycle (Morgan and Chuenpagdee 2003). Guidance wires and decelerator/parachutes are used relatively infrequently over a wide area, and are mobile for only a short time. Therefore, unlike discarded fishing gear, it is extremely unlikely that guidance wires and decelerator/parachutes could interact.

### Summary of Entanglement Stressors

The Navy identified and analyzed two military expended materials types that have potential to entangle fishes: cables and wires, and decelerator/parachutes. Other military expended materials types such as bomb or missile fragments do not have the physical characteristics to entangle fishes in the marine environment and were not analyzed. Even for fishes that might encounter and become entangled in an expended torpedo wire, the breaking strength of that wire is low enough that the impact would be only temporary and not likely to cause harm to the individual. Given the low number of decelerator/parachutes expended, it would be very unlikely that fishes would encounter and become entangled in any decelerator/parachutes or sonobuoy accessories. If a fish were to encounter and become entangled in any of these items, the growth, survival, annual reproductive success, or lifetime reproductive success of populations would not be impacted directly or indirectly.

*Pursuant to the ESA, entanglement stressors used under the No Action Alternative, Alternative 1, and Alternative 2 may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon; and no effect on rockfish species.*

*Entanglement stressors used under the No Action Alternative, Alternative 1, and Alternative 2 may affect, but are not likely to adversely affect, critical habitat for green sturgeon; and would have no effect on critical habitat for Chinook, chum, bull trout, or rockfish.*

### 3.9.3.5 Ingestion Stressors

This section analyzes the potential ingestion impacts of the various types of munitions and military expended materials other than munitions used by the Navy during training and testing activities within the Study Area. Aspects of ingestion stressors that are applicable to marine organisms in general are presented in Section 3.0.5.3.5 (Ingestion Stressors). Ingestion of expended materials by fishes could occur in coastal and open ocean areas and can occur at the surface, in the water column, or at the seafloor depending on the size and buoyancy of the expended object and the feeding behavior of the fish. Floating material is more likely to be eaten by fishes that feed at or near the water surface (e.g., ocean sunfishes, basking sharks, etc.), while materials that sink to the seafloor present a higher risk to bottom-feeding fishes (e.g., rockfish, skates/rays, flounders).

It is reasonable to assume that any item of a size that can be swallowed by a fish could be eaten at some time; this analysis focuses on ingestion of materials in two locations: (1) at the surface or water column, and (2) at the seafloor. Open-ocean predators and open-ocean planktivores are most likely to ingest materials in the water column. Coastal bottom-dwelling predators and estuarine Inland Waters bottom-dwelling predators could ingest materials from the seafloor. The potential for fish, including the ESA-listed fish species, to encounter and ingest expended materials is evaluated with respect to their feeding group and geographic range, which influence the probability that they would eat military expended materials.

The Navy expends the following types of materials during training and testing in the Study Area that could become ingestion stressors: non-explosive practice munitions (small- and medium-caliber), fragments from high-explosives, fragments from targets, chaff, flare casings (including plastic end caps and pistons), and small decelerator/parachutes. The activities that expend these items and their general distribution are detailed in Section 3.0.5.3.5 (Ingestion Stressors). Metal items eaten by marine fish are generally small (such as fishhooks, bottle caps, and metal springs), suggesting that small- and medium-caliber projectiles, pistons, or end caps (from chaff canisters or flares) are more likely to be ingested.

Both physical and toxicological impacts could occur as a result of consuming metal or plastic materials. Items of concern are those of ingestible size that either drift at or just below the surface (or in the water column) for a time or sink immediately to the seafloor. The likelihood that expended items would cause a potential impact on a given fish species depends on the size and feeding habits of the fish and the rate at which the fish encounters the item and the composition of the item. In this analysis only small- and medium-caliber munitions (or small fragments from larger munitions), chaff, small decelerator/parachutes, and end caps and pistons from flares and chaff cartridges are considered to be of ingestible size for a fish.

The analysis of ingestion impacts on fish is structured around the following feeding strategies:

#### Feeding at or Just Below the Surface or Within the Water Column

- **Open-Ocean Predators.** Large, migratory, open-ocean fishes, such as dorado, sharks, and billfishes feed on fast-swimming prey in the water column of the Study Area (Table 3.9-11). These fishes range widely in search of unevenly distributed food patches. The ESA-listed salmonid species and eulachon fall into this category. Smaller military expended materials could be mistaken for prey items and ingested purposefully or incidentally as the fish is swimming.
- **Open-Ocean Planktivores.** Plankton eating fish in the open-ocean portion of the Study Area include anchovies, sardines, flying fishes, ocean sunfish, and basking sharks (Table 3.9-11). These fishes feed by either filtering plankton from the water column or by selectively ingesting larger zooplankton. These planktivores could encounter and incidentally feed on smaller types of military expended materials (e.g., chaff, end caps, pistons) at the surface or in the water column. None of the species listed under the ESA in the Study Area are open ocean planktivores, but some species in this group of fishes (e.g., anchovies) constitute a major prey base for many important predators.

**Table 3.9-11: Summary of Ingestion Stressors on Fishes Based on Location**

| Feeding Guild | Representative Species | ESA-Protected Species | Overall Potential for Impact |
|---|---|---|---|
| Offshore Area: Open-ocean Predators | Dorado, most shark species, billfish | Salmonids, Pacific eulachon | These fishes may eat floating or sinking expended materials, but the encounter rate would be extremely low. |
| Offshore Area: Open-ocean plankton eaters | Basking shark | None | These fishes may ingest floating expended materials incidentally as they feed in the water column, but the encounter rate would be extremely low. |
| Offshore Area and Inland Waters: Coastal bottom-dwelling predators | Rockfishes, groupers, jacks | Bocaccio, canary rockfish, yelloweye rockfish | These fishes may eat expended materials on the seafloor, but the encounter rate would be extremely low. |
| Offshore Area and Inland Waters: Coastal/estuarine bottom-dwelling predators and scavengers | Skates and rays, flounders | Green sturgeon | These fishes could incidentally eat some expended materials while foraging, especially in muddy waters with limited visibility. However, encounter frequency would be extremely low. |

Note: ESA = Endangered Species Act

Military expended materials that could potentially impact these types of fish at or just below the surface or in the water column include those items that float or are suspended in the water column for some period of time (e.g., decelerator/parachutes and end caps and pistons from chaff cartridges or flares). Military expended materials that could be ingested by fish at the seafloor include items that sink (e.g., small-caliber projectiles and casings, fragments from high-explosive munitions).

#### Fishes Feeding at the Seafloor

- **Coastal Bottom Dwelling Predators/Scavengers.** Large predatory fishes near the seafloor are represented by rockfishes, groupers, and jacks, which are typical seafloor predators in coastal and deeper nearshore waters of the Study Area (see Table 3.9-11). These species feed opportunistically on or near the bottom, taking fish and invertebrates from the water column and from the seafloor (e.g., crabs, octopus). Bottom-dwelling fishes in the nearshore coasts (see Table 3.9-11) may feed by seeking prey and by scavenging on dead fishes and invertebrates (e.g., skates, rays, flatfish, rat fish). The ESA-listed rockfish species (bocaccio, canary rockfish, and yelloweye rockfish) and green sturgeon are all bottom dwelling predators.

Potential impacts of ingestion to adults are different than for other lifestages (eggs, larvae, juveniles) because early lifestages are too small to ingest any military expended materials except for chaff. Therefore, no ingestion potential impacts on early lifestages would occur with the exception of later stage larvae and juveniles.

Within the context of fish location in the water column and feeding strategies, the analysis is divided into (1) munitions (small- and medium-caliber projectiles, and small fragments from larger munitions); and (2) military expended material other than munitions (chaff, chaff end caps, pistons, decelerator/parachutes, flares, and target fragments).

### 3.9.3.5.1 Impacts from Ingestion of Munitions and Military Expended Materials Other than Munitions

The potential impacts of ingesting foreign objects on a given fish depend on the species and size of the fish. Fish that normally eat spiny, hard-bodied invertebrates could be expected to have tougher mouths and digestive systems than fish that normally feed on softer prey. Materials that are similar to the normal diet of a fish would be more likely to be ingested and more easily handled once ingested—for example, by fish that feed on invertebrates with sharp appendages. These items could include fragments from high-explosives that a fish could encounter on the seafloor. Relatively small or smooth objects, such as small caliber projectiles or their casings, might pass through the digestive tract without causing harm. A small sharp-edged item could cause a fish immediate physical distress by tearing or cutting the mouth, throat, or stomach. If the object is rigid and large (relative to the fish’s mouth and throat), it may block the throat or obstruct the flow of waste through the digestive system. An object may be enclosed by a cyst in the gut lining (Danner et al. 2009; Hoss and Settle 1990). Ingestion of large foreign objects could lead to disruption of a fish’s normal feeding behavior, which could be sublethal or lethal.

Munitions are heavy and would sink immediately to the seafloor, so exposure would be limited to those fish identified as bottom-dwelling predators and scavengers. It is possible that expended small caliber projectiles on the seafloor could be colonized by seafloor organisms and mistaken for prey or that expended small caliber projectiles could be accidentally or intentionally eaten during foraging. Over time, the metal may corrode or become covered by sediment in some habitats, reducing the likelihood of a fish encountering the small caliber, non-explosive practice munitions.

Fish feeding on the seafloor in the offshore locations where these items are expended (e.g., gunnery boxes) would be more likely to encounter and ingest them than fish in other locations. A particularly large item (relative to the fish ingesting it) could become permanently encapsulated by the stomach lining, with the rare chance that this could impede the fish's ability to feed or take in nutrients. However, in most cases, a fish would pass a round, smooth item through its digestive tract and expel it, with no long-term measurable reduction in the individual's fitness (Danner et al. 2009; Hoss and Settle 1990).

If high-explosive ordnance does not explode, it would sink to the bottom. In the unlikely event that explosive material, high-melting-point explosive (known as HMX) or royal demolition explosive (known as RDX), is exposed on the ocean floor it would break down in a few hours (U.S. Department of the Navy 2001b). HMX or RDX would not accumulate in the tissues of fish (Lotufo et al. 2010; Price et al. 1998). Fish may take up trinitrotoluene (TNT) from the water when it is present at high concentrations but not from sediments (Lotufo et al. 2010). As described in Section 3.1.3.1.5.2 (Unexploded Ordnance) of this EIS/OEIS, most studies of unexploded ordnance in marine environments have not detected explosives or have detected them in very minute concentrations. The rapid dispersal and dilution of TNT expected in the marine water column reduces the likelihood of a fish encountering high concentrations of TNT to near zero.

There are no training or testing activities involving ingestible expended materials proposed for the Western Behm Canal portion of the Study Area under any alternative. Therefore, there would be no impact from ingestible expended materials in the Western Behm Canal portion of the Study Area from any alternative.

## No Action Alternative

### <u>Training Activities</u>

#### Offshore Area

***<u>Projectiles</u>***

Table 3.0-20 lists the number and location of small- and medium-caliber projectiles. As indicated in Section 3.0.5.3.5.1 (Non-explosive Practice Munitions) under the No Action Alternative, small- and medium-caliber projectile use would occur in the Offshore Area. Species that occur in these areas would have the potential to be exposed to small- and medium-caliber projectiles.

Table 3.0-21 lists the number and location of activities that expend fragments from high-explosive ordnance and munitions (e.g., demolition charges, grenades, bombs, missiles, and rockets). The number and footprint of high-explosive ordnance and munitions are detailed in Table 3.3-4; however, the fragment size cannot be quantified. As indicated in Section 3.0.5.3.5.2 (Fragments from High-Explosive Munitions) under the No Action Alternative, high-explosive ordnance and munitions use would occur in the offshore OPAREA. Species that occur in these areas would have the potential to be exposed to fragments from high explosive ordnance and munitions. These items are heavy and would sink immediately to the seafloor, so exposure to fishes would be limited to those groups identified as bottom-dwelling predators and scavengers. It is possible that expended small-caliber projectiles on the seafloor could be colonized by seafloor organisms and mistaken for prey or that expended small-caliber projectiles could be accidentally or intentionally eaten during foraging. Over time, the metal corrodes slowly or may become covered by sediment in some habitats, reducing the likelihood of a fish encountering the small-caliber non explosive practice munitions. High explosive munitions are typically fused to detonate within 5 ft. (1.5 m) of the water surface, with steel fragments breaking off in all directions and rapidly decelerating in the water and settling to the seafloor. The analysis generally assumes that most explosive expended materials sink to the seafloor and become incorporated into the seafloor with no substantial accumulations in any particular area (see Section 3.1, Sediments and Water Quality).

Encounter rates in locations with concentrated small-caliber projectiles would be assumed to be greater than in less concentrated areas. Fishes feeding on the seafloor in the offshore locations where these items are expended (e.g., focused in gunnery boxes) would be more likely to encounter these items and at risk for potential ingestion impacts than in other locations. If ingested, these items could potentially disrupt an individual's feeding behavior or digestive processes. If the item is particularly large for the fish ingesting it, the projectile could become permanently encapsulated by the stomach lining, with the rare chance that this could impede the fish's ability to feed or take in nutrients (Danner et al. 2009; Hoss and Settle 1990). However, in most cases a fish would pass the round and smooth item through their digestive tract and expel the item with full recovery expected without impacting the individual's growth, survival, annual reproductive success, or lifetime reproductive success.

Unexploded high-explosive munitions would sink to the bottom. The residual explosive material would not be exposed to the marine environment for a long time, possibly many years, as it is encased in a non-buoyant cylindrical package. When the HMX or RDX are eventually exposed on the ocean floor, they would break down within a few hours (U.S. Department of the Navy 2001b) and would not accumulate in the tissues of fishes (Lotufo et al. 2010; Price et al. 1998). TNT would bioaccumulate in fish tissues if present at high concentrations in the water, but not from fish exposure to TNT in sediments (Lotufo et al. 2010). Given the rapid dispersal and dilution expected in the marine water column, the likelihood of a fish encountering high concentrations of TNT is very low. Over time, RDX residue would be covered by ocean sediments in most habitats or diluted by ocean water.

It is not possible to predict the size or shape of fragments resulting from high explosives. High explosives used in the Study Area range in size from medium-caliber projectiles to large bombs, rockets, and missiles. When these items explode, they partially break apart or remain largely intact with irregular shaped pieces—some of which may be small enough for a fish to ingest. Fishes would not be expected to ingest most fragments from high explosives because most pieces would be too large to ingest. Also, since fragment size cannot be quantified, it is assumed that fragments from larger munitions are similarly sized as larger munitions, but more fragments would result from larger munitions than smaller munitions. Small-caliber projectiles far outnumber the larger-caliber high explosive projectiles/bombs/missiles/rockets expended as fragments in the Study Area. Although it is possible that the number of fragments resulting from a high explosive could exceed this number, this cannot be quantified. Therefore, small-caliber projectiles would be more prevalent throughout the Study Area and more likely to be encountered by bottom-dwelling fishes and potentially ingested than fragments from any type of high explosive munitions.

***Chaff and Flares***

Tables 3.0-27 and 3.0-28 lists the number and location of expended chaff and flares in the Offshore Area. As indicated in Section 3.0.5.3.5.3 (Military Expended Materials Other Than Munitions) under the No Action Alternative, activities that expend chaff and flares occur in the open ocean areas of the Study Area. Species that occur in these areas would have the potential to be exposed to chaff and flares. Under the No Action Alternative, a total of 160 chaff cartridges would be expended from aircraft during training activities. No potential impacts would occur from the chaff itself, as discussed in Section 3.0.5.3.5.3 (Military Expended Materials Other Than Munitions), but there is some potential for the end caps or pistons associated with the chaff cartridges to be ingested. Under the No Action Alternative, a total of 184 flares would be expended during training flare exercises. The flare device consists of a cylindrical cartridge approximately 1.4 in (3.6 cm) in diameter and 5.8 in (14.7 cm) in length. Items that could be potentially ingested from flares include plastic end caps and pistons. An extensive literature review and controlled experiments conducted by the U.S. Air Force revealed that self-protection flare use poses little risk to the environment (U.S. Air Force 1997). The light generated by flares in the air (designed to burn out completely prior to entering the water) would have no impact on fish based on short burn time, relatively high altitudes where they are used, and their wide-spread and infrequent use. The potential exists for large, open-ocean predators (e.g., tunas, billfishes, pelagic sharks) to ingest self-protection flare end caps or pistons as they float on the water column for some time. A variety of plastic and other solid materials have been recovered from the stomachs of billfishes, dorado (South Atlantic Fishery Management Council 2011) and tuna (Hoss and Settle 1990).

End caps and pistons eventually sink in salt water (Spargo 1999), which reduces the likelihood of ingestion by surface-feeding fishes. However, some of the material could remain at or near the surface, and predatory fishes may incidentally ingest these items.

Based on the low environmental concentration (Tables 3.3-4 through 3.3-7), it is unlikely that a large number of fish would ingest an end cap or piston, much less a harmful quantity. Furthermore, a fish might expel the item before swallowing it. The number of fish potentially impacted by ingestion of end caps or pistons would be low based on the low environmental concentration and population-level impacts are not expected to occur.

#### Summary of Training Activities

Overall, the potential impacts of ingesting small-caliber projectiles, high explosive fragments, decelerator/parachutes, or end caps/pistons would be limited to individual cases where a fish might suffer a negative response, for example, by ingesting an item too large to be digested. While ingestion of ordnance-related materials or the other military expended materials identified here could result in sublethal or lethal impacts, the likelihood of ingestion is low based on the dispersed nature of the materials and the limited exposure of those items at the surface/water column or seafloor where certain fishes could be at risk of ingesting those items. Furthermore, a fish might taste an item then expel it before swallowing it (Felix et al. 1995) in the same manner that fish would temporarily take a lure into its mouth, then spit it out. Based on these factors, the number of fish potentially impacted by ingestion of ordnance-related materials would be low and population-level impacts are not likely to occur.

While ingestible expended materials could overlap with all of the ESA-listed species, the likelihood of ingestion would be extremely low given the dispersed nature of the activity in the study area overlapped with ESA listed species. However, there would be the potential for effect. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. Therefore, ingestible expended materials would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by the ingestible expended materials in the Offshore Area; however, any effects would be to prey species and would be minimal.

### Inland Waters

***Projectiles***

Table 3.0-20 lists the number and location of small- and medium-caliber projectiles. As indicated in Section 3.0.5.3.5.1 (Non-Explosive Practice Munitions), under the No Action Alternative, small- and medium-caliber projectile use would not occur in the Inland Waters.

Table 3.0-21 lists the number and location of activities that expend fragments from high-explosive ordnance and munitions (e.g., demolition charges, grenades, bombs, missiles, and rockets). The number and footprint of high-explosive ordnance and munitions are detailed in Table 3.3-4; however, the fragment size cannot be quantified. As indicated in Section 3.0.5.3.5.2 (Fragments from High-Explosive Munitions), under the No Action Alternative, only four underwater detonation high explosives that may result in fragments would occur in the Inland Waters section of the Study Area. Species that occur in these areas would have the potential to be exposed to fragments from high explosive ordnance and munitions. These items are heavy and would sink immediately to the seafloor, so exposure to fishes would be limited to those groups identified as bottom-dwelling predators and scavengers. High explosive munitions are typically fused to detonate within 5 ft. (1.5 m) of the water surface, with steel fragments breaking off in all directions and rapidly decelerating in the water and settling to the seafloor. The analysis generally assumes that most explosive expended materials sink to the seafloor and become incorporated into the seafloor, with no substantial accumulations in any particular area (see Section 3.1, Sediments and Water Quality).

If ingested, these items could potentially disrupt an individual's feeding behavior or digestive processes. If the item is particularly large for the fish ingesting it, the projectile could become permanently encapsulated by the stomach lining, with the rare chance that this could impede the fish's ability to feed or take in nutrients (Danner et al. 2009; Hoss and Settle 1990). However, in most cases a fish would pass the round and smooth item through their digestive tract and expel the item with full recovery expected without impacting the individual's growth, survival, annual reproductive success, or lifetime reproductive success.

Unexploded high-explosive munitions would sink to the bottom. The residual explosive material would not immediately be exposed to the marine environment as it is encased in a non-buoyant cylindrical package that may take years to slowly decay. When the HMX or RDE are eventually exposed on the ocean floor, they would break down within a few hours (U.S. Department of the Navy 2001b) and would not accumulate in the tissues of fishes (Lotufo et al. 2010; Price et al. 1998). TNT would bioaccumulate in fish tissues if present at high concentrations in the water, but not from fish exposure to TNT in sediments (Lotufo et al. 2010). Given the rapid dispersal and dilution expected in the marine water column, the likelihood of a fish encountering high concentrations of TNT is very low. Over time, RDX residue would be covered by ocean sediments in most habitats or diluted by ocean water (Section 3.1, Sediments and Water Quality, Section 3.1.3.1, Explosives and Explosion Byproducts).

It is not possible to predict the size or shape of fragments resulting from high explosives. High explosives used in Inland Waters are underwater explosives. When these items explode, they partially break apart or remain largely intact with irregular shaped pieces—some of which may be small enough for a fish to ingest. Fishes would not be expected to ingest most fragments from high explosives because most pieces would be too large to ingest. Also, since fragment size cannot be quantified, it is assumed that fragments from larger munitions are similarly sized as larger munitions, but more fragments would result from larger munitions than smaller munitions.

#### ***Chaff and Flares***

Under the No Action Alternative, activities that expend chaff and flares do not occur in the Inland Waters portion of the Study Area.

### Summary of Training Activities

Overall, the potential impacts of ingesting underwater detonations or their fragments would be limited to individual cases where a fish might suffer a negative response, for example, ingesting an item too large to be digested. While ingestion of ordnance-related materials, or the other military expended materials identified here, could result in sublethal or lethal impacts, the likelihood of ingestion is low based on the dispersed nature of the materials, the low number dispersed, and the limited exposure of those items at the surface/water column or seafloor where certain fishes could be at risk of ingesting those items. Furthermore, a fish might taste an item then expel it before swallowing it (Felix et al. 1995), in the same manner that fish would temporarily take a lure into its mouth, then spit it out. Based on these factors, the number of fish potentially impacted by ingestion of ordnance-related materials would be low and population-level impacts are not likely to occur.

Based on the primarily nearshore distribution of all ESA-listed species and areas of munitions use, potential ingestion would be extremely low given the unlikelihood for ESA-listed species to occur in the areas of munitions use and the dispersed nature of the activity. The majority of the PCEs required by coho, steelhead, bull trout, sockeye, green sturgeon and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. Munitions use would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, munitions use would have no effect on coho, steelhead, bull trout, sockeye, green sturgeon and Pacific eulachon critical habitat. There could be an effect on the rockfish habitat and nearshore critical habitat for Chinook and chum salmon; however, any effects would be to prey species and would be minimal.

*Pursuant to the ESA, ingestion stressors occurring for training activities under the No Action Alternative may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Ingestion stressors associated with training activities under No Action Alternative may affect, but are not likely to adversely affect, critical habitat for green sturgeon, Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and would have no effect on critical habitat for bull trout or rockfish.*

## Testing Activities

### Offshore Area

Under the No Action Alternative, a variety of potentially ingestible military expended materials would be released to the Offshore Area of the Study Area during Navy testing activities. No chaff canisters would be released during testing activities under the No Action Alternative. Ingestion of military expended materials such as sonobuoys, in-water devices, and guidance wires are not likely as they are too large to be ingested by most fish. The total number of military expended munitions expended under the No Action Alternative in the Offshore Area is 200, and the number of military expended materials other than munitions expended in the Offshore Area is 404 (Table 3.9-4).

While ingestible expended materials could overlap with all of the ESA-listed species, the likelihood of ingestion would be extremely low given the low abundance of ESA-listed species in the Study Area, and the dispersed nature of the activity. However, there would be the potential for effect. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. Ingestible expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, ingestible expended materials would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by the ingestible expended materials in the Offshore Area; however, any effects would be to prey species and would be minimal.

#### Inland Waters

Under the No Action Alternative, no testing activities use small- or medium-caliber projectiles (Table 3.0-20). Testing of torpedo projectiles and sonobuoys would occur in the Inland Waters under the No Action Alternative. Under the No Action Alternative, no testing activities would expend fragments from high-explosive ordnance and munitions (Table 3.0-21). Under the No Action Alternative, no testing activities use chaff or flares (Tables 3.0-27 and 3.0-28).

Overall, the potential impacts of ingesting fragments from explosive torpedoes and sonobuoys would be limited to individual cases where a fish might suffer a negative response, for example, ingesting an item too large to be digested. The likelihood of ingestion is low based on the dispersed nature of the materials, the low number dispersed, and the limited exposure of those items at the surface/water column or seafloor where certain fishes could be at risk of ingesting those items. Furthermore, a fish might taste an item then expel it before swallowing it (Felix et al. 1995) in the same manner that fish would temporarily take a lure into its mouth, then spit it out. Based on these factors, the number of fish potentially impacted by ingestion of ordnance-related materials would be low and population-level impacts are not likely to occur.

Based on the primarily nearshore distribution of all ESA-listed species and areas of munitions use, potential ingestion would be extremely low given the unlikelihood for ESA-listed species to occur in the areas of munitions use and the dispersed nature of the activity. The majority of the PCEs required by coho, steelhead, bull trout, sockeye, green sturgeon and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. Ingestible expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, munitions use would have no effect on coho, steelhead, bull trout, sockeye, green sturgeon and Pacific eulachon critical habitat. There could be an effect on rockfish habitat and nearshore critical habitat for Chinook and Chum salmon; however, any effects would be to prey species and would be minimal.

*Pursuant to the ESA, ingestion of munitions or military expended material under the No Action Alternative may affect, but is not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Ingestion of munitions or military expended material for testing activities under the No Action Alternative may affect, but is not likely to adversely affect, nearshore critical habitat for green sturgeon, , Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and would have no effect on critical habitat for bull trout or rockfish.*

# Alternative 1

## Training Activities

### Offshore Area

#### *Projectiles*

Table 3.0-20 lists the number and location of small- and medium- caliber projectiles. The number and location of small- and medium- caliber projectiles does not change from the No Action Alternative under Alternative 1. As indicated in Section 3.0.5.3.5.1 (Non-Explosive Practice Munitions), under Alternative 1, small- and medium-caliber projectile use would occur in the offshore area, open ocean portions of the Study Area. Species that occur in these areas would have the potential to be exposed to small- and medium-caliber projectiles.

Table 3.0-21 lists the number and location of activities that expend fragments from high-explosive ordnance and munitions (e.g., demolition charges, grenades, bombs, missiles, and rockets). The number and footprint of high-explosive ordnance and munitions are detailed in Table 3.3-5; however, the fragment size cannot be quantified. As indicated in Section 3.0.5.3.5.2 (Fragments from High-Explosive Munitions), under Alternative 1, high-explosive ordnance and munitions use would occur in the Offshore Area, open ocean portions of the Study Area. Species that occur in these areas would have the potential to be exposed to fragments from high explosive ordnance and munitions.

#### *Chaff and Flares*

Tables 3.0-27 and 3.0-28 lists the number and location of expended chaff and flares. As indicated in Section 3.0.5.3.5.3 (Military Expended Materials Other Than Munitions) under Alternative 1, activities that expend chaff and flares occur in the Offshore Area, open ocean portion of the Study Area. Species that occur in these areas would have the potential to be exposed to chaff and flares.

The use of chaff increases from 2,900 under the No Action Alternative, to 5,000 under Alternative 1. This increase in expended materials would increase the probability of ingestion risk; however, as discussed under the No Action Alternative, the likelihood of ingestion would still be low based on the dispersed nature of the materials and the limited exposure of those items at the surface/water column or seafloor where certain fishes could be at risk of ingesting those items. Therefore, the number of fish potentially impacted by ingestion of expended materials would be low and population-level impacts are not likely to occur.

While ingestible expended materials could overlap with all of the ESA-listed species, the likelihood of ingestion would be extremely low given the low abundance of ESA-listed species in the Study Area, and the dispersed nature of the activity. However, there would be the potential for effect. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. Therefore, ingestible expended materials would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by the ingestible expended materials in the Offshore Area; however, any effects would be to prey species and would be minimal.

### Inland Waters

#### *Projectiles*

Table 3.0-20 lists the number and location of projectiles expended under Alternative 1. As indicated in Section 3.0.5.3.5.1 (Non-Explosive Practice Munitions) under Alternative 1, small- and medium-caliber projectile use would not occur in the Inland Waters portions of the Study Area.

Table 3.0-21 lists the number and location of activities that expend fragments from high-explosive ordnance and munitions (e.g., demolition charges, grenades, bombs, missiles, and rockets). The number and footprint of high-explosive ordnance and munitions are detailed in Table 3.3-5; however, the fragment size cannot be quantified. As indicated in Section 3.0.5.3.5.2 (Fragments from High-Explosive Munitions), under Alternative 1, underwater detonations would increase from 4 in the No Action Alternative to 42 under Alternative 1. Species that occur in these areas would have the potential to be exposed to fragments from high explosive ordnance and munitions.

***Chaff and Flares***

Under Alternative 1, no training activities use chaff or flares in the Inland Waters (Tables 3.0-27 and 3.0-28).

Based on the primarily nearshore distribution of all ESA-listed species and areas of munitions use, potential ingestion would be extremely low given the unlikelihood of ESA-listed species to occur in the areas of munitions use and the dispersed nature of the activity. The majority of the PCEs required by coho, steelhead, bull trout, sockeye, green sturgeon and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. Ingestible expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, munitions use would have no effect on coho, steelhead, bull trout, sockeye, green sturgeon and Pacific eulachon critical habitat. There could be an effect on rockfish habitat and the nearshore critical habitat for Chinook and Chum salmon; however, any effects would be to prey species and would be minimal.

*Pursuant to the ESA, ingestion stressors occurring under Alternative 1 may affect, but are not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*Ingestion stressors associated with training activities under Alternative 1 may affect, but are not likely to adversely affect, critical habitat for Chinook (Puget Sound ESU), chum (Hood Canal Summer-Run ESU), and green sturgeon; and would have no effect on critical habitat for bull trout, or rockfish.*

**Testing Activities**

**Offshore Area**

Under Alternative 1, no testing activities use small- or medium-caliber projectiles (Table 3.0-20). Under Alternative 1, no testing activities would expend fragments from high-explosive ordnance and munitions (Table 3.0-21). Under Alternative 1, no testing activities use chaff or flares (Tables 3.0-27 and 3.0-28). Based on the lack of expended materials used in testing activities under Alternative 1, there would be no effect to ESA-listed species or their associated critical habitats.

**Inland Waters**

Under Alternative 1, no testing activities would use small- or medium-caliber projectiles in the Inland Waters (Table 3.0-20). Under Alternative 1, no testing activities would expend fragments from high-explosive ordnance and munitions (Table 3.0-21). Under Alternative 1, no testing activities would use flares in the Inland Waters (Tables 3.0-27 and 3.0-28).

Based on the primarily nearshore distribution of all ESA-listed species and areas of munitions use, potential ingestion would be extremely low given the unlikelihood for ESA-listed species to occur in the areas of flares use and the dispersed nature of the activity. The majority of the PCEs required by coho, steelhead, bull trout, sockeye, green sturgeon and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. Ingestible expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, munitions use would have no effect on coho, steelhead, bull trout, sockeye, green sturgeon and Pacific eulachon critical habitat. There could be an effect on rockfish habitat and the nearshore critical habitat for Chinook and Chum salmon; however, any effects would be to prey species and would be minimal.

*Pursuant to the ESA, ingestion of munitions or military expended material other than munitions for testing activities under Alternative 1 may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*Ingestion of munitions or military expended material other than munitions for testing activities under Alternative 1 may affect, but is not likely to adversely affect, nearshore critical habitat for Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) salmon; and would have no effect on critical habitat for green sturgeon, bull trout, or rockfish.*

## Alternative 2

### Training Activities

#### Offshore Area

Under Alternative 2, the number of military expended materials would be the same as under Alternative 1 (Table 3.9-4). Therefore, the impact of military expended materials would be the same as under Alternative 1.

While ingestible expended materials could overlap with all of the ESA-listed species, the likelihood of ingestion would be extremely low given the low abundance of ESA-listed species in the Study Area, and the dispersed nature of the activity. However, there would be the potential for effect. The majority of the PCEs required by the salmonid species and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Offshore Area. Ingestible expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, ingestible expended materials would have no effect on salmonid species and Pacific eulachon critical habitat. Green sturgeon critical habitat may be affected by the ingestible expended materials in the Offshore Area; however, any effects would be to prey species and would be minimal.

#### Inland Waters

Under Alternative 2, the Navy proposes the same numbers and types of military expended materials as described in Alternative 1. Therefore, the impacts of Alternative 2 training activities on fish would be the same as for Alternative 1.

Based on the primarily nearshore distribution of all ESA-listed species and areas of munitions use, potential ingestion would be extremely low given the unlikelihood for ESA-listed species to occur in the areas of flares use and the dispersed nature of the activity. The majority of the PCEs required by coho, steelhead, bull trout, sockeye, green sturgeon, and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. Ingestible expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, munitions use would have no effect on coho, steelhead, bull trout, sockeye, green sturgeon, and Pacific eulachon critical habitat. There could be an effect on rockfish habitat and the nearshore critical habitat for Chinook and Chum salmon; however, any effects would be to prey species and would be minimal.

*Pursuant to the ESA, ingestion stressors occurring in the Offshore Area under Alternative 2 may affect, but are not likely to adversely affect, ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species.*

*Ingestion stressors associated with training activities under Alternative 2 may affect, but are not likely to adversely affect, green sturgeon, Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) salmon critical habitat; and would have no effect on critical habitat for bull trout or rockfish.*

#### Testing Activities

#### Offshore Area

Under Alternative 2, no testing activities use small- or medium-caliber projectiles (Table 3.0-20). Under Alternative 2, no testing activities would expend fragments from high-explosive ordnance and munitions (Table 3.0-21). Under Alternative 2, no testing activities use chaff or flares (Tables 3.0-27 and 3.0-28). Based on the lack of expended materials used in testing activities under Alternative 2, there would be no effect to ESA-listed species or their associated critical habitats.

#### Inland Waters

Under Alternative 2, the number of military expended materials would only increase by approximately 5 percent compared to Alternative 1 (Table 3.9-4). Therefore, the impacts of military expended materials would be similar to those discussed under Alternative 1.

Based on the primarily nearshore distribution of all ESA-listed species and areas of munitions use, potential ingestion would be extremely low given the unlikelihood for ESA-listed species to occur in the areas of flares use and the dispersed nature of the activity. The majority of the PCEs required by coho, steelhead, bull trout, sockeye, green sturgeon, and Pacific eulachon are applicable to fresh water and estuaries (i.e., spawning sites, rearing sites, and migration corridors) and are outside the Study Area. Ingestible expended materials would not affect water quality or prey availability as PCEs for salmonid species and Pacific eulachon. Therefore, munitions use would have no effect on coho, steelhead, bull trout, sockeye, green sturgeon and Pacific eulachon critical habitat. There could be an effect on rockfish habitat and the nearshore critical habitat for Chinook and Chum salmon; however, any effects would be to prey species and would be minimal.

*Pursuant to the ESA, ingestion of munitions or military expended material other than munitions for testing activities under Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*Ingestion of munitions or military expended material other than munitions for testing activities under Alternative 2 may affect, but is not likely to adversely affect, nearshore critical habitat for Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) salmon; and would have no effect on critical habitat for green sturgeon, bull trout, or rockfish.*

### Combined Ingestion Stressors

An individual fish could experience the following impacts of ingestion stressors: stress, behavioral changes, ingestion causing injury, and ingestion causing mortality. Ingestion causing mortality cannot act in combination because mortal injuries occur with the first instance. Therefore, there is no possibility for the occurrence of this consequence to increase if sub-stressors are combined.

Sub-lethal impacts may result in delayed mortality because they cause irrecoverable injury or alter the individual's ability to feed or detect and avoid predation. Normally, for fish large enough to ingest it, most small-caliber projectiles would pass through a fish's digestive system without injury. However, in this scenario it is possible that a fish's digestive system could already be compromised or blocked in such a manner that the small-caliber projectiles can no longer easily pass through without harm. It is conceivable that a fish could first ingest a small bomb fragment that might damage or block its digestive tract, then ingest a small-caliber projectile, with magnified combined impacts. Sub-lethal effects resulting in mortality could be more likely if the activities occurred in essentially the same location and occurred within the individual's recovery time from the first disturbance. This circumstance is likely to arise only during training and testing activities that cause frequent and recurring ingestion stressors to essentially the same location (e.g., chaff cartridge end caps/flares expended at the same location as small-caliber projectiles). In these specific circumstances the potential impacts to fishes from combinations of ingestion stressors may be greater than the sum of their individual impacts.

These specific circumstances that could magnify the impacts of ingestion stressors are highly unlikely to occur because, with the exception of a SINKEX, it is highly unlikely that chaff cartridge end caps/flares and small-caliber projectiles would impact essentially the same location because most of these sub-stressors are widely dispersed in time and space.

The combined impact of these sub-stressors does not increase the risk in a meaningful way because the risk of injury or mortality is extremely low for each sub-stressor independently. While it is conceivable that interaction between sub-stressors could magnify their combined risks, the necessary circumstances are highly unlikely to overlap. Interaction between ingestion sub-stressors is likely to have neutral impacts for fishes.

*Pursuant to the ESA, the use of munitions or military expended materials of ingestible size for training activities under the No Action Alternative, Alternative 1, or Alternative 2 may affect, but is not likely to adversely affect, ESA-listed salmonid species, Pacific eulachon, green sturgeon, and rockfish species.*

*The use of munitions or military expended materials of ingestible size for training activities under the No Action Alternative, Alternative 1, or Alternative 2 may affect, but is not likely to adversely affect, nearshore critical habitat for green sturgeon, Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU) salmon; and would have no effect on critical habitat for bull trout or rockfish.*

### Summary and Conclusions of Ingestion Impacts

The Navy identified and analyzed three military expended materials types that have ingestion potential for fishes: non-explosive practice munitions, military expended materials from high explosives, and military expended materials from non-ordnance items (e.g., end caps, canisters, chaff, and accessory materials). The probability of fishes ingesting military expended materials depends on factors such as the size, location, composition, and the buoyancy of the expended material. These factors, combined with the location and feeding behavior of fishes were used to analyze the likelihood the expended material would be mistaken for prey and what the potential impacts would be if ingested. Most expended materials, such as large- and medium-caliber ordnance, would be too large to be ingested by a fish, but other materials, such as small-caliber munitions or some fragments of larger items, may be small enough to be swallowed by some fishes. During normal feeding behavior, many fishes ingest nonfood items and often reject (spit out) nonfood items prior to swallowing. Other fishes may ingest and swallow both food and nonfood items indiscriminately. There are concentrated areas where bombing, missile, and gunnery activities that generate materials that could be ingested. However, even within those areas, the overall impact on fishes would be inconsequential.

The potential impacts of military expended material ingestion would be limited to individual cases where a fish might suffer a negative response, for example, ingesting an item too large, sharp, or pointed to pass through the digestive tract without causing damage. Based on available information, it is not possible to accurately estimate actual ingestion rates or responses of individual fishes. Nonetheless, the number of military expended materials ingested by fishes is expected to be very low and only an extremely small percentage of the total would be potentially encountered by fishes. Certain feeding behavior such as “suction feeding” along the seafloor exhibited by sturgeon may increase the probability of ingesting military expended materials relative to other fishes; however, encounter rates would still remain low.

#### 3.9.3.6 Secondary Stressors

This section analyzes potential impacts on fishes exposed to stressors indirectly through impacts on habitat, sediment, or water quality. These are also primary elements of marine fish habitat and firm distinctions between indirect impacts and habitat impacts are difficult to maintain. For the purposes of this analysis, indirect impacts on fishes via sediment or water which do not require trophic transfer (e.g., bioaccumulation) in order to be observed are considered here. It is important to note that the terms "indirect" and "secondary" do not imply reduced severity of environmental impacts, but instead describe how the impact may occur in an organism or its ecosystem.

Stressors from Navy training and testing activities could pose secondary or indirect impacts on fishes via habitat, sediment, and water quality. These include (1) explosives and by-products; (2) metals; (3) chemicals; (4) other materials such as targets, chaff, and plastics, and (5) impacts on fish habitat. Activities associated with these stressors are detailed in Tables 2.8-1 through 2.8-3, and analyses of their potential impacts are discussed in Section 3.1 (Sediments and Water Quality) and Section 3.3 (Marine Habitats).

##### 3.9.3.6.1 Explosives

In addition to directly impacting fish and fish habitat, underwater explosions could impact other species in the food web including plankton and other prey species that fish feed upon. The impacts of underwater explosions would differ depending upon the type of prey species in the area of the blast. As discussed in Section 3.9.3.1 (Acoustic Stressors), fish with swim bladders are more susceptible to blast injuries than fish without swim bladders.

In addition to physical impacts of an underwater blast, prey might have behavioral reactions to underwater sound. For instance, prey species might exhibit a strong startle reaction to detonations that might include swimming to the surface or scattering away from the source. This startle and flight response is the most common secondary defense among animals (Hanlon and Messenger 1996). The sound from underwater explosions might induce startle reactions and temporary dispersal of schooling fishes if they are within close proximity. The abundances of fish and invertebrate prey species near the detonation point could be diminished for a short period of time before being repopulated by animals from adjacent waters. Alternatively, any prey species that would be directly injured or killed by the blast could draw in scavengers from the surrounding waters that would feed on those organisms, and in turn could be susceptible to becoming directly injured or killed by subsequent explosions. Any of these scenarios would be temporary, only occurring during activities involving explosives, and no lasting impact on prey availability or the pelagic food web would be expected. Indirect impacts of underwater detonations and high explosive ordnance use under the Proposed Action would not result in a decrease in the quantity or quality of fish populations or fish habitats in the Study Area.

#### 3.9.3.6.2 Explosion By-Products, and Unexploded Ordnance

Deposition of undetonated explosive materials into the marine environment can be reasonably well estimated by the known failure and low-order detonation rates of high explosives. Undetonated explosives associated with mine neutralization activities are collected after training is complete; therefore, potential impacts are assumed to be inconsequential for these training and testing activities, but other activities could result in unexploded ordnance and unconsumed explosives on the seafloor. Fishes may be exposed by contact with the explosive, contact with contaminants in the sediment or water, and ingestion of contaminated sediments.

High-order explosions consume most of the explosive material, creating typical combustion products. In the case of RDX, 98 percent of the products are common seawater constituents and the remainder are rapidly diluted below threshold impact level. Explosion by-products associated with high order detonations present no indirect stressors to fishes through sediment or water. However, low order detonations and unexploded ordnance present elevated likelihood of impacts on fishes.

Indirect impacts of explosives and unexploded ordnance to fishes via sediment is possible in the immediate vicinity of the ordnance. Degradation of explosives proceeds via several pathways discussed in Section 3.1 (Sediments and Water Quality). Degradation products of RDX are not toxic to marine organisms at realistic exposure levels (Rosen and Lotufo 2010). TNT and its degradation products impact developmental processes in fishes and are acutely toxic to adults at concentrations similar to real-world exposures (Halpern et al. 2008; Rosen and Lotufo 2010). Relatively low solubility of most explosives and their degradation products means that concentrations of these contaminants in the marine environment are relatively low and readily diluted. Furthermore, while explosives and their degradation products were detectable in marine sediment approximately 6–12 in (15.2–30.5 cm) away from degrading ordnance, the concentrations of these compounds were not statistically distinguishable from background beyond 3–6 ft. (0.9–1.8 m) from the degrading ordnance (see Section 3.1, Sediments and Water Quality). Taken together, it is likely that various lifestages of fishes could be impacted by the indirect impacts of degrading explosives within a very small radius of the explosive 1–6 ft. (0.3–1.8 m).

#### 3.9.3.6.3 Metals

Certain metals are harmful to fishes at concentrations above background levels (e.g., cadmium, chromium, lead, mercury, zinc, copper, manganese, and many others) (Wang and Rainbow 2008). Metals are introduced into seawater and sediments as a result of Navy training and testing activities involving vessel hulls, targets, ordnance, munitions, and other military expended materials (see Section 3.1.3.2, Metals). Some metals bioaccumulate and physiological impacts begin to occur only after bioaccumulation concentrates the metals (see Section 3.3, Marine Habitats, and Chapter 4, Cumulative Impacts). Indirect impacts of metals to fishes via sediment and water involve concentrations several orders of magnitude lower than concentrations achieved via bioaccumulation. Fishes may be exposed by contact with the metal, contact with contaminants in the sediment or water, and ingestion of contaminated sediments. Concentrations of metals in sea water are orders of magnitude lower than concentrations in marine sediments. It is extremely unlikely that fishes would be indirectly impacted by toxic metals via the water.

#### 3.9.3.6.4 Chemicals

Several Navy training and testing activities introduce potentially harmful chemicals into the marine environment; principally, flares and propellants for rockets, missiles, and torpedoes. Polychlorinated biphenyls (PCBs) are discussed in Section 3.1 (Sediments and Water Quality). Properly functioning flares missiles, rockets, and torpedoes combust most of their propellants, leaving only benign or readily diluted soluble combustion by-products (e.g., hydrogen cyanide). Operational failures allow propellants and their degradation products to be released into the marine environment.

The greatest risk to fishes from flares, missile, and rocket propellants is perchlorate, which is highly soluble in water, persistent, and impacts metabolic processes in many plants and animals. Fishes may be exposed by contact with contaminated water or ingestion of contaminated sediments. Since perchlorate is highly soluble, it does not readily absorb to sediments. Therefore, missile and rocket fuel poses no risk of indirect impact on fishes via sediment. In contrast, the principal toxic components of torpedo fuel, propylene glycol dinitrate and nitrodiphenylamine, adsorb to sediments, have relatively low toxicity, and are readily degraded by biological processes (see Section 3.1, Sediments and Water Quality). It is conceivable that various lifestages of fishes could be indirectly impacted by propellants via sediment in the immediate vicinity of the object (e.g., within a few inches [a few cm]), but these potential impacts would diminish rapidly as the propellant degrades.

#### 3.9.3.6.5 Other Materials

Some military expended materials (e.g., decelerator/parachutes) could become remobilized after their initial contact with the seafloor (e.g., by waves or currents) and could be reintroduced as an entanglement or ingestion hazards for fishes. In some bottom types (without strong currents, hard-packed sediments, and low biological productivity), items such as projectiles might remain intact for some time before becoming degraded or broken down by natural processes. While these items remain intact sitting on the bottom, they could potentially remain ingestion hazards. These potential impacts may cease only (1) when the military expended materials are too massive to be mobilized by typical oceanographic processes, (2) if the military expended materials become encrusted by natural processes and incorporated into the seafloor, or (3) when the military expended materials become permanently buried. In this scenario, a decelerator/parachute could initially sink to the seafloor, but then be transported laterally through the water column or along the seafloor, increasing the opportunity for entanglement. In the unlikely event that a fish would become entangled, injury or mortality could result. However, the entanglement stressor would eventually cease to pose an entanglement risk as the item becomes encrusted or buried.

#### 3.9.3.6.6 Impacts on Fish Habitat

The Proposed Action could result in localized and temporary changes to the benthic community during activities that impact fish habitat. Fish habitat could become degraded during activities that would strike the seafloor or introduce military expended materials, bombs, projectiles, missiles, rockets, or fragments to the seafloor. During, or following activities that impact benthic habitats, fish species may experience loss of available benthic prey at locations in the Study Area where these items might be expended on essential fish habitat or habitat areas of particular concern. Additionally, plankton and zooplankton that are eaten by fish may also be negatively impacted by these same expended materials. The spatial area of essential fish habitat and habitat areas of particular concern impacted by the Proposed Action would be relatively small compared to the available habitat in the Study Area. However, there would still be vast expanses of essential fish habitat and habitat areas of particular concern adjacent to the areas of habitat impact that would remain undisturbed by the Proposed Action.

Impacts of physical disturbance and strikes by small, medium, and large projectiles would be concentrated within designated gunnery box areas, resulting in localized disturbances of hard bottom areas, but could occur anywhere in the Study Area. Hard bottom is important habitat for many different species of fish, including those fishes managed by various fishery management plans.

When a projectile hits a biogenic habitat (a habitat that is produced by other living organisms), the substrate immediately below the projectile is not available at that habitat type on a long-term basis, until the material corrodes. The substrate surrounding the projectile would be disturbed, possibly resulting in short-term localized increased turbidity. Given the large spatial area of the range complexes compared to the small percentage covered by biogenic habitat, it is unlikely that most of the small, medium, and large projectiles expended in the Study Area would fall onto this habitat type. Furthermore, these activities are distributed within discrete locations within the Study Area, and the overall footprint of these areas is quite small with respect to the spatial extent of this biogenic habitat within the Study Area.

Sinking exercises could also provide secondary impacts on deep sea populations. These activities occur in open-ocean areas, outside of the coastal range complexes, with potential direct disturbance or strike impacts on deep sea fishes. Secondary impacts on these fishes could occur after the ship hulls sink to the seafloor. Over time, the ship hull would be colonized by marine organisms that attach to hard surfaces. For fishes that feed on these types of organisms, or whose abundances are limited by available hard structural habitat, the ships that are sunk during SINKEX could provide an incidental beneficial impact on the fish community (Love and York 2006).

Designated critical habitat of the ESA-listed coho, steelhead, bull trout, sockeye, and Pacific eulachon includes estuarine and freshwater habitat and is outside the Study Area. Therefore, there would be no impacts associated with secondary stressors. However, critical habitat for Chinook, chum, green sturgeon and rockfish habitat is within the Study Area and there would be minimal impacts associated with secondary stressors, including water column effects, disturbed sediments, and prey availability.

*Pursuant to the ESA, secondary stressors may affect, but are not likely to adversely affect ESA-listed salmonid species, green sturgeon, Pacific eulachon, and rockfish species*.

*Secondary stressors may affect, but are not likely to adversely affect, critical habitat for green sturgeon, Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and would have no effect on critical habitat for bull trout or rockfish.*

## 3.9.4 Summary of Potential Impacts on Fish

### 3.9.4.1 Combined Impacts of All Stressors

As described in Section 3.0.5.5 (Resource-Specific Impacts Analysis for Multiple Stressors), this section evaluates the potential for combined impacts of all the stressors from the Proposed Action. The analysis and conclusions for the potential impacts from each individual stressor are discussed in the analyses of each stressor in the sections above and summarized in Section 3.9.4.2 (Endangered Species Act Determinations).

There are generally two ways that a fish could be exposed to multiple stressors. The first would be if a fish were exposed to multiple sources of stress from a single activity (e.g., a mine warfare activity may include the use of a sound source and a vessel). The potential for a combination of these impacts from a single activity would depend on the range of effects of each stressor and the response or lack of response to that stressor. Most of the activities described in the Proposed Action involve multiple stressors; therefore, it is likely that if a fish were within the potential impact range of those activities, they may be impacted by multiple stressors simultaneously. This would be even more likely to occur during large-scale exercises or activities that span a period of days or weeks (such as a SINKEX or composite training unit exercise).

A fish could be exposed to a combination of stressors from multiple activities over the course of its life. This is most likely to occur in areas where training and testing activities are more concentrated (e.g., near naval ports, testing ranges, and routine activity locations and in areas that individual fish frequent because it is within the animal's home range, migratory corridor, spawning or feeding area). Except for in the few concentration areas mentioned above, combinations are unlikely to occur because training and testing activities are generally separated in space and time in such a way that it would be very unlikely that any individual fish would be exposed to stressors from multiple activities. However, animals with a home range intersecting an area of concentrated Navy activity have elevated exposure risks relative to animals that simply transit the area through a migratory corridor. The majority of the proposed training and testing activities occur over a small spatial scale relative to the entire Study Area, have few participants, and are of a short duration (a few hours or less).

Multiple stressors may also have synergistic effects. For example, fish that experience temporary hearing loss or injury from acoustic stressors could be more susceptible to physical strike and disturbance stressors via a decreased ability to detect and avoid threats. Fish that experience behavioral and physiological impacts of ingestion stressors could be more susceptible to entanglement and physical strike stressors via malnourishment and disorientation. These interactions are speculative, and without data on the combination of multiple Navy stressors, the synergistic impacts from the combination of Navy stressors are difficult to predict in any meaningful way. Navy research and monitoring efforts include data collection through conducting long-term studies in areas of Navy activity, occurrence surveys over large geographic areas, biopsy of animals occurring in areas of Navy activity, and tagging studies where animals are exposed to Navy stressors. These efforts are intended to contribute to the overall understanding of what impacts may be occurring overall to animals in these areas.

Although potential impacts to certain fish species from the Proposed Action may include injury or mortality, impacts are not expected to decrease the overall fitness of any given population. Mitigation measures designed to reduce the potential impacts are discussed in Chapter 5 (Standard Operating Procedures, Mitigation, and Monitoring). The potential impacts anticipated from the Proposed Action are summarized in Section 3.9.4.2 (Endangered Species Act Determinations), with respect to each regulation applicable to fish.

*Pursuant to the ESA, the combined impacts of all the stressors under the No Action Alternative, Alternative 1, or Alternative 2 may affect, and are likely to adversely affect, ESA-listed Chinook salmon, coho salmon, chum, sockeye salmon, Steelhead (Puget Sound DPS, , Upper Columbia River DPS, Middle Columbia River DPS, Lower Columbia River DPS, Upper Willamette River DPS, and Snake River Basin DPS), Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), yelloweye rockfish (Puget Sound/Georgia Basin DPS), Bull trout, and Pacific eulachon.*

*Pursuant to the ESA, the combined impacts of all the stressors under the No Action Alternative, Alternative 1, or Alternative 2 may affect, and are not likely to adversely affect, other ESA-listed Steelhead and green sturgeon.*

*The combined impacts of all the stressors under the No Action Alternative, Alternative 1, or Alternative 2 may affect, but are not likely to adversely affect, critical habitat for green sturgeon, bull trout , Chinook (Puget Sound ESU), and chum (Hood Canal Summer-Run ESU); and would have no effect on critical habitat for Bocaccio rockfish (Puget Sound/Georgia Basin DPS), canary rockfish (Puget Sound/Georgia Basin DPS), and yelloweye rockfish (Puget Sound/Georgia Basin DPS).*

### 3.9.4.2 Endangered Species Act Determinations

Table 3.9-12 summarizes the ESA determinations for each sub-stressor analyzed for training activities, and **Error! Reference source not found.** summarizes the determinations for testing.

**Table 3.9-12: Summary of Endangered Species Act Determinations for Training Activities for the Preferred Alternative (Alternative 1)**

| Distinct Population Segment (DPS)/ Evolutionarily Significant Unit (ESU) | | Overall ESA Determination | ESA Determinations by Stressor | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Acoustic | | Energy | Physical | | | Entanglement | | Ingestion | |
| | | | Sonar and other non-impulsive sources | Explosives and other impulsive sources | Electromagnetic devices | Vessels and in water devices | Military expended materials | Seafloor Devices | Fiber optic cables and guidance wires | Decelerator/parachutes | Military expended materials other than munitions | Munitions |
| Chinook Salmon | Puget Sound ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Upper Columbia River Spring-Run ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Lower Columbia River ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Upper Willamette River ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Snake River Spring/Summer-Run ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Snake River Fall-Run ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | California Coastal ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Central Valley Spring-Run ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Sacramento River Winter-Run | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| Coho Salmon | Lower Columbia ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Oregon coast ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Southern Oregon/Northern California Coast ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Central California Coast | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| Chum Salmon | Hood Canal Summer-Run ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Columbia River ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| Sockeye Salmon | Lake Ozette ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Snake River ESU | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |

Notes: LAA = May affect, likely to adversely affect; NLAA = May affect, not likely to adversely affect; NE = No effect.

**Table 3.9-12: Summary of Endangered Species Act Determinations for Training Activities for the Preferred Alternative (Alternative 1) (continued)**

| Distinct Population Segment (DPS)/ Evolutionarily Significant Unit (ESU) | | Overall ESA Determination | ESA Determinations by Stressor: Acoustic | | Energy | Physical | | | Entanglement | | Ingestion | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sonar and other non-impulsive sources | Explosives and other impulsive sources | Electromagnetic devices | Vessels and in water devices | Military expended materials | Seafloor Devices | Fiber optic cables and guidance wires | Decelerator/parachutes | Military expended materials other than munitions | Munitions |
| Steelhead | Puget Sound DPS | LAA | LAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Upper Columbia River DPS | LAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Middle Columbia River DPS | LAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Lower Columbia River DPS | LAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Upper Willamette River DPS | LAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Snake River Basin DPS | LAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Northern California DPS | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | California Central Valley DPS | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Central California Coast DPS | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | South-Central California Coast DPS | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| | Southern California DPS | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| Bull Trout – Coastal Puget Sound DPS | | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| Bocaccio Rockfish – Puget Sound/Georgia Basin DPS | | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| Canary Rockfish – Puget Sound/Georgia Basin DPS | | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| Yelloweye Rockfish – Puget Sound/Georgia Basin DPS | | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| Pacific Eulachon – Southern DPS | | LAA | NLAA | LAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |
| Green Sturgeon – Southern DPS | | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA | NLAA |

Notes: LAA = May affect, likely to adversely affect; NLAA = May affect, not likely to adversely affect; NE = No effect.

**Table 3.9-13: Summary of Critical Habitat Effect Determinations for Training and Testing Activities**

| Species/DPS/ESU | Critical Habitat Determination | | |
|---|---|---|---|
| | Training | Testing | Overall |
| **FISH** | | | |
| Chinook Salmon – Puget Sound ESU | NLAA | NLAA | NLAA |
| Chum Salmon – Hood Canal summer-run ESU | NLAA | NLAA | NLAA |
| Bull Trout – Coastal Puget Sound DPS | NE | NLAA | NLAA |
| Bocaccio Rockfish | NE | NE | NE |
| Canary Rockfish | NE | NE | NE |
| Yelloweye Rockfish | NE | NE | NE |
| Green Sturgeon – Southern DPS | NLAA | NLAA | NLAA |

Notes: NE = No effect; NLAA = May affect, not likely to adversely affect

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# 3.10 Cultural Resources

## TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES

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# 3.10 Cultural Resources

**CULTURAL RESOURCES SYNOPSIS**

The United States (U.S.) Department of the Navy (Navy) considered all potential stressors and analyzed the following for submerged cultural resources:

- Acoustic (underwater explosions and cratering from underwater explosions)
- Physical disturbance (in-water devices, use of seafloor devices, and deposition of military expended materials)

**Preferred Alternative (Alternative 1)**

- <u>Acoustic and Physical Disturbance</u>: Acoustic and physical stressors, as indicated above, would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters in accordance with Section 106 of the National Historic Preservation Act (NHPA). The Navy previously analyzed impacts that could result from these training and testing activities and concluded that there would be no adverse effects on historic properties. The Washington State Historic Preservation Officer concurred with these findings. As new training and testing activities described here represent the same or relatively similar types of activities previously analyzed, with adjustments to tempo and location, no adverse effects on cultural resources are expected. In accordance with addendum Section 402 of the NHPA, no World Heritage sites outside the United States would be affected.

## 3.10.1 Introduction and Methods

### 3.10.1.1 Introduction

Cultural resources are found throughout the Northwest Training and Testing Study Area (hereafter referred to as the Study Area). The approach to assessing cultural resources includes defining the resource; presenting the regulatory requirements for identifying, evaluating, and treating the resource within established jurisdictional parameters; establishing the specific resource subtypes in the Study Area; identifying the data used to define the current conditions; and describing the method of impact analysis. Under the National Environmental Policy Act (NEPA), an Environmental Impact Statement (EIS) must address the adverse and beneficial effects of a proposed federal action on important historic and cultural aspects of our national heritage (40 Code of Federal Regulations [C.F.R.] §1508.8). While NEPA and Section 106 of the National Historic Preservation Act (NHPA) (Title 54 U.S. Code [U.S.C.] [§ 300101 et seq.]) represent two separate procedural laws, the Navy is implementing the requirements concurrently and using definitions, criteria, and processes associated with Section 106 to further refine NEPA definitions (e.g., important historic and cultural aspects of our national heritage under NEPA are defined here as resources eligible for or listed in the National Register of Historic Places [NRHP] in accordance with Section 106).

Cultural resources are defined as districts, landscapes, sites, structures, objects, and ethnographic resources, as well as other physical evidence of human activity, that are considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources include archaeological resources, historic architectural resources, and traditional cultural properties.

Archaeological resources include prehistoric and historic sites and artifacts. Archaeological resources can have a surface component, a subsurface component, or both. Prehistoric resources are physical properties resulting from human activities that predate written records; they include village sites, temporary camps, lithic scatters, roasting pits, hearths, milling features, petroglyphs, rock features, and burials. Historic resources postdate the advent of written records in a region; they include building foundations, refuse scatters, wells, cisterns, and privies. Submerged cultural resources include submerged archaeological sites and features, historic shipwrecks and other submerged historic materials, such as sunken airplanes and piers. Architectural resources are elements of the built environment consisting of standing buildings or structures from the historic period. These resources include existing buildings, dams, bridges, lighthouses, and forts.

Resources that are significant to American Indian and Alaska Native tribes and nations that may be considered traditional cultural properties include, but are not limited to, archaeological sites and artifacts, locations of historic and contemporary events, sacred areas, landscapes, and sources of raw materials used to produce tools and sacred objects. Many resources are also sacred places important to American Indian and Alaska Native tribes and nations and may include mountain peaks, springs, and burial sites. Traditional uses may prescribe the use of particular native plants, animals, or minerals from specific places. The community may consider these resources essential for the continuation of their traditional culture. Traditional cultural properties are those resources listed in or eligible for listing in the National Register of Historic Places (NRHP) and are afforded the same protection as other types of historic properties. Traditional cultural properties are not limited to American Indians or Alaska Native tribes but can represent any ethnic group or living community with strong ties to the property (National Park Service 1998).

American Indian and Alaska Native traditional resources are addressed in Section 3.11 (American Indian and Alaska Native Traditional Resources). In some instances, these traditional resources and associated sites can be classified as traditional cultural properties and would be subject to the same consultation process and protections as other resources listed in or eligible for listing in the NRHP. Traditional resources within the context of a traditional cultural landscape in the Study Area have been generally discussed in ongoing government-to-government consultations. However, no specific traditional cultural properties have been identified to date. Analysis of potential impacts on traditional resources is currently provided in Section 3.11 (American Indian and Alaska Native Traditional Resources).

#### 3.10.1.2 Identification, Evaluation, and Treatment of Cultural Resources

The Study Area defined in Chapter 2 (Description of Proposed Action and Alternatives) of this document also serves as the Area of Potential Effects (APE) for consideration of effects on historic properties pursuant to Section 106 of the NHPA of 1966 as amended. To summarize, the Study Area is composed of established maritime operating and warning areas in the eastern north Pacific Ocean region, including the Strait of Juan de Fuca, Puget Sound, and Western Behm Canal in southeastern Alaska. The area includes air and water space within Washington, as well as outside state waters of Oregon and Northern California. It includes four existing range complexes and facilities: the Northwest Training Range Complex (NWTRC); the Naval Undersea Warfare Center (NUWC) Division, Keyport Range Complex; Carr Inlet Operating Area (OPAREA); and the Southeast Alaska Acoustic Measurement Facility (SEAFAC). In addition to these range complexes, the Study Area also includes United States (U.S.) Department of the Navy (Navy) pierside locations where sonar (sound navigation and ranging) maintenance and testing occurs as part of overhaul, modernization, maintenance, and repair activities at Navy piers at Naval Base (NAVBASE) Kitsap Bremerton, NAVBASE Kitsap Bangor, and Naval Station Everett.

Procedures for identifying, evaluating, and treating cultural resources within state territorial waters (within 3 nautical miles [nm] of the coast) and U.S. territorial waters (within 12 nm of the coast) are contained in a series of federal and state laws and regulations, as well as agency guidelines. Archaeological, architectural, and American Indian and Alaska Native resources are protected by various laws and their implementing regulations: the NHPA of 1966 as amended, the Archeological and Historic Preservation Act of 1974, the Archaeological Resources Protection Act of 1979, the American Indian Religious Freedom Act of 1978, the Native American Graves Protection and Repatriation Act of 1990, the Submerged Lands Act of 1953, the Abandoned Shipwreck Act of 1987, and the Sunken Military Craft Act of 2004. The Advisory Council on Historic Preservation (Advisory Council) further guides treatment of archaeological and architectural resources through the regulations, *Protection of Historic Properties* (36 C.F.R. Part 800). The category of “historic properties” is a subset of cultural resources defined in the NHPA as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP, including artifacts, records, and material remains related to such a property or resource.

Section 106 of the NHPA requires federal agencies to consider the effects of their actions on historic properties and give the Advisory Council on Historic Preservation a reasonable opportunity to comment. The regulations implementing Section 106 (36 C.F.R. Part 800) specify a consultation process to assist in satisfying this requirement. Consultation with the appropriate State Historic Preservation Officers, the Advisory Council, American Indian and Alaska Native tribes, the public, and state and federal agencies is required by Section 106 of the NHPA. The Washington State Historic Preservation Officer was notified on January 14, 2014, that the draft EIS/Overseas EIS (OEIS) was available for review. The Washington State Historic Preservation Officer provided a response on February 13, 2014. Letters formally initiating the Section 106 process and defining the APE were sent to the Alaska and Washington State Historic Preservation Officers on March 11, 2015.

Scoping letters for this EIS/OEIS were sent on February 23, 2012, to 51 American Indian tribes and nations in Washington, Oregon, and California, and three Alaska Native Tribes. Scoping letters dated February 23, 2012, were also sent to the Northwestern Indian Fisheries Commission, Skagit River System Cooperative, the InterTribal Sinkyone Wilderness Council, Cape Fox Corporation, Central Council of the Tlingit and Haida Indian Tribes, and Sealaska. Electronic mails formally initiating the Section 106 process were sent to four Alaska Native tribes on November 3, 2014, and 26 Washington American Indian tribes and nations between September and December 2014. Section 106 consultation with American Indian tribes and nations in California and Oregon was not conducted because training and testing activities occur outside 12 nm from the coastline of these states, excluding the activities from consideration under NHPA (Chief of Naval Operations [OPNAV] Environmental Readiness Program Manual [M-5090.1]).

Additional regulations and guidelines for submerged historic resources include 10 U.S.C. § 113, note for the Sunken Military Craft Act; the *Abandoned Shipwreck Guidelines* prepared by the National Park Service (National Park Service 2007); and, for conducting research or recovering Navy ship and aircraft wrecks, the *Guidelines for Archaeological Research Permit Applications on Ship and Aircraft Wreck*s *under the Jurisdiction of the Department of the Navy* (36 C.F.R. Part 767) overseen by the Naval History and Heritage Command. The Sunken Military Craft Act does not apply to actions taken by, or at the direction of, the United States. In addition, the federal archaeological program developed by the National Park Service includes an ensemble of historical and archaeological resource protection laws to which federal managers adhere.

The U.S. government is a signatory to The Convention Concerning the Protection of the World Cultural and Natural Heritage, commonly known as the 1972 World Heritage Convention (WHC or "the Convention"). The WHC protects natural and cultural sites of outstanding universal value. Specifically, the purpose of the Convention is to identify and conserve sites and properties of outstanding cultural or natural importance to the common heritage of humanity and catalogue these properties and sites in an internationally recognized list known as the World Heritage List. In nominating sites to the World Heritage List, the U.S. government pledges to the international community to protect them in perpetuity. Accordingly, the Department of Defense's cultural resources policy and environmental regulations require compliance with terms of the Convention. The addendum (addendum Section 402) to the NHPA (recodified at 54 U.S.C. § 307101(e), Consideration of Undertaking on Property), International Federal Activities Affecting Historic Properties) requires an assessment by federal agencies of project effects on resources outside the United States that are identified on the World Heritage List or on the applicable country's equivalent of the NRHP.

Olympic National Park in Washington is the only World Heritage site in the Study Area. Olympic National Park was inscribed as a World Heritage site under the Convention in 1981. The general criteria under which Olympic National Park was inscribed were

> (vii) contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance; and
>
> (ix) be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal, and marine ecosystems and communities of plants and animals.

More specifically, the nomination provided the following justification for each of the criteria respectively:

"Olympic National Park is of remarkable beauty, and is the largest protected area in the temperate region of the world that includes in one complex ecosystem from ocean edge through temperate rainforest, alpine meadows and glaciated mountain peaks. It contains one of the world's largest stands of virgin temperate rainforest, and includes many of the largest coniferous tree species on earth.

The park's varied topography from seashore to glacier, affected by high rainfall has produced complex and varied vegetation zones, providing habitats of unmatched diversity on the Pacific coast. The coastal Olympic rainforest reaches its maximum development within the property and has a living standing biomass which may be the highest anywhere in the world. The park's isolation has allowed the development of endemic wildlife, subspecies of trout, varieties of plants and unique fur coloration in mammals, indications of a separate course of evolution."

Although addendum Section 402 of the NHPA does not specifically apply to the Proposed Action, the Navy has considered the importance of the Olympic National Park World Heritage site in the analysis of potential impacts in light of United States' obligations under the Convention. No activities are proposed to occur directly within the property boundaries of Olympic National Park, and airspace activities that may occur in designated Special Use Airspace overlaying the park are fully in compliance with Federal Aviation Administration regulations and recommendations applicable to these areas. Aircraft noise associated with training activities conducted in the Olympic Military Operations Areas (MOAs) (portions of which overlay the Park) has been identified as a potential concern. As discussed in Socioeconomic Resources (Section 3.12), the noise study conducted for the Olympic MOAs concluded that aircraft noise impacts associated with the Proposed Action would be negligible. Other attributes of the Olympic National Park World Heritage Site that contribute to its outstanding universal value, including topography, remarkable beauty, and the complexity of the Olympic ecosystems, would not be affected by the Navy's proposed aircraft overflights. Airspace activities are not expected to disrupt the isolation that led to species development; overflights were occurring prior to the park's designation. There is no evidence that noise or air emissions would result in rainforest depletion. The Proposed Action and alternatives would not cause changes that would alter the complex and varied ecosystems. See Appendix K (World Heritage Site Analysis) for further details on the analysis of impacts to the Olympic National Park as a World Heritage Site.

No specific procedures for identifying and protecting cultural resources in the open ocean have been defined by the international community (Zander and Varmer 1996). No treaty offering comprehensive protection of submerged cultural resources has been developed. The United Nations 1982 Convention on the Law of the Sea and several international conventions prepared by the United Nations Educational, Scientific, and Cultural Organization apply to submerged cultural resources, including the 1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property; the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage; and the 2001 Convention on the Protection of the Underwater Cultural Heritage. Only the 1970 and 1972 conventions have been fully ratified by the United States.

#### 3.10.1.3 Methods

##### 3.10.1.3.1 Approach

###### 3.10.1.3.1.1 Regulatory Requirements

Within the Pacific region, the approach for establishing current conditions is based on different regulatory parameters defined by geographical location. Within U.S. territorial waters (0–12 nm), both the NEPA and the NHPA (OPNAV M-5090.1) are applicable. The NHPA is also applicable for any resources identified on the World Heritage List or on an applicable country's equivalent of the NRHP beyond U.S. territorial waters in accordance with Section 402 (recodified at 54 U.S.C. § 307101(e), Consideration of Undertaking on Property). Areas beyond 12 nm in the open ocean will not be analyzed because those areas are beyond the jurisdiction of the NHPA and NEPA.

The implementing regulations of Section 106 of the NHPA require federal agencies to take into account the effects that an undertaking would have on cultural resources included in or eligible for inclusion in the NRHP. "Historic properties" is synonymous with NRHP-eligible or -listed archaeological, architectural, or traditional resources. Cultural resources that have received a consensus determination of eligibility in consultation with the State Historic Preservation Officer or a determination by the Keeper of the NRHP must be considered eligible and thus are afforded the same regulatory consideration as resources listed in the NRHP. Evaluations and determinations of historic properties within the Study Area are the responsibility of the federal agency, in consultation with State Historic Preservation Officers in Alaska and Washington. Consultations were not conducted with the State Historic Preservation Officers in Oregon or California because training and testing activities occur outside 12 nm from the coastline of these states, excluding the activities from consideration under NHPA (OPNAV M-5090.1).

Secretary of the Navy Instruction (SECNAVINST) 5090.8a, *Policy for Environmental Protection, Natural Resources and Cultural Resources Programs*, and OPNAV M-5090.1 Chapter 13, *Cultural Resources Compliance and Management*, require the Navy to consider the effects of its undertakings on cultural resources in its planning and program efforts. SECNAVINST 4000.35a, *Department of the Navy Cultural*

*Resources Program*, establishes policy and assigns responsibilities within the Navy for fulfilling the requirements of cultural resources laws such as the NHPA.

#### 3.10.1.3.1.2 National Register of Historic Places Criteria

Properties are evaluated for nomination to the NRHP and for NRHP eligibility using the following criteria (36 C.F.R. § 60.4(a)-(d)):

- Criterion A: Associated with events that have made a significant contribution to the broad patterns of American history
- Criterion B: Associated with the lives of persons significant in the American past
- Criterion C: Embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction
- Criterion D: Yield, or may be likely to yield, information important in prehistory or history

A historic property also must possess the aspects of integrity—location, design, setting, materials, workmanship, feeling, and association—to convey its significance and to qualify for the NRHP. These seven aspects, in various combinations, define integrity. To retain integrity, a property will always possess several, and usually most, of these aspects.

Cultural resources in U.S. territorial waters (within 12 nm of the coastline) are defined as follows:

- Resources listed in or eligible for listing in the NRHP (Section 106 of the NHPA)
- Resources entitled to sovereign immunity (e.g., Russian brigs)

#### 3.10.1.3.1.3 Previous Section 106 Consultation

The Navy previously conducted Section 106 consultations for the training and testing activities included in the No Action Alternative. These consultations were completed for activities included in the NWTRC; the NUWC Division, Keyport Range Complex; and SEAFAC. On March 18, 2009, the Washington State Historic Preservation Officer concurred with the Navy's finding of No Historic Properties Affected for activities proposed in the NUWC Division, Keyport Range Complex Extension (Whitlam 2009a). On November 5, 2009, the Washington State Historic Preservation Officer concurred with the Navy's finding of No Adverse Effect to Historic Properties for activities proposed in the NWTRC (Whitlam 2009b). In each letter, the Washington State Historic Preservation Officer asked to receive any correspondence or comments from concerned tribes or other parties. It also stipulated that should archaeological or historic materials be discovered during project activities, work in the immediate vicinity would stop, the area would be secured, and concerned tribes and the State Historic Preservation Officer would be notified. Section 106 consultation between the Alaska Department of Natural Resources, Division of Parks & Outdoor Recreation, Office of History and Archaeology (the Alaska State Historic Preservation Office), the U.S. Forest Service, and the Advisory Council on Historic Preservation were conducted in 1989 for the development of SEAFAC naval facilities on Back Island. Submerged cultural resources within the Western Behm Canal were not included in the consultation.

In September 2003, the Navy sent scoping letters to associated American Indian tribes regarding the NUWC Division, Keyport Range Complex Extension EIS/OEIS. The Navy solicited feedback on the Draft EIS/OEIS in September 2008, and government-to-government consultations occurred as part of Section 106 compliance for the NUWC Division, Keyport Range Complex Extension EIS/OEIS between October 2008 and March 2009. The following American Indian tribes and nations were involved in these consultations (listed in alphabetical order): Hoh Tribe, Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, Makah Tribe, Port Gamble S'Klallam Tribe, Quileute Tribe, Quinault Indian Nation, Skokomish Indian Tribe, and Suquamish Tribe. In addition, the Point No Point Treaty Council was notified. The Navy responded to the tribes' comments and concerns on the NUWC Keyport Range Complex Extension Draft EIS/OEIS in the response to comments section of the Final EIS/OEIS, and edits were made to the text of the document as required.

In July 2007, the Navy sent scoping letters inviting associated American Indian tribes to be involved in public participation efforts associated with the NWTRC EIS/OEIS. Comments were also solicited during public review of the Draft EIS/OEIS from December 2009 to April 2010. In fulfillment of Section 106 obligations for completion of the EIS/OEIS, the Navy considered comments from American Indian tribes resulting from communications during the NEPA process. Nineteen Washington tribes and two American Indian organizations, and 11 Oregon and California tribes were invited to participate in government-to-government consultation. No government-to-government consultation was requested, and all communication with the Navy was conducted through tribal staff. Comments expressing concern related to several topics, including impacts on usual and accustomed fishing rights, communication protocols between the Navy and tribes, and safety of tribal fishing vessels, were provided by the tribes. The Navy responded to the tribes' comments and concerns on the NWTRC Draft EIS/OEIS in the response to comments section of the Final EIS/OEIS, and revisions were made to the text of the document as required.

#### 3.10.1.3.2 Data Sources

Cultural resources information relevant to this EIS/OEIS was derived from various sources, including previous environmental documents, the National Register Information System (managed by the National Park Service), online maps and data, and published sources, as cited. Previous environmental documents used for general information include the *Northwest Training Range Complex EIS/OEIS* (U.S. Department of the Navy 2010a), the *NAVSEA NUWC Keyport Range Complex Extension EIS/OEIS* (U.S. Department of the Navy 2010b), the *TRIDENT Support Facilities Explosives Handling Wharf (EHW-2) FEIS* (U.S. Department of the Navy 2012), and the *Historic and Archeological Resources Protection Plan for the Naval Air Station Whidbey Island, Washington* (Blukis Onat 1994). Information from the following databases was obtained from previous documents or reviewed directly online for information on submerged resources, types, and eligibility for listing in the NRHP:

- National Register Information System
- Washington Information System for Architectural and Archaeological Records Data
- National Oceanic and Atmospheric Administration Automated Wreck and Obstruction Information System
- Bureau of Ocean Energy Management's Alaskan shipwreck inventory

#### 3.10.1.3.3 Cultural Context

##### 3.10.1.3.3.1 Offshore Area

The coastal region of the northwestern United States was largely shaped by a series of glacial events and changes in sea level, with subsequent emergence of land masses and deposition of glacial till and outwash. During the last glacial maximum (19,000 years ago), the Pacific Ocean was about 120 meters lower than the modern sea level and the Washington coastline expanded 39 kilometers west of the modern coast (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013). As the result of deglaciation, sea levels rose and inundated these expanded coastlines.

Before and during the glacial period, active volcanoes contributed to formation of some of the existing landforms. Present-day shorelines and islands resulted from both the erosion and deposition of natural materials (Blukis Onat 1994).

Early populations may have migrated into the area using different routes at different times. At least three possible migration routes have been proposed and include the full maritime migration, the partially amphibious migration, and the ice-free corridor migration (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013). Early peoples with a fully maritime adaptation (long-distance oceangoing travel and broad use of coastal economic resources, including areas along extensive glacial ice margins) could easily negotiate movement across the Bering Strait and continue along the eastern Pacific coast at or before 16,000 years before present (BP). A partially amphibious migration is posited based on early populations employing a mix of terrestrial and maritime movements and adaptations with coastal and adjacent environments; this type of migration may have required only limited seafaring needs. The ice-free corridor migration is based on deglaciation between the Cordilleran and Laurentide ice sheets in inland areas (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013).

Regardless of their migration route or initial adaptation, the first human inhabitants were probably big game hunters and are known as Paleoindians (8,000–14,000 years BP). Although they probably supplemented their diet by gathering various plant species, such organic items are not often well preserved by the archaeological record. Instead, they are best known through the artifacts they left behind, principally projectile points. Additionally, technological distinctions among the projectile points (Clovis, Folsom) may be indicative of cultural divisions and possibly the specialization toward hunting, particularly of game animals (U.S. Department of the Navy 2012).

As summarized previously (U.S. Department of the Navy 2012), the climate became warmer and drier after 8,000 years BP, native groups along the coastline of the Pacific Northwest adapted to a maritime subsistence, focusing on the harvest of marine fish and mammals. The ocean offered whales, porpoises, sea lions, seals, and shellfish, as well as dozens of fish species. At various times of the year, the rivers were full of spawning salmon. The adjoining uplands were home to deer, elk, and other game. This wealth of animal resources allowed for the development of large, permanent settlements and their accompanying social systems, and leaders.

In the 18th century, Spaniards became the first Europeans to visit the Washington coast. In 1774, Juan Pérez explored the Northwest coastline. A year later, an expedition led by Bruno Heceta made the first recorded landing in what would become Washington State near the mouth of the Hoh River. Maritime activity in the Offshore Area was associated with procurement of marine resources (open ocean fishing and whaling by the coastal tribes and nations and American whaling); general exploration and transit (initial exploration and trade by the Spain and Britain and military activity and shipbuilding associated with World War I and World War II); and transport of raw materials, manufactured goods, and people (e.g., furs, timber, gold, miners, and marine resources) (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013). Because of the treacherous nature of the Pacific coastline in Washington, light stations or lighthouses were initially constructed from 1852 to 1858 to assist in the rescue of mariners (such as the Destruction Island Light Station [1891] located south of the Hoh River). These Life Saving Service locations joined with the Revenue Cutter Service in 1915 and became the U.S. Coast Guard. During World War II, these light stations were used as spotting stations for military land and sea operations as well as radio stations (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013).

#### 3.10.1.3.3.2 Inland Waters

Continuing human occupation and use of the northern Puget Sound region dates to over 14,000 years ago. Prehistoric Northwest Coast peoples lived in an area with a relatively mild climate, temperate rain forest, and rich marine life. The chronological sequence for the northern Puget Sound is composed of four periods (Blukis Onat 1994). The Generalized Resource Development (ca. 13,000–6,000 years BP) period is characterized by assemblages limited to flaked stone artifacts and debris containing medium to large lanceolate projectile points, and cobble limited to flaked stone artifacts and debris containing medium to large lanceolate projectile points, cobble tools, and crescentic bifaces. The succeeding Specialized Resource Development (ca. 6,000–2,500 years BP) period is indicated by assemblages of medium leaf-shaped, stemmed, and shouldered stone projectile points; bone and antler unilaterally and bilaterally barbed points; and unbarbed unipoints of bone and antler. The period of Specialized Resource Management (ca. 2,500–250 years BP) encompasses three shorter units defined on the basis of research conducted further north and likely represents Coast Salish. The first of these units (Locarno Beach) is indicated by assemblages, including contracting stem flaked basalt projectile points, microblades and microcores, ground slate points and knives, antler toggling harpoon heads, handstones, grinding slabs, and antler wedges. The Marpole culture type is characterized by medium stemmed and unstemmed leaf-shaped flaked lithic projectile points, ground slate points and knives, microblades and microcores, ground stone celts, handstones, grinding slabs, nontoggling antler harpoons, stone sculpture, and clamshell and shale disk beads. The third, Strait of Georgia culture type, is indicated by small triangular basalt projectile points, similar ground slate points, ground slate knives, ground celts, unilaterally barbed bone points, bone awls, composite antler toggling harpoons, and antler wedges. The period of Culture Conflict (ca. 250–100 years BP) represents the early historic times (Blukis Onat 1994).

Within the Puget Sound region, archaeological sites have largely been recognized in two settings: shell middens located in littoral areas and sites located in riverine areas. As their names suggest, the littoral and riverine sequences are intrinsically tied to the environments in which they are recognized, and represent aboriginal adaptations to these specific conditions. The littoral sequence refers to cultural adaptations to coastal or seashore environments, whereas the riverine sequence applies to inland, river-based settings. Most of the sites which have been excavated within littoral areas have consisted of midden deposits marked by molluscan shell and fragments of mammalian and avian bone. These sites generally contain low quantities of tools, and tools that do exist are often stylistically quite variable (Blukis Onat 1994).

Early investigations leading to the development of the littoral sequence primarily took place at the Skagit River delta and adjacent islands. The earliest identified assemblages are believed to date to the period 4000–2500 years BP. These remains suggest an adaptation focused upon the exploitation of the littoral zone, with the hunting of coastal land animals and the gathering of intertidal resources being of prime importance. This pattern of resource exploitation appears to have remained relatively constant for the next 2,000 years. Although little change is observed within the adaptive strategies of the aboriginal inhabitants of Puget Sound littoral zone, stylistic change has been identified within local technologies. Scallop, *Dentalium,* and *Olivella* shells, jade adzes, and graphite are common components of Marpole culture assemblages, while exotic aboriginal trade goods and items of European manufacture mark the Culture Conflict period.

Subsistence activities among the Northwest Coast peoples, including those living in the area that encompasses Puget Sound, included a reliance on fishing, hunting, and gathering with an emphasis on aquatic resources, and the utilization of preservation and storage technologies. The basic food sources included salmon, shellfish, land mammals, berries, freshwater fish, and wild plants. Vegetable foods included camas roots and lily bulbs supplemented by berries and nuts. Net traps or spears were used to capture waterfowl, and bows and arrows were used for game.

Among the northwest tribes, riverine fishing, especially the taking of salmon and steelhead, was universally important as an element of diet and, in cultural traditions, in religious practices and trade. The northwest groups developed a wide variety of fishing methods such as nets, traps, weirs, spears, and hook and line, which they used to catch fish at numerous locations throughout the areas they lived and traveled. Species taken included coho, Chinook, pink, sockeye, and chum salmon; rockfish; perch; ling cod; halibut; herring; smelt; and trout. They gathered numerous shellfish species on beaches and mudflats, including cockles, clams, saltwater snails, oysters, barnacles, crab, chitons, and mussels (U.S. Department of the Navy 1997). Hunting expeditions pursued elk, deer, bear, seals, and ducks (Watson 1999).

With a few exceptions, Northwest Coast peoples occupied permanent villages in winter, and many had permanent structures for other seasons (Suttles 1990). Their cedar-plank dwellings typically housed several related families. They often settled along the estuaries of small rivers and along the open coastline where intertidal, estuarine, and marine resources were available for subsistence uses.

Northwest Coast material culture is distinctive for its highly developed woodworking technology that produced plank houses, dugout canoes, and beautifully crafted utensils. Renowned art work included carving, painting, and textiles.

Spanish, English, and Russian explorers and fur traders visited the area that would become the Northwest Coast of the United States during the late 1700s. In 1792, Captain George Vancouver set out to map and explore coastal areas in what is now northern Washington. In May 1792, Joseph Whidbey, accompanied by Peter Puget, mapped and explored areas of what is now Puget Sound. America's formal incursion into this area was marked by the entry of the United States Exploring Expedition, commanded by Lieutenant Charles Wilkes, into Puget Sound in 1841.

The Puget Sound area became U.S. territory when the 1846 Oregon Treaty was signed. In 1850, Colonel Isaac Ebey claimed a square mile of prairie on Admiralty Inlet to become the first permanent settler on Whidbey Island. During the late 1850s and early 1860s, traders, travelers, missionaries, and settlers entered the area and began to move into land cleared by logging operations. These newcomers interacted with local tribes in numerous ways, including bringing in new diseases and alcohol.

Maritime activity in the Inland Waters was associated with procurement of marine resources (fishing by the Puget Sound tribes and nations); general exploration and transit (initial exploration and trade; military activity and shipbuilding); and transport of raw materials, manufactured goods, and people (e.g., furs, timber, fish, gold, and miners). Light stations or lighthouses were constructed to assist in the rescue of mariners (such as the Tatoosh Island Light Station [1857] located at the south end of the Strait of Juan de Fuca) (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013).

#### 3.10.1.3.3.3 Western Behm Canal, Alaska

The following is adapted and excerpted from the National Park Service (2012):

The southeastern region of Alaska, also known as the Alaska Panhandle, stretches from the Copper River delta and the Malaspina Forelands, past the Alexander Archipelago south to the northern end of the Queen Charlotte Islands (at the Dixon Entrance to Hecate Strait) in a narrow arc extending along the North Pacific coast. Sharply bounded on the inland side by mountain ranges, this zone is radically different in climate, vegetation, and fauna from the regions beyond the mountains. The coastal strip features a relatively mild climate, temperate rain forest, and rich marine life. There are two coastal environments in the zone: outer coast and inner coast. The famed Inside Passage of Alaska, a sheltered coastline separated from the open ocean by the islands of the Alexander Archipelago, provided a protected marine environment for exploitation. Areas north of this region were exposed to the open Pacific and Gulf of Alaska, a much more difficult ecological zone that experienced less of a classic Northwest Coast cultural development.

This culture is characterized by a nonhorticultural subsistence style based on hunting and gathering. Because of the richness and predictability of such resources (e.g., fishing for salmon and halibut, sea mammal hunting, shellfish, plants, berries), surpluses were generated, and a complex sociocultural system developed along with an elaborate and distinctive art style. Material culture was distinctive in its highly developed and elaborate woodworking technology that produced plank houses, bowls, canoes, monuments, boxes, and many other tools and utensils. A highly developed twined basketry was also notable, as were textiles of wool and vegetable fiber. Permanent winter villages or towns with seasonal camps at dispersed resource locations were a standard settlement pattern.

Beginning in 1741, with Bering's second expedition that touched on the Northwest Coast, European contact continued and increased. Russian exploitation of sea otter fueled continued expansion and settlement from the Aleutians. Russians made solid contact with the Eyak and Tlingit by 1780. By 1779, Spanish explorers had reached as far north as southeastern Alaska. James Cook's third voyage, in 1778, reached Nootka Sound and the Gulf of Alaska. Lituya Bay was explored by the French under LaPerouse in 1786. A Spanish scientific expedition under the leadership of Malaspina reached Yakutat Bay in 1791. Sitka was founded by the Russians in 1799 and destroyed by the Tlingit in 1802. The Tlingit fort was destroyed in 1804 by the Russians, and the first permanent European base on the Northwest Coast was built at Novo-Arkhangel’sk. American purchase of Alaska in 1867 led to further settlement and exploitation of the region. The Klondike Gold Rush of 1898, followed by a series of other gold rushes, led to the opening of Alaska, which has continued to this day (National Park Service 2012).

Maritime activity in the Western Behm Canal was associated with procurement of marine resources and transport of raw materials, manufactured goods, and people (e.g., timber, canned salmon, gold, and miners) (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013).

## 3.10.2 AFFECTED ENVIRONMENT

The affected environment is discussed relative to known wrecks, obstructions, occurrences, or unknowns; cultural resources eligible for or listed in the NRHP; and cultural resources eligible for or listed in state registers. Within these categories, the Study Area is divided into three distinct regions for cultural resources evaluation: the Offshore Area, the Inland Waters, and Western Behm Canal, Alaska. In accordance with the addendum to the NHPA (16 U.S.C. 470a-2: International Federal activities affecting historic properties), only potential impacts on World Heritage sites will be addressed in areas beyond 12 nm; however, no resources identified on the World Heritage List occur in the Study Area.

### 3.10.2.1 Marine Archaeological Sites

Marine archaeological sites and features include prehistoric sites associated with early maritime migrations that were inundated during deglaciation and are now located on the continental shelf (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013), and prehistoric and historic sites that were intentionally placed in or under water (Stilson et al. 2003).

Physiographic and archaeological research was conducted for the Pacific Outer Continental Shelf (California, Oregon and Washington) beyond state waters (greater than 3 nm) to predict the distribution of marine prehistoric sites (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013). Predictive models to delineate paleoshorelines and paleolandscapes were developed as part of this process (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013). This geographic information system-based model made predictions about potential site locations based on assumptions about resource distributions that attract prehistoric peoples to particular paleolandscapes and considered how these resource areas are differentially affected by the rise in sea level. The study predicted that the highest potential site location areas would be found within alluvial drainages that have economically attractive resources and relatively high rates of sedimentary deposition that should serve to preserve prehistoric sites better than in the interfluve areas (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013).

Prehistoric and historic sites associated with water-related activities in Washington include canoe runs; petroglyphs and pictographs; fish weirs and traps; reef net anchors; trash dumps; piers, wharves, docks, and bridges; dams; and marine railways (Stilson et al. 2003).

Synthesis and interpretation of archaeologically documented land use patterns and ethnographic data was used to develop a predictive model to identify the potential for inundated prehistoric sites located on the continental shelf in southeast Alaska (Monteleone 2013). The model was generated and refined based on variables of slope, aspect, distance to streams, distance to lakes, shoreline complexity, tributary junctions, and locations of known archaeological sites. The model was field tested during two underwater surveys using sonar, remotely operated vehicles, and sediment sampling.

#### 3.10.2.1.1 Offshore Area

Based on the predictive model (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013), the Offshore Area has an increased probability for inundated prehistoric sites from the large embayments of Gray's Harbor and Willapa Bay, which were produced as rising sea level drowned large incised river valleys of the paleolandscape. No subsurface sampling of marine deposits has been conducted and no inundated prehistoric sites have been identified.

Based on data sources reviewed (Section 3.10.1.3.2, Data Sources), no prehistoric and historic sites that were intentionally placed in or under water have been identified in the Offshore Area.

#### 3.10.2.1.2 Inland Waters

Based on the predictive model (ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research 2013), the Inland Waters have a lower probability for inundated prehistoric sites because of the lack of paleolandscape features (e.g., estuaries and streams) associated with concentrated resource availability. No subsurface sampling of marine deposits has been conducted, and no inundated prehistoric sites have been identified.

Based on data sources reviewed (Section 3.10.1.3.2), no prehistoric and historic sites that were intentionally placed in or under water have been identified in the inland waters.

#### 3.10.2.1.3 Western Behm Canal, Alaska

Although a predictive model was developed (Monteleone 2013), specific paleolandscape settings of inundated prehistoric sites associated with early maritime migrations were not identified. Even though limited underwater surveys were conducted to test the model, no areas in the Western Behm Canal were surveyed (Monteleone 2013). No inundated prehistoric sites have been previously identified in the Western Behm Canal.

### 3.10.2.2 Known Wrecks, Obstructions, Occurrences, or Unknowns

Several types of historic properties may be present in the Study Area (Figure 2.1-1), including wrecks of ships, submarines, aircraft, and barges; sunken navigational equipment such as buoys; and manmade obstructions. The context within which these types of resources were formed provides an understanding of the overall development of the resource base and information on relative locations.

As the result of mechanical, chemical, and biological erosion and decay, historic shipwrecks exhibit differential preservation. Shipwrecks in high-energy zones, as in shallow waters along the coastlines, are generally less well preserved because they have been scoured by the abundant fluvial sediments driven by coastal currents and heavy wave action (Pearson et al. 2003). However, if portions of the shipwreck are buried in sediment and protected from scouring, preservation may be high. Ferrous metal oxidation is accelerated by elevated seawater temperature, and shipworms consume wooden ship members. Deep-water wrecks may be better preserved because the lower seawater temperatures at depth slow the oxidation of ferrous metals and reduce the number of wood-eating shipworms; however, preservation of deep-water shipwrecks does vary (Pearson et al. 2003).

In accordance with the Abandoned Shipwreck Act, abandoned shipwrecks in state waters on the Pacific coast are considered the property of the U.S. government (Barnette 2010). Warships or other vessels used for military purposes at the time of their sinking retain sovereign immunity (e.g., Russian brigs). According to the principle of sovereign immunity, foreign warships sunk in U.S. territorial waters are protected by the U.S. government, which acts as custodian of the sites in the best interest of the sovereign nation (Neyland 2001).

Estimated numbers of historic submerged resources used in this EIS/OEIS are compiled from various information sources. Data changes are made yearly as exploration systems become more sophisticated and additional discoveries are made. Because no comprehensive survey or evaluation of submerged cultural resources has occurred for the entire Study Area, discoveries of additional submerged cultural resources may occur. Additionally, some existing and unrecorded submerged cultural resources could be considered eligible for the NRHP.

#### 3.10.2.2.1 Offshore Area

The Offshore Area contains submerged cultural resources primarily associated with maritime trade, transport, and military activities, and includes many shipwrecks. In particular, the Olympic coast of Washington is a ship graveyard as a result of the isolated, rocky shores, heavy ship traffic, and ferocious weather and wave action. These conditions have resulted in numerous founderings, collisions, and groundings. Some ships simply disappeared, with a last known location recorded by a lighthouse tender.

At Washington, the eastern boundary of the Offshore Area abuts the coastline and includes a 1-mile-wide surf zone of Quinault Range Site. This portion of the study area contains many known Navy shipwrecks and several submerged Navy aircraft (Grant et al. 1996). As shown in Figure 3.10-1, more than 150 wrecks have been documented near the Olympic Coast National Marine Sanctuary (National Oceanic and Atmospheric Administration 2008). Along the shorelines of the sanctuary are memorials to crews and passengers who died in nearby shipwrecks. These include the wrecks of the *Prince Arthur* in 1903, the *P.J. Pirrie* in 1920, nine ships wrecked between Quillayute Rocks and Cape Alava, five at Destruction Island, and four near Hoh Head (National Oceanic and Atmospheric Administration 1993).

At Oregon and in Northern California, the Study Area boundary is 12 nm off the coastline. At this distance, states and their associated State Historic Preservation Offices do not have jurisdiction (OPNAV M-5090.1). If cultural resources were discovered, these resources would not be listed on either the state registers or the NRHP because they are beyond state and U.S. territorial waters.

#### 3.10.2.2.2 Inland Waters

The Strait of Juan de Fuca and Puget Sound contain an extensive collection of wrecks and submerged aircraft (Figure 3.10-2) (Grant et al. 1996; Northern Maritime Research 2007). For example, six known shipwrecks are in waters adjacent to NAVBASE Kitsap Bangor, while 105 are in the Crescent Harbor area.

Obstructions and wrecks are listed in the National Oceanic and Atmospheric Administration Automated Wreck and Obstruction Information System database. In this area, most shipwrecks are of unknown origin, date of sinking, or type (National Oceanic and Atmospheric Administration 2008). Those that have been identified date from the early 1800s (including the Hudson Bay supply ship *Isabella*, which sank around 1830) to modern fishing boats, barges, cabin cruisers, and tugs. Some of the vessels were cargo ships and freighters damaged during World War II. A mine sweeper, the *USS Crow*, was sunk by an erratic-running aircraft torpedo in the Puget Sound in 1943 (Naval Historical Center 2004). Some ships were deliberately sunk to create artificial habitats or reefs.

Ten shipwrecks are within or near the NUWC Division, Keyport Range Complex (U.S. Department of the Navy 2010b, Northern Maritime Research 2007): the *Laurel*, the *Elk*, the *A.R. Robinson*, the *R.M. Hasty*, the *Orion*, the *B.C. Company No. 4*, the *Union*, the *Curlew*, the *Nokomis*, and an unnamed vessel. Although not listed on the NRHP, these shipwrecks may be considered potentially eligible (U.S. Department of the Navy 2010b).

#### 3.10.2.2.3 Western Behm Canal, Alaska

The Bureau of Ocean Energy Management's Alaskan shipwreck inventory was used to identify existing records of shipwrecks near the Study Area. The agency provides the most comprehensive compilation of Alaska shipwrecks to date. The database lists shipwrecks in Alaska from earliest Russian times (1741) to the present, as compiled from an extensive literature search. The electronic database was updated in May 2011 (Bureau of Ocean Energy Management 2012). Queries were completed for Behm Canal and other named areas in the immediate vicinity of the SEAFAC Restricted Area, including Clover Passage, Clover Pass, Naha Bay, Bond Bay, Helm Bay, Wading Cove, and Raymond Cove. The results of the search indicated the presence of 29 shipwrecks within or near the Study Area (Figure 3.10-3). These included steamers, a skiff, a ferry, a salmon troller, and numerous gas screws; none of these shipwrecks have been evaluated for eligibility to the NRHP.

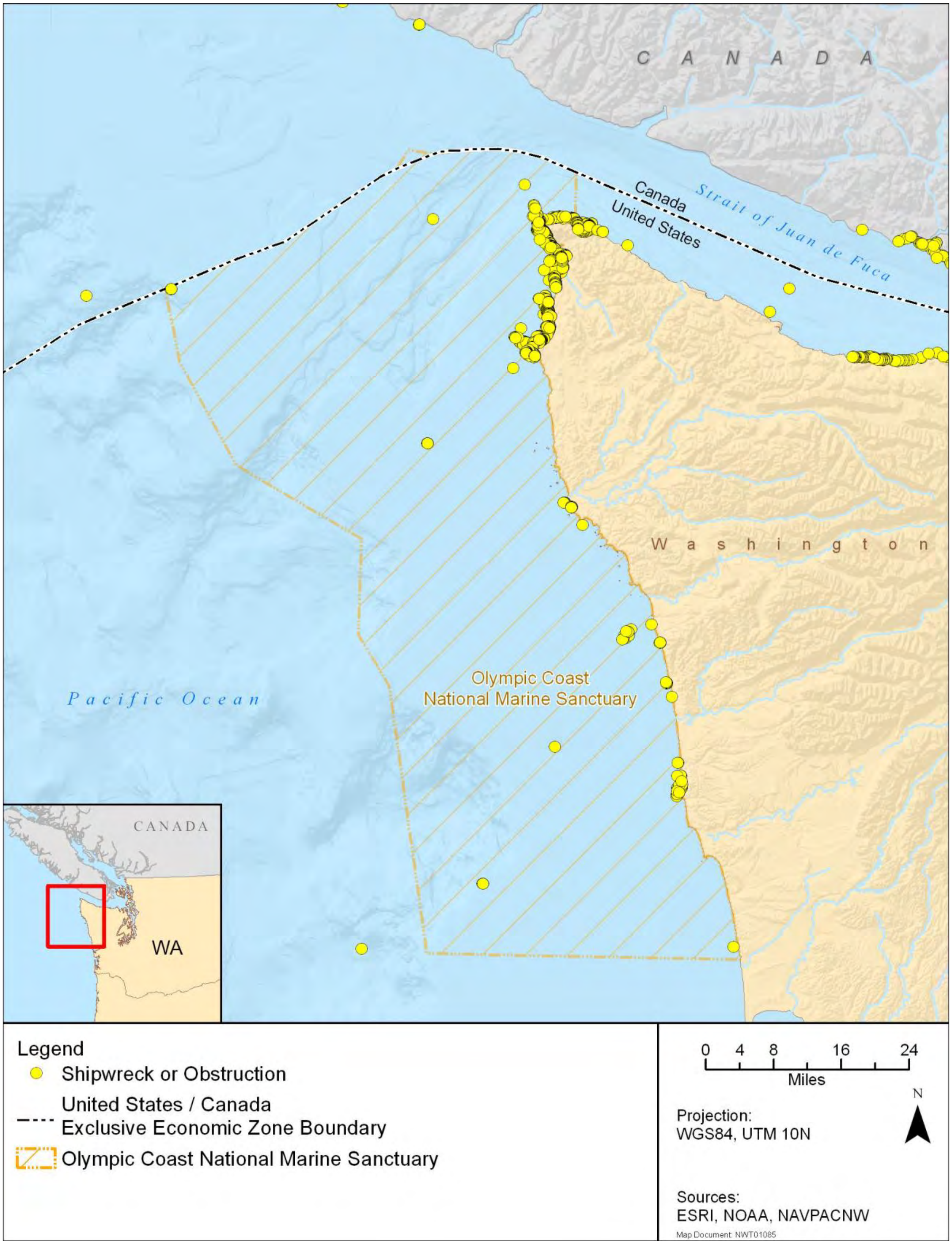


**Figure 3.10-1: Known Shipwrecks and Obstructions in the Northern Portion of the Offshore Area**

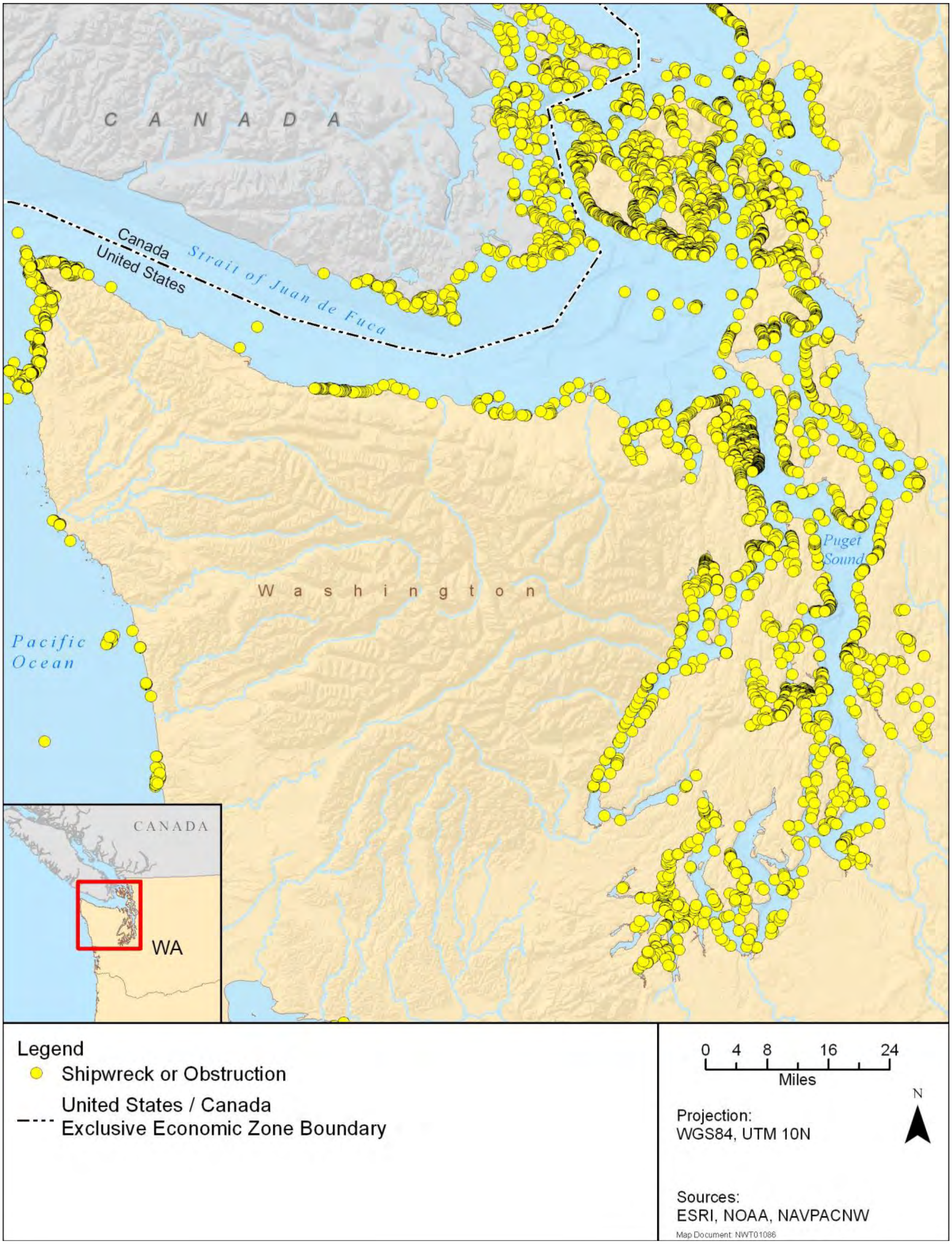


**Figure 3.10-2: Known Shipwrecks and Obstructions within the Inland Waters**

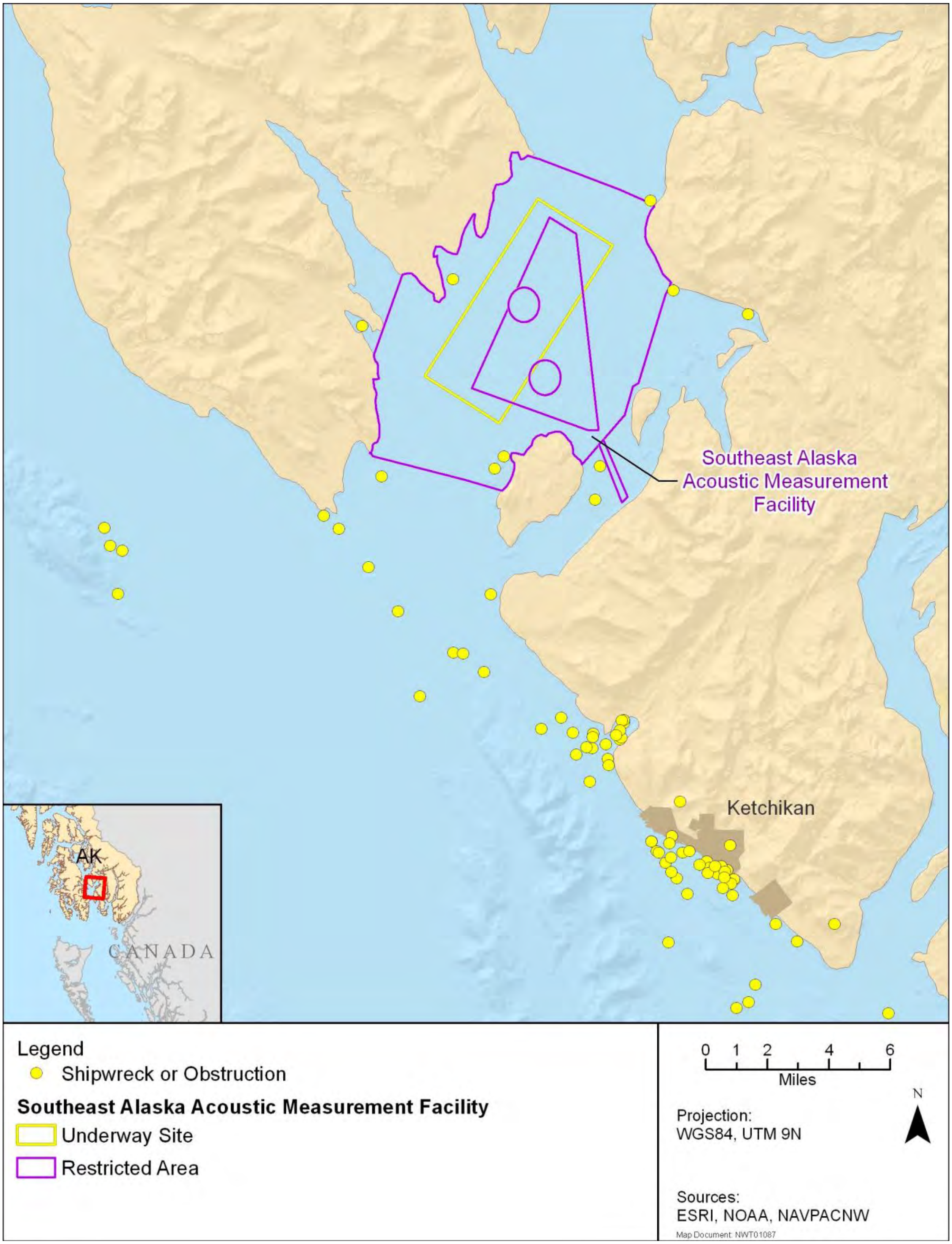


**Figure 3.10-3: Known Shipwrecks and Obstructions in the Western Behm Canal, Alaska**

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

#### 3.10.2.3.1 Offshore Area

No cultural resources eligible for or listed in the NRHP or traditional cultural properties have been previously identified in the Offshore Area.

#### 3.10.2.3.2 Inland Waters

An Inland Waters tribe has indicated that the marine waters used by tribal fishermen are composed of a network of sites within the context of a traditional cultural landscape; the tribe believes that this network of sites is likely to be considered eligible for the NRHP as a traditional cultural property. Cultural features within the maritime cultural landscape, spread throughout the Study Area, are located in submerged, nearshore, intertidal, and marine settings. Cultural features include, but are not limited to, clam and oyster beds and fishing stations, landmarks, camps, underwater outcroppings, reefs, and kelp beds. Many traditional cultural properties are natural objects, or appear to have had little or no visible modification by humans. Yet a natural object, a traditional salmon set net site, shellfish beds, a yew tree, a kelp bed, or an underwater rock outcropping may be eligible for the NRHP based on local cultural and historic significance. Different sites across the Study Area have unique cultural and historical distinctiveness for tribal members. Some sites have distinct and clear associations with important aspects of tribal history. Other sites have associations with particular tribal families and important associations with historic individuals significant in tribal history. Other important harvest sites may appear to lack individual distinction but are an integral part of broader traditional cultural network of maritime and marine cultural sites.

To date, no cultural resources eligible for or listed in the NRHP or evaluated as traditional cultural properties have been identified in the Inland Waters.

#### 3.10.2.3.3 Western Behm Canal, Alaska

No cultural resources eligible for or listed in the NRHP or traditional cultural properties have been previously identified in the Western Behm Canal.

### 3.10.2.4 Cultural Resources Eligible for or Listed in State Registers

#### 3.10.2.4.1 Offshore Area

No cultural resources eligible for or listed in the Washington Heritage Register have been previously identified in the Offshore Area.

#### 3.10.2.4.2 Inland Waters

No cultural resources eligible for or listed in the Washington Heritage Register have been previously identified.

#### 3.10.2.4.3 Western Behm Canal, Alaska

No cultural resources eligible for or listed in the state register have been previously identified.

### 3.10.2.5 Current Practices

The Navy has established protective measures to reduce potential effects on cultural resources from training and testing exercises. The Navy routinely avoids known submerged obstructions, including submerged cultural resources such as historic shipwrecks, by providing the locations of known shipwrecks and other submerged cultural resources to operators prior to and well in advance of training and testing activities through the Protective Measures Assessment Protocol program. Known obstructions are avoided to prevent damage to sensitive Navy equipment and vessels and to ensure the accuracy of training and testing exercises.

### 3.10.3 Environmental Consequences

This section evaluates how and to what degree the activities described in Chapter 2 (Description of Proposed Action and Alternatives) could impact cultural resources of the Study Area. Tables 2.8-1 through 2.8-3 present the baseline and proposed training and testing activity locations for each alternative (including numbers of events and ordnance expended). Appendix A (Navy Activity Descriptions) describes the warfare areas and associated stressors that were considered in analyzing the potential effects on cultural resources. The stressors vary in intensity, frequency, duration, and location within the Study Area. The stressors applicable to cultural resources include:

- Acoustic Stressors
    - Impacts from underwater explosions – shock (pressure) waves
    - Impacts from underwater explosions – cratering
- Physical Stressors
    - Impacts from in-water device strikes
    - Impacts from seafloor devices
    - Impacts from deposition of military expended materials

Sonar and other non-impulse sources do not affect the structural elements of historic shipwrecks and, therefore, an in-depth analysis of sonar impacts will not be included in this section. Archaeologists regularly use multibeam sonar and sidescan sonar to explore shipwrecks without disturbing them. Based on the physics of underwater sound, the shipwreck would need to be very close (< 22 feet [ft.] [< 6.7 meters {m}]) to the sonar sound source for the shipwreck to experience even slight oscillations from the induced pressure waves. Any oscillations experienced at a depth of less than 22 ft. (6.7 m) would be negligible up to within a few yards from the sonar source. This distance is smaller than the typical safe navigation and operating depth for most sonar sources; therefore, sonar sources are not expected to impact historic shipwrecks.

Based on an initial screening of potential impacts of sonar maintenance and testing, pierside locations have been eliminated from detailed consideration in the analysis of impacts on cultural resources based on the extremely limited potential for active sonar to damage adjacent historic properties.

Table 3.10-1 presents quantitative data (number of components or activities) for the analysis of each stressor applicable to cultural resources. The information is based on descriptions presented in Chapter 2 (Description of Proposed Action and Alternatives) and Appendix A (Navy Activity Descriptions), and is derived from Tables 2.8-1 through 2.8-3 and Appendix E (Training and Testing Activities Matrices).

The specific analysis of the training and testing activities presented in this section considers relevant components and associated data with the geographic location of the activity and the resource. Training activities are not proposed in the Western Behm Canal; therefore, only the Offshore Area and the Inland Waters will be analyzed under Training Activities.

### 3.10.3.1 Acoustic Stressors

Acoustic stressors that could impact cultural resources are vibration and shock (pressure) waves from underwater explosions, as well as cratering created by underwater explosions. A shock wave and oscillating bubble pulses resulting from underwater explosions associated with the use of torpedoes, missiles, bombs, projectiles, mines, and improved extended echo ranging sonobuoys could impact the exposed portions of nearby submerged cultural resources. Shock waves (pressure) generated by underwater explosions would be periodic rather than continuous and could create overall structural instability and eventual collapse of architectural features of submerged cultural resources. The amount of damage would depend on factors such as the size of the charge, the distance from the historic shipwreck, the water depth, and the topography of the ocean floor.

**Table 3.10-1: Stressors Applicable to Cultural Resources for Training and Testing Activities**

| Components | Area | Number of Components or Events | | | | | |
|---|---|---|---|---|---|---|---|
| | | No Action Alternative | | Alternative 1 | | Alternative 2 | |
| | | Training | Testing | Training | Testing | Training | Testing |
| **Acoustic Stressors** | | | | | | | |
| Underwater explosions – IEER, SUS buoys, and torpedoes | Offshore Area | 149 | 0 | 0 | 142 | 0 | 156 |
| | Inland Waters | 0 | 0 | 0 | 0 | 0 | 0 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Underwater explosions – EOD | Offshore Area | 0 | 0 | 0 | 0 | 0 | 0 |
| | Inland Waters | 4 | 0 | 42 | 0 | 42 | 0 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Physical Disturbance and Strike Stressors** | | | | | | | |
| Activities including in-water devices | Offshore Area | 387 | 38 | 493 | 134 | 493 | 158 |
| | Inland Waters | 0 | 377 | 1 | 628 | 1 | 691 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Military expended materials | Offshore Area | 189,815 | 604 | 198,028 | 3,922 | 198,028 | 4,325 |
| | Inland Waters | 8 | 442 | 3,085 | 513 | 3,085 | 563 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Activities including seafloor devices | Offshore Area | 0 | 5 | 0 | 6 | 0 | 7 |
| | Inland Waters | 2 | 210 | 16 | 225 | 16 | 239 |
| | W. Behm Canal | 0 | 0 | 0 | 5 | 0 | 15 |

Notes: (1) The values presented include the entire Offshore Area for training activities; however, only 3 percent of Warning Area 237 occurs within the 3–12 nm limit. Therefore, the number of activities analyzed is limited to this portion of the Offshore Area.
(2) IEER = Improved Extended Echo Ranging; SUS = Signal, Underwater Sound; EOD = Explosive Ordnance Disposal; nm = nautical miles

#### 3.10.3.1.1 Impacts from Explosive Shock (Pressure) Waves from Underwater Explosions

Explosive detonations during training and testing activities are associated with high-explosive ordnance, including bombs, missiles, and naval gun shells; torpedoes; demolition charges; and explosive sonobuoys. Some detonations would occur in the air or near the water's surface including Sinking Exercise (SINKEX) activities. Detonations associated with explosive torpedoes and explosive sonobuoys would occur in the water column; demolition charges could occur near the surface, in the water column, or near the ocean bottom. Most detonations would occur in waters greater than 200 ft. (61 m) in depth, and greater than 3 nm from shore, although mine warfare (MIW), demolition, and some testing detonations could occur in shallow water close to shore. Shock waves from nearby underwater detonations may damage the exposed portions of historic shipwrecks because water rapidly transmits shock waves. The amount of damage from an underwater explosion would depend on factors such as the size of the explosive charge, the distance from the historic shipwreck, and the topography of the seafloor.

No testing activities associated with underwater detonations in the Inland Waters or in the Western Behm Canal have been identified under any alternative (see Table 3.10-1). Therefore, only the Offshore Area (both training and testing) and the Inland Waters (training) will be analyzed for impacts from explosive shock (pressure) waves from underwater explosions.

#### 3.10.3.1.1.1 No Action Alternative

**Training Activities**

**Offshore Area**

Under the No Action Alternative, training activities would continue at current levels within existing designated areas in the Offshore Area (see Table 3.10-1). Underwater explosions from explosive torpedoes associated with existing SINKEX activities would occur near the water's surface. The Navy previously analyzed impacts that could result from training activities generating explosive shock (pressure) waves from underwater explosions and concluded that there would be no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). As the training activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, no adverse effects on cultural resources are expected from shock waves created by underwater detonations.

**Inland Waters**

Under the No Action Alternative, training activities would continue at current levels within existing designated areas within the Inland Waters (see Table 3.10-1), specifically Crescent Harbor and Hood Canal Explosive Ordnance Disposal (EOD) Ranges. The Navy previously analyzed impacts that could result from training activities generating explosive shock (pressure) waves from underwater explosions and concluded that there would be no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). As the training activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, no adverse effects on cultural resources are expected from shock waves created by underwater detonations.

*In accordance with Section 106 of the National Historic Preservation Act, the use of underwater explosives during training activities under the No Action Alternative would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

**Testing Activities**

**Offshore Area**

Under the No Action Alternative, there are no testing activities in the Offshore Area that include underwater explosions (see Table 3.10-1). Therefore, there is no potential for shock waves from underwater explosions at depth to affect submerged cultural resources.

*The Navy does not propose to use underwater explosives during testing activities under the No Action Alternative. Therefore, in regard to Section 106 of the National Historic Preservation Act, there is no potential for shock waves from underwater explosions to affect submerged cultural resources within U.S. territorial waters of the Study Area.*

#### 3.10.3.1.1.2 Alternative 1

**<u>Training Activities</u>**

**Offshore Area**

Under Alternative 1, the Navy will no longer train with improved extended echo ranging sonobuoy or other explosive-round detonations in the Offshore Area (see Table 3.10-1). Therefore, no effects from training activities creating underwater explosions in the Offshore Area would occur.

**Inland Waters**

Under Alternative 1, the number and type of underwater detonations associated with mine neutralization in the Inland Waters would increase from the No Action Alternative (see Table 3.10-1). The Navy previously analyzed impacts that could result from the same or relatively similar underwater detonations at these sites and concluded there would be no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). In Alternative 1, explosives training would increase from two 2.5-pound (lb.) and two 1.5 lb. underwater detonations at Crescent Harbor and Hood Canal, respectively, to three 2.5 lb. underwater detonations at each location. Additionally, under Alternative 1, six annual events would take place (three each at Crescent Harbor and Hood Canal) in which up to six shock wave action generators (SWAG) would be used per event. Each SWAG consists of a small explosive charge of less than 0.5 ounce. Of the increase in underwater detonations from the No Action Alternative to Alternative 1, 36 of the 42 would be these much smaller SWAG detonations. Furthermore, known historic shipwrecks, obstructions, and archaeological sites are avoided during training exercises. As a result, no adverse effects on cultural resources from shock waves created by underwater detonations at depth are expected.

*In accordance with Section 106 of the National Historic Preservation Act, the use of underwater explosives during training activities under Alternative 1 would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

**<u>Testing Activities</u>**

**Offshore Area**

Under Alternative 1, underwater explosions from use of improved extended echo ranging sonobuoys and from explosive torpedo tests, would be introduced in the Offshore Area (see Table 3.10-1). However, the Navy previously analyzed testing activities generating explosive shock (pressure) waves from underwater explosions (U.S. Department of the Navy 2010a) and concluded they resulted in no adverse effects on historic properties. The Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). As the testing activities described here represent the same or relatively similar type of activity previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from shock waves created by underwater detonations. Furthermore, known historic shipwrecks, obstructions, and archaeological sites are avoided during testing.

*In accordance with Section 106 of the National Historic Preservation Act, the use of underwater explosives during testing activities under Alternative 1 would not adversely affect submerged cultural resources within U.S. territorial waters of the Study Area.*

#### 3.10.3.1.1.3 Alternative 2

**Training Activities**

**Offshore Area**

Under Alternative 2, the Navy would no longer train with improved extended echo ranging sonobuoy or other explosive-round detonations in the Offshore Area (see Table 3.10-1). Therefore, no effects from training activities creating underwater explosions in the Offshore Area would occur.

**Inland Waters**

Under Alternative 2, the number and type of underwater detonations associated with mine neutralization in the Inland Waters would increase from the No Action Alternative as described under Alternative 1 (see Table 3.10-1). However, effects from training in the Inland Waters would be similar as described in Section 3.10.3.1.1.2 (Alternative 1).

*In accordance with Section 106 of the National Historic Preservation Act, the use of underwater explosives during training activities under Alternative 2 would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

**Testing Activities**

**Offshore Area**

Under Alternative 2, underwater explosions from the use of improved extended echo ranging sonobuoys and from explosive torpedo tests would be introduced in the Offshore Area and conducted at a slightly higher frequency than under Alternative 1 (see Table 3.10-1). However, the Navy previously analyzed testing activities generating explosive shock (pressure) waves from underwater explosions (U.S. Department of the Navy 2010a), and concluded to result in no adverse effects on historic properties. The Washington State Historic Preservation Officer concurred with this finding. As the testing activities described here represent the same or relatively similar type of activity previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from shock waves created by underwater detonations. Furthermore, known historic shipwrecks, obstructions, and archaeological sites are avoided during testing.

*In accordance with Section 106 of the National Historic Preservation Act, the use of underwater explosives during testing activities under Alternative 2 would not adversely affect submerged cultural resources within U.S. territorial waters of the Study Area.*

### 3.10.3.1.2 Impacts from Explosives – Cratering

Underwater explosions at depth or on or near the ocean bottom could displace sediment and leave a crater. Cratering could affect submerged cultural resources (e.g., shipwrecks) at or near the point of detonation. Cratering of unconsolidated, soft-bottom habitats would result from mine neutralization charges set on or near the bottom. These relatively small (no greater than 2.5 lb.) charges are set by Navy divers in shallow waters. Cratering could disrupt or destroy features of unidentified historic shipwrecks and unrecorded historic resources and could destroy those characteristics that would make them eligible for listing in the NRHP.

No training activities with underwater detonations on or near the ocean bottom are proposed in the Offshore Area or Western Behm Canal under any alternative (see Table 3.10-1), and no testing activities with underwater detonations on or near the ocean bottom are proposed in any part of the Study Area under any alternative; therefore, only training activities in the Inland Waters portion of the Study Area will be analyzed for impacts from underwater explosives creating cratering.

#### 3.10.3.1.2.1 No Action Alternative

**Training Activities**

**Inland Waters**

Under the No Action Alternative, training activities in the Inland Waters that include underwater explosions would continue at current levels within existing designated areas (see Table 3.10-1). The Navy previously analyzed impacts that could result from training activities creating ocean bottom cratering from underwater explosions and concluded that there would be either no historic properties affected or no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with these findings (Whitlam 2009a, Whitlam 2009b). As the training activities described here in the No Action Alternative represent the same level of activity within the same locations in the Study Area as previously analyzed, no adverse effects on cultural resources are expected from cratering caused by underwater explosions.

*In accordance with Section 106 of the National Historic Preservation Act, the use of underwater explosives at or near the ocean bottom during training activities under the No Action Alternative would not adversely affect submerged cultural resources within the Inland Waters of the Study Area.*

#### 3.10.3.1.2.2 Alternative 1

**Training Activities**

**Inland Waters**

Under Alternative 1, the number of detonations in the Inland Waters associated with MIW exercises would increase from the No Action Alternative (see Table 3.10-1). Training would continue at the existing Crescent Harbor and Hood Canal EOD Ranges, where the Navy currently trains. The Navy previously analyzed impacts that could result from these training activities creating ocean bottom cratering from underwater explosions and concluded that there would either be no historic properties affected or no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with these findings (Whitlam 2009a, Whitlam 2009b). As the training activities described here represent the same or relatively similar type of activity previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from cratering caused by underwater detonations. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

*In accordance with Section 106 of the National Historic Preservation Act, the use of underwater explosives at or near the ocean bottom during training activities under Alternative 1 would not adversely affect submerged cultural resources within the Inland Waters of the Study Area.*

#### 3.10.3.1.2.3 Alternative 2

**Training Activities**

**Inland Waters**

Under Alternative 2, the number of detonations in the Inland Waters associated with MIW exercises would increase from the No Action Alternative as described under Alternative 1 (see Table 3.10-1). Training would continue at the existing Crescent Harbor and Hood Canal EOD Ranges, where the Navy currently trains. The Navy previously analyzed impacts that could result from these training activities creating ocean bottom cratering from underwater explosions and concluded that there would either be no historic properties affected or no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with these findings (Whitlam 2009a, Whitlam 2009b). As the training activities described here represent the same or relatively similar type of activity previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from cratering caused by underwater detonations. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources. Therefore, no adverse effects on cultural resources are expected by cratering caused by underwater explosions, similar to what is described in Section 3.10.3.1.2.2 (Alternative 1).

*In accordance with Section 106 of the National Historic Preservation Act, the use of underwater explosives at or near the ocean bottom during training activities under Alternative 2 would not adversely affect submerged cultural resources within the Inland Waters of the Study Area.*

### 3.10.3.2 Physical Disturbance and Strike Stressors

Any physical disturbance on the continental shelf and seafloor, such as targets or mines resting on the seafloor, moored mines, bottom-mounted tripods, unmanned underwater vehicles, or bottom crawlers, could inadvertently damage or destroy submerged cultural resources. Use of a towed system and attachment cable could inadvertently encounter, snag, damage, and/or destroy unknown historic resources in shallow water if such resources are within the training and testing areas. Expended materials such as chaff, flares, projectiles, casings, target or missile fragments, non-explosive practice munitions, rocket fragments, ballast weights, sonobuoys, torpedo launcher accessories, or mine shapes could be deposited on the ocean bottom on or near submerged cultural resources. Heavier expended materials could damage intact fragile shipwreck features if they landed with sufficient velocity on a resource.

#### 3.10.3.2.1 Impacts from In-Water Devices

Activities including in-water devices as discussed in this analysis employ unmanned vehicles such as remotely operated vehicles, unmanned surface and undersea vehicles, and towed devices. These devices are self-propelled and unmanned or towed through the water from a variety of platforms, including helicopters and surface ships. Towed systems and attachment cables could inadvertently encounter, snag, damage, or destroy historic resources in relatively shallow water, especially during low tide, if such resources are within the Study Area.

No testing activities associated with in-water devices in the Western Behm Canal have been identified under any alternative (see Table 3.10-1). Therefore, only the Offshore Area and the Inland Waters will be analyzed for impacts from in-water devices.

##### 3.10.3.2.1.1 No Action Alternative

**<u>Training Activities</u>**

**Offshore Area**

Under the No Action Alternative, training activities with the potential for impacts from activities including in-water devices would continue at current levels in existing designated areas within the Offshore Area (see Table 3.10-1). The Navy previously analyzed impacts that could result from these training activities using in-water devices and concluded that there would be no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). As the training activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, no adverse effects on cultural resources are expected from the use of in-water devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

#### Inland Waters

Under the No Action Alternative, no training activities with the potential for impacts from activities including in-water devices occur within the Inland Waters (see Table 3.10-1).

*In accordance with Section 106 of the National Historic Preservation Act, the use of in-water devices during training activities under the No Action Alternative would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

#### Testing Activities

#### Offshore Area

Under the No Action Alternative, testing activities with the potential for impacts from activities including in-water devices would continue at current levels in existing designated areas within the Offshore Area (see Table 3.10-1). The Navy previously analyzed impacts that could result from these testing activities using in-water devices and concluded that there would be no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). As the testing activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, no adverse effects on cultural resources are expected from the use of in-water devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

#### Inland Waters

Under the No Action Alternative, testing activities with the potential for impacts from activities including in-water devices would continue at current levels in existing designated areas within the Inland Waters (see Table 3.10-1). The Navy previously analyzed impacts that could result from these testing activities using in-water devices and concluded that there would be no historic properties affected; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009a). As the testing activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, no adverse effects on cultural resources are expected from the use of in-water devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

*In accordance with Section 106 of the National Historic Preservation Act, the use of in-water devices during testing activities under the No Action Alternative would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

### 3.10.3.2.1.2 Alternative 1

#### Training Activities

#### Offshore Area

Under Alternative 1, the number of anti-submarine warfare and MIW training activities with potential for impacts from activities including in-water devices would increase from the No Action Alternative (see Table 3.10-1). In-water devices would be deployed in areas currently used for training. The Navy previously analyzed impacts that could result from these training activities using in-water devices and concluded that there would be no adverse effects on historic properties; the Washington State Historic

Preservation Officer concurred with this finding (Whitlam 2009b). As the training activities described here represent the same or relatively similar type of activity previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from the use of in-water devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

#### Inland Waters

Under Alternative 1, the Navy proposes to conduct one new activity (Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise, conducted once every 2 years) that would have the potential for impacts from activities including in-water devices (see Table 3.10-1). In-water devices would be deployed in areas currently used for training but would also be deployed in areas where training has historically occurred but which have not been previously analyzed. The Navy previously analyzed impacts that could result from these training activities using in-water devices (U.S. Department of the Navy 2010a) and concluded that there would be either no historic properties affected or no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with these findings (Whitlam 2009b). As the training activities described here represent the same or relatively similar type of activity previously analyzed, with adjustments to tempo and locations, no adverse effects on cultural resources are expected from the use of in-water devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

*In accordance with Section 106 of the National Historic Preservation Act, the use of in-water devices during training activities under Alternative 1 would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

### Testing Activities

#### Offshore Area

Under Alternative 1, testing activities in the Offshore Area with the potential for impacts from the use of in-water devices would increase from the No Action Alternative (see Table 3.10-1). The Navy previously analyzed impacts that could result from testing activities using in-water devices and concluded that there would be no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). Several new testing activities would occur in the Offshore Area and include Anti-Submarine Warfare (ASW) countermeasure, ASW torpedo testing, and the Littoral Combat Ship (LCS) ASW Mission Package testing. The new testing activities described here represent the same or relatively similar use of in-water devices identified in the types of activities previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from the use of in-water devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

#### Inland Waters

Under Alternative 1, testing involving activities using in-water devices would increase (see Table 3.10-1), and additional testing would also be introduced in the Inland Waters, representing additional activity compared to the No Action Alternative. The Navy previously analyzed impacts that could result from testing activities using in-water devices and concluded that there would be no historic properties affected; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009a). Several new testing activities would occur in the Inland Waters and include unmanned vehicle development, payload testing, and countermeasure testing. As the new testing activities described here represent the same or relatively similar use of in-water devices identified in the types of activities previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from the use of in-water devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

*In accordance with Section 106 of the National Historic Preservation Act, the use of in-water devices during testing activities under Alternative 1 would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

#### 3.10.3.2.1.3 Alternative 2

**Training Activities**

**Offshore Area**

Under Alternative 2, the number of anti-submarine warfare and MIW training activities would increase from the No Action Alternative as described under Alternative 1 (see Table 3.10-1). In-water devices would be deployed in areas currently used for training. Therefore, effects from training in the Offshore Area would be the same as described in Section 3.10.3.2.1.2 (Alternative 1).

**Inland Waters**

Under Alternative 2, the Navy proposes to conduct one activity (Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise, conducted once every year) that would have the potential for impacts from activities including in-water devices as described under Alternative 1 (see Table 3.10-1). In-water devices would be deployed in areas currently used for training but would also be deployed in areas where training has historically occurred but which have not been previously analyzed. Therefore, effects from training in the Inland Waters would be the same as described in Section 3.10.3.2.1.2 (Alternative 1).

*In accordance with Section 106 of the National Historic Preservation Act, the use of in-water devices during training activities under Alternative 2 would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

**Testing Activities**

**Offshore Area**

Under Alternative 2, testing activities in the Offshore Area with the potential for impacts from the use of in-water devices would increase from the No Action Alternative (see Table 3.10-1). The Navy previously analyzed impacts that could result from testing activities and concluded that there would be no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). As the new testing activities described here represent the same or relatively similar use of in-water devices identified in the types of activities previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from the use of in-water devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

**Inland Waters**

Under Alternative 2, testing involving activities using in-water devices would increase (see Table 3.10-1), and additional testing would also be introduced in the Inland Waters, representing additional activity compared to the No Action Alternative. The Navy previously analyzed impacts that could result from these testing activities and concluded that there would be no historic properties affected; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009a). As the new testing activities described here represent the same or relatively similar use of in-water devices identified in the types of activities previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from the use of in-water devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

*In accordance with Section 106 of the National Historic Preservation Act, the use of in-water devices during testing activities under Alternative 2 would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

#### 3.10.3.2.2 Impacts from Activities Including Seafloor Devices

Seafloor devices include moored mine shapes, anchors, bottom-placed instruments, and unmanned underwater vehicles that crawl across the ocean floor. Seafloor devices are either stationary or move very slowly along the bottom. Physical disturbances on the continental shelf and seafloor such as precision anchoring, targets or mines resting on the ocean floor, moored mines, or bottom-mounted tripods could damage or destroy submerged cultural resources. Autonomous or nonautonomous vehicles contain obstacle detection sensors and implement avoidance routines; therefore, these devices would avoid large objects such as submerged cultural resources. Some devices (e.g., crawlers) may crawl over objects as obstacles to navigation rather than avoid them. Precision anchoring could crush or snag structural elements of historic resources; however, this is highly unlikely. Divers are used to set bottom and moored mine anchors (blocks of concrete weighing several hundred pounds) in waters less than 150 ft. (46 m) deep and routinely avoid known obstructions, which include historic resources and any unrecorded obstructions they might encounter. Seafloor devices could disrupt the horizontal patterning and vertical stratigraphy of submerged cultural resources or could damage structural elements of the historic resources through crushing and snagging. However, it is unlikely these resources could be disturbed by the use of seafloor devices because the Navy routinely avoids locations of known obstructions, which includes submerged cultural resources.

##### 3.10.3.2.2.1 No Action Alternative

**<u>Training Activities</u>**

**Offshore Area**

No training activities using seafloor devices in the Offshore Area are included in the No Action Alternative (see Table 3.10-1). Therefore, submerged cultural resources would not be affected by training activities in the No Action Alternative.

**Inland Waters**

Under the No Action Alternative, training activities using seafloor devices would continue at current levels (see Table 3.10-1). With the exception of precision anchoring exercises, the Navy previously analyzed impacts that could result from these training activities using seafloor devices and concluded that there would be no historic properties affected; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009a). As the training activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, a finding of no historic properties affected is expected from the use of seafloor devices. With regard to precision anchoring activities, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

*In accordance with Section 106 of the National Historic Preservation Act, the use of seafloor devices during training activities under the No Action Alternative would not affect submerged cultural resources within the Inland Waters of the Study Area.*

**Testing Activities**

**Offshore Area**

Under the No Action Alternative, testing activities using seafloor devices would continue at current levels (see Table 3.10-1). The Navy previously analyzed impacts that could result from these testing activities using seafloor devices and concluded that there would be no historic properties affected; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009a). As the testing activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, a finding of no historic properties affected is expected from the use of seafloor devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources

**Inland Waters**

Under the No Action Alternative, testing activities using seafloor devices would continue at current levels (see Table 3.10-1). The Navy previously analyzed impacts that could result from these testing activities using seafloor devices and concluded that there would be no historic properties affected; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009a). As the testing activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, a finding of no historic properties affected is expected from the use of seafloor devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

**Western Behm Canal, Alaska**

No testing activities including or requiring the installation of additional seafloor devices in the Western Behm Canal would occur under any alternative (see Table 3.10-1). Therefore, submerged cultural resources would not be affected by testing activities.

*In accordance with Section 106 of the National Historic Preservation Act, the use of seafloor devices during testing activities under the No Action Alternative would not affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

#### 3.10.3.2.2.2 Alternative 1

**Training Activities**

**Offshore Area**

No training activities using seafloor devices in the Offshore Area are included in Alternative 1 (see Table 3.10-1). Therefore, submerged cultural resources would not be affected by training activities in Alternative 1.

**Inland Waters**

Under Alternative 1, training activities using seafloor devices would increase in the Inland Waters (see Table 3.10-1). With the exception of precision anchoring exercises, the Navy previously analyzed impacts that could result from these training activities using seafloor devices and concluded that there would be no historic properties affected; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009a). As the training activities described here represent the same or relatively similar use of seafloor devices identified in the types of activities previously analyzed, with adjustments to tempo, a finding of no historic properties affected is expected from the use of seafloor devices. With regard to precision anchoring activities in defined anchorage areas, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

*In accordance with Section 106 of the National Historic Preservation Act, the use of seafloor devices during training activities under Alternative 1 would not affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

#### Testing Activities

#### Offshore Area

Under Alternative 1, testing activities using seafloor devices would increase in the Offshore Area (Table 3.10-1). The Navy previously analyzed impacts that could result from these testing activities using seafloor devices and concluded that there would be no historic properties affected; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009a). As the testing activities described here represent the same or relatively similar use of seafloor devices identified in the types of activities previously analyzed, with adjustments to tempo, a finding of no historic properties affected is expected from the use of seafloor devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

#### Inland Waters

Under Alternative 1, testing activities using seafloor devices would increase from the No Action Alternative (see Table 3.10-1) and would involve areas where testing has historically occurred but which have not been previously analyzed. The Navy previously analyzed impacts that could result from testing activities using seafloor devices and concluded that there would be no historic properties affected; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009a). As the testing activities described here represent the same or relatively similar use of seafloor devices identified in the types of activities previously analyzed, with adjustments to tempo, a finding of no historic properties affected is expected from the use of seafloor devices. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources. As a result, no effects from activities including seafloor devices are expected.

#### Western Behm Canal, Alaska

Testing activities including or requiring the installation of seafloor devices would be introduced in the Western Behm Canal (see Table 3.10-1). The Navy routinely avoids locations of known obstructions, which include submerged cultural resources. As a result, no effects from testing activities including seafloor devices are expected.

*In accordance with Section 106 of the National Historic Preservation Act, the use of seafloor devices during testing activities under Alternative 1 would not affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

### 3.10.3.2.2.3 Alternative 2

#### Training Activities

#### Offshore Area

No training activities using seafloor devices in the Offshore Area are included in Alternative 2 (see Table 3.10-1). Therefore, submerged cultural resources would not be affected by training activities in Alternative 2.

#### Inland Waters

Under Alternative 2, training activities using seafloor devices would increase in the Inland Waters as described in Alternative 1 (see Table 3.10-1). Therefore, effects from training in the Inland Waters would be the same as described in Section 3.10.3.2.2.2 (Alternative 1).

*In accordance with Section 106 of the National Historic Preservation Act, the use of seafloor devices during training activities under Alternative 2 would not affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

#### Testing Activities

#### Offshore Area

Under Alternative 2, testing activities using seafloor devices would increase in the Offshore Area (see Table 3.10-1). However, effects from testing activities using seafloor devices in the Offshore Area would be similar as described in Section 3.10.3.2.2.2 (Alternative 1).

#### Inland Waters

Under Alternative 2, testing activities using seafloor devices would increase from the No Action Alternative (see Table 3.10-1) and would involve areas where testing has historically occurred but which have not been previously analyzed. However, effects from testing activities using seafloor devices in the Inland Waters would be similar as described in Section 3.10.3.2.2.2 (Alternative 1).

#### Western Behm Canal, Alaska

Under Alternative 2, testing activities including or requiring the installation of seafloor devices would be introduced in the Western Behm Canal as described under Alternative 1 (see Table 3.10-1). The Navy routinely avoids locations of known obstructions, which include submerged cultural resources. Therefore, effects from testing in the Western Behm Canal would be the same as described in Section 3.10.3.2.2.2 (Alternative 1).

*In accordance with Section 106 of the National Historic Preservation Act, the use of seafloor devices during testing activities under Alternative 2 would not affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

### 3.10.3.2.3 Impacts from Military Expended Materials

The deposition of non-explosive practice munitions, sonobuoys, and military expended materials other than ordnance could impact submerged cultural resources through possible sudden impact of resources on the seafloor or the simple settling of military expended materials on top of submerged cultural resources. The likelihood of these materials either impacting or landing on submerged cultural resources is very low because of the size of the Study Area.

Most of the anticipated expended munitions (e.g., large-caliber, non-explosive practice munitions) would be small objects and fragments that would slowly drift to the sea floor after striking the ocean surface. Larger and heavier objects (e.g., targets, bombs, or missiles) could strike the ocean surface with sufficient velocity, but they would slow down as they moved through the water. These larger and heavier objects could affect a submerged cultural resource by creating sediment and artifact displacement. A historic resource could be affected by damaging structural elements and artifacts in the regions with higher cultural resources density.

If expended materials should sink near or on a submerged cultural resource, the expended materials would not affect the historic characteristics of the submerged cultural resource that contribute to its eligibility for the NRHP. The presence of expended materials on submerged sites would reflect post-depositional processes.

No testing activities associated with military expended materials in the Western Behm Canal have been identified under any alternative (see Table 3.10-1). Therefore, only the Offshore Area and the Inland Waters will be analyzed for impacts from military expended materials.

#### 3.10.3.2.3.1 No Action Alternative

**Training Activities**

**Offshore Area**

Under the No Action Alternative, training activities would continue at current levels in the Offshore Area (see Table 3.10-1). The Navy previously analyzed impacts that could result from these training activities associated with military expended materials and concluded that there would be no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). As the training activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, no adverse effects on cultural resources are expected from the deposition of military expended materials. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

**Inland Waters**

Under the No Action Alternative, training activities associated with MIW would continue at current levels in the Inland Waters (see Table 3.10-1). The Navy previously analyzed impacts that could result from these training activities associated with military expended materials and concluded that there would be either no historic properties affected or no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with these findings (Whitlam 2009a, Whitlam 2009b). As the training activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, no adverse effects on cultural resources are expected from the deposition of military expended materials. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

*In accordance with Section 106 of the National Historic Preservation Act, the deposition of military expended materials during training activities under the No Action Alternative would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

**Testing Activities**

**Offshore Area**

Under the No Action Alternative, testing activities would continue at current levels within existing OPAREAs in the Offshore Area (see Table 3.10-1). The Navy previously analyzed impacts that could result from these testing activities associated with military expended materials and concluded that there would be no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). As the testing activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, no adverse effects on cultural resources are expected from the deposition of military expended materials. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

**Inland Waters**

Under the No Action Alternative, testing activities would continue at current levels in the Inland Waters (see Table 3.10-1). The Navy previously analyzed impacts that could result from these testing activities associated with military expended materials and concluded that there would be either no historic properties affected or no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with these findings (Whitlam 2009a, Whitlam 2009b). As the testing activities described here in the No Action Alternative represents the same level of activity within the same locations in the Study Area as previously analyzed, no adverse effects on cultural resources are expected from the deposition of military expended materials. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

*In accordance with Section 106 of the National Historic Preservation Act, the deposition of military expended materials during testing activities under the No Action Alternative would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

#### 3.10.3.2.3.2 Alternative 1

**Training Activities**

**Offshore Area**

Under Alternative 1, the number of expended items from training activities associated with anti-submarine and MIW would increase from the No Action Alternative within the Offshore Area (see Table 3.10-1). Expended materials could be deposited on the ocean bottom on or near known and previously unidentified submerged cultural resources. However, these materials likely would not contact a submerged cultural resource. If they sink near this type of cultural resource, the expended materials would not affect the historic characteristics of the submerged cultural resource. The Navy previously analyzed impacts that could result from these training activities associated with military expended materials and concluded that there would be either no historic properties affected or no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with these findings (Whitlam 2009a, b). As the training activities described here represent the same or relatively similar deposition of military expended materials identified in the types of activities previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from the deposition of military expended materials. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

**Inland Waters**

Under Alternative 1, the number of expended items from training activities associated with anti-surface and MIW would increase from the No Action Alternative in the Inland Waters (see Table 3.10-1) with the introduction of anti-surface warfare and maritime homeland defense activities and an increase in MIW activities. These training activities would occur in areas currently used but would also take place in areas where training has historically occurred but which have not been previously analyzed. Expended materials could be deposited on the ocean bottom on or near known and previously unidentified submerged cultural resources. However, these materials likely would not contact a submerged cultural resource. If they sink near this type of cultural resource, the expended materials would not affect the historic characteristics of the submerged cultural resource. The Navy previously analyzed impacts that could result from these training activities associated with military expended materials and concluded that there would be either no historic properties affected or no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with these findings (Whitlam 2009a, Whitlam 2009b). As the training activities described here represent the same or relatively similar deposition of military expended materials identified in the types of activities previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from the deposition of military expended materials. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources.

*In accordance with Section 106 of the National Historic Preservation Act, the deposition of military expended materials during training activities under Alternative 1 would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

## Testing Activities

### Offshore Area

Under Alternative 1, expended items from testing activities would increase from the No Action Alternative in the Offshore Area (see Table 3.10-1). Expended materials could be deposited on the ocean bottom on or near known and previously unidentified submerged cultural resources. However, these materials likely would not contact a submerged cultural resource. If they should sink near this type of cultural resource, the expended materials would not affect the historic characteristics of the submerged cultural resource. The Navy previously analyzed impacts that could result from these testing activities associated with military expended materials and concluded that there would be no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with this finding (Whitlam 2009b). Several new testing activities will occur in the Offshore Area and include ASW tracking tests using sonobuoys. As the new testing activities described here represent the same or relatively similar deposition of military expended materials identified in the types of activities previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from the deposition of military expended materials. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources. As a result, no effects by military expended materials are expected.

### Inland Waters

Under Alternative 1, the number of expended items from testing activities would increase from the No Action Alternative within the Inland Waters (see Table 3.10-1). Expended materials could be deposited on the ocean bottom on or near known and previously unidentified submerged cultural resources. However, these materials likely would not contact a submerged cultural resource. If they sink near this type of cultural resource, the expended materials would not affect the historic characteristics of the submerged cultural resource. The Navy previously analyzed impacts that could result from these testing activities associated with military expended materials and concluded that there would be either no historic properties affected or no adverse effects on historic properties; the Washington State Historic Preservation Officer concurred with these findings (Whitlam 2009a, Whitlam 2009b). As the testing activities described here represent the same or relatively similar deposition of military expended materials identified in the types of activities previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected from the deposition of military expended materials. Furthermore, the Navy routinely avoids locations of known obstructions, which include submerged cultural resources. As a result, no effects by military expended materials are expected.

*In accordance with Section 106 of the National Historic Preservation Act, the deposition of military expended materials during testing activities under Alternative 1 would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

##### 3.10.3.2.3.3 Alternative 2

**Training Activities**

**Offshore Area**

Under Alternative 2, the number of expended items from training activities associated with MIW would increase within the Offshore Area from the No Action Alternative as described in Alternative 1 (see Table 3.10-1). These training activities would occur in areas currently used for training. Therefore, effects from training in the Offshore Area would be the same as described in Section 3.10.3.2.3.2 (Alternative 1).

**Inland Waters**

Under Alternative 2, the number of expended items from training activities associated with MIW would increase from the No Action Alternative within the Inland Waters as described in Alternative 1 (see Table 3.10-1). However, effects from training in the Inland Waters would be the same as described in Section 3.10.3.2.3.2 (Alternative 1).

*In accordance with Section 106 of the National Historic Preservation Act, the deposition of military expended materials during training activities under Alternative 2 would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

**Testing Activities**

**Offshore Area**

Under Alternative 2, expended items from testing activities would increase from the No Action Alternative within the Offshore Area (see Table 3.10-1). However, effects from testing in the Offshore Area would be similar as described in Section 3.10.3.2.3.2 (Alternative 1).

**Inland Waters**

Under Alternative 2, expended items from testing activities within the Inland Waters would increase from the No Action Alternative (see Table 3.10-1). However, effects from testing in the Inland Waters would be similar as described in Section 3.10.3.2.3.2 (Alternative 1).

*In accordance with Section 106 of the National Historic Preservation Act, the deposition of military expended materials during testing activities under Alternative 2 would not adversely affect submerged cultural resources within U.S. territorial waters or Inland Waters of the Study Area.*

### 3.10.3.3 Summary of Potential Impacts of All Stressors on Cultural Resources

Stressors described in this EIS/OEIS would not result in potential impacts on cultural resources under the No Action Alternative, Alternative 1, or Alternative 2 within U.S. territorial waters because measures discussed in 3.10.2.5 (Current Practices) have been previously implemented to protect these resources. In addition, impacts that could result from the stressors associated with the training and testing activities and geographic areas included in this document have been addressed in previous compliance submittals to state and tribal agencies, who concurred with this finding. The Navy did not consult with the Oregon State Historic Preservation Office or the California State Historic Preservation Office because training and testing activities occur outside 12 nm from the coastline of these states, excluding the activities from consideration under NHPA (OPNAV M-5090.1). The Navy initiated Section 106 consultation for the Proposed Action with the Washington Department of Archaeology and Historic Preservation (the Washington State Historic Preservation Office) and the Alaska Department of Natural Resources, Division of Parks & Outdoor Recreation, Office of History and Archaeology (the Alaska State Historic Preservation Office) by letters dated March 11, 2015. The Navy submitted the Determination of Effect and request for concurrence with a finding of No Adverse Effect on Historic Properties by letter to the Washington Department of Archaeology and Historic Preservation on March 11, 2015, and to the Alaska Department of Natural Resources, Division of Parks & Outdoor Recreation, Office of History and Archaeology on June 23, 2015. The Navy and the Washington Department of Archaeology and Historic Preservation are in consultation regarding the Navy's finding of no adverse effect on historic properties. The Alaska State Historic Preservation Office concurred with the Navy's finding of no adverse effect on historic properties in their letter dated July 20, 2015.

Table 3.10-2 discusses the Section 106 effects applicable to cultural resources resulting from the training and testing activities that would occur under the proposed alternatives.

**Table 3.10-2: Summary of Section 106 Effects of Training and Testing Activities on Cultural Resources**

| Alternative and Stressor | Section 106 Effects of Training and Testing Activities |
|---|---|
| **No Action Alternative** | |
| Acoustic Stressors | Acoustic stressors resulting from underwater explosions creating shock (pressure) waves and cratering of the seafloor during training and testing activities would not adversely affect submerged cultural resources within United States (U.S.) territorial waters and Inland Waters because measures have been previously implemented to protect these resources. |
| Physical Stressors | Physical stressors resulting from vessel strikes and use of in-water devices, use of seafloor devices, or deposition of expended materials would not adversely affect submerged cultural resources within U.S. territorial waters and Inland Waters. |
| **Alternative 1 (Preferred Alternative)** | |
| Acoustic Stressors | Acoustic stressors resulting from underwater explosions creating shock (pressure) waves and cratering of the seafloor during training and testing activities would not adversely affect submerged cultural resources within U.S. territorial waters and Inland Waters because measures have been previously implemented to protect these resources. |
| Physical Stressors | Physical stressors resulting from vessel strikes and use of in-water devices, use of seafloor devices, and deposition of expended materials during training and testing activities would not adversely affect submerged cultural resources within U.S. territorial waters and Inland Waters because measures have been previously implemented to protect these resources. |
| Regulatory Determination | Alternative 1 increases the number of training and testing activities and introduces these activities in areas where training and testing have historically occurred but which have not been previously analyzed. Acoustic and physical stressors, as indicated above, would not adversely affect submerged cultural resources within U.S. territorial waters and Inland Waters in accordance with Section 106 of the National Historic Preservation Act (NHPA). The Navy previously analyzed impacts that could result from training and testing activities and concluded that there would be no adverse effects on historic properties. The Washington State Historic Preservation Officer concurred with these findings. As the new training and testing activities described here represent the same or relatively similar types of activities previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected. In accordance with addendum Section 402 of the NHPA, no World Heritage sites would be affected. |
| **Alternative 2** | |
| Acoustic Stressors | Acoustic stressors resulting from underwater explosions creating shock (pressure) waves and cratering of the seafloor during training and testing activities would not adversely affect submerged cultural resources within U.S. territorial waters and Inland Waters because measures have been previously implemented to protect these resources. |
| Physical Stressors | Physical stressors resulting from vessel strikes and use of in-water devices, use of seafloor devices, and deposition of expended materials during training and testing activities would not adversely affect submerged cultural resources within U.S. territorial waters and Inland Waters because measures have been previously implemented to protect these resources. |
| Regulatory Determination | Alternative 2 increases the number of training and testing activities, and introduces these activities in areas where training and testing have historically occurred but which have not been previously analyzed. Acoustic and physical stressors, as indicated above, would not adversely affect submerged cultural resources within U.S. territorial waters and Inland Waters in accordance with Section 106 of the NHPA. The Navy previously analyzed impacts that could result from training and testing activities and concluded that there would be no adverse effects on historic properties. The Washington State Historic Preservation Officer concurred with these findings. As the new training and testing activities described here represent the same or relatively similar types of activities previously analyzed, with adjustments to tempo, no adverse effects on cultural resources are expected. In accordance with addendum Section 402 of the NHPA, no World Heritage sites would be affected. |

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# 3.11 American Indian and Alaska Native Traditional Resources

## TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES

There are no figures in this section.

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# 3.11 AMERICAN INDIAN AND ALASKA NATIVE TRADITIONAL RESOURCES

**AMERICAN INDIAN AND ALASKA NATIVE TRADITIONAL RESOURCES SYNOPSIS**

The United States Department of the Navy considered all potential stressors, and the following have been analyzed for American Indian and Alaska Native traditional resources:

- Impeding access to Tribal usual and accustomed (U&A) fishing grounds and stations
- Changes to the availability of marine resources or habitat
- Loss or damage to tribal fishing gear

**Preferred Alternative (Alternative 1)**

- Navy training and testing activities in the Offshore Area are not likely to impede access to U&A fishing grounds. Navy training and testing activities in Inland Waters could temporarily impede Tribal access to portions of their U&A fishing grounds. The potential for impeded access would increase compared to the No Action Alternative.
- Training and testing activities are not expected to have a measureable effect on the availability of marine resources for harvest by Tribes.
- The potential for loss of or damage to fishing gear from Navy training and testing activities in the Offshore Area is low, but the potential would increase slightly compared to the No Action Alternative. The potential for loss of or damage to fishing gear in Inland Waters would increase compared to the No Action Alternatives as a result of Transit Protection System training events. The potential for loss of or damage to fishing gear from Navy testing activities in Inland Waters is low under Alternative 1, but the potential would increase compared to the No Action Alternative.

## 3.11.1 INTRODUCTION AND METHODS

### 3.11.1.1 Introduction

The Northwest Training and Testing (NWTT) Study Area (hereinafter Study Area) is composed of established maritime operating and warning areas in the eastern North Pacific Ocean region, including the Strait of Juan de Fuca, Puget Sound (including Hood Canal and Carr Inlet), and Western Behm Canal in southeastern Alaska (Figure 2.1-1). The Study Area includes air and water space within Washington, as well as outside state waters of Oregon and Northern California. It includes four existing range complexes and facilities: the Northwest Training Range Complex (NWTRC) (Figure 2.1-2); the Naval Undersea Warfare Center (NUWC) Division, Keyport Range Complex (Figure 2.1-3); Carr Inlet Operating Area (OPAREA) (Figure 2.1-3); and the Southeast Alaska Acoustic Measurement Facility (SEAFAC) (Figure 2.1-4). The Study Area also includes United States (U.S.) Department of the Navy (Navy) pierside locations where sonar (sound navigation and ranging) maintenance and testing occurs as part of overhaul, modernization, maintenance, and repair activities at Navy piers at Naval Base (NAVBASE) Kitsap Bremerton, NAVBASE Kitsap Bangor, and Naval Station Everett. In the Study Area, American Indian and Alaska Native traditional resources are located within state territorial waters (0–3 nautical miles [nm] of the coast), within United States (U.S.) territorial waters (0–12 nm of the coast) and within the global commons (more than 12 nm from the coast). The 56 federally-recognized Tribes and Nations (hereinafter referred to as Tribes) with traditional resources in the Study Area are identified in Tables 3.11-2 through 3.11-4.

Several types of traditional resources are present in the Study Area, including various plants and animals as well as Tribal marine resource gathering areas (e.g., traditional fishing areas; whaling areas; and seaweed-, mussel-, abalone-, and clam-gathering grounds).

Protected Tribal resources, as defined in Department of Defense (DoD) Instruction 4710.02, *DoD Interactions with Federally Recognized Tribes*, are "those natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by or reserved by or for Indian Tribes through treaties, statutes, judicial decisions, or Executive Orders (EOs), including Tribal trust resources." Tribal trust resources are defined as "Indian lands or treaty rights to certain resources." These resources include plants, animals, and locations associated with hunting, fishing, and gathering activities for subsistence or ceremonial use. For the purposes of this section, the term "traditional resources" will be used to encompass protected Tribal resources.

American Indian and Alaska Native traditional cultural properties (i.e., historic properties eligible for listing in the National Registry of Historic Places [NRHP] under the National Historic Preservation Act) are discussed in Section 3.10 (Cultural Resources).

#### 3.11.1.2 Policy and Legal Requirements

In October 1998 and as amended in 1999, the DoD promulgated its Native American and Alaska Native Policy, emphasizing the importance of respecting and consulting with Tribal governments on a government-to-government basis. The policy requires an assessment, through consultation, of the effects of proposed DoD actions that may have the potential to significantly affect traditional resources (including traditional subsistence resources such as shellfish), Tribal rights (such as fisheries), and American Indian lands before decisions are made by the agencies. In addition, the DoD issued its *DoD American Indian and Alaska Native Policy: Alaska Implementation Guidance* (December 19, 2007) to consider situations and issues unique to Alaska Native Tribes.

In 2005, the Navy updated its policy for consultation with federally-recognized American Indian Tribes. The Secretary of the Navy Instruction (SECNAVINST) 11010.14A, *Department of the Navy Policy for Consultation with Federally Recognized Indian Tribes*, implements DoD policy within the Navy and encourages ongoing consultations and communications.

Commander, Navy Region Northwest (COMNAVREGNW) Instruction 11010.14, *Policy for Consultation with Federally-Recognized American Indian and Alaska Native Tribe*s (November 10, 2009), sets forth policy, procedures, and responsibilities for consultations with federally-recognized American Indian and Alaska Native Tribes in the Navy Region Northwest area of responsibility. The goal of the policy is to establish permanent working relationships built upon respect, trust, and openness with Tribal governments.

EOs requiring consultation with Tribes include EO 13175, *Consultation and Coordination with Indian Tribal Governments*; the Presidential Memorandum dated November 5, 2009, emphasizing agencies' need to comply with EO 13175; and the Presidential Memorandum dated April 29, 1994, *Government-to-Government Relations with Native American Governments*. Laws requiring consultation with Tribes include the National Historic Preservation Act of 1966 as amended in 2006; the American Indian Religious Freedom Act of 1978; and EO 13007, Indian Sacred Sites.

#### 3.11.1.3 Government-to-Government Consultation

In January 2014, the Commanding Officers of Naval Air Station Whidbey Island (NASWI) and NAVBASE Kitsap invited 56 Tribes with traditional resources in the Study Area to evaluate the Navy's draft analysis in the NWTT Draft Environmental Impact Statement (EIS)/Overseas EIS (OEIS) and to consider whether they desired government-to-government consultation regarding the Proposed Action. Consultations with the Tribes who have requested government-to-government consultation are ongoing.

Based on SECNAVINST 11010.14A, government-to-government consultations are confidential; consultation documents are maintained in the Navy's administrative record and are not included as an attachment to this document. However, comments submitted by Tribes and Tribal organizations during the public comment period and Navy's response to comments are provided in Appendix I (Public Participation).

#### 3.11.1.4 Federal Trust Responsibility and Federally Secured Off-Reservation Fishing Rights

American Indian and Alaska Native Tribes are dependent sovereign nations. This unique relationship provides the basis for legislation, treaties, and EOs that define unique rights or privileges of Tribes. Accordingly, the United States has a trust relationship with Tribes. The DoD American Indian and Alaska Native Policy states: "Under the federal trust doctrine, the United States—and individual agencies of the federal government—owe a fiduciary duty to Indian Tribes. The nature of that duty depends on the underlying substantive laws (i.e., treaties, statutes, agreements) creating the duty. Where agency actions may affect Indian lands or off-reservation treaty rights (Alaska Native Tribes do not have treaty rights), the trust duty includes a substantive duty to protect these lands and treaty rights 'to the fullest extent possible.' Otherwise, unless the law imposes a specific duty on the federal government with respect to Indians, the trust responsibility may be discharged by the agency's compliance with general statutes and regulations not specifically aimed at protecting Indian Tribes." The trust responsibility has been interpreted to require federal agencies to carry out their activities in a manner that is protective of American Indian treaty rights. EO 13175, *Consultation and Coordination with Indian Tribal Governments,* affirms the trust responsibility of the United States and directs agencies to consult with Tribes, and to respect Tribal sovereignty when taking actions affecting such rights.

Treaties with American Indian Tribes are government-to-government agreements, similar to international treaties, and preempt contrary state laws. Tribal treaty rights are not affected by later federal laws (unless Congress clearly abrogates treaty rights). Language in treaties and other federal laws securing off-reservation fishing and hunting rights has been construed as preserving aboriginal rights that Indians traditionally exercised before the treaties were executed. Treaty fishing and hunting clauses are not a "grant of rights (from the federal government to the Indians), but a grant of rights from them - a reservation of those not granted" (*United States v. Winans,* 25 S. Ct. 662, [1905]). This means that the Tribes retain rights not specifically surrendered to the United States.

Between 1854 and 1856, the United States negotiated five treaties—the treaties of Medicine Creek, Point Elliot, Point No Point , Neah Bay, and Olympia—with the Northwest Tribes to acquire great expanses of land. The treaties collectively are called the Stevens-Palmer Treaties, after Isaac I. Stevens, the governor of the Washington Territory, and Joel Palmer, the superintendent of Indian affairs for the Oregon Territory, who negotiated the treaties on behalf of the United States (Woods 2005). These federal treaties acknowledged that the Tribes living in western Washington maintained the right to fish at off-reservation "usual and accustomed" grounds and stations (hereinafter referred to as U&A fishing grounds) (Table 3.11-1).

Although representatives of the current Confederated Tribes of the Chehalis Reservation, Cowlitz Indian Tribe, and Shoalwater Bay Tribe attended the treaty council for the Treaty of Olympia, these Tribes did not sign the treaty because they preferred separate reservations in their traditional Tribal territories rather than removal to the Quinault reservation (*Confederated Tribes of Chehalis Indian Reservation v. State of Washington* 1996, 96 F.3d 334, 340 [Ninth Cir. 1996]). The Chehalis Reservation was established in 1864 by order of the Secretary of the Interior and the Shoalwater Bay Reservation was established by executive order in 1866 (*Confederated Tribes of Chehalis Indian Reservation v. State of Washington* 1996).

The Treaty with the Yakima was signed by the federal government and representatives who are now the Confederated Tribes and Bands of the Yakama Nation on 9 June 1855 (Table 3.11-1).

One of the primary legal cases in Washington state that interprets the Stevens-Palmer Treaties is *United States v. Washington* (1974), which is known as the Boldt Decision after the presiding U.S. District Court Judge George Boldt. *United States v. Washington* (1974) affirmed the rights of Washington Tribes that were party to the various treaties to harvest fish in their U&A fishing grounds, identified the U&A locations of various Tribes, and allocated up to 50 percent of the available salmon and steelhead harvest to treaty Tribes. In a later proceeding in *United States v. Washington* (1995) (known as the Rafeedie Decision), the court determined that the treaty rights also included the right to take shellfish. As a result of these decisions, it is generally understood that Tribal treaty rights include access and up to 50 percent of the available fin and shellfish harvest in a Tribe's U&A fishing grounds. A recent court decision in *United States v. Washington* (2013) (known as the Culvert Decision) determined that Tribal treaty rights include habitat protection. Specifically, culverts under roads owned by the State of Washington that block fish passage to and from Tribal U&A fishing grounds must be remedied to provide fish passage. This case is presently on appeal to the Ninth Circuit Court of Appeals. The parameters of this component of Tribal treaty rights will be developed in this litigation and subsequent court decisions. The ruling in *United States v. Oregon* (1969) enforces and implements the Columbia River treaty Tribes' fishing rights reserved by the Stevens-Palmer treaties.

Many adjudicated U&A fishing grounds overlap, and some are designated as primary or secondary. The primacy of Skokomish fishing rights in the waters of Hood Canal over those of other Tribes that retained U&A rights under the treaties was affirmed under a 1985 ruling by the Ninth Circuit Court of Appeals (*United States v. Skokomish Indian Tribe* 1985). As a result of the ruling, the Suquamish Tribe has secondary rights and requires the permission of the Skokomish Tribe to exercise its U&A rights south of the Hood Canal Bridge. Since the 1985 court decision, this permission has not been granted.

In 1994, the United States formally recognized that the Hoh Indian Tribe, Makah Indian Tribe, Quileute Indian Tribe, and the Quinault Indian Nation, have treaty rights to fish for groundfish in offshore areas (50 Code of Federal Regulations [C.F.R.] 660.50). U&A fishing grounds were established in offshore areas beyond U.S. territorial waters (greater than 12 nm). In 2015, the United States District Court for the Western District of Washington in Seattle, Washington determined that the western boundary of the Quinault Indian Nation's U&A in the Pacific Ocean is 30 miles from shore, and the western boundary of the Quileute Tribe's U&A in the Pacific Ocean is 40 miles offshore (*United States v. State of Washington* 2015).

**Table 3.11-1: Treaty Rights for Usual and Accustomed Fishing Grounds in Washington**

| Treaty | Date Signed | American Indian Tribes Signatories | Tribal Usual and Accustomed Treaty Text |
|---|---|---|---|
| Treaty of Medicine Creek | December 26, 1854 | Representatives of who are now the Nisqually Indian Tribe, Puyallup Tribe, and Squaxin Island Tribe | The right of taking fish, at all U&A grounds and stations, is further secured to said Indians in common with all citizens of the Territory, and of erecting temporary houses for the purpose of curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses on open and unclaimed lands: *Provided, however*, That they shall not take shellfish from any beds staked or cultivated by citizens, and that they shall alter all stallions not intended for breeding-horses, and shall keep up and confine the latter. |
| Treaty of Point Elliot | January 22, 1855 | Representatives of who are now the Lummi Tribe, Muckleshoot Indian Tribe, Samish Indian Nation, Snoqualmie Tribe, Stillaguamish Tribe, Suquamish Tribe, Swinomish Tribe, Tulalip Tribe, and the Upper Skagit Tribe | The right of taking fish at U&A grounds and stations is further secured to said Indians in common with all citizens of the Territory, and of erecting temporary houses for the purpose of curing, together with the privilege of hunting and gathering roots and berries on open and unclaimed lands. Provided, however, that they shall not take shell-fish from any beds staked or cultivated by citizens. |
| Point No Point Treaty | January 26, 1855 | Representatives of who are now the Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, Port Gamble S'Klallam Tribe, and Skokomish Tribal Nation | The right of taking fish at U&A grounds and stations is further secured to said Indians in common with all citizens of the Territory, and of erecting temporary houses for the purposes of curing, together with the privilege of hunting and gathering roots and berries on open and unclaimed lands. Provided, however, that they shall not take shell-fish from any beds staked or cultivated by citizens. |
| Treaty of Neah Bay | January 31, 1855 | Representatives of who are now the Makah Tribe | The right of taking fish and of whaling or sealing at U&A grounds and stations is further secured to said Indians in common with all citizens of the United States, and of erecting temporary houses for the purpose of curing, together with the privilege of hunting and gathering roots and berries on open and unclaimed lands: *Provided, however*, That they shall not take shell fish from any beds staked or cultivated by citizens. |
| Treaty with the Yakima | June 9, 1855 | Representatives who are now the Confederated Tribes and Bands of the Yakama Nation | The exclusive right of taking fish in all the streams, where running through or bordering said reservation, is further secured to said confederated Tribes and bands of Indians, as also the right of taking fish at all U&A places, in common with the citizens of the Territory, and of erecting temporary buildings for curing them; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land. |
| Treaty of Olympia | July 1, 1855 and January 25, 1856 | Representatives of who are now the Hoh Indian Tribe, Quileute Indian Tribe, and the Quinault Indian Nation | The right of taking fish at all U&A grounds and stations is secured to said Indians in common with all citizens of the Territory, and of erecting temporary houses for the purpose of curing the same; together with the privilege of hunting, gathering roots and berries, and pasturing their horses on all open and unclaimed lands. Provided, however, That they shall not take shell-fish from any beds staked or cultivated by citizens; and provided, also, that they shall alter all stallions not intended for breeding, and keep up and confine the stallions themselves. |

In 1996, the Confederated Tribes of the Chehalis Reservation and Shoalwater Bay Tribe filed suit against the State of Washington to claim off-reservation fishing rights (*Confederated Tribes of Chehalis Indian Reservation v. State of Washington* 1996). The Tribes asserted that they are entitled to fishing rights as a result of the EOs which created their reservations and that they are entitled to the treaty fishing rights of the Quinault Indian Nation. The 1996 ruling concluded that the Tribes did not have sufficient foundation to claim off-reservation fishing rights and, therefore, have no U&A fishing grounds beyond the boundaries of their reservations (*Confederated Tribes of Chehalis Indian Reservation v. State of Washington* 1996).

Treaties with the Oregon Tribes were negotiated and ratified by the United States between 1853 and 1864. These treaties established reservations in exchange for lands ceded by the Tribes although no off-reservation fishing or hunting rights were secured. The Cow Creek Umpqua Treaty, signed by the federal government and representatives of who are now the Cow Creek Band of Umpqua Indians and the Confederated Tribes of the Grand Ronde Community on September 19, 1853, secured the Tribe a reservation in exchange for ceded lands; no treaty rights for off-reservation fishing were secured. The treaties with the Rogue River Tribes, signed by the federal government and representatives of who are now the Confederated Tribes of Siletz Indians and the Confederated Tribes of the Grand Ronde Community on September 10, 1853 and on November 15, 1854, secured the Tribe a reservation in exchange for ceded lands; no treaty rights for off-reservation fishing were secured. The Treaty of 1855, signed by the federal government and representatives of who are now the Confederated Bands of the Warm Springs Reservation on June 25, 1855, secured these Tribes the following:

> That the exclusive right of taking fish in the streams running through and bordering said reservation is hereby secured to said Indians; and at all other usual and accustomed stations, in common with citizens of the United States, and of erecting suitable houses for curing the same; also the privilege of hunting, gathering roots and berries, and pasturing their stock on unclaimed lands, in common with citizens, is secured to them.

The Treaty with the Klamath, signed by the federal government and representatives of who are now the Klamath Tribes on October 14, 1864, secured the Tribe the following:

> The exclusive right of taking fish in the streams and lakes, included in said reservation, and of gathering edible roots, seeds, and berries within its limits, is hereby secured to the Indians aforesaid.

A treaty with representatives of who are now the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians was negotiated in 1855, but never ratified by the United States. Anson Dart, original superintendent of Indian Affairs in Oregon, negotiated nineteen treaties with Oregon Tribes in 1851. This included representatives of the present-day Coquille Indian Tribe. However, Dart's authority to negotiate treaties was revoked by the United States Senate and his treaties were never acknowledged or ratified.

Although 18 treaties were negotiated with the California Tribes by 1852 that established reservations in exchange for ceded lands, all were rejected by the United States. In 1856, four reservations were established including on the Klamath River and in Round Valley; however, these early reservations were abandoned in the 1860s as a result of poor environmental conditions, land title laws, political conditions, and enslavement of native peoples. The Hoopa Valley Reservation was established in 1864 but fishing and hunting rights were not specifically defined.

#### 3.11.1.5 Alaska Native Tribes: Reservations and Subsistence Hunting and Fishing

The Alaska Statehood Act of 1958 stipulated that the United States hold and retain absolute jurisdiction and control of any lands or other property (including fishing rights), the right or title to which may be held by Alaska Native Tribes, Eskimo, or Aleut populations or held by the United States in trust for said groups (Jones 1981).

On December 18, 1971, Alaska Native aboriginal claims were settled and extinguished by the Alaska Native Claims Settlement Act (ANCSA). The Alaska Native Claims Settlement Act created 12 regional profit-making Alaska Native corporations and over 200 village, group, and urban corporations to receive approximately 45.5 million acres of land along with a cash payment of approximately $1 billion. A 13th regional corporation headquartered in Seattle was later established for Alaska Natives who live outside of Alaska who participated in the cash settlement, but did not receive land. ANCSA terminated all Indian reservations and reserves in Alaska with the exception of the Metlakatla Indian Community, Annette Island Reserve. Tribes that had their reservations terminated had the option of keeping their former reservation land with both surface and subsurface ownership. If they chose that option, they did not receive a cash settlement or participate as shareholders in the regional corporations. ANCSA extinguished aboriginal claims to land and any aboriginal hunting and fishing rights that may have existed. Sections 17(d)(1) and (2) of ANCSA provided for withdrawing millions of acres of unreserved public land in Alaska for national and public interests, which resulted in the passage of the Alaska National Interest Lands Conservation Act (ANILCA) in 1980. ANILCA protected over 100 million acres of federal lands in Alaska, doubling the size of the country's national park and refuge system and tripling the amount of land designated as wilderness. ANILCA also addressed issues of Alaska Native land claims, the subsistence lifestyle, energy development, economic growth, and transportation planning by creating solutions that were meant to be compatible with each other. As defined in Title VIII, Section 803, subsistence uses are, "the customary and traditional uses by rural Alaska residents of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

Subsistence hunting and fishing are economically and culturally important for many who reside in Alaska, including Alaska Native Tribes. Alaska state law directs the Board of Game and Board of Fisheries to provide a reasonable opportunity for subsistence uses first, before providing for other uses of any harvestable surplus of a fish or game population. State law also requires identification of nonsubsistence areas, which are defined as areas where dependence upon subsistence (customary and traditional uses of fish and wildlife) is not a principal characteristic of the economy, culture, and way of life.

Though a relatively small part of the overall state economy, salmon fishing is the mainstay of several Alaska Native villages as well as for segments of the Alaska Native population residing in many shoreline cities and towns. Salmon is an important source of spiritual and physical sustenance for Northwest American Indian and Alaska Native Tribes, and salmon are culturally important to many other residents of these areas. Subsistence and recreational fishermen use a variety of fishing gear to harvest salmon (National Oceanic and Atmospheric Administration 2012).

#### 3.11.1.6 Previous Environmental Documents

Previous environmental documents used for general information include the *Southeast Alaska Acoustic Measurement Facility (SEAFAC), Behm Canal, Ketchikan Gateway Borough: Environmental Impact Statement* (U.S. Department of the Navy 1988), *Marine Resources Assessment for the Pacific Northwest*

*Operating Area* (U.S. Department of the Navy 2006), the *Northwest Training Range Complex EIS/OEIS* (U.S. Department of the Navy 2010a), the *NAVSEA NUWC Keyport Range Complex Extension EIS/OEIS* (U.S. Department of the Navy 2010b), and the *Trident Support Facilities Explosive Handling Wharf (EHW-2) Final EIS* (U.S. Department of the Navy 2012).

#### 3.11.1.7 Previous Coordination with American Indian Tribes

The Navy previously consulted with the Western Washington Treaty Tribes for the training and testing activities included in the No Action Alternative. This coordination was completed for activities at the NUWC Division, Keyport Range Complex, and the NWTRC, and serve as a basis for ongoing consultation with the American Indian Tribes for this project.

### 3.11.2 Affected Environment

#### 3.11.2.1 American Indian and Alaska Native Tribes and Traditional Resources

This section identifies the 56 federally-recognized Tribes that have traditional resources in the Study Area. These traditional resources include off-reservation treaty U&A fishing grounds, some of which extend beyond 12 nm.

##### 3.11.2.1.1 Offshore Area

Eighteen federally-recognized Tribes are currently or historically associated with the Offshore Area: four Tribes in Washington have off-reservation Treaty U&A fishing grounds, and 14 Tribes in Oregon and Northern California have traditional resources in co-use navigable water areas where the Navy conducts training and testing the Offshore Area (Table 3.11-2).

In Washington, there are four Tribes that have off-reservation Treaty U&A fishing grounds in co-use navigable waters area where the Navy conducts training and testing activities in the Offshore Area:

- Hoh Indian Tribe, Washington
- Makah Indian Tribe of the Makah Indian Reservation, Washington
- Quileute Indian Tribe of the Quileute Indian Reservation, Washington
- Quinault Indian Nation, Washington

These four Washington coastal Tribes helped designate the Olympic Coast National Marine Sanctuary and continue to support Sanctuary operation by serving on the Advisory Council, and helping to shape Sanctuary policy, education, and research priorities (National Oceanic and Atmospheric Administration 2008). In addition to being members of the Olympic Coast National Marine Sanctuary Advisory Council, the four coastal Tribes, with the State of Washington, have formed the Olympic Coast National Marine Sanctuary Intergovernmental Policy Council. This Council serves to better coordinate the needs and rights of the co-managers of the resources within the sanctuary with sanctuary staff and the National Marine Sanctuary Program.

The following 14 Washington, Oregon, and California federally-recognized Tribes have traditional resources (e.g., migratory fish species, specifically salmon, that migrate upstream into the inland waters) in co-use navigable water areas where the Navy conducts training and testing activities in the Offshore Area:

- Confederated Tribes of the Chehalis Reservation, Washington
- Cowlitz Indian Tribe, Washington

- Shoalwater Bay Indian Tribe of the Shoalwater Bay Indian Reservation, Washington
- Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians, Oregon
- Confederated Tribes of Grand Ronde Community of Oregon, Oregon
- Confederated Tribes of Siletz Indians of Oregon, Oregon
- Coquille Indian Tribe of Oregon, Oregon
- Big Lagoon Rancheria, California
- Cher-Ae Heights Indian Community of the Trinidad Rancheria, California
- Elk Valley Rancheria, California
- Resighini Rancheria, California
- Smith River Rancheria, California
- Wiyot Tribe (formerly the Table Bluff Rancheria), California
- Yurok Tribe, California

Also, 15 federally-recognized Tribes with traditional use areas inland of the Oregon and California coast may have traditional resource habitat in Offshore Areas; these migratory marine resources (e.g., salmon, steelhead, lamprey eel, and sturgeon) travel the rivers upstream into the Tribes' traditional territories and are part of the local subsistence and ceremonial activities of the Tribes.

- Confederated Tribes of the Warm Springs Reservation, Oregon
- Cow Creek Band of Umpqua Indians, Oregon
- Klamath Tribes, California
- Cahto Indian Tribe of the Laytonville Rancheria, California
- Coyote Valley Band of Pomo Indians, California
- Hoopa Valley Tribe, California
- Hopland Band of Pomo Indians of the Hopland Rancheria, California
- Karuk Tribe, California
- Pinoleville Pomo Nation, California
- Potter Valley Tribe, California
- Redwood Rancheria of Pomo Indians, California
- Robinson Rancheria of Pomo Indians, California
- Round Valley Indian Tribes, California
- Scotts Valley Band of Pomo Indians, California
- Sherwood Valley Rancheria of Pomo Indians, California

**Table 3.11-2: Offshore Area - American Indian Tribes and Traditional Resources**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| U&A Fishing Grounds and Traditional Resources | Hoh Indian Tribe, Washington | The Hoh Indian Tribe is a band of the Quileute Indian Tribe, although it is recognized as a separate Tribal entity. Their reservation is on the Olympic Peninsula of northern Washington. The Tribe retains many of its traditional customs, including practicing the canoe culture. Members dip net for smelt and harvest perch, crab, and razor and butter clams from tidelands, and they operate a fish hatchery program (Tiller 2005p). U&A fishing grounds include the Dickey, Quilayute, Soleduck, Calawah, Bogachiel, Hoh, Clearwater, Queets, and Quinault rivers on the Olympic Peninsula, and offshore areas from the coastline to beyond 12 nm between the Quilayute River and the Quinault River (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Makah Indian Tribe of the Makah Indian Reservation, Washington | The Makah Indian Tribe of the Makah Indian Reservation on the northwestern tip of the Olympic Peninsula was established by the Treaty of Neah Bay in 1855 (Tiller 2005t). The Makah Indian Tribe, of Nooktan origin, practiced a subsistence lifestyle centered on fishing for sea otters, whale, seal, and smaller species such as shellfish, and on trading these products with other Tribes (Tiller 2005t). Currently, the "fishing industry represents the most important aspect of the Makah's economy" (Tiller 2005t). However, Tribal income is broadly based on agriculture, livestock, forestry, construction, services and retail, transportation, and tourism and recreation. In 1998, approximately 70 percent of the Tribal population was engaged in employment in fishing for salmon, groundfish, and sea urchins, while others were employed in a fish-buying and processing plant. The Makah Nation Fish Hatchery is designed for public viewing of migrating salmon. U&A fishing grounds associated with the Offshore Area include Ozette and Sooes rivers emptying into the Pacific Ocean and offshore areas from the coastline to beyond 12 nm north of Norwegian Memorial (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Quileute Indian Tribe of the Quileute Indian Reservation, Washington | Quileute Indian Tribe culture is centered on the ocean, river, and forest, and the Quileute are related to the Hoh. The Quileute Reservation is along Pacific Ocean beaches at the mouth of the Quileute River. They historically practiced a hunting, fishing, and gathering subsistence lifestyle, dominated by the use of seal and whale oil, which also was used as a valuable trading commodity (Tiller 2005aa). Many present-day Quileute derive their livelihood from tourism, small commercial development, logging, and fishing industries. U&A fishing grounds include the Dickey, Quilayute, Soleduck, Calawah, Bogachiel, Hoh, Clearwater, Queets, and Quinault rivers on the Olympic Peninsula, and offshore areas from the coastline to beyond 12 nm between Sand Point and the Queets River (Freedman et al. 2004) extended to 40 nm (*United States v. State of Washington* 2015). |
| U&A Fishing Grounds and Traditional Resources | Quinault Indian Nation, Washington | The Quinault Indian Nation ("canoe people" or "people of the cedar tree") originally practiced a subsistence lifestyle centered on fishing, hunting, and gathering. Their reservation is in the southwestern corner of the Olympic Peninsula (Tiller 2005ab). The Quinault economy is based on gaming, tourism, media and communications, small commercial development, logging, and fishing industries. U&A fishing grounds include the Clearwater, Queets, Quinault, and Moclips rivers on the Olympic Peninsula, and offshore areas from the coastline to beyond 12 nm between Destruction Island and Point Chehalis (Freedman et al. 2004). In 2015, the United States District Court for the Western District of Washington in Seattle, Washington determined that the western boundary of the Quinault Indian Nation's U&A in the Pacific Ocean is 30 miles from shore (*United States v. State of Washington* 2015). |

**Table 3.11-2: Offshore Area - American Indian Tribes and Traditional Resources (continued)**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| Traditional Resources | Confederated Tribes of the Chehalis Reservation, Washington | The Confederated Tribes of the Chehalis Reservation is located near the confluence of the Black and Chehalis rivers south of Puget Sound in the state of Washington and consist of the Upper Chehalis and Lower Chehalis Tribes. Historically, the Upper Chehalis subsistence was a riverine based economy; the Lower Chehalis subsistence was ocean based. Historically, subsistence was based on fishing for salmon (chum, Chinook, and coho) on the Chehalis River; fishing for summer sturgeon in Willapa Bay; collecting shellfish; coastal fishing for halibut, cod, surf smelt, and herring; hunting seals, porpoises, sea lions, and sea otters; hunting elk, deer, and bear in the uplands; and gathering camas, berries, and other plant foods (Hajda 1990). Subsistence and ceremonial fishing are still vital to the Tribal culture, and the present economy includes livestock raising, small commercial salmon fishing, and gaming (Tiller 2005al). |
| Traditional Resources | Cowlitz Indian Tribe, Washington | The Cowlitz Indian Tribe are a part of the southwest coast Salish (including the Quinault, Lower Chehalis, and Upper Chehalis groups), with traditional territory inland along the Cowlitz River, a tributary of the Columbia River. Historically, subsistence was based on fishing for salmon (coho, chum, and fall Chinook) and eulachon on the Cowlitz River, hunting elk and deer in the uplands, and gathering camas, berries, hazelnuts and other plant foods. Currently, the Cowlitz Indian Tribe continues traditional activities including fishing and is pursuing the establishment of reservations lands and building a casino (Hajda 1990; Tiller 2005ak). |
| Traditional Resources | Shoalwater Bay Indian Tribe of the Shoalwater Bay Indian Reservation, Washington | The Shoalwater Bay Indian Tribe of the Shoalwater Bay Indian Reservation resides on Willapa Bay at North Cove on the coast of Washington. Tribal members consist of the Chehalis, Chinook, and Quinault Tribes. Traditional subsistence was based on salmon, sturgeon, halibut, cod, surf smelt, herring, trout, shellfish, stranded whales, sea mammals (such as seals, porpoises, sea lions, and sea otters), deer, and elk (Hajda 1990). Currently, the economy is based on small commercial development and gaming (Tiller 2005ad). |
| Traditional Resources | Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians, Oregon | The Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians, Oregon live on Coos Bay in southwestern Oregon, and the Tribal members consist of the Coos, Lower Umpqua, and Siuslaw Tribes. Traditional subsistence was based on salmon, herring, smelt, lampreys, saltwater and freshwater fish, shellfish, seals, sea lions, deer, and elk (Zenk 1990). Their current economy is based on tourism and gaming (Tiller 2005l). |
| Traditional Resources | Confederated Tribes of the Grand Ronde Community of Oregon, Oregon | The Confederated Tribes of the Grand Ronde Community of Oregon reside in the Willamette Valley in northwestern Oregon, and Tribal members consist of the Kalapuya, Clackamas, Molalla, Rogue River, Chasta, Umpqua, Salmon River, and Nehalem bands of the Tillamook Tribes. Traditionally subsistence was based on salmon, lamprey eel, stranded whales, sea lions, seals, shellfish, and elk (Seaburg and Miller 1990). Presently, the economy is based on forestry, mining, commercial development, communications, tourism, and gaming (Tiller 2005n). |
| Traditional Resources | Confederated Tribes of Siletz Indians of Oregon, Oregon | The Confederated Tribes of Siletz Indians of Oregon live near Siletz in western Oregon, and Tribal members consist of the Kalapuya, Molalla, Rogue River, Chasta, Umpqua, Calapooia, and Scoton Tribes. Traditionally, subsistence was based on salmon, lamprey eel, stranded whales, sea lions, seals, shellfish, and elk (Seaburg and Miller 1990). Currently, the economy is based on forestry, fisheries, manufacturing, commercial development, communications, tourism, and gaming (Tiller 2005o). |

**Table 3.11-2: Offshore Area - American Indian Tribes and Traditional Resources (continued)**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| Traditional Resources | Confederated Tribes of the Warm Springs Reservation, Oregon | The Confederated Tribes of the Warm Springs Reservation is located on the eastern slope of the Cascade Range about 100 miles southeast of Portland, Oregon. The Confederated Tribes of Warm Springs includes eight Tribal groups: the four Sahaptin speaking groups (Tenino, Wyampan, Ta-ih, and Dock-spus), three groups speaking Kiksht or Upper Chinook known as the Wasco, and the Northern Paiutes (Hunn and French 1998).Traditionally, subsistence was based on salmon, suckers, and trout (along major rivers), root plants, berries, nuts, seeds, deer and elk in the upland areas (Hunn and French 1998). Currently, the economy is based on forestry, agriculture, fisheries, commercial development, gaming, and tourism (Tiller 2005ap) |
| Traditional Resources | Coquille Indian Tribe, Oregon | The Coquille Indian Tribe resides near Coos Bay and North Bend, Oregon, and Tribal members are of the Coquille Indian Tribe. Traditional subsistence was based on salmon, shellfish, camas root, acorns, roots and berries, deer, and elk (Miller and Seaburg 1990). The current economy is based on agriculture, construction, tourism, and gaming (Tiller 2005m). |
| Traditional Resources | Cow Creek Band of Umpqua Indians, Oregon | The Cow Creek Band of the Umpqua Indians live near Roseburg in southwestern Oregon. Traditionally, subsistence was based on acorns, root plants, seeds, berries, deer, salmon and other fish (Kendall 1990). Currently, the economy is based on agriculture, commercial development and gaming (Tiller 2005aq). |
| Traditional Resources | Klamath Tribes, Oregon | The Klamath Tribes live near Upper Klamath Lake in south central Oregon, and the population is composed of members of the Klamath Tribe, Modoc Tribe, and Yahooskin Band of the Snake River Indian Tribe. Traditionally, subsistence was based on suckers, trout, whitefish, salmon, root plants such as camas, berries, seeds, deer, and elk (Stern 1998). Currently, the economy is based on commercial development, gaming and tourism (Tiller 2005ar). |
| Traditional Resources | Big Lagoon Rancheria, California | The Big Lagoon Rancheria is located in northern California, and Tribal members consist of the Tolowa and Yurok Tribes. Traditional Tolowa subsistence was seasonally based and focused on salmon and smelt, hunting, acorn collecting, and plant gathering (Gould 1978); Yurok subsistence included shellfish, salmon, sturgeon, eel, candlefish, surffish, deer, elk, sea lion and acorns (Pilling 1978). Current practices include fishing and shellfishing (Tiller 2005e). The present economy is based on tourism. |
| Traditional Resources | Cahto Indian Tribe of the Laytonville Rancheria | The Cahto Indian Tribe resides on the Laytonville Rancheria in northwest California. Traditionally, subsistence was based on acorns, salmon, deer, and various plant resources (Myers 1978). Currently, the economy is based on agriculture, forestry, gaming, and tourism (Tiller 2005as).<br>The Tribe is a member of the InterTribal Sinkyone Wilderness Council that is comprised of 10 federally-recognized North Coast Tribes in California. The Council is a non-profit land conservation consortium that owns and manages the 3,845-acre parcel of redwood forestland (InterTribal Wilderness land) along the Lost Coast north of Fort Bragg, California. |

**Table 3.11-2: Offshore Area - American Indian Tribes and Traditional Resources (continued)**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| Traditional Resources | Cher-Ae Heights Indian Community of the Trinidad Rancheria, California | The Cher-Ae Heights Indian Community of the Trinidad Rancheria live in northern California; Tribal members consist of the Wiyot, Yurok, and Tolowa Tribes. Traditional Wiyot subsistence included harvesting shellfish, hunting sea mammals such as sea lions and stranded whales, hunting deer and elk, surf and saltwater fishing along the coast, and salmon fishing (Elsasser 1978). Yurok subsistence included shellfish, salmon, sturgeon, eel, candlefish, surffish, deer, elk, sea lion, and acorns (Pilling 1978). Traditional Tolowa subsistence was seasonally based and focused on salmon and smelt, sea lions, acorns, and plant resources (Gould 1978). The present economy is based on tourism and gaming (Tiller 2005j). |
| Traditional Resources | Coyote Valley Band of Pomo Indians, California | The Coyote Valley Band of Pomo Indians live near Ukiah in northwestern California. The Tribal members are descendants of the Shodakai Pomo. Traditionally, subsistence was based on acorns, nuts, seeds, root plants, deer, elk, antelope, seal, sea lion, and lake, stream, and sea-going fish (McLendon and Oswalt 1978; Bean and Theodoratus 1978). Currently, the economy is based on tourism and gaming (Tiller 2005at).<br>The Tribe is a member of the InterTribal Sinkyone Wilderness Council that is comprised of 10 federally-recognized North Coast Tribes in California. The Council is a non-profit land conservation consortium that owns and manages the 3,845-acre parcel of redwood forestland (InterTribal Wilderness land) along the Lost Coast north of Fort Bragg, California. |
| Traditional Resources | Elk Valley Rancheria, California | The Elk Valley Rancheria is located in northern California, and Tribal members consist of the Tolowa, Yurok, and Kuroki Tribes (Tiller 2005f). Traditional Tolowa subsistence was seasonally based and focused on fishing for salmon and smelt, hunting, acorn collecting, and plant gathering (Gould 1978); Yurok subsistence included harvesting shellfish; fishing for salmon, sturgeon, eel, candlefish, and surffish; hunting deer, elk, and sea lion; and collecting acorns (Pilling 1978). The current economy is based on small commercial development and gaming (Tiller 2005f). |
| Traditional Resources | Hoopa Valley Tribe | The Hoopa Valley Tribe (Hupa people) resides along the Trinity River in Humboldt County, California, and their reservation covers half of their traditional territory. Traditionally, subsistence was based on acorns, salmon, steelhead, sea-going trout, deer, and elk (Wallace 1978). Currently, the economy is based on forestry, fisheries, commercial development, gaming, and tourism (Tiller 2005au). |
| Traditional Resources | Hopland Band of Pomo Indians of the Hopland Rancheria | The Hopland Band of the Pomo Indians resides in northwestern California south of Ukiah. Traditional territory includes Humboldt County to San Pablo Bay; fishing and gathering trips to the Pacific Ocean were seasonally based. Traditionally, subsistence was based on acorns, nuts, seeds, root plants, deer, elk, antelope, seal, sea lion, and lake, stream, and ocean fish ( (McLendon and Oswalt 1978; Bean and Theodoratus 1978). Currently, the economy is based on agriculture, commercial development, and gaming (Tiller 2005av).<br>The Tribe is a member of the InterTribal Sinkyone Wilderness Council that is comprised of 10 federally-recognized North Coast Tribes in California. The Council is a non-profit land conservation consortium that owns and manages the 3,845-acre parcel of redwood forestland (InterTribal Wilderness land) along the Lost Coast north of Fort Bragg, California. |

**Table 3.11-2: Offshore Area - American Indian Tribes and Traditional Resources (continued)**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| Traditional Resources | Karuk Tribe | The Karuk Tribe resides in northwestern California. Traditional territory followed the watersheds bordering the Klamath River. Traditionally, subsistence was based on salmon, deer, elk, root plants, acorns, seeds, and nuts (Bright 1978). Currently, the economy is based on commercial development and tourism (Tiller 2005aw). |
| Traditional Resources | Pinoleville Pomo Nation | The Pinoleville Pomo Nation resides in northern California in Mendocino and Lake Counties (Tiller 2005ax). Traditionally, subsistence was based on acorns, nuts, seeds, root plants, deer, elk, antelope, seal, sea lion, and lake, stream, and sea-going fish (McLendon and Oswalt 1978; Bean and Theodoratus 1978). Currently, the economy is based on agriculture.<br>The Tribe is a member of the InterTribal Sinkyone Wilderness Council that is comprised of 10 federally-recognized North Coast Tribes in California. The Council is a non-profit land conservation consortium that owns and manages the 3,845-acre parcel of redwood forestland (InterTribal Wilderness land) along the Lost Coast north of Fort Bragg, California. |
| Traditional Resources | Potter Valley Tribe | The Potter Valley Tribe resides in northern California northeast of Ukiah and Tribal members are of the Little Lake Pomo Band (Tiller 2005ay). Traditionally, subsistence was based on acorns, nuts, seeds, root plants, deer, elk, antelope, seal, sea lion, and lake, stream, and ocean fish ( (McLendon and Oswalt 1978; Bean and Theodoratus 1978). Currently, the economy is based on commercial development.<br>The Tribe is a member of the InterTribal Sinkyone Wilderness Council that is comprised of 10 federally-recognized North Coast Tribes in California. The Council is a non-profit land conservation consortium that owns and manages the 3,845-acre parcel of redwood forestland (InterTribal Wilderness land) along the Lost Coast north of Fort Bragg, California. |
| Traditional Resources | Redwood Rancheria of Pomo Indians | The Redwood Rancheria of Pomo Indians resides northeast of Redwood Valley in Mendocino County along the northeastern side of the Russian River valley. Members of the Redwood Rancheria belong to the Northern Pomo Band (Tiller 2005az). Traditionally, subsistence was based on acorns, nuts, seeds, root plants, deer, elk, antelope, seal, sea lion, and lake, stream, and ocean fish ( (McLendon and Oswalt 1978; Bean and Theodoratus 1978).<br>The Tribe is a member of the InterTribal Sinkyone Wilderness Council that is comprised of 10 federally-recognized North Coast Tribes in California. The Council is a non-profit land conservation consortium that owns and manages the 3,845-acre parcel of redwood forestland (InterTribal Wilderness land) along the Lost Coast north of Fort Bragg, California. |
| Traditional Resources | Resighini Rancheria, California | The Resighini Rancheria is located in northern California on the south shore of the Klamath River, and Tribal members are of the Yurok Tribe (Tiller 2005g). Yurok subsistence included harvesting shellfish; fishing for salmon, sturgeon, eel, candlefish, and surffish; hunting deer, elk, and sea lion; and collecting acorns (Pilling 1978). The present economy is based on small commercial development (Tiller 2005g). |

**Table 3.11-2: Offshore Area - American Indian Tribes and Traditional Resources (continued)**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| Traditional Resources | Robinson Rancheria of Pomo Indians, California | The Robinson Rancheria of Pomo Indians is located northwest of Sacramento, California. Traditionally, subsistence was based on acorns, nuts, seeds, root plants, waterfowl, and lake and stream fish such as suckers, pike, and carp (McLendon and Oswalt 1978; McLendon and Lowy 1978). Currently, the economy is based on commercial development, gaming and tourism (Tiller 2005aaa).<br>The Tribe is a member of the InterTribal Sinkyone Wilderness Council that is comprised of 10 federally-recognized North Coast Tribes in California. The Council is a non-profit land conservation consortium that owns and manages the 3,845-acre parcel of redwood forestland (InterTribal Wilderness land) along the Lost Coast north of Fort Bragg, California. |
| Traditional Resources | Round Valley Indian Tribes, California | The Round Valley Indian Tribes reside on the Round Valley Reservation located in the northeastern portion of Mendocino County, California. The Round Valley Reservation was established in 1858 as the Nome Cult Farm. The Round Valley Indian Tribes include Yuki, Concow Maidu, Little Lake, Pomo, Nomlaki, Cahto, Wailaki, and Pit River Groups (Tiller 2005aab). Traditional territory included coastal and inland riverine areas. Traditionally, subsistence was based on deer hunting, salmon fishing, and harvesting acorns (Miller 1978). Currently, the economy is based on commercial development, gaming, and tourism (Tiller 2005aab).<br>The Tribe is a member of the InterTribal Sinkyone Wilderness Council that is comprised of 10 federally-recognized North Coast Tribes in California. The Council is a non-profit land conservation consortium that owns and manages the 3,845-acre parcel of redwood forestland (InterTribal Wilderness land) along the Lost Coast north of Fort Bragg, California. |
| Traditional Resources | Scotts Valley Band of Pomo Indians, California | The Scotts Valley Band of Pomo Indians resides on the Sugar Bowl Rancheria in northern California (Tiller 2005aac). Traditionally, subsistence was based on acorns, nuts, seeds, root plants, deer, elk, antelope, seal, sea lion, and lake, stream, and sea-going fish (McLendon and Oswalt 1978; Bean and Theodoratus 1978).<br>The Tribe is a member of the InterTribal Sinkyone Wilderness Council that is comprised of 10 federally-recognized North Coast Tribes in California. The Council is a non-profit land conservation consortium that owns and manages the 3,845-acre parcel of redwood forestland (InterTribal Wilderness land) along the Lost Coast north of Fort Bragg, California. |
| Traditional Resources | Sherwood Valley Rancheria of Pomo Indians, California | The Sherwood Valley Rancheria of Pomo Indians is located in northwestern California. Their traditional territory included coastal areas (Tiller 2005aad). Traditionally, subsistence was based on acorns, nuts, seeds, root plants, deer, elk, antelope, seal, sea lion, and lake, stream, and sea-going fish (McLendon and Oswalt 1978; Bean and Theodoratus 1978).<br>The Tribe is a member of the InterTribal Sinkyone Wilderness Council that is comprised of 10 federally-recognized North Coast Tribes in California. The Council is a non-profit land conservation consortium that owns and manages the 3,845-acre parcel of redwood forestland (InterTribal Wilderness land) along the Lost Coast north of Fort Bragg, California. |

**Table 3.11-2: Offshore Area - American Indian Tribes and Traditional Resources (continued)**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| Traditional Resources | Smith River Rancheria, California | The Smith River Rancheria is located in northern California near the Oregon border, and the population are members from the Tolowa Tribe. Traditional Tolowa subsistence was seasonally based and focused on fishing for salmon and smelt, hunting, acorn collecting, and plant gathering (Gould 1978); the current economy is based on tourism and gaming (Tiller 2005h). |
| Traditional Resources | Wiyot Tribe, California | The Wiyot Tribe resides near Eureka in northern California and Tribal members are of the Wiyot Tribe (Tiller 2005i). Traditional Wiyot subsistence included harvesting shellfish, using sea mammals such as sea lions and stranded whales, hunting deer and elk, surf and saltwater fishing along the coast, and salmon fishing (Elsasser 1978). |
| Traditional Resources | Yurok Tribe of the Yurok Reservation, California | The Yurok Tribe of the Yurok Reservation is along the Klamath River in northern California, and Tribal members are of the Yurok Tribe. Yurok subsistence included harvesting shellfish; fishing for salmon, sturgeon, eel, candlefish, and surffish; hunting deer, elk, and sea lion; and collecting acorns (Pilling 1978). The current economy is based on small commercial development (Tiller 2005k). |

Notes: nm = nautical mile(s), U&A = usual and accustomed

#### 3.11.2.1.2 Inland Waters

Nineteen federally-recognized American Indian Tribes are currently or historically associated with the Inland Waters. In Washington, the following Tribes have off reservation Treaty U&A fishing rights in co-use navigable waters where the Navy conducts training and testing in the Inland Waters (Table 3.11-3).

- Confederated Tribes and Bands of the Yakama Nation
- Jamestown S'Klallam Tribe
- Lower Elwha Tribal Community
- Lummi Tribe of the Lummi Reservation
- Makah Indian Tribe of the Makah Indian Reservation
- Muckleshoot Indian Tribe
- Nisqually Indian Tribe
- Nooksack Indian Tribe
- Port Gamble S'Klallam Tribe
- Puyallup Tribe of the Puyallup Reservation Samish Indian Nation
- Sauk-Suiattle Indian Tribe
- Skokomish Indian Tribe
- Squaxin Island Tribe of the Squaxin Island Reservation
- Stillaguamish Tribe of Indians of Washington
- Suquamish Indian Tribe of the Port Madison Reservation
- Swinomish Indian Tribal Community Tulalip Tribes of Washington
- Upper Skagit Indian Tribe

**Table 3.11-3: Inland Areas - American Indian Tribes and Traditional Resources**

| Resource Type in Study Area | Tribe | Brief Profile |
| --- | --- | --- |
| U&A Fishing Grounds and Traditional Resources | Confederated Tribes and Bands of the Yakama Nation | The Confederated Tribes and Bands of the Yakama Nation reside on the eastern slopes of the Cascade Mountains in south central Washington (Tiller 2005ao). The Yakama subsistence pattern was seasonally based and consisted of salmon fishing along the Columbia and Yakima rivers and their tributaries in the spring and early summer, and hunting and plant gathering in the upper elevations during the summer and fall (Schuster 1998). The current Tribal economy is diverse and includes agriculture, forestry, fisheries, tourism and recreation, gaming, and commercial enterprises (Tiller 2005an). Treaty U&A fishing grounds include the east shoreline of Puget Sound from Everett to Olympia (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Jamestown S'Klallam Tribe | The Jamestown S'Klallam Tribe is part of the Klallam Tribal groups that also include the Lower Elwha Tribal Community and the Port Gamble S'Klallam Tribe. The Tribal reservation is on the northern Olympic Peninsula near Sequim, Washington. Historically, Klallam peoples used the Hood Canal for summer fishing and gathering, especially for shellfish, herring, and salmon (Tiller 2005q; Point No Point Treaty Council 2011). The current economy of the Jamestown S'Klallam Tribe is based on art, seafood industries, commercial development, construction, information technology and communications, and gaming (Tiller 2005q). U&A fishing grounds include the Hoke, Elwha, Dungeness, Dosewallips, and Skokomish rivers, Dabob Bay, Hood Canal, and the Strait of Juan de Fuca from Cape Flattery to the Admiralty Inlet and north to encompass the San Juan Islands (Port Gamble S'Klallam Tribe 2010).<br>As signatory to the Treaty of Point No Point, the Tribe along with the Port Gamble S'Klallam Tribe and Lower Elwha Tribal Community created the Point No Point Treaty Council to work together to co-manage treaty-protected natural resources. |
| U&A Fishing Grounds and Traditional Resources | Lower Elwha Tribal Community | The Lower Elwha Tribal Community is part of the Klallam Tribal groups that also include the Jamestown S'Klallam Tribe and the Port Gamble S'Klallam Tribe. The Tribal reservation is on the northern Olympic Peninsula near Port Angeles, Washington. Historically, Klallam peoples used the Hood Canal for summer fishing and gathering, especially for shellfish, herring, and salmon (Tiller 2005q; Point No Point Treaty Council 2011). The present economy for the Lower Elwha Tribal Community includes salmon hatcheries, retail industries, and gaming (Tiller 2005r). U&A fishing grounds include the Hoke, Elwha, Dungeness, Dosewallips, and Skokomish rivers, Dabob Bay, Hood Canal, and the Strait of Juan de Fuca from Cape Flattery to the Admiralty Inlet and north to encompass the San Juan Islands (Port Gamble S'Klallam Tribe 2010).<br>As signatory to the Treaty of Point No Point, the Tribe along with the Jamestown S'Klallam Tribe and the Port Gamble S'Klallam Tribe and Lower Elwha Tribal Community created the Point No Point Treaty Council to work together to co-manage treaty protected natural resources. |
| U&A Fishing Grounds and Traditional Resources | Lummi Tribe of the Lummi Reservation | The Lummi Tribe of the Lummi Reservation resides in northwest Washington. Before the Treaty of Point Elliot and reservation establishment, the Lummis occupied the northern San Juan Islands and the adjacent mainland, where they traveled to traditional reef-net locations. Salmon was their primary food source, and many ceremonies, beliefs, and community activities centered on salmon (Tiller 2005s). Presently, the economy is based primarily on salmon and shellfish hatcheries, small commercial developments, and gaming (Tiller 2005s). U&A fishing grounds include northern Puget Sound from the Canadian border, on the west side of the San Juan Islands to Port Townsend to the north border of King County, Washington, and inland watersheds such as the Nooksack River (Freedman et al. 2004). |

**Table 3.11-3: Inland Areas - American Indian Tribes and Traditional Resources (continued)**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| U&A Fishing Grounds and Traditional Resources | Makah Indian Tribe of the Makah Indian Reservation | The Makah Indian Tribe of the Makah Indian Reservation was described previously. U&A fishing grounds associated with Inland Waters includes the Hoke, Pysht, West Twin, East Twin, Lyre, and upper Elwha rivers emptying into the Strait of Juan de Fuca, and the Strait of Juan de Fuca from Cape Flattery to the Admiralty Inlet (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Muckleshoot Indian Tribe | The Muckleshoot Indian Tribe lives east of the Seattle-Tacoma metropolitan area, but Tribal ancestral homelands include areas along the eastern and southern reaches of Puget Sound. Historically, it depended on the abundance of natural resources, especially salmon and red cedar (Tiller 2005u). The foundation of today's Tribal economy is based on gaming, fishing, and retail industries. U&A fishing grounds include the east side of Puget Sound from the north border of King County to the east side of Maury Island near Tacoma and inland watersheds such as the Cedar, White, and Puyallup rivers (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Nisqually Indian Tribe | The Nisqually Indian Tribe resided in the woodlands and prairies of the Nisqually River basin. Traditional subsistence was based on salmon, fish, shellfish, waterfowl, and plant foods such as berries, nuts, bulbs and roots, and sprouts. Today, its reservation is in western Washington, east of Olympia. It operates two major fish hatcheries on the Nisqually River and derives other income from gaming enterprises (Tiller 2005v). U&A fishing grounds include the south portion of Cedar Inlet and inland watersheds such as the Nisqually River (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Nooksack Indian Tribe | The Nooksack Indian Tribe lives in the upper Nooksack River valley, in northeastern Washington. It is a Coast Salish nation whose traditional means of subsistence included fishing, hunting, clam digging, root gathering, and trading (Tiller 2005w). The present-day Tribal economy is supported by enterprises such as service, retail, gaming, and fisheries, including operation of a fisheries laboratory and salmon-rearing pond. U&A fishing grounds include northern Puget Sound from Canadian border, on the east of San Juan Islands to the north border of Skagit County, Washington, and inland waters such as the Nooksack River (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Port Gamble S'Klallam Tribe | As signatory to the Treaty of Point No Point, the Tribe along with the Jamestown S'Klallam Tribe and the Lower Elwha Tribal Community created the Point No Point Treaty Council to work together to co-manage treaty protected natural resources. |
| U&A Fishing Grounds and Traditional Resources | Puyallup Tribe of the Puyallup Reservation | The Puyallup Tribe of the Puyallup Reservation resides on the Puyallup Reservation, south of Seattle, at the southern end of Puget Sound. Like many other Puget Sound groups, the Puyallup gathered salmon, shellfish, wild game, roots, and berries (Tiller 2005z). It is a major employer in King County, with a wide variety of enterprises such as gaming, a marina, media and communications, international shipping, and seafood ventures. U&A fishing grounds include the south Puget Sound from north tip of Vashon Island to Tacoma and inland watersheds such as the White and Puyallup rivers (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Samish Indian Nation | The Samish Indian Nation is currently landless with the national headquarters established on Fidalgo Island on the east side of Puget Sound near Anacortes. Traditional subsistence activities included hunting of deer, elk, seal, waterfowl and shore birds; gathering fruits and other plant foods; harvesting shellfish; and fishing. The current economy is based on tourism and recreation, and retail enterprises (Tiller 2005an). Original territory included Samish Island, Guemes Island, eastern Lopez Island, Cypress Island, and Fidalgo Island (Samish Indian Nation 2014). |

**Table 3.11-3: Inland Areas - American Indian Tribes and Traditional Resources (continued)**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| U&A Fishing Grounds and Traditional Resources | Sauk-Suiattle Indian Tribe | The Sauk-Suiattle Indian Tribe lives in the Sauk Prairie area east of Puget Sound. Historically, its members fished the area rivers for salmon, often traveling down to Puget Sound to harvest fish and shellfish (Tiller 2005ac). Fishing continues to be a vital occupation for the Tribe, and as part of the Skagit System Cooperative, the Tribe helps to manage the state's salmon and steelhead resources. U&A fishing grounds include the Sauk and Suiattle Rivers in Skagit and Snohomish Counties (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Skokomish Indian Tribe | The Skokomish Indian Tribe occupies the delta of the Skokomish River where it empties into the Hood Canal; the reservation was created by the Point No Point Treaty (Tiller 2005ae). The territory of the Twana or Skokomish people (whose descendants are now the Skokomish Tribal Nation) runs along both sides of the Hood Canal, where these people had winter villages, including the Quilcene and Dabob grounds near Dabob Bay. They frequented Dabob Bay and surrounding beaches for seasonal salmon fishing and clam digging. The Twana assigned place names to four shoreline areas in the Dabob Bay area: Whitney Point was a summer campsite; "Pulali," as in Pulali Point, was probably derived from the native name of a wild cherry, *Pulela*; Zelatched Point was a summer campsite; and Sylopash Point was likely named for a probable mythological site (U.S. Department of the Navy 2002). The Tribe operates several businesses, including a fish hatchery, a fish processing plant, gas station, convenience store, and casino. U&A fishing grounds include Dabob Bay and Hood Canal and inland watersheds such as the Quilcene, Dosewallips, Duckabush, Skokomish, Tahuya, and Union rivers (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Squaxin Island Tribe of the Squaxin Island Reservation | Squaxin Island Tribe of the Squaxin Island Reservation (people of the water) includes descendants of the original maritime inhabitants of the seven inlets of south Puget Sound; the Squaxin Island Reservation is in Puget Sound. They are closely related to the Nisqually Tribe. They gathered oysters, clams, smelt, and herring for smoking and year-round consumption (Tiller 2005af). The Tribal economy is based on fisheries, tourism, gaming, and small commercial development (Tiller 2005af). U&A fishing grounds include Case Inlet, Totten Inlet, Eld Inlet, Hammersley Inlet, and inland watersheds such as the Deschutes River (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Stillaguamish Tribe of Indians of Washington | The members of the Stillaguamish Tribe of Indians of Washington are descendants of the Stoluckwamish River Tribe but are referred to as Stillaguamish because of their traditional location along the Stillaguamish River. Their reservation is between the Cascade Mountains and Puget Sound. Historically, harvesting salmon, hunting goats, and gathering vegetative foods provided their subsistence base (Tiller 2005ag). Besides service and retail outlets, the Stillaguamish economy is now based on gaming and fisheries, including a fish hatchery. U&A fishing grounds include from north Port Susan inland along the Stillaguamish River in Skagit and Snohomish Counties (Freedman et al. 2004). |

**Table 3.11-3: Inland Areas - American Indian Tribes and Traditional Resources (continued)**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| U&A Fishing Grounds and Traditional Resources | Suquamish Indian Tribe of the Port Madison Reservation | The Suquamish Indian Tribe of the Port Madison Reservation occupies the Port Madison Reservation, which is on the Kitsap Peninsula and was set aside as part of the Point Elliot Treaty of 1855. Traditional subsistence was based on salmon, fish, shellfish, waterfowl, and plant foods such as berries, nuts, bulbs and roots, and sprouts. Commercial fishing and shellfish harvest reflect the Tribe's main source of income; other economy ventures include small commercial development, media and communications, tourism, and gaming (Tiller 2005y). U&A fishing grounds include northern Puget Sound from the Canadian border; on the west side of the San Juan Islands to Port Townsend; on the east side south of Seattle, Dabob Bay, and Hood Canal; and inland watersheds on the Olympic Peninsula such as the Quilcene, Dosewallips, Duckabush, Skokomish, Tahuya, and Union rivers (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Swinomish Indian Tribal Community | The Swinomish Indian Tribal Community live on Fidalgo Island in Washington; the population consists of Swinomish, Kikiallus, Lower Skagit, and Samish Tribal members (Tiller 2005ah). Historically, their subsistence lifestyle was based on salmon and other fish, supplemented with game, berries, nuts, and roots. Current income sources include businesses, government, agriculture, forestry, gaming, manufacturing, services, tourism, and fisheries. U&A fishing grounds include northern Puget Sound from the Canadian border, on the west side of the San Juan Islands to Port Townsend to the north border of King County, Washington, and inland watersheds such as the Nooksack River (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Tulalip Tribes of Washington | Tulalip Tribes of Washington occupy their reservation west of the city of Marysville, on the Puget Sound. The term "Tulalip Tribes" refers to several allied Tribes who traditionally made the area their homeland. Salmon harvest is an important part of the historic and contemporary economy (Tiller 2005ai). The Tulalip Reservation economy is based on gaming, retail outlets, a marina, small commercial development, construction, mining, and a fish hatchery that "produces more than nine million salmon fingerlings annually" (Tiller 2005ai). U&A fishing grounds include from south Port Susan to Port Townsend and south of Whidbey Island and inland watersheds such as the Skykomish and Snoqualmie Rivers (Freedman et al. 2004). |
| U&A Fishing Grounds and Traditional Resources | Upper Skagit Indian Tribe | The Upper Skagit Indian Tribe resides just northeast of the Puget Sound, in the Cascades foothills. The Upper Skagit are descendants of 11 Tribal bands and groups that occupied the Samish Bay and other river drainages in Washington. Traditional subsistence was based on salmon, fish, shellfish, waterfowl, and plant foods such as berries, nuts, bulbs and roots, and sprouts. The Tribe owns a fish hatchery at Helmick, and their major sources of Tribal revenues are tourism, gaming, federal grants, and retail businesses (Tiller 2005aj). U&A fishing grounds include along the Skagit River in Skagit and Whatcom Counties (Freedman et al. 2004). Fishing continues to be a vital occupation for the Tribe, and as part of the Skagit System Cooperative, the Tribe helps to manage the state's salmon and steelhead resources. |

Note: U&A = usual and accustomed

#### 3.11.2.1.3 Western Behm Canal, Alaska

Four federally-recognized Alaska Native Tribes are currently or historically associated with the Western Behm Canal in co-use navigable waters where the Navy conducts testing (Table 3.11-4).

- Central Council of the Tlingit and Haida Indian Tribes
- Ketchikan Indian Community
- Metlakatla Indian Community, Annette Island Reserve
- Organized Village of Saxman

**Table 3.11-4: Alaska Native Tribes and Traditional Resources**

| Resource Type in Study Area | Tribe | Brief Profile |
|---|---|---|
| Traditional Resources | Central Council of the Tlingit and Haida Indian Tribes | The Central Council of the Tlingit and Haida Indian Tribes represent all Tlingit and Haida peoples; the Haida village of Hydaburg is located on the southwest coast of Prince of Wales island, northwest of Ketchikan (Tiller 2005 am). Traditional subsistence practices consist of fishing for salmon, halibut, crab, and shrimp; hunting seals, porpoises, sea lions, fur seals, and sea otters; utilizing stranded whales; hunting deer, bear, and beaver; digging clams; and gathering berries and other plant resources (Blackman 1990, Stearns 1990). The current economy in Hydaburg includes fishing and forestry; traditional subsistence practices remain a focus of the Haida culture (Tiller 2005 am). Under the Alaska Native Claims Settlement Act, the Haida Corporation is the village corporation for Hydaburg (Stearns 1990). The village also is a shareholder with Sealaska Corporation, the regional Native corporation. |
| Traditional Resources | Ketchikan Indian Corporation | The Ketchikan Indian Corporation occupies the southwestern coast of Revillagigedo Island. Ketchikan Creek was originally used as a fishing camp by the Tongass and Cape Fox Tlingits. The Ketchikan Indian Community was not included in the Alaska Native Claims Settlement Act but is recognized as an “Alaska Native Village” entity by the Bureau of Indian Affairs (Tiller 2005b). |
| Traditional Resources | Metlakatla Indian Community, Annette Island Reserve | The Metlakatla Indian Community, Annette Island Reserve, lives within and controls the Annette Island Reserve—the only Native reserve (or “Indian Land”) in Alaska—on the Clarence Strait opposite Ketchikan. This community was established by Canadian Tsimshians who migrated in 1887 (Tiller 2005c). In 1891, Congress designated all waters within 3,000 nautical feet of the island as Reserve Waters, to be used exclusively by the members of the Metlakatla Indian Community. Therefore, all management of fisheries within this 3,000 nautical feet, as well as management of all wildlife species within the reserve, is the responsibility of the Metlakatla Indian Community and the Metlakatla Department of Fish and Wildlife. The Tribal economy is based on fishing, fish processing, wood products industries, and services (Tiller 2005c). The Metlakatla Indian Community did not participate in the Alaska Native Claims Settlement Act. |
| Traditional Resources | Organized Village of Saxman | The Organized Village of Saxman is south of Ketchikan on the west side of Revillagigedo Island. This Tlingit community was established in 1894 (Tiller 2005d). Under the Alaska Native Claims Settlement Act, the Cape Fox Corporation is the village corporation for the Organized Village of Saxman. The village also is a shareholder with Sealaska Corporation, the regional Native corporation (Tiller 2005d). |

### 3.11.2.2 Tribal Fishing Areas and Use

Many of the marine species found within the Study Area are culturally significant to the Tribes of coastal Washington, Oregon, California, and Alaska. Tribes harvest traditional resources for ceremonial and subsistence uses as well as for commercial enterprises (i.e., Tribal fisheries). Procurement of traditional resources, such as marine invertebrates and fish, is regulated by geographical area (e.g., U&A fishing grounds), fishing methods, season, and species limits per day or per size. Tribal fisheries are place-oriented, limited to the adjudicated U&A fishing grounds. This results in immobile fisheries that cannot move to a new location if the resources or habitats are depleted. Most of the following discussion is derived or excerpted from the Marine Resources Assessment for the Pacific Northwest Operating Area (U.S. Department of the Navy 2006).

Salmon are important to many coastal Tribes in Washington, Oregon, California, and Alaska. This species is treated ceremoniously by providing a core symbol of Tribal identity, individual identity, and enabling the Tribal culture to endure as well as being of nutritional and economic importance. Their ceremonial and subsistence salmon fishery refers to a non-commercial fishery that Tribal members catch and use for either ceremonial or subsistence purposes. Tribal fishermen engaged in commercial fisheries may take a portion of their catch for ceremonial and subsistence use, and designate that as “take home fish.” A Tribe may also open a fishery specifically to catch fish for a ceremony or other community use when there is no concurrent commercial opening (U.S. Department of the Navy 2006).

Most Tribes in western Washington maintain the right to fish at U&A fishing grounds as stated in the Stevens-Palmer Treaties (Medicine Creek, Point Elliot, Point No Point, Neah Bay, and Olympia). Specific U&A fishing grounds are identified by Tribe in Tables 3.11-2 and 3.11-3 and presented below.

Tribes in Oregon and California, with no treaties or treaties that did not acknowledge off-reservation fishing rights, had traditional territories that included coastal areas or were inland based but relied on migratory marine resources (e.g., salmon, steelhead, lamprey eel, and sturgeon) travelling upstream into their traditional territories. Habitat for traditional marine resources occurs in the Offshore Area of the coasts of Oregon and California.

Alaska Native Tribes do not have specifically designated Tribal fisheries but have use of state fisheries for commercial, subsistence, and ceremonial activities. However, the Western Behm Canal is located within the Ketchikan Nonsubsistence Use Area (Alaska Department of Fish and Game 2011), which precludes subsistence uses of resources in Western Behm Canal by both Alaska Native and non-Native fishermen.

#### 3.11.2.2.1 Offshore Area

As stated in Section 3.11.2.1.1 (Offshore Area), the U&A fishing grounds for the Hoh Indian Tribe, Makah Indian Tribe, Quileute Indian Tribe, and the Quinault Indian Nation include Olympic Peninsula rivers and watersheds, and offshore areas. U&A fishing grounds were established in offshore areas beyond U.S. territorial waters (greater than 12 nm), including the Olympic Coast National Marine Sanctuary, from the following locations on the Washington coast west:

- Makah Indian Tribe- north of Norwegian Memorial,
- Quileute Indian Tribe- between Sand Point and Queets River extended to 40 nm,
- Hoh Indian Tribe- between Quillayute River and Quinault River, and
- Quinault Indian Nation- between Destruction Island and Point Chehalis

In addition, coastal areas include:

- Grays Harbor, Quillayute, and Cape Flattery, where the Makah Tribe conducts a marine gillnet fishery (National Oceanic and Atmospheric Administration 1993),
- Willapa Bay used by the Hoh Indian Tribe, Makah Indian Tribe, Quileute Indian Tribe, and Quinault Indian Nation (National Oceanic and Atmospheric Administration 1993), and
- Grays Harbor used by the Quinault Indian Nation for commercial fishing fleet (National Oceanic and Atmospheric Administration 1993).

The Tribes utilize the Northwest Indian Fisheries Commission (NWIFC), which was established to coordinate fisheries management of these Tribes for implementation of orders arising from the 1974 U.S. v. Washington decision. This commission provides technical support to American Indian Tribes assisting in intertribal coordination on harvest policy.

#### 3.11.2.2.1.1 Salmon Fisheries

Commercial, ceremonial and subsistence fishing for the Hoh Indian Tribe, Makah Indian Tribe, Quileute Indian Tribe, and the Quinault Indian Nation takes place in offshore areas and along Olympic Peninsula rivers and drainages.

The Makah Indian Tribe has ceremonial and subsistence salmon fisheries in the Sooes River, the Quinault Indian Nation in Grays Harbor system and its tributaries as well as the Quinault and Queets river systems, the Hoh Indian Tribe in Hoh River, and Quileute Indian Tribe in the Quillayute River and its tributaries. These fisheries use primarily gillnets, but other gears can be used, as regulated by the Tribe. They occur at any time of the year round when harvestable fish are present. Catch limits are determined by the status of the individual run, but are typically one or two fish per day of a certain size (U.S. Department of the Navy 2006).

In the offshore areas along the coast, trolling gear is utilized by all four Tribes conducting commercial fishing. Since 1983, Tribal regulations allow all-except-coho fishing in May and June and all-salmon fishing for portions of the summer depending on stock abundance. The duration of the summer all-salmon fishing has varied from 12 to 92 days with most years running between 20 and 42 days. At the entrance to the Strait of Juan de Fuca, the Makah Indian Tribe has troll fishing.

Commercial fishing methods and seasons along the Olympic Peninsula rivers consist of: the Quinault Indian Nation fishes with primarily gillnets for spring, summer, and fall Chinook, chum, sockeye, and coho salmon from spring through early summer on the Quinault and Queets rivers. Both the Hoh and Quileute Indian Tribes harvest coho salmon and spring, summer, and fall Chinook salmon with commercial gillnets from spring through early winter in the Hoh and Quillayute rivers, respectively. The precise timing and harvest levels vary and are determined by stock status and agreements with the State of Washington.

#### 3.11.2.2.1.2 Groundfish Fisheries

In 1994, the U.S. government formally granted the Hoh Indian Tribe, Makah Indian Tribe, Quileute Indian Tribe, and the Quinault Indian Nation treaty rights to fish for groundfish, and concluded that, in general terms, the quantification of those rights is 50 percent of the harvestable surplus of groundfish available in the Tribes' U&A fishing grounds (described at 60 C.F.R. 660.324). These Tribes have formal allocations for sablefish, black rockfish, and Pacific whiting and participate in ceremonial and subsistence and commercial fisheries off the Washington State coast. All Tribes participating in groundfish fisheries use longline vessels in their fleet, but only the Makah Indian Tribe has trawlers. Groundfish fishing occurs primarily with hook and line and pots (U.S. Department of Navy 2006). Only the Makah Indian Tribe has fished on the Tribal Pacific whiting allocation which takes place from May through September (U.S. Department of the Navy 2006).

#### 3.11.2.2.1.3 Pacific Halibut Fisheries

The Hoh Indian Tribe, Makah Indian Tribe, Quileute Indian Tribe, and the Quinault Indian Nation possess and exercise treaty fishing rights to Pacific halibut. Specific halibut allocations began in 1986 with the Tribes in 1989 harvesting their full allocation in the offshore areas. In 1993, judicial confirmation of treaty halibut rights occurred and treaty entitlement was established at 50 percent of the harvestable supply of halibut in the Tribes combined U&A fishing grounds. Tribal allocations are divided into a commercial component and a year-round ceremonial and subsistence component (U.S. Department of the Navy 2006). Tribal ceremonial and subsistence begins on 1 January and continues through 31 December, whereas Tribal fisheries (commercial) use very narrow time windows of two days or less, beginning in the first part of March. There are three successive seasons set by agreement. Active fishing on a commercial basis continues into May. Dates are sometimes changed at the last minute because of weather, per conferencing and agreement.

#### 3.11.2.2.1.4 Shellfish Harvests

Along the Pacific coastal sandy beaches from the Columbia River to Kalaloch, federal management plans are signed each year between Washington Department of Fish and Wildlife and Tribal governments with razor clam harvest rights. Razor clam harvests are set and monitored within each of the five management beaches: Long Beach Peninsula from the Columbia River north to the mouth of Willapa Bay, Twin Harbors from Willapa Bay north to the south jetty at the mouth of Grays Harbor, Copalis Beach from the north jetty at the mouth of Grays Harbor to the Copalis River, Mocrocks from the Copalis River to the Moclips River (south boundary of the Quinault Indian Reservation), and Kalaloch from the South Beach campground to Olympic National Park Beach Trail 3 (U.S. Department of the Navy 2006).

### 3.11.2.2.2 Inland Waters

As stated in section 3.11.2.1.1 (Inland Waters), 19 Tribes have U&A fishing grounds (including the Strait of Juan de Fuca, Puget Sound, and inland rivers) (Table 3.11-3). The Western Washington Treaty Tribes created the NWIFC to coordinate fisheries management of these Tribes for implementation of orders arising from the 1974 *United States v. Washington* decision. This commission provides technical support to American Indian Tribes assisting in intertribal coordination on harvest policy. The Columbia River Treaty Tribes created the Columbia River Intertribal Fish Commission.

#### 3.11.2.2.2.1 Salmon Fisheries

Salmon regulations in Puget Sound for the harvest of ceremonial and subsistence fish generally allow fishing year round with one or two fish per day of a certain size. Ceremonial salmon are generally taken in special fisheries that allow a certain number (e.g., 50) to be harvested by a group for use in a particular ceremony.

In the Strait of Juan de Fuca, Puget Sound, and Hood Canal, the primary commercial harvest means are drift gillnets, set gillnets, purse seine, trap, hook and line, trolling gear, dip nets, round haul, and beach seine by Tribal fishermen. Gear preference may vary by Tribe and location. The primary salmon species targeted are sockeye, coho, chum, Chinook, and pink salmon in the Strait of Juan de Fuca. In north Puget Sound, sockeye, chum, and pink salmon are targeted for harvest, whereas the coho, chum, and Chinook salmon are harvested in central/south Puget Sound and Hood Canal. Fishing occurs primarily from summer through late fall in Puget Sound, but can extend through the winter months in the Strait of Juan de Fuca. In freshwater areas, fisheries can occur in any month year round when harvestable salmon are present. Each Tribe regulates its own fisheries including allowable gear and locations individually within its U&A fishing grounds. A coordinated management approach is dictated if these areas overlap the U&A fishing grounds of other Tribes.

#### 3.11.2.2.2.2 Pacific Halibut Fisheries

Nine western Washington Indian Tribes (Jamestown S'Klallam Tribe, Lower Elwha Tribal Community, Lummi Tribe of the Lummi Reservation, Nooksack Indian Tribe, Port Gamble S'Klallam Tribe, Skokomish Indian Tribe, Suquamish Indian Tribe of the Port Madison Reservation, Swinomish Indian Tribal Community, and Tulalip Tribes of Washington) possess and exercise treaty fishing rights to Pacific halibut. In 1993, judicial confirmation of treaty halibut rights occurred and treaty entitlement was established at 50 percent of the harvestable supply of halibut in the Tribes combined U&A fishing grounds. Tribal allocations are divided into a commercial component and a year-round ceremonial and subsistence component. Tribal ceremonial and harvesting begins on 1 January and continues through 31 December, whereas Tribal fisheries (commercial) begin between 1 March and 1 April and continues through 15 November or until Tribal allocation is taken, whichever is earlier (U.S. Department of the Navy 2006).

#### 3.11.2.2.2.3 Shellfish Harvest

The Tribes have two distinct types of shellfish harvests: ceremonial and subsistence, and commercial. Ceremonial and subsistence procurement of shellfish, which have a central role in Tribal gatherings (e.g., weddings, funerals, etc.) and daily nutrition, are utilized for Tribal use only. Shellfish harvested during the commercial fishery are sold directly to licensed shellfish buyers who either sell shellfish directly to the public or to other commercial entities.

The Tribes with U&A fishing grounds in the Inland Waters are able to harvest intertidal shellfish (e.g., clams: Manila, butter, native little neck, horse, geoduck, eastern soft shell and cockles and oysters: Pacific and Olympia) in accordance with the 1995 ruling (United States v. Washington 1995, known at the Rafeedie Decision). Each of these Tribes has U&A harvest areas that reflects the historical region in which the harvest of shellfish occurs on public lands and privately owned tidelands. The harvestable amount of clams and oysters on all public beaches is shared equally among sport harvesters and treaty Tribes, whereas on private tidelands, the private owner and treaty Tribes are each limited to taking up to 50 percent of the harvestable surplus of shellfish.

On private-owned tidelands, Tribal shellfish procurement involves: conducting shellfish population surveys/estimates to determine Tribes' share of naturally occurring population, notifying the tideland property owner and Washington Department of Fish and Wildlife of the harvest dates/times, and acquiring a valid harvest identification card.

According to Judge Rafeedie's implementation plan, the Tribes are allowed to harvest no more than five days on any beach with one additional day granted for every additional 50 feet of beach over 200 feet in length. By agreement, Tribal commercial clam and oyster harvest must be scheduled for certain days on certain beaches. The Tribal fishery is closed on these beaches when the Tribal share of clams and oysters is reached for the year.

#### 3.11.2.2.3 Western Behm Canal, Alaska

Although subsistence hunting and fishing are economically and culturally important for many Alaska Native Tribes, the Western Behm Canal is within the Ketchikan Nonsubsistence Use Area (Alaska Department of Fish and Game 2011), which precludes subsistence uses of resources in Western Behm Canal by both Alaska Native and non-native fishermen.

## 3.11.3 Environmental Consequences

This section evaluates how and to what degree the activities described in Chapter 2 could impact Tribal traditional resources of the Study Area. Tables 2.8-1 through 2.8-3 present the baseline and proposed training and testing activity locations for each alternative (including numbers of events and ordnance expended). Section 3.0, Appendix A (Navy Activities Descriptions), and Appendix E (Training and Testing Activities Matrices) describe the warfare areas and associated stressors that were considered for analysis of Tribal traditional resources. The activities vary in intensity, frequency, duration, and location within the Study Area. Based on comments received from Tribal governments for this EIS/OEIS and past Navy actions, the concerns to Tribal traditional resources include:

- Impeding access to Tribal U&A fishing grounds or other traditional fishing areas in co-use navigable waters
- Changes to the availability of marine resources or habitat
- Loss or damage to Tribal fishing gear

The specific analysis of the training and testing activities presented in this section considers relevant components and associated data with the geographic location of the activity and Tribal traditional resources. Training activities are not proposed in the Western Behm Canal; therefore, only the Offshore Area and the Inland Waters will be analyzed under training activities.

### 3.11.3.1 Impeding Access to U&A Fishing Grounds or Traditional Fishing Areas

Many Tribes and the Navy depend heavily upon co-use navigable waters within the Study Area and have mutual interests in sustainable use of these waters. The Study Area includes U&A fishing grounds in co-use navigable waters where the Navy conducts training and testing activities. For some activities in co-use areas, the Navy must temporarily restrict public access to ensure that safety, security, and operational requirements are met. These intermittent restrictions could temporarily impede access to U&A fishing grounds and result in lost fishing opportunities. Some Tribal fisheries are only open for short time periods (days or weeks). Therefore, even intermittent, temporary access restrictions have the potential to result in reduced harvest and income, if they coincide with Tribal fishing activities. Likewise, the Navy could find it necessary to delay, relocate, or cancel training or testing events because of ongoing Tribal fishing activities. Several Tribes and the Navy are engaged in ongoing government-to-government consultation to help ensure that co-use navigable waters continue to meet both Tribal and military needs.

As discussed in Section 3.11.2.1 (American Indian and Alaska Native Tribes and Traditional Resources), U&A fishing grounds are located in the Inland Waters portion of the Study Area and in portions of the Offshore Area located off the coast of Washington. No U&A fishing grounds exist in Western Behm Canal or portions of the Offshore Area located off the coasts of Oregon or California. Traditionally, some Oregon and California Tribes procured marine resources directly from coastal and nearshore areas (less than 12 nm). These traditional fishing and harvesting areas are outside the Study Area and access to these areas would not be affected by the Proposed Action. Although subsistence hunting and fishing are economically and culturally important for many Alaska Native Tribes, the Western Behm Canal is within the Ketchikan Nonsubsistence Use Area (Alaska Department of Fish and Game 2011), which precludes subsistence uses of resources in Western Behm Canal by both Alaska Native and non-Native fishermen.

#### 3.11.3.1.1 No Action Alternative

##### 3.11.3.1.1.1 Training

**Offshore Area**

The U&A fishing grounds in the Offshore Area (Section 3.11.2.1.1 [Offshore Area]) are located off the coast of Washington and extend up to 35 nm from shore. The Tribes harvest fish in the areas for commercial, ceremonial, and subsistence purposes with gear ranging from hook and line to trawlers.

Under the No Action Alternative, training activities would continue at current levels and within established ranges and training locations (see Table 2.8-1). When planning a training event in the Offshore Area, the Navy considers maritime traffic, ocean use patterns, and other factors when choosing a location. Most training activities are conducted greater than 12 nm offshore and some are normally conducted more than 50 nm offshore (e.g., Air-to-Surface Bombing Exercises and certain Anti-Submarine Warfare Exercises), where the likelihood of interactions with other ocean users is relatively low. When training or testing activities are scheduled that require specific areas to be free of other vessels, the Navy requests that the U.S. Coast Guard (USCG) issue Notices to Mariners (NTMs) to inform the public. Units conducting training activities ensure that the appropriate safety zone is clear of other vessels before engaging in certain activities, such as firing weapons. As discussed in Section 3.13 (Public Health and Safety), inability to obtain a “clear range” could cause an event to be delayed, relocated, or cancelled. Firing exercises are suspended if visual or radar warning indicates the presence of any vessel or aircraft within firing range.

Given the vast size of the Offshore Area, the Navy normally has the ability to obtain a clear range without asking other vessels to leave the area and would not prevent the use of an area by fishing or other vessels, absent unusual circumstances. For example, the Navy may request a vessel to redirect if it is attempting to enter an established safety zone during ongoing activities or if it approaches too close to a Navy vessel. The USCG has published a final rule establishing protection zones extending 500 yards (yd.) (457 meters [m]) around all Navy vessels in navigable waters of the U.S. and within the boundaries of Coast Guard Pacific Area (32 C.F.R. Part 761), where all vessels must proceed at a no-wake speed. Nonmilitary vessels are not allowed to approach within 100 yd. (91 m) of a U.S. naval vessel, whether underway or moored, unless authorized by an official patrol.

Based on the factors discussed above, Navy training activities in the Offshore Area under the No Action Alternative are not likely to impede access to U&A fishing grounds except in rare instances where a vessel attempts to enter an established safety zone during ongoing activities or if it approaches too close to a Navy vessel.

**Inland Waters**

Tribes with U&A fishing grounds in Inland Waters are identified in Section 3.11.2.1.2 (Inland Waters). These Tribes harvest fish and shellfish for ceremonial, subsistence, and commercial purposes using hook and line, gillnets, and traditional Tribal gear. In addition, some types of shellfish are harvested by divers. Most of the Inland Waters portion of the Study Area consists of co-use navigable waters that include one or more Tribes’ U&A fishing grounds.

Under the No Action Alternative, training activities would continue at current levels and within established ranges and training locations (see Table 2.8-1), and would include Mine Neutralization – Explosive Ordnance Disposal (EOD), Personnel Insertion/Extraction, and Search and Rescue. The EOD training takes place at the Crescent Harbor and Hood Canal EOD Training Ranges. This training includes underwater detonation of high-explosives. A 700 yd. (640 m) radius exclusion zone must be established around the detonation site during this training activity to ensure public safety. The Navy requests the USCG to issue NTMs to inform the public of EOD training activities. In addition, the Navy provides advanced notification directly to Tribes with treaty resources in the area to de-conflict schedules where possible. Four EOD training events would be conducted annually (two at each EOD range) under the No Action Alternative and each event could last up to 4 hours.

Establishing the exclusion zone for EOD training could temporarily impede Tribal access to portions of their U&A fishing grounds. However, the exclusion zones would be temporary (up to 4 hours per event) and infrequent (4 times per year), and would affect a relatively small area. The Navy would also communicate with potentially affected Tribes in advance to de-conflict schedules where possible.

#### 3.11.3.1.1.2 Testing

**Offshore Area**

The potential for testing activities to temporarily impede access to U&A fishing grounds in the Offshore Area under the No Action Alternative would be similar to that described above for training activities in the Offshore Area. Testing activities in the Offshore Area under the No Action Alternative would take place in the Quinault Range Site and NTMs would be used to inform the public of activities. Unlike training in the Offshore Area, testing would not include use of high-explosives or weapons firing (other than non-explosive torpedoes) under the No Action Alternative. However, some testing activities could require a clear range and temporary establishment of safety zones to ensure public safety, security, or integrity of testing data. As discussed above for training, the Navy normally has the ability to obtain a clear range in the Offshore Area without asking other vessels to leave the area and would not prevent the use of an area by fishing or other vessels, absent unusual circumstances. Navy testing activities in the Offshore Area under the No Action Alternative are not likely to impede access to U&A fishing grounds except in rare instances where a vessel attempts to enter an established safety zone during ongoing activities or if it approaches too close to a Navy vessel.

The Navy is engaged in ongoing consultation with Tribes that have U&A fishing grounds that overlap the Quinault Range Site to exchange range and fishing schedule information to de-conflict schedules where possible.

**Inland Waters**

As discussed above for training, most of the Inland Waters portion of the Study Area consists of co-use navigable waters that include one or more Tribes' U&A fishing grounds. Under the No Action Alternative, testing activities would continue at current levels and within established ranges and testing locations (see Tables 2.8-2 and 2.8-3) and NTMs would be used to inform the public of activities. Some testing activities require restrictions on marine vessel traffic to ensure safety and security, or to eliminate acoustic interference during noise-sensitive testing.

The Keyport Range Site is charted as a restricted area on National Oceanic and Atmospheric Administration (NOAA) Navigation Chart 18446. The Dabob Bay and Hood Canal restricted areas are charted as Naval Operating Areas on NOAA Navigation Chart 18458. These designations help ensure public safety by promoting public awareness to avoid training and testing areas. The Navy maintains yellow, white, and red lights to warn nonmilitary craft of the status of Navy activities within the Dabob Bay portion of the Dabob Bay Range Complex (DBRC) Site. Red or alternating white and red lights indicate that range activities involving critical measurements are in progress, engines should be stopped until red beacons have been shut off to indicate the test is completed, and advice of Navy personnel on guard boats should be followed when in or near the range site. Typically, boat passage is permitted between tests when the yellow beacons are operating. The descriptions of the lights are posted at local boat ramps and marinas and are clearly indicated on NOAA Nautical Chart 18458.

Based on previous consultation with the Jamestown S'Klallam Tribe, the Lower Elwha Klallam Tribe, the Port Gamble S'Klallam Tribe, the Skokomish Indian Tribe, and the Point No Point Treaty Council, the Navy has implemented an information exchange with the Tribes affected by some activities at the DBRC Site. The Navy provides site use scheduling information (weekly schedule of activity and estimated usage time) and the Tribes provide fisheries regulations with the understanding that the Navy will not schedule test events that conflict with fishery openings. Any significant emergent changes/updates to this schedule are sent to the points of contact via e-mail as they may occur. The affected Tribes provide a copy of the annual regulations for the various Tribal fisheries through the Point No Point Treaty Council to the Navy. The Council also notifies the Navy of any emergency regulations that are made during the year. In addition, the Navy and the Suquamish Tribe exchange information for the Keyport Range Site.

When required to accomplish a test safely and efficiently, the Navy may restrict marine traffic and request the USCG to issue NTMs. Restrictions placed on marine traffic during testing activities in Inland Waters under the No Action Alternative could temporarily impede Tribal access to portions of their U&A fishing grounds. However, information exchange between the Tribes and Navy help to ensure schedules are de-conflicted where possible.

**Western Behm Canal, Alaska**

During operations, the Navy can close the Navy's test site to all vessel traffic, although normally such closures will not exceed 20 minutes. Small craft may operate within 500 yd. (457 m) of the shoreline at speeds no greater than 5 knots during closure periods. These closures minimize ambient underwater sound levels during testing to ensure integrity of the testing and to fully accomplish SEAFAC's mission. They also help protect public safety during testing events.

The Western Behm Canal is within the Ketchikan Nonsubsistence Use Area (Alaska Department of Fish and Game 2011), which precludes subsistence uses of resources in the Western Behm Canal by both Alaska Native and non-Native fishermen. Because traditional resources in the Western Behm Canal are not available for subsistence uses by Alaska Native Tribes, no impact on Alaska Native accessibility of traditional fishing areas would occur as a result of testing activities.

#### 3.11.3.1.2 Alternative 1

##### 3.11.3.1.2.1 Training

**Offshore Area**

Training activities under Alternative 1 would increase compared to the No Action Alternative (see Table 2.8-1). However, the increase in training activity is not expected to impede access to U&A fishing grounds. As discussed for the No Action Alternative, the Navy normally has the ability to obtain a clear range in the Offshore Area without asking other vessels to leave the area and would not prevent the use of an area by fishing or other vessels, absent unusual circumstances. Navy training activities in the Offshore Area under Alternative 1 are not likely to impede access to U&A fishing grounds except in rare instances where a vessel attempts to enter an established safety zone during ongoing activities or if it approaches too close to a Navy vessel.

**Inland Waters**

Under Alternative 1, training activities would increase compared to the No Action Alternative and some new activities would be introduced (see Table 2.8-1). The number of EOD training events at the Crescent Harbor and Hood Canal EOD Ranges would increase from two per year at each site to six per year at each site under Alternative 1. As discussed for the No Action Alternative, an exclusion zone must be established around the detonation site during this training activity to ensure public safety. Establishing the exclusion zone for EOD training could temporarily impede Tribal access to portions of their U&A fishing grounds. The exclusion zones would be temporary (up to 4 hours per event) and infrequent (12 times per year), and would affect a relatively small area. The Navy would continue to provide advanced notification directly to Tribes with treaty resources in the area to de-conflict schedules where possible.

Surface ship sonar maintenance would be performed under Alternative 1 at NAVBASE Kitsap Bremerton in Sinclair Inlet, NAVBASE Kitsap Bangor Waterfront in Hood Canal, and Naval Station Everett. Existing security restrictions prevent public access at Navy pierside locations; therefore, access to U&A fishing grounds would not change as a result of these maintenance activities.

Alternative 1 includes Maritime Security Operations (MSO), which encompasses various components. One component of MSO is Transit Protection System (TPS). Each TPS event includes up to nine security escorts moving within Puget Sound and the Strait of Juan de Fuca. USCG personnel and their ancillary equipment are involved in these events. Every 2 years, a TPS training event occurs that involves up to 16 vessels transiting from Hood Canal to Admiralty Inlet. During this biennial event, boat crews train to engage surface targets by firing small-caliber (blank) weapons. Generally, the escorts establish a moving perimeter (security zone) around a larger naval vessel to prevent other vessels from entering that security zone. Depending on the type of vessel escort being conducted and other conditions, the security zone could be from a 100-yd. to a 1,000 yd. radius around the escorted vessel. If present, all other vessels would be required to exit the security zone in accordance with general regulations in 33 C.F.R. Section 165, Subpart D until the convoy passes. Most often, this would mean temporarily relocating to a point closer to the shoreline. The impact to other vessels would typically last no more than 15 minutes, until the transiting vessels have passed.

Alternative 1 also includes similar maritime security escort training with Coastal Riverine Group (CRG) boat crews conducting force protection for designated naval vessels and movements. Using up to four vessels per event, these CRG boat crews train to protect naval vessels while entering and leaving ports. Other missions include ensuring compliance with vessel security zones for ships in port and at anchor, conducting patrols to counter waterborne threats, and conducting harbor approach defense.

For national security reasons, NTMs are issued in advance of TPS events only on a case-by-case basis. However, the USCG Maritime Force Protection Unit (MFPU) provides notification of TPS events to Tribal Fisheries Enforcement Officers prior to the vessels departing Bangor. All vessels (Tribal, commercial or private), which are on the water during a TPS event would be required to move immediately from the security zone established by the convoy. In some cases, fishermen might find it necessary to leave gear in place to comply with this requirement. Although the vessel can return to the site after convoy passage, the vessel may have used more fuel than expected, damage or loss of fishing gear is possible if left in the security zone (see Section 3.11.3.3, Loss of Fishing Gear), and fish or shellfish harvest may be reduced for that day. If a TPS event coincides with a limited opening of a particular fishing season (e.g., fishing for Coho salmon using gillnets in Hood Canal north of NAVBASE Kitsap Bangor occurs from September 25 through October 11 [Washington Department of Fish and Wildlife and the Northwest Indian Fisheries Commission 2014]), a potential loss of harvest could occur in that season.

Training activities in the Inland Waters under Alternative 1 have the potential to impede Tribal access to U&A fishing grounds; increase economic costs for maintaining and operating fishing equipment (e.g.., fuel costs during relocation and damage or loss of fishing gear); and reduce ceremonial, subsistence, and commercial harvests.

#### 3.11.3.1.2.2 Testing

**Offshore Area**

Under Alternative 1, testing activities would increase compared to the No Action Alternative (see Tables 2.8-2 and 2.8-3). However, the increase in testing activity is not expected to impede access to U&A fishing grounds. Alternative 1 would include testing of explosive torpedoes. However, this activity would be conducted greater than 50 nm off the cost of Washington, outside of U&A fishing grounds. Testing events using aircraft in the Offshore Area under Alternative 1 would not affect access to U&A fishing grounds. As discussed for the No Action Alternative, the Navy normally has the ability to obtain a clear range in the Offshore Area without asking other vessels to leave the area and would not prevent the use of an area by fishing or other vessels, absent unusual circumstances. Navy testing activities in the Offshore Area under Alternative 1 are not likely to impede access to U&A fishing grounds except in rare instances where a vessel attempts to enter an established safety zone during ongoing activities or if it approaches too close to a Navy vessel.

**Inland Waters**

Under Alternative 1, testing activities would increase compared to the No Action Alternative and some new activities would be introduced (see Tables 2.8-2 and 2.8-3). The Navy is retaining the Carr Inlet OPAREA and infrequent operational and acoustic research studies could be conducted there under Alternative 1. No explosives would be used at Carr Inlet OPAREA. Public use restrictions associated with Carr Inlet OPAREA are codified in U.S. Code (U.S.C.) Title 33 §334.1250. These restrictions were established for the level and type of activity that existed when the Navy's Fox Island Laboratory was in place. Since the dis-establishment of the shore lab in 2009, the nature of activity and the in-water infrastructure has changed. Fixed buoys and hydrophones are no longer in place. As such, the restrictions that were in place that pertained to this equipment are expected to be relaxed in an upcoming revision to the C.F.R. The area is open to navigation at all times. Maritime traffic to points within Carr Inlet and through Carr Inlet to adjacent waters is permitted free access. Some restrictions may be instituted when the range is in use under Alternative 1. The public would be notified via published announcement in local newspapers and in the local USCG NTM if the Navy plans testing activities in the Carr Inlet OPAREA. The Navy would continue to communicate with Tribes that have U&A fishing grounds that overlap the Carr Inlet OPAREA to de-conflict schedules where possible.

Pierside sonar and acoustic testing would be performed under Alternative 1 at NAVBASE Kitsap Bremerton in Sinclair Inlet, NAVBASE Kitsap Bangor Waterfront in Hood Canal, and Naval Station Everett. Existing security restrictions prevent public access at Navy pierside locations; therefore, access to U&A fishing grounds would not change as a result of these testing activities.

As discussed for the No Action Alternative, restrictions placed on marine traffic during testing activities in Inland Waters under Alternative 1 could temporarily impede Tribal access to portions of their U&A fishing grounds.

**Western Behm Canal, Alaska**

The Western Behm Canal is within the Ketchikan Nonsubsistence Use Area (Alaska Department of Fish and Game 2011), which precludes subsistence uses of resources in the Western Behm Canal by both Alaska Native and non-Native fishermen. Because traditional resources in the Western Behm Canal are not available for subsistence used by Alaska Native Tribes, no impact on the accessibility of Alaska Native traditional fishing areas would occur as a result of testing activities.

#### 3.11.3.1.3 Alternative 2

##### 3.11.3.1.3.1 Training

**Offshore Area**

Training activities under Alternative 2 would be the same as Alternative 1 (see Table 2.8-1) and represent an increase compared to the No Action Alternative. Therefore, the analysis presented for training activities in the Offshore Area under Alternative 1 also applies to Alternative 2. Navy training activities in the Offshore Area under Alternative 2 are not likely to impede access to U&A fishing grounds except in rare instances where a vessel attempts to enter an established safety zone during ongoing activities or if it approaches too close to a Navy vessel.

**Inland Waters**

Training activities under Alternative 2 would increase compared to the No Action Alternative and would be the same as Alternative 1 (see Table 2.8-1). Therefore, the analysis presented for training activities in the Offshore Area under Alternative 1 also applies to Alternative 2. Training activities in the Inland Waters under Alternative 2 have the potential to impede Tribal access to U&A fishing grounds; increase economic costs for maintaining and operating fishing equipment (e.g., fuel costs during relocation and damage or loss of fishing gear); and reduce ceremonial, subsistence, and commercial harvests.

##### 3.11.3.1.3.2 Testing

**Offshore Area**

Testing activities under Alternative 2 would increase compared to the No Action Alternative and Alternative 1 (see Tables 2.8-2 and 2.8-3). As discussed for Alternative 1, the increase in testing activity is not expected to impede access to U&A fishing grounds. As discussed for the No Action Alternative, the Navy normally has the ability to obtain a clear range in the Offshore Area without asking other vessels to leave the area and would not prevent the use of an area by fishing or other vessels, absent unusual circumstances. Navy testing activities in the Offshore Area under Alternative 2 are not likely to impede access to U&A fishing grounds except in rare instances where a vessel attempts to enter an established safety zone during ongoing activities or if it approaches too close to a Navy vessel.

**Inland Waters**

Testing activities under Alternative 2 would increase compared to the No Action Alternative and Alternative 1 (see Tables 2.8-2 and 2.8-3). As discussed for the No Action Alternative and Alternative 1, restrictions placed on marine traffic during testing activities in Inland Waters under Alternative 1 could temporarily impede Tribal access to portions of their U&A fishing grounds. However, information exchange between the Tribes and Navy help to ensure schedules are de-conflicted where possible.

**Western Behm Canal, Alaska**

The Western Behm Canal is within the Ketchikan Nonsubsistence Use Area (Alaska Department of Fish and Game 2011), which precludes subsistence uses of resources in the Western Behm Canal by both Alaska Native and non-Native fishermen. Because traditional resources in the Western Behm Canal are not available for subsistence uses by Alaska Native Tribes, no impact on the accessibility of Alaska Native traditional fishing areas would occur as a result of testing activities.

### 3.11.3.2 Changes in the Availability of Marine Resources or Habitat

The availability and health of marine resources is a concern for Tribes with U&A fishing grounds in the Study Area, as well those with U&A fishing grounds in inland areas outside the Study Area. In many cases the main traditional resources harvested in these inland U&A fishing grounds are species such as salmon, steelhead, or sturgeon that complete a portion of their life-cycle in marine environments. The availability of harvested traditional resource species could be affected if training and testing activities resulted in the following:

- A measurable reduction in a population or stock caused by direct impacts such as mortality or indirect impacts to water quality and habitat,
- Bioaccumulation of contaminates to levels where fish or shellfish would be unhealthy to consume, or
- Mobile species avoiding U&A fishing grounds or altering their migratory patterns in response to disturbances.

When resource population levels dip, it becomes more likely that the Tribal and state co-managers will close a fishery to harvest, reduce the duration of open seasons, or reduce the catch quota. Furthermore, when there are less fish, more effort and time must be expended to catch the same number of fish. Where fish populations are low, greater effort means more commercial fishermen may give up fishing as their main source of income.

The Navy has analyzed potential impacts of the No Action Alternative, Alternative 1, and Alternative 2 on resources harvested by Tribes and associated habitat in the following sections of the EIS/OEIS: 3.1 (Sediments and Water Quality), 3.3 (Marine Habitats), 3.7 (Marine Vegetation), 3.8 (Marine Invertebrates), 3.9 (Fish). Based on the analyses in these sections, the Proposed Action could directly affect individuals of some species harvested by Tribes, including mortality in a relatively small number of individuals. However, there would be no population- or stock-level impacts and there would be no measurable change in availability. Impacts on water quality and habitat would be localized and negligible, and would not be expected to affect availability of resources for harvest by Tribes. The Proposed Action is not expected to contribute to bioaccumulation in fish and shellfish species harvested by the Tribes based on the types and quantities of potential contaminates released and their fate and transport in the environment. Disturbances associated with the Proposed Action would be intermittent, of short duration, and widely dispersed, and are not expected to cause harvested species to avoid U&A fishing grounds or alter their migratory patterns.

Chapter 5 (Standard Operating Procedures, Mitigation, and Monitoring) describes protective measures the Navy implements within the Study Area. Although some of the measures specifically address species listed under the Endangered Species Act, many of them would also benefit species harvested by Tribes.

The Proposed Action is not expected to have a measureable effect on the availability of marine resources for harvest by Tribes.

### 3.11.3.3 Loss of Fishing Gear

As discussed in Section 3.11.3.1 (Impeding Access to U&A Fishing Grounds or Traditional Fishing Areas) Tribal fishing activities and Navy training and testing activities occur in co-use areas in the Inland Waters portion of the Study Area and in portions of the Offshore Area located off the coast of Washington. Consequently, the potential exists for interactions between naval vessels and equipment and Tribal fishing gear. Loss or damage to gear is a concern for Tribal fishermen because it can result in lost fishing opportunities and increase the cost of fishing, which could ultimately reduce harvest and income.

Tribal fishermen use many types of fishing gear in the Study Area, including hook and line, gillnets, longline gear, troll gear, trawls, seines, traps or pots, and traditional Tribal fishing gear. In general, any gear that is designed to be fished unattended, either in the water column or on the bottom (e.g., gillnets, longlines, pots), would be most susceptible to snagging by a vessel or mobile in-water device. However, Tribal fishermen mark their gear in accordance with fishing regulations and the Navy uses standard navigational practices to avoid potential interactions with fixed gear. In-water devices include unmanned vehicles such as remotely operated vehicles, unmanned surface and undersea vehicles, and towed devices. These devices are self-propelled and unmanned or towed through the water from a variety of platforms, including helicopters and surface ships. Before deploying an in-water device, it is standard operating procedure to search the intended path of the device for obstructions that could damage the device, including other vessels, buoys or markers (possibly associated with fishing gear), and floating debris (e.g., driftwood, trash).

Interactions between mobile fishing gear such as a trawl (i.e., a net towed by a vessel along the bottom or in the water column) and naval vessels is unlikely because the vessels involved would avoid each other. Interactions between mobile gear and a fixed in-water device such as testing equipment would also be unlikely because fixed devices would be clearly marked on the surface with a buoy. Mobile gear fished on or near the bottom could encounter military expended materials that the Navy was unable to recover. These items are typically small, constructed of soft materials (such as target cardboard boxes or tethered target balloons), or intentionally designed to sink to the bottom after serving their purpose (e.g., sonobuoys), so they would not represent an entanglement risk to fishing gear. As discussed in Section 3.1 (Sediments and Water Quality), a west coast study categorized types of marine debris collected by a trawler during a groundfish survey. Military expended materials categorized as plastic, metal, fabric and fiber, and rubber accounted for 7.4, 6.2, 13.2, and 4.7 percent, respectively, of the total count of items collected. The footprint of military expended materials in the Study Area is discussed in Section 3.3 (Marine Habitats), which concludes that if all military expended materials were placed side by side in the Study Area, the footprint would be approximately 0.04 square nautical miles. Because this footprint is so small relative to the size of the Study Area, fishermen probably would not encounter military expended materials.

As discussed in Section 3.11.1.3 (Government-to-Government Consultation), the Navy and several Tribes with U&A fishing grounds in the Study Area are engaged in ongoing government-to-government consultation. The potential for interactions between Tribal fishing gear and naval vessels and equipment is a topic of mutual interest addressed through the consultation process. As discussed in Section 3.11.3.1 (Impeding Access to U&A Fishing Grounds or Traditional Fishing Areas), several Tribes and the Navy have implemented or are continuing formal communication procedures to de-conflict schedules where possible. These communications, in addition to standard NTMs issued by USCG, help to avoid and minimize the potential for lost or damaged Tribal fishing gear associated with Navy training and testing activities. Any claims for loss or damage to fishing gear related to Navy activities are addressed through the Navy's claims adjudication process. Information on admiralty claims can be found at the Navy Judge Advocate General's Corps website: http://www.jag.navy.mil/organization/code_11.htm.

#### 3.11.3.3.1 No Action Alternative

##### 3.11.3.3.1.1 Training

**Offshore Area**

Section 3.11.3.1 (Impeding Access to U&A Fishing Grounds or Traditional Fishing Areas) describes the potential for Tribal fishing and Navy training activities to overlap in the Offshore Area. The potential for interaction would be limited to areas off the coast of Washington out to the western limit of U&A fishing grounds (35 nm). Given the vast size of the Offshore Area, the Navy normally has the ability avoid areas that are actively being used by other vessels, which reduces the potential to encounter and damage fishing gear. Some Tribes use trawlers in the Offshore Area and could potentially encounter military expended materials when bottom trawling. Many individual items are small and would not likely cause damage if encountered. Large items such as sonobuoys would be more likely to cause damage, but the probability of encountering one would be low. As discussed above and in Section 3.3 (Marine Habitats), the overall footprint of military expended materials in the Study Area is relatively small and fishermen probably would not encounter military expended materials. Therefore, damage to fishing gear from Navy training activities in the Offshore Area would be rare under the No Action Alternative.

**Inland Waters**

Under the No Action Alternative, training activities would continue at current levels and within established ranges and training locations (see Table 2.8-1), and would include Mine Neutralization – EOD, Personnel Insertion/Extraction, and Search and Rescue. Small boats, which have good maneuverability and visibility, would be used to support these activities. Small boat crews would be expected to see and avoid any marked fishing gear in the area during these exercises. EOD training requires establishment of a 700 yd. (640 m) radius exclusion zone; therefore, no fishing gear would be in the area during this activity. Submersible and non-submersible in-water devices would be used during Personnel Insertion/Extraction. Before deploying an in-water device, it is standard operating procedure to search the intended path of the device for obstructions that could damage the device, including other vessels, buoys or markers (possibly associated with fishing gear), and floating debris (e.g., driftwood, trash). No military expended materials that present a risk of snagging or damaging fishing gear would be used during training activities in Inland Waters under the No Action Alternative (see Section 3.0.5.3.3.3 [Military Expended Material]). Therefore, damage to fishing gear from Navy training activities in Inland Waters would be rare under the No Action Alternative.

##### 3.11.3.3.1.2 Testing

**Offshore Area**

Section 3.11.3.1 (Impeding Access to U&A Fishing Grounds or Traditional Fishing Areas) describes the potential for Tribal fishing and Navy testing activities to overlap in the Offshore Area. The potential for interaction would be limited to areas off the coast of Washington out to the western limit of U&A fishing grounds (35 nm). Given the vast size of the Offshore Area, the Navy normally has the ability avoid areas that are actively being used by other vessels, which reduces the potential to encounter and damage fishing gear. Various in-water devices would be used during testing in the Offshore Area. Before deploying an in-water device, it is standard operating procedure to search the intended path of the device for obstructions that could damage the device, including other vessels, buoys or markers (possibly associated with fishing gear), and floating debris (e.g., driftwood, trash). Sonobuoys are the only military expended materials associated with testing in the Offshore Area that present a risk of damaging fishing gear under the No Action Alternative (see Section 3.0.5.3.3.3 [Military Expended Material]). As discussed above for training in the Offshore Area, the likelihood of a bottom trawl encountering a sonobuoy is low. Therefore, damage to fishing gear from Navy testing activities in the Offshore Area would be rare under the No Action Alternative.

**Inland Waters**

Section 3.11.3.1 (Impeding Access to U&A Fishing Grounds or Traditional Fishing Areas) describes the potential for Tribal fishing and Navy testing activities to overlap in Inland Waters; standard procedures used to ensure safety, security, and testing data integrity; and procedures for communicating with Tribes that have U&A fishing grounds in testing areas. The specified procedures effectively avoid and minimize the potential for damage to fishing gear during testing activities in Inland Waters. Most of the materials and items used during testing are recovered after use. However, some items such as sonobuoys (about six per year), subsurface targets (up to eight per year), guidance wires, and ballast weights may not be recoverable (see Section 3.0.5.3.3.3 [Military Expended Material]). These items could present a risk to gear fished on the bottom, but the probability of encountering these items would be low. Therefore, damage to fishing gear from Navy testing activities in Inland Waters would be rare under the No Action Alternative.

**Western Behm Canal, Alaska**

The Western Behm Canal is within the Ketchikan Nonsubsistence Use Area (Alaska Department of Fish and Game 2011), which precludes subsistence uses of resources in the Western Behm Canal by both Alaska Native and non-Native fishermen. Because traditional resources in the Western Behm Canal are not available for subsistence uses by Alaska Native Tribes, loss or damage to Alaska Native fishing equipment would not occur as a result of testing activities resulting in vessel or in-water device strikes. No testing activities resulting in the deposition of military expended materials occur in the Western Behm Canal (see Table 2.8-1 and 2.8-3).

#### 3.11.3.3.2 Alternative 1

##### 3.11.3.3.2.1 Training

**Offshore Area**

Under Alternative 1, training activities would increase compared to the No Action Alternative (see Table 2.8-1). As discussed for the No Action Alternative, the Navy normally has the ability avoid areas that are actively being used by other vessels, which reduces the potential to encounter and damage fishing gear in the Offshore Area. The number of military expended material items, including sonobuoys, would increase under Alternative 1. Therefore, Tribal fishermen using bottom trawls may be more likely to encounter these materials, but as discussed for the No Action Alternative the probability would remain low. Damage to fishing gear from Navy training activities in the Offshore Area would be rare under Alternative 1, but risk would increase slightly compared to the No Action Alternative.

**Inland Waters**

Under Alternative 1, training activities in Inland Waters would increase compared to the No Action Alternative (see Table 2.8-1). New training activities would also be conducted in Inland Waters under Alternative 1. The number of EOD training events at the Crescent Harbor and Hood Canal EOD Ranges would increase from two per year at each site to six per year at each site under Alternative 1. As discussed for the No Action Alternative, an exclusion zone must be established around the detonation site during this training activity to ensure public safety. Therefore, no fishing gear would be in the area during this activity. The number Personnel Insertion/Extraction – Submersible events would not change and the number Personnel Insertion/Extraction – Submersible events would decrease under Alternative 1. No military expended materials that present a risk of snagging or damaging fishing gear would be used during training activities in Inland Waters under Alternative 1 (see Section 3.0.5.3.3.3 [Military Expended Material]).

Under Alternative 1, the Navy proposes to conduct MSOs, which includes TPS and CRG escort activities. These activities, associated security requirements, and notification procedures are discussed in Section 3.11.3.1 (Impeding Access to U&A Fishing Grounds or Traditional Fishing Areas). As noted above, if present, all other vessels would be required to exit the security zone in accordance with general regulations in 33 C.F.R. Section 165, Subpart D until the convoy passes. In some cases, fishermen might find it necessary to leave fishing gear in place to comply with this requirement, thus increasing the potential for damage or loss. For national security reasons, NTMs are issued in advance of TPS events only on a case-by-case basis. However, the USCG MFPU provides notification of TPS events to Tribal Fisheries Enforcement Officers from potentially affected Tribes prior to the vessels departing Bangor.

Surface ship sonar maintenance would be performed under Alternative 1 at NAVBASE Kitsap Bremerton in Sinclair Inlet, NAVBASE Kitsap Bangor Waterfront in Hood Canal, and Naval Station Everett. Existing security restrictions prevent public access at Navy pierside locations; therefore, fishing gear would not be affected by these activities.

The potential for loss or damage to fishing gear would increase under Alternative 1 as a result of MSO and TPS events. Loss or damage to Tribal fishing gear could reduce fishing opportunities while the gear is being replaced or repaired, and could increase the amount of effort and resources required to catch the same amount of fish. The USCG MFPU would provide notification of TPS events to Tribal Fisheries Enforcement Officers. Information exchange between the Tribes and Navy help to ensure schedules are de-conflicted where possible.

#### 3.11.3.3.2.2 Testing

**Offshore Area**

Under Alternative 1, testing activities in the Offshore Area would increase compared to the No Action Alternative (see Tables 2.8-2 and 2.8-3). However, the increase in testing activity is not expected to increase damage to fishing gear. New activities under Alternative 1 would include testing of explosive torpedoes. However, this activity would be conducted greater than 50 nm off the cost of Washington, outside of U&A fishing grounds and would not damage Tribal fishing gear. As discussed for the No Action Alternative, the Navy normally has the ability avoid areas that are actively being used by other vessels, which reduces the potential to encounter and damage fishing gear in the Offshore Area. The number of military expended material items, including sonobuoys, chaff, and flares, would increase under Alternative 1. Therefore, Tribal fishermen using bottom trawls may be more likely to encounter these materials, but as discussed for the No Action Alternative the probability would remain low. Damage to fishing gear from Navy testing activities in the Offshore Area would be rare under Alternative 1, but risk would increase slightly compared to the No Action Alternative.

**Inland Waters**

Under Alternative 1, testing activities would increase compared to the No Action Alternative (see Tables 2.8-2 and 2.8-3). The Navy is retaining the Carr Inlet OPAREA and infrequent operational and acoustic research studies could be conducted there under Alternative 1. As discussed in Section 3.11.3.1 (Impeding Access to U&A Fishing Grounds or Traditional Fishing Areas), the nature of activity and the in-water infrastructure at Carr Inlet OPAREA has changed since the dis-establishment of the shore lab in

2009. Fixed buoys and hydrophones are no longer in place. Use of this area under Alternative 1 may include temporary placement of underwater testing devices. Appropriate safety procedures and temporary marine traffic restrictions would be used to avoid interactions with fishing gear. The public would be notified via published announcement in local newspapers and in the local USCG NTM if the Navy plans testing activities in the Carr Inlet OPAREA. Information exchange between the Tribes and Navy help to ensure schedules are de-conflicted where possible.

Pierside sonar and acoustic testing would be performed under Alternative 1 at NAVBASE Kitsap Bremerton in Sinclair Inlet, NAVBASE Kitsap Bangor Waterfront in Hood Canal, and Naval Station Everett. Existing security restrictions prevent public access at Navy pierside locations; therefore, fishing gear would not be affected by these activities.

As discussed for the No Action Alternative, most of the materials and items used during testing are recovered after use. The only change in military expended materials under Alternative 1 would be one additional subsurface target per year. Military expended materials could present a risk to gear fished on the bottom, but the probability of encountering these items would be low.

Standard procedures used to ensure safety, security, and testing data integrity; and procedures for communicating with Tribes that have U&A fishing grounds in testing areas would continue to be implemented under Alternative 1 and would minimize the risk of fishing gear damage. Damage to fishing gear from Navy testing activities in Inland Waters would be rare under Alternative 1, but risk would increase slightly compared to the No Action Alternative.

**Western Behm Canal, Alaska**

The Western Behm Canal is within the Ketchikan Nonsubsistence Use Area (Alaska Department of Fish and Game 2011), which precludes subsistence uses of resources in the Western Behm Canal by both Alaska Native and non-Native fishermen. Because traditional resources in the Western Behm Canal are not available for subsistence uses by Alaska Native Tribes, loss or damage to Alaska Native fishing equipment would not occur as a result of an increase of testing activities resulting in vessel or in-water device strikes. No testing activities resulting in the deposition of military expended materials occur in the Western Behm Canal (see Tables 2.8-2 and 2.8-3).

#### 3.11.3.3.3 Alternative 2

##### 3.11.3.3.3.1 Training

**Offshore Area**

Training activities under Alternative 2 would be the same as Alternative 1 (see Table 2.8-1) and represent an increase compared to the No Action Alternative. Therefore, the analysis presented for training activities in the Offshore Area under Alternative 1 also applies to Alternative 2. Damage to fishing gear from Navy training activities in the Offshore Area would be rare under Alternative 1, but risk would increase slightly compared to the No Action Alternative.

**Inland Waters**

Training activities under Alternative 2 would be the same as Alternative 1 and represent an increase compared to the No Action Alternative (see Table 2.8-1). Therefore, the analysis presented for training activities in Inland Water under Alternative 1 also applies to Alternative 2. The potential for loss or damage to fishing gear would increase under Alternative 2 as a result of MSO and TPS events. Loss or damage to Tribal fishing gear could reduce fishing opportunities while the gear is being replaced or repaired, and could increase the amount of effort and resources required to catch the same amount of fish. The USCG MFPU would provide notification of TPS events to Tribal Fisheries Enforcement Officers. Information exchange between the Tribes and Navy help to ensure schedules are de-conflicted where possible.

#### 3.11.3.3.3.2 Testing

**Offshore Area**

Testing activities in the Offshore Area would increase under Alternative 2 compared to the No Action Alternative and Alternative 1 (see Tables 2.8-2 and 2.8-3). As discussed for Alternative 1, the increase in testing activity is not expected to increase damage to fishing gear and the new testing of explosive torpedoes would be conducted greater than 50 nm off the cost of Washington, outside of U&A fishing grounds. The Navy normally has the ability avoid areas that are actively being used by other vessels, which reduces the potential to encounter and damage fishing gear in the Offshore Area. The number of military expended material items, including sonobuoys, chaff, and flares, would increase under Alternative 2. Therefore, Tribal fishermen using bottom trawls may be more likely to encounter these materials, but as discussed for the No Action Alternative the probability would remain low. Damage to fishing gear from Navy testing activities in the Offshore Area would be rare under Alternative 2, but risk would increase slightly compared to the No Action Alternative and Alternative 1.

**Inland Waters**

Testing activities in Inland Waters would increase under Alternative 2 compared to the No Action Alternative and Alternative 1 (see Tables 2.8-2 and 2.8-3). As discussed for Alternative 1, use of the Carr Inlet OPAREA may include temporary placement of underwater testing devices. Appropriate safety procedures and temporary marine traffic restrictions would be used to avoid interactions with fishing gear. Existing security restrictions prevent public access at Navy pierside locations; therefore, fishing gear would not be affected by these activities. The only change in military expended materials under Alternative 2 would be three additional subsurface target per year compared to the No Action Alternative. Military expended materials could present a risk to gear fished on the bottom, but the probability of encountering these items would be low. Standard procedures used to ensure safety, security, and testing data integrity; and procedures for communicating with Tribes that have U&A fishing grounds in testing areas would continue to be implemented under Alternative 2 and would minimize the risk of fishing gear damage. Damage to fishing gear from Navy testing activities in Inland Waters would be rare under Alternative 2, but risk would increase slightly compared to the No Action Alternative and Alternative 1.

**Western Behm Canal, Alaska**

The Western Behm Canal is within the Ketchikan Nonsubsistence Use Area (Alaska Department of Fish and Game 2011), which precludes subsistence uses of resources in the Western Behm Canal by both Alaska Native and non-Native fishermen. Because traditional resources in the Western Behm Canal are not available for subsistence uses by Alaska Native Tribes, loss or damage to Alaska Native fishing equipment would not occur as a result of testing activities resulting in vessel or in-water device strikes. No testing activities resulting in the deposition of military expended materials occur in the Western Behm Canal (see Tables 2.8-2 and 2.8-3).

### 3.11.3.4 Summary of Potential Impacts on American Indian and Alaska Native Traditional Resources

Potential impacts on American Indian and Alaska Native traditional resources under the No Action Alternative, Alternative 1, and Alternative 2 are summarized in Table 3.11-5.

**Table 3.11-5: Summary of Impacts of Training and Testing Activities on American Indian and Alaska Native Traditional Resources**

| Alternative and Concern | Impacts of Training and Testing Activities |
|---|---|
| **No Action Alternative** | |
| Impeding Tribal Access to U&A Fishing Grounds | Navy training and testing activities in the Offshore Area under the No Action Alternative are not likely to impede access to U&A fishing grounds except in rare instances where a vessel attempts to enter an established safety zone during ongoing activities or if it approaches too close to a Navy vessel.<br>Navy training and testing activities in Inland Waters under the No Action Alternative could temporarily impede Tribal access to portions of their U&A fishing grounds. The Navy would communicate with potentially affected Tribes in advance to de-conflict schedules where possible. |
| Change in the Availability of Marine Resources | Training and testing activities under the No Action Alternative are not expected to have a measureable effect on the availability of marine resources for harvest by Tribes. |
| Loss of Fishing Gear | Loss of or damage to fishing gear from Navy training and testing activities in the Offshore Area would be rare under the No Action Alternative.<br>Loss of or damage to fishing gear from Navy training and testing activities in Inland Waters would be rare under the No Action Alternative. |
| **Alternative 1 (Preferred Alternative)** | |
| Impeding with Access to Tribal U&A Fishing Grounds | Navy training and testing activities in the Offshore Area under Alternative 1 are not likely to impede access to U&A fishing grounds except in rare instances where a vessel attempts to enter an established safety zone during ongoing activities or if it approaches too close to a Navy vessel.<br>Navy training and testing activities in Inland Waters under Alternative 1 could temporarily impede Tribal access to portions of their U&A fishing grounds. The potential for impeded access would increase compared to the No Action Alternative because of Maritime Security Operations, such as Transit Protection System training events and increases in testing activities. The Navy would communicate with potentially affected Tribes in advance to de-conflict schedules where possible. The U.S. Coast Guard Maritime Force Protection Unit would provide notification of Transit Protection System events to Tribal Fisheries Enforcement Officers. |
| Change in the Availability of Marine Resources | Training and testing activities under Alternative 1 are not expected to have a measureable effect on the availability of marine resources for harvest by Tribes. |
| Loss of Fishing Gear | Loss of or damage to fishing gear from Navy training and testing activities in the Offshore Area would be rare under Alternative 1, but would increase slightly compared to the No Action Alternative.<br>The potential for loss of or damage to fishing gear would increase under Alternative 1 as a result of Maritime Security Operations, such as Transit Protection System training events. Loss of or damage to fishing gear from Navy testing activities in Inland Waters would be rare under Alternative 1, but risk would increase compared to the No Action Alternative. |

**Table 3.11-5: Summary of Impacts of Training and Testing Activities on American Indian and Alaska Native Traditional Resources (continued)**

| **Alternative 2** | |
|---|---|
| Impeding with Access to Tribal U&A Fishing Grounds | Navy training and testing activities in the Offshore Area under Alternative 2 are not likely to impede access to U&A fishing grounds except in rare instances where a vessel attempts to enter an established safety zone during ongoing activities or if it approaches too close to a Navy vessel.<br>Navy training and testing activities in Inland Waters under Alternative 2 could temporarily impede Tribal access to portions of their U&A fishing grounds. The potential for impeded access would increase compared to the No Action Alternative because of Maritime Security Operations, such as Transit Protection System training events and increases in testing activities. The Navy would communicate with potentially affected Tribes in advance to de-conflict schedules where possible. The U.S. Coast Guard Maritime Force Protection Unit would provide notification of Transit Protection System events to Tribal Fisheries Enforcement Officers. |
| Change in the Availability of Marine Resources | Training and testing activities under Alternative 2 are not expected to have a measureable effect on the availability of marine resources for harvest by Tribes. |
| Loss of Fishing Gear | Loss of or damage to fishing gear from Navy training and testing activities in the Offshore Area would be rare under Alternative 2, but would increase slightly compared to the No Action Alternative.<br>The potential for loss of or damage to fishing gear would increase under Alternative 2 as a result of Maritime Security Operations, such as Transit Protection System training events. Loss of or damage to fishing gear from Navy testing activities in Inland Waters would be rare under Alternative 2, but risk would increase compared to the No Action Alternative. |

Note: U&A = usual and accustomed

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# 3.12 Socioeconomic Resources

## TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES

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## 3.12 SOCIOECONOMIC RESOURCES

**SOCIOECONOMIC RESOURCES SYNOPSIS**

The United States Department of the Navy (Navy) considered all potential stressors, and the following have been analyzed for socioeconomic resources:

- Accessibility (limiting access to the ocean and the air)
- Physical Disturbance and Interactions (aircraft, vessels and in-water devices, military expended materials)
- Aircraft and Vessel Noise (weapons firing, aircraft and vessel noise)
- Secondary Impacts (from changes to the availability of marine resources)

**Preferred Alternative (Alternative 1)**

- Impacts on socioeconomic resources are expected to be minor because inaccessibility to areas of co-use would be localized and temporary, the Navy's strict standard operating procedures would minimize physical disturbance and interactions, the majority of airborne activities would occur well out to sea far from tourism and recreation locations, and impacts on marine species are not expected. Further, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

### 3.12.1 INTRODUCTION AND METHODS

This section provides an overview of the characteristics of socioeconomic resources in the Northwest Training and Testing (NWTT) Study Area (hereafter referred to as the Study Area) and describes, in general terms, the methods used to analyze the Proposed Action's potential impacts on these resources.

The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) state that when economic or social effects and natural or physical environmental effects are interrelated, the environmental impact statement will discuss these effects on the human environment (40 Code of Federal Regulations [C.F.R.] 1508.14). The CEQ regulations state that the "human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment." To the extent that the ongoing and proposed United States (U.S.) Department of the Navy (Navy) training and testing activities in the Study Area could affect the natural or physical environment, the socioeconomic analysis evaluates how elements of the human environment might be affected. The Navy identified three broad socioeconomic topics based on their association with human activities and livelihoods in the Study Area. Each of these socioeconomic resources is an aspect of the human environment that involves economics (e.g., employment, income, or revenue) and social conditions (e.g., enjoyment and quality of life) associated with the marine environment of the Study Area. Therefore, this evaluation considered potential impacts on the following three socioeconomic activities:

- Transportation and shipping
- Commercial and recreational fishing (usual and accustomed fishing by Pacific Northwest American Indian tribes and nations and Alaska Natives is analyzed in Section 3.11, American Indian and Alaska Native Traditional Resources)
- Tourism

The baseline for identifying the socioeconomic conditions in the Study Area was derived using relevant published information from sources that included federal, state, regional, and local government agencies and databases, academic institutions, conservation organizations, technical and professional organizations, and private groups. Previous environmental studies were also reviewed for relevant information.

The alternatives were evaluated based on the potential for and the degree to which training and testing activities could impact socioeconomic resources. The potential for impacts depends on the likelihood that the training and testing activities would interact with public activities or infrastructure. Factors considered in the analysis include whether there would be temporal or spatial interfaces between the public or infrastructure and Navy training and testing. If there is potential for this interaction, factors considered to estimate the degree to which an exposure could impact socioeconomic resources include whether there could be an impact on livelihood, quality of experience, resource availability, income, or employment. If there is no expected potential for the public to interface with an activity, the impacts would be considered negligible.

The alternatives were also reviewed for any disproportionately high and adverse effects on any low-income populations or minority populations in accordance with Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This EO requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions. The CEQ has emphasized the importance of incorporating environmental justice review in the analyses conducted by federal agencies under NEPA and of developing protective measures that avoid disproportionate environmental effects on minority and low-income populations.

### 3.12.2 Affected Environment

The area of interest for assessing potential impacts on socioeconomic resources is composed of established military operations areas (MOAs) and warning areas in the eastern North Pacific Ocean region, adjacent to the Northwest coast of the United States (California, Oregon, and Washington), including the Strait of Juan de Fuca, Puget Sound (Washington state Inland Waters), and Western Behm Canal in southeastern Alaska (see Figure 2.1-1). In addition, the Study Area includes Navy piers at Naval Base (NAVBASE) Kitsap Bremerton, NAVBASE Kitsap Bangor, and Naval Station Everett. The area of interest for the environmental justice review associated with EO 12898 are the low-income and minority populations adjacent to the Study Area. This section describes the three socioeconomic resources (transportation and shipping, commercial and recreational fishing, and tourism) associated with human activities and livelihoods in the Study Area from shore seaward out to 12 nautical miles (nm) consistent with NEPA.

Areas of surface water within the Study Area may be designated as restricted areas, as described in the C.F.R., Title 33 (Navigation and Navigable Waters), Part 334 (Danger Zone and Restricted Area Regulations) and established by the U.S. Army Corps of Engineers. A restricted area is designated to prohibit or limit public access to an area. Restricted areas generally provide security for government property and protection of the public from risks of damage or injury arising from government activities in the area (33 C.F.R. 334.2). Restricted areas within 12 nm of shore in the Study Area have the potential to impact the three socioeconomic resources identified above.

All of the training and testing activities proposed in this Environmental Impact Statement (EIS)/Overseas EIS (OEIS) would occur in one or more of these three range subdivisions:

- Offshore Area (Pacific Northwest Operating Area [OPAREA], including the surf zone at Pacific Beach)
- Inland Waters (Washington state inland waters)
- Western Behm Canal (Southeast Alaska Acoustic Measurement Facility [SEAFAC])

The Offshore Area includes air, surface, and subsurface OPAREAs extending generally west from the coastline of Washington, Oregon, and Northern California for about 250 nm into international waters. In Washington, the eastern boundary of the Offshore Area abuts the coastline for 1 mile (mi.) (.6 kilometers [km]) of surf zone at Pacific Beach; while in Oregon and Northern California, the boundary lies 12 nm off the coastline. The Offshore Area also includes the Quinault Range Site. Further description of the Offshore Area can be found in Section 2.1.1 (Description of the Offshore Area).

The Inland Waters include air, sea, and undersea space inland of the coastline and eastward to include all waters of the Strait of Juan de Fuca, the Puget Sound, and the Strait of Georgia. None of this area extends into Oregon or California. Further description of the Inland Waters can be found in Section 2.1.2 (Description of the Inland Waters).

SEAFAC consists of three major functional components: (1) Back Island Operations Center and supporting facilities, (2) Underway Measurement Site, and (3) Static Site (see Figure 2.1-4). The three major functional components are within the five restricted areas in Western Behm Canal. The main purposes of the restricted areas are to lessen acoustic encroachment from nonparticipating vessels and prohibit certain activities that could damage SEAFAC's sensitive in-water acoustic instruments and associated cables. The perimeter of Restricted Area 5 constitutes the Study Area boundary, and the Study Area does not include land-based supporting facilities or operations. The sensors at SEAFAC are passive and measure radiated noise in the water, such as machinery on submarines and other underwater vessels. SEAFAC does not use tactical mid-frequency active sonar (sound navigation and ranging). Active acoustic sources are used for communications and range calibration, and to provide position information for units operating submerged on the range. Further description of the Western Behm Canal can be found in Section 2.1.3 (Description of the Western Behm Canal, Alaska).

#### 3.12.2.1 Transportation and Shipping

The Study Area is used by the military and civilians for a broad spectrum of activities. The Navy conducts training and testing activities in areas where transportation and shipping occurs. Notifications of potentially hazardous operations are communicated to all vessels and operators by use of Notices to Mariners (NTMs), issued by the U.S. Coast Guard (USCG), and Notices to Airmen (NOTAMs), issued by the Federal Aviation Administration (FAA). The Department of Defense also publishes separate NOTAMs about runway closures, missile launches, special traffic management procedures, and malfunction of navigational aids.

##### 3.12.2.1.1 Commercial Shipping

Ocean shipping is a significant component of the regional economy. Washington State handles 7 percent of the country's exports and 6 percent of its imports. The maritime Port of Seattle was the nation's 11th-busiest waterborne freight gateway for international merchandise trade by value of shipments in 2008. More than 1,000 vessels called at the Port of Seattle in 2008 (U.S. Department of Transportation 2009). Container vessels made the most calls at the port, accounting for 64 percent, while 28 percent of the calls were by dry-bulk ships. Seattle and Tacoma were ranked seventh and 11th, respectively, among U.S. ports for total cargo imported and exported in 2011. Taken together, these two ports make up the nation's fourth-largest container load center in the United States (American Association of Port Authorities 2012). Other key ports in the region include:

- Bellingham (Whatcom County, Washington)
- Orcas, Friday Harbor, and Lopez (San Juan County, Washington)
- Anacortes and Skagit County (Skagit County, Washington)
- Coupeville and South Whidbey Island (Island County, Washington)
- Port Angeles (Clallam County, Washington)
- Port Townsend (Jefferson County, Washington)
- Everett and Edmonds (Snohomish County, Washington)
- Olympia (Thurston County, Washington)
- Shelton, Allyn, Grapeview, Dewatto, and Hoodsport (Mason County, Washington)
- Kingston, Indianola, Keyport, Poulsbo, Brownsville, Tracyton, Waterman, Bremerton, Silverdale, and Manchester (Kitsap County, Washington)
- Grays Harbor (Grays Harbor County, Washington)
- Port of Astoria (Clatsup County, Oregon)
- Port of Newport (Lincoln County, Oregon)
- Coos Bay (Coos County, Oregon)
- Port Orford (Curry County, Oregon)
- Eureka (Humboldt County, California)

Bassett et al. (2012) recorded vessel traffic over a period of just under a year as large vessels passed within 12.4 mi. (20 km) of a hydrophone site located at Admiralty Inlet in Puget Sound. During this period there were 1,363 unique Automatic Identification System transmitting vessels recorded. In 2014, there were over 5,300 cargo, cruise, or fishing vessels docking at one of the major ports in Puget Sound.[1] In addition to these port calls resulting in approximately 10,600 annual vessel transits, there is the routine ferry, recreational, and other vessel traffic from commercial activities such as whale watching in the Inland Waters portion of the NWTT Study Area.

#### 3.12.2.1.1.1 Offshore Area

Ocean traffic is the transit of commercial, private, or military vessels at sea, including submarines. The ocean traffic flow in congested waters, especially near coastlines, is controlled by the use of directional shipping lanes for large vessels, including cargo, container ships, and tankers. Traffic flow controls are also implemented to ensure that harbors and ports of entry remain as uncongested as possible. There is less control on open-ocean traffic involving recreational boating, sport fishing, commercial fishing, and activity by naval vessels. In most cases, the factors that govern shipping or boating traffic include adequate depth of water, weather conditions (primarily affecting recreational vessels), availability of fish and other marine resources, and temperature.

Most vessels entering or leaving the Washington ports travel northwest, southwest, or south through the Study Area, particularly the Pacific Northwest OPAREA, without incident or delay. Shipping to and from the south typically follows the coastline of Washington, Oregon, and California. Ships traveling

[1] Vancouver, Seattle, or Tacoma; Vessel statistics for 2014 from (1) www.portmetrovancouver.com "2014 Statistics Overview" (accessed 2 July 2015; on file); and (2) the Port of Seattle Marine Terminal Information System, Port of Tacoma Cargo Reporting Information System (accessed 2 July 2015; on file).

between Washington ports, Hawaii, and the Far East travel via the most direct route or great circle route (Figure 3.12-1).

#### 3.12.2.1.1.2 Inland Waters

The Keyport Range Site, Dabob Bay Range Complex (DBRC) Site, Carr Inlet OPAREA, Navy 3 and Navy 7 OPAREAs, and pierside locations are all within Inland Waters of Washington State. The Keyport Range Site is charted on navigational charts as a restricted area. Although it is not a restricted area, the Navy limits or restricts access into Crescent Harbor as a safety protocol when mine warfare (MIW) training is being conducted. Access to pierside locations is also restricted at all times.

Navigational obstructions may occur in a small portion of Keyport Range Site tests; in these cases (as for current activities), an NTM is issued. In addition, the USCG has published a final rule establishing protection zones extending 500 yards (yd.) (457 meters [m]) around all Navy vessels in navigable waters of the United States and within the boundaries of Coast Guard Pacific Area (32 C.F.R. Part 761). All vessels must proceed at a no-wake speed when within a protection zone. Nonmilitary vessels are not permitted to enter within 100 yd. (91 m) of a U.S. naval vessel, whether underway or moored, unless authorized by an official patrol.

The DBRC Site contains Dabob Bay and Hood Canal military operating areas, which are charted as naval OPAREAs on navigational charts. During any activities within Dabob Bay, the NUWC Keyport-maintained yellow, white, and red warning lights at Sylopash Point, Pulali Point, Whitney Point, Zelatched Point, and the southeast end of Bolton Peninsula notify nonmilitary craft of the status of range use. Descriptions of these lights are posted at local boat ramps and marinas. Yellow or alternating white and yellow lights indicate to nonmilitary vessels that (1) they should proceed with caution; (2) range activities are in progress, but no noise-sensitive acoustic measurement tests are in progress; or (3) vessels should be prepared to shut down engines when lights change to red. Red or alternating white and red lights indicate (1) range activities involving critical measurements are in progress; (2) engines should be stopped until red beacons have been shut off, indicating the test is completed; and (3) advice of Navy personnel on guard boats should be followed when in or near the range site. Typically, boat passage is permitted between tests when the yellow beacons are operating.

The Carr Inlet OPAREA contains a restricted area (33 C.F.R. 334.1250); it was once used as an acoustic range but has been inactive since 2008. No special use airspace is associated with the Carr Inlet OPAREA.

Pierside sonar maintenance testing within the Study Area is conducted within the Puget Sound at NAVBASE Kitsap Bremerton, NAVBASE Kitsap Bangor Waterfront, and Naval Station Everett. Activities at these pierside locations (Bremerton, Bangor, and Everett) are conducted in the established waterfront restricted areas for those installations.

#### 3.12.2.1.1.3 Western Behm Canal, Alaska

Western Behm Canal includes five restricted areas (see Figure 2.1-4). During operations, the Navy can close the restricted area to all vessel traffic, although normally such closures will not exceed 20 minutes. Small craft may operate within 500 yd. (457 m) of the shoreline at speeds no greater than 5 knots during closures. The purpose of these transitory restrictions is to minimize ambient underwater sound levels to ensure integrity of the testing for accomplishing SEAFAC's mission; these restrictions also help protect public safety during testing. On average, 10 transitory restrictions occur annually for a total of 40 days per year. In some restricted areas, no vessel may anchor, tow a drag of any kind, deploy a net, or dump any material at any time.


**Figure 3.12-1: Shipping Routes in Pacific Northwest United States**

The Navy conducts tests in the Western Behm Canal throughout the year. However, from May 1 through September 15 annually, the Navy conducts acoustic measurement tests that will result in only transitory restrictions in Area 5 (see Figure 2.1-4) for a total of no more than 15 days. This falls within the cruise ship season, when visitation and recreational use of Western Behm Canal is highest and when vessel traffic associated with commercial fishing is most likely. This provision ensures that at least 89 percent of the days during this important time would be free of transit restrictions.

Public notification that the Navy will conduct operations in Western Behm Canal is given at least 72 hours in advance to the following Ketchikan contacts: USCG, Ketchikan Gateway Borough Planning Department, Harbor Master, Alaska Department of Fish and Game, KRBD radio, KTKN radio, and the *Ketchikan Daily News*.

#### 3.12.2.1.2 Air Traffic

Air traffic refers to movements of aircraft through airspace. Safety and security factors dictate that use of airspace and control of air traffic be closely regulated. Accordingly, regulations applicable to all aircraft are promulgated by the FAA to define permissible uses of designated airspace and to control that use. These regulations are intended to accommodate the various categories of aviation, whether military, commercial, or general. Common air routes over the Study Area are depicted in Figure 3.12-2.

The system of airspace designation uses various definitions and classifications to facilitate control. Airspace is categorized generally as either "controlled" or "uncontrolled." Controlled airspace is further organized into several different classes distinguished by altitude, range, use (e.g., commercial or military), and proximity to a major airport. Controlled airspace means that services supporting aircraft flying under instrument flight rules are available. Such services include air-to-ground radio communication, navigational aids, and air traffic control services for maintaining separation between aircraft. Controlled airspace does not mean that all flights are controlled by air traffic control.

Special use airspace consists of both controlled and uncontrolled airspace and has defined dimensions where flight and other activities are confined because of their nature and the need to restrict or prohibit nonparticipating aircraft for safety reasons. Special use airspace is established under procedures outlined in 14 C.F.R. Part 73 The primary purpose of special use airspace is to establish or designate airspace in the interest of national defense, security, and/or welfare. Restricted areas, warning areas, and MOAs are used for military training. One type of special use airspace of particular relevance to the Study Area is a warning area, defined in 14 C.F.R. Part 1 as follows:

> "A warning area is airspace of defined dimensions, extending from 3 nm outward from the coast of the United States that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both."

A restricted area is airspace designated under 14 C.F.R. Part 73 within which the flight of aircraft, while not wholly prohibited, is subject to restriction. The military returns special use airspace to the FAA when the airspace is not employed for its designated military use.

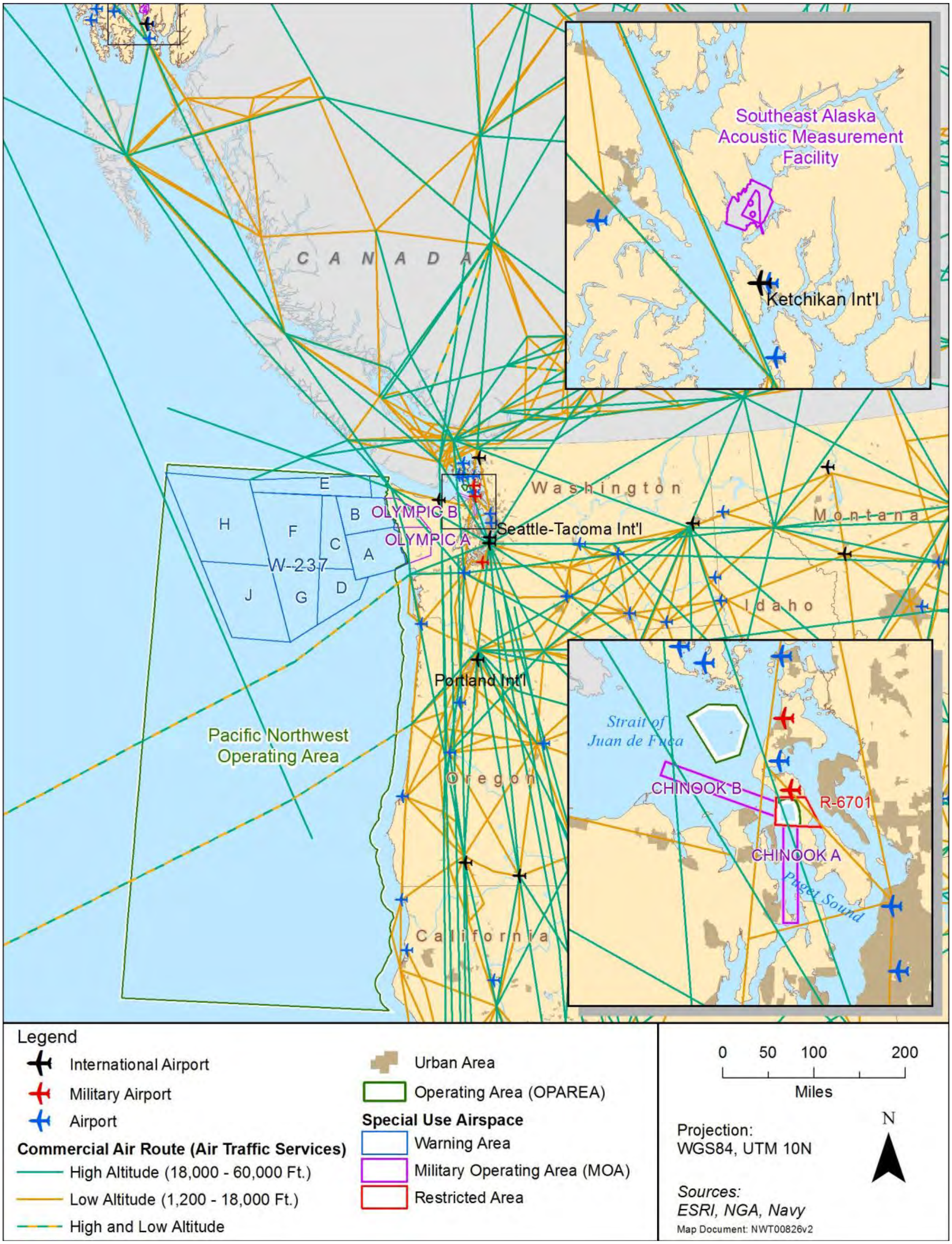


**Figure 3.12-2: Commercial Air Routes in Pacific Northwest United States**

##### 3.12.2.1.2.1 Offshore Area

Jet routes are the network of airways serving commercial aviation operations from flight level (FL) 180 up to but not including FL 450 (flight levels are the specified heights, in hundreds of feet above sea level). The routes in the Study Area are primarily managed by the Seattle Air Route Traffic Control Center. Victor routes are the network of airways serving commercial aviation operations up to but not including 18,000 feet (ft.) (5,486 m) above mean sea level (MSL). Seattle Terminal Radar Approach Control coordinates approach services for the Seattle-Tacoma International Airport and has over 450,000 operations per year for southern and central Puget Sound.

The special use airspace in the Offshore Area (Figure 3.12-2) included in this analysis consists of Warning Area 237 (W-237) and the Olympic MOAs. W-237 extends westward from the coast of Washington, covering 24,989 square nautical miles ($nm^2$). The Olympic A and B MOAs are airspace over the Olympic Peninsula of the Washington coast encompassing 1,619 $nm^2$. Portions of the Olympic MOAs overlay the western edge of the Olympic National Park and national and state forest land (Figure 3.12-4). Approximately 24 percent of the park lies beneath the MOAs. The Olympic MOAs were established in 1977, and the Navy has flown in the region for more than 40 years. Access restrictions, published by the Seattle Center, are released to the aviation community through NOTAMs and included on their Automated Terminal Information System broadcasts.

Other special use airspace in the Northwest Training Range Complex (NWTRC) is covered by the NWTRC EIS/OEIS (U.S. Department of the Navy 2010) and will not be addressed in this EIS/OEIS.

##### 3.12.2.1.2.2 Inland Waters

The special use airspace in the Puget Sound portion of the Study Area (Figure 3.12-2), included in this analysis, consists of Restricted Area 6701 (R-6701) and Chinook MOAs. R-6701 is over Admiralty Bay and is activated when necessary to support safe range operations. Chinook A and B MOAs are approach corridors leading into R-6701; they cover 23 and 33 $nm^2$ of airspace, respectively. Access restrictions are released to the aviation community through NOTAMs and included on their Automated Terminal Information System broadcasts. Other special use airspace in the NWTRC is covered by the NWTRC EIS/OEIS (U.S. Department of the Navy 2010) and will not be addressed in this EIS/OEIS.

##### 3.12.2.1.2.3 Western Behm Canal, Alaska

Controlled airspace similar to a temporary flight restriction exists over the SEAFAC area in Western Behm Canal during acoustic trials. The restriction is released to the aviation community through a NOTAM, published by local airports, and included on their Automated Terminal Information System broadcast. The temporary flight restriction extends up to 3,000 ft. (914 m) and has a radius of 1 nm. It is intended to keep floatplanes with tourists or fishermen at a distance when SEAFAC is conducting acoustic tests.

#### 3.12.2.1.3 Vehicle Traffic

##### 3.12.2.1.3.1 Inland Waters

The only portion of the Study Area with vehicular traffic that could be impacted is in the Inland Waters, specifically, State Route 104. It is located on the west side of Puget Sound in northern Jefferson and Kitsap Counties. The route extends across the Hood Canal Floating Bridge, a drawbridge with two 300-ft spans that can open to allow marine traffic to pass. During openings, vehicular traffic on State Route 104 queues and back-ups occur. During 2010, there were 335 bridge openings and 17,000 vehicles are estimated to cross the bridge daily (Washington State Department of Transportation 2011).

Commercial or recreational vessels intending to cross will contact the bridge crew at least 1 hour before the opening (Washington State Department of Transportation 2011). Notification to the public is made via the Washington State Department of Transportation website, a notification board on approaching highways, phone text messages, and e-mail. Vehicle traffic is held at the traffic control gates located on the bridge during openings for commercial or recreational vessels, etc. These openings last for up to 30 minutes (Washington State Department of Transportation 2014), though clearance of the traffic queue will take longer. Some bridge openings associated with Navy training activities are longer, lasting for up to 60 minutes. Traffic is held off the bridge (in advance) using a physical barrier imposed by Washington State Patrol Troopers including canine teams. Traffic control gates at the end of the bridge are also employed. Traffic can queue for up to 4 miles on either side, depending on the time of day. These longer bridge openings also receive advance notice via a notification board on approaching highways; however, the lead-time is less than the minimum 1 hour for national security reasons.

### 3.12.2.2 Commercial and Recreational Fishing

#### 3.12.2.2.1 Offshore Area

The commercial fishing sector provides approximately 10,000 jobs in the greater Seattle area and accounts for gross annual sales of more than $3.5 billion (Washington State 2007). Recreational fishing is extremely limited due to the distance from shore and the capabilities of recreational fishing vessels. Less than 10 percent of recreational fishing takes place in federal waters, which are beyond 3 nm from shore. Commercial fishing gear used in the Study Area includes drift gillnets, longline gear, troll gear, trawls, seining, and traps or pots. The National Marine Fisheries Service (NMFS) has reported commercial fishing landings in Washington State of over 210 million pounds of fish and shellfish in 2011, worth over $329 million (National Marine Fisheries Service 2013).

Commercial fishing takes place throughout the Offshore Area, from nearshore waters adjacent to the mainland to the offshore fishing grounds. The Pacific Fishery Management Council is one of eight regional fishery management councils established by the Magnuson Fishery Conservation and Management Act of 1976 to manage fisheries of the U.S. coastline (including the coasts of California, Oregon, and Washington). The council has defined four main fisheries: groundfish (e.g., flounder, sole), highly migratory species (e.g., tuna), coastal pelagic species (e.g., anchovy, mackerel, herring, sardines), and salmon. Pacific Fisheries Information Network maintains commercial catch block data for ocean areas off the coasts of Washington, Oregon, California, Alaska, and British Columbia. For 2011, the most commonly harvested commercial species in Washington State waters were groundfish species, tuna (albacore), crab, and salmon (Pacific Fisheries Information Network 2012) (Table 3.12-1).

**Table 3.12-1: Annual Commercially Landed Catch and Value within Washington Waters (2011)**

| PFMC-Managed Species by Management Plan | RWT-MTONS | Revenue |
|---|---|---|
| **Coastal Pelagic Species** | | |
| Northern anchovy | 191.0 | $68,129 |
| Pacific herring | 217.2 | $169,353 |
| **Total** | **408.2** | **$237,482** |
| **Crab** | | |
| Dungeness crab | 12,307.0 | $83,582,330 |
| **Total** | **12,307.0** | **$83,582,330** |

**Table 3.12-1: Annual Commercially Landed Catch and Value within Washington Waters (2011) (continued)**

| PFMC-Managed Species by Management Plan | RWT-MTONS | Revenue |
|---|---|---|
| **Pacific Coast Groundfish Species** | | |
| Arrowtooth flounder | 568.8 | $129,470 |
| Dover sole | 660.0 | $500,424 |
| English sole | 64.9 | $49,101 |
| Lingcod | 149.7 | $259,674 |
| Pacific cod | 353.8 | $393,122 |
| Pacific whiting | 34,481.0 | $7,190,224 |
| Petrale sole | 234.0 | $707,929 |
| Rex sole | 43.0 | $33,046 |
| Rock sole | 3.7 | $2,889 |
| Rockfish | 1,071.5 | $1,190,485 |
| Sablefish | 1,556.1 | $12,439,343 |
| Spiny dogfish | 214.0 | $140,125 |
| Starry flounder | 31.4 | $23,796 |
| Unspecified flatfish | 1.2 | $810 |
| Unspecified sanddabs | 26.3 | $20,947 |
| Unspecified skate | 44.3 | $20,128 |
| Walleye Pollock | 1.1 | $381 |
| **Total** | **39,504.8** | **$23,101,894** |
| **Highly Migratory Species** | | |
| Albacore tuna | 6,012.4 | $22,244,246 |
| **Total** | **6,012.4** | **$22,244,246** |
| **Other** | | |
| Miscellaneous fish/animals | 6.2 | $1,471 |
| Sea urchins | 52.7 | $119,347 |
| Pacific halibut | 588.1 | $6,503,204 |
| Red sea urchin | 32.4 | $48,212 |
| Unspecified octopus | 1.6 | $2,537 |
| Unspecified sea cucumbers | 418.4 | $3,869,702 |
| Unspecified shark | 1.7 | $0 |
| Unspecified melt | 37.5 | $42,903 |
| Unspecified squid | 2.6 | $280 |
| Unspecified hagfish | 700.8 | $1,299,501 |
| Unspecified shad | 8.0 | $3,888 |
| White sturgeon | 62.4 | $333,226 |
| **Total** | **1,912.4** | **$12,217,278** |

**Table 3.12-1: Annual Commercially Landed Catch and Value within Washington Waters (2011) (continued)**

| PFMC-Managed Species by Management Plan | RWT-MTONS | Revenue |
|---|---|---|
| **Pacific Salmon Species** | | |
| Chinook salmon | 2,494.5 | $13,366,085 |
| Chinook roe | 0.5 | $4,467 |
| Chum salmon | 3,843.1 | $9,997,926 |
| Chum roe | 0.3 | $2,199 |
| Coho salmon | 1,142.6 | $3,878,366 |
| Coho roe | 0.9 | $7,994 |
| Pink salmon | 8633.0 | $9,077,354 |
| Sockeye salmon | 816.9 | $3,040,523 |
| Steelhead salmon | 188.8 | $882,081 |
| **Total** | **17,704.5** | **$42,428,279** |
| **Shrimp** | | |
| Other shrimp | 37.9 | $99,394 |
| Pink shrimp | 4,342.4 | $4,610,336 |
| Spotted prawn | 192.1 | $2,293,275 |
| Unspecified bait shrimp | 57.0 | $152,593 |
| **Total** | **4,629.4** | **$7,155,598** |
| **Other Species[1]** | | |
| Other species | 16,572.0 | $100,049,385 |
| **Total** | **16,572.0** | **$100,049,385** |
| **Grand total** | **99,248.0** | **$291,015,131** |

[1] Other Species category includes species not displayable in this report because of confidentiality restrictions.
Notes: PFMC = Pacific Fishery Management Council; RWT-MTONS = round metric weight equivalent in metric tons
Source: Pacific Fishery Management Council 2012

Within the Offshore Area, groundfish species make up most of the commercial catch. In 2011, groundfish accounted for 49 percent and salmon accounted for 18 percent of the commercial harvest. The overall 2011 annual catch in Washington State totaled 99,248 metric tons, worth $291,015,131 (Pacific Fisheries Information Network 2012).

In 2006, the NMFS completed an assessment for the Pacific Fishery Management Council of West Coast fishing communities for their engagement in and dependence on commercial and recreational fisheries income, as well as their resilience and vulnerability to changes in income from those fisheries (Pacific Fishery Management Council 2006). Based on this assessment, the communities that access fishery resources within the Offshore Area tend to have small populations, are geographically isolated, and are heavily dependent on tourism and natural resource extraction industries, including fishing.

Of the commercial fishing communities most dependent on fishing income, the following communities heavily depend on the groundfish resource and support fishing fleets that may access waters within the Study Area: Astoria, Oregon; Bellingham, Washington; Brookings, Oregon; Coos Bay, Oregon; Newport, Oregon; and Port Orford, Oregon. In addition, the Oregon ports of Newport, Garibaldi, Brookings, and Charleston are the most heavily engaged Northwest ports in chartered recreational fishing. The west coast's five fishing communities, least economically resilient to change in access to commercial and recreational fishery resources, all depend on income from fishery resources within the Offshore Area:

Netarts and Copalis Beach, Oregon; Neah Bay and La Push, Washington; and Moss Landing, California. Three of the four least resilient west coast fishing counties also depend on income from fishery resources within the Offshore Area: Hood River and Lincoln Counties, Oregon, and Grays Harbor County, Washington. Additionally, the NMFS assessment characterized Ilwaco, Washington, as one of the west coast's two "most vulnerable" communities to changes in engagement in commercial fishing activities, meaning that it scored highest in terms of its engagement in and dependence on fishing income and lowest in terms of its resilience to economic change. Although these communities are not in the Study Area, they could potentially be affected by the Proposed Action because they fish in the Study Area.

#### 3.12.2.2.2 Inland Waters

Puget Sound supports several industry sectors that are integrally linked to the marine environment. These include commercial fishing, sportfishing, and recreational activities that involve sailing and power boating. Washington's commercial fishing industry is the second-largest seafood producer in the United States following Alaska; Washington fishermen catch more than 60 percent of the edible seafood harvested in the United States (Washington State Department of Commerce 2012). The state is the largest producer of farmed shellfish in the nation and is a leading producer of naturally growing shellfish, most of which come from Puget Sound. Salmon also support a variety of fisheries in the Puget Sound region. These include sport, commercial, and tribal usual and accustomed fisheries (Pacific Fishery Management Council 2012). Commercial and tribal usual and accustomed fisheries are conducted with purse seine or gill nets, primarily in the open waterways of Puget Sound and Hood Canal (Washington Department of Fish and Wildlife 2012a). American Indian and Alaska Native tribal and subsistence fishing is analyzed in Section 3.11 (American Indian and Alaska Native Traditional Resources).

Commercial geoduck clam (*Panopea generosa*) harvest is managed by the Washington Department of Fish and Wildlife (Washington Department Fish and Wildlife 2012b). Geoduck harvest areas occur throughout the Puget Sound on soft bottom substrates. The Pacific Fishery Management Council has not reported geoduck harvests since 2007, but in that year, the harvest was valued at $28,000. Of the 2011 commercial catch of crustaceans, over 73 percent was attributable to Dungeness crabs (*Metacarcinus magister*) (about 12,307 metric tons). The remaining percent were various shrimp (4,629 metric tons). The catch of crustaceans was worth approximately $91,000,000 in 2011. In comparison, the annual catch of squid and octopus was worth $2,817; urchins were worth $167,559, and other invertebrates (e.g., snails, sea cucumbers) were worth approximately $3,869,702 (Table 3.12-1).

Recreational fishing typically occurs throughout the inlets of Puget Sound and Hood Canal. Recreational sportfishing in Puget Sound has been conservatively estimated to contribute $117 million per year to the regional economy (Washington Department of Ecology 2012). In 2004, an estimated 438,000 marine angler trips were taken (Kraig and Smith 2011) and over 175,000 pounds of fish (not counting shellfish) were caught by sportfishermen (Kraig and Smith 2011). In 2011, Washington State Department of Fish and Wildlife published the catch totals for 2007–2008 recreational sportfishing, including steelhead, salmon, shellfish, and other marine fish (Table 3.12-2).

**Table 3.12-2: Recreational Sportfishing Catch for 2007–2008**

| Sportfishing Activity | Total Pounds in 2007–2008 | Total Number of Catches, 2007–2008 |
|---|---|---|
| Sturgeon | | 17,962 |
| Salmon | | 545,737 |
| Steelhead | | 9,066 |
| Marine fish | | 103,273 |
| Oysters | 483,816 | |
| Clams | 305,397 | |
| Dungeness crab | 1,141,977 | |

Source: Kraig 2011

#### 3.12.2.2.3 Western Behm Canal, Alaska

Commercial fishing of salmon in the state waters near Ketchikan represents a large portion of the harvest for Ketchikan residents (Ketchikan Gateway Borough 2007). While hand and power-troll efforts for salmon harvest have declined, purse-seine and drift-gillnet efforts are stable in state waters. Other important commercial fisheries in the area include sea cucumber, sea urchin, herring spawn, and shrimp. The Ketchikan Coastal Management Program Plan (Ketchikan Gateway Borough 2007) identifies several open water areas near SEAFAC as heavy or moderate recreational fishing areas. These waters include portions of Behm Canal around Betton and Back Islands, Clover Passage, Clover Pass, Smuggler's Cove, and Helm Bay.

Navy activities that have the potential to conflict with other uses of Behm Canal, including commercial and recreational fishing, are minimized through specific provisions in 33 C.F.R. Section 334, including short-duration closures and advanced public notification through NTMs. Navy activities have occurred in Behm Canal for approximately 20 years while minimizing conflicts with and impacts on other users.

### 3.12.2.3 Tourism

Coastal tourism and recreation can be defined as the full range of tourism, leisure, and recreation activities that take place in the coastal zone and the offshore coastal waters. These activities include coastal tourism development (e.g., hotels, resorts, restaurants, food industry, vacation homes, second homes) and the infrastructure supporting coastal development (e.g., retail businesses, marinas, fishing tackle stores, dive shops, fishing piers, recreational boating harbors, beaches, recreational fishing facilities). Also included is ecotourism (e.g., whale watching) and recreational activities such as recreational boating, cruises, swimming, recreational fishing, surfing, snorkeling, and self-contained underwater breathing apparatus (SCUBA) diving.

#### 3.12.2.3.1 Offshore Area

Tourism within the Study Area occurs primarily within Puget Sound. Offshore tourism includes whale watching, which occurs March through November with peak tourism activity in the summer. Whale watching by boat primarily occurs along the Oregon coast (Newport and Depoe Bay) and Northern California (Ft. Bragg). Whale watching off the Washington coast occurs from boat- and land-based operations (O'Conner et al. 2009).

Portions of the Olympic National Park and Olympic National Forest are within the Study Area. Tourism activities include, but are not limited to, backpacking, hiking, camping, fishing, flora gazing, horseback riding, mountaineering, photography, skiing, snowshoeing, stargazing, and wildlife watching. Over three million people visited the National Park in 2014, spending more than $263,000,000 in the area on local businesses (Thomas et al., 2014), which shows a steady increase from the previous year (National Park Service 2015).

Designated wilderness areas exist on the Olympic Peninsula beneath the Olympic MOAs. These include the Olympic National Park, managed by the National Park Service, and the Colonel Bob Wilderness, managed by the U.S. Forest Service. As designated wilderness areas, these areas enjoy the protections as set forth in the Wilderness Act of 1964 (16 U.S. Code 1131–1136). Specifically, “there shall be no commercial enterprise and no permanent road within any wilderness area,” and “no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.” The Wilderness Act defines a wilderness as “an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions.”

#### 3.12.2.3.2 Inland Waters

Puget Sound is a body of water east of Admiralty Inlet through which ocean waters reach inland approximately 50 mi. (80 km) from the Pacific coast to provide all-weather ports for oceangoing ships at Seattle, Tacoma, and Olympia. The waterway is a complex and intricate system of channels, inlets, estuaries, embayments, and islands. Because of these beneficial waterways, the Puget Sound region is home to most Washington State citizens. An estimated 390,000 people participate in recreational activities in the waters and on the beaches of Puget Sound at least once a year (Washington Department of Ecology 2012). Most Puget Sound communities lie on either side of the north-south Interstate Highway 5 corridor that serves as the major traffic thoroughfare of the state.

Hood Canal is a natural glacier-carved fjord and the only true saltwater fjord in the lower United States; its clear deep waters provide world-class recreation opportunities. Dabob Bay is the largest of several internal bays of Hood Canal, which stretches more than 70 mi. (112 km) through Washington's pristine forestlands. Vendors along the shoreline offer a wide variety of boat rentals for recreational activities; services include recreational tours and group events. State parks on the shores of Hood Canal include Belfair, Twanoh, Potlatch, Triton Cove, Scenic Beach, Dosewallips, Kitsap Memorial, and Shine Tidelands (Figure 3.12-3). Hood Canal is a primary destination for tourism in south Puget Sound; camping is prevalent at private, national forest, and state park campgrounds. Near Carr Inlet, Penrose Point State Park provides camping on the shores of south Puget Sound.

The inland areas of Washington, many of which are adjacent to the Study Area, accommodate many outdoor activities, including backpacking, bird watching, boating, canoeing, fishing, golf, camping, hunting, kayaking, offroading, mountain biking, hiking and nature walks, swimming, tubing, and wildlife viewing and photography (U.S. Department of the Navy 2010). Tourism is especially important for the towns of Coupeville and Langley, and Penn Cove Mussel Farm exports large quantities of its highly renowned Penn Cove Mussels. This aquaculture facility, along with many small farms, reflects the rural, agricultural nature of most of central Whidbey Island.

Sport fishing, sailing, power boating, kayaking, diving, whale watching, and other watersports are all activities popular in the Puget Sound marine areas (U.S. Department of the Navy 2010). Recreational boating and ocean-related tourism activities contribute millions of dollars to the regional economy.

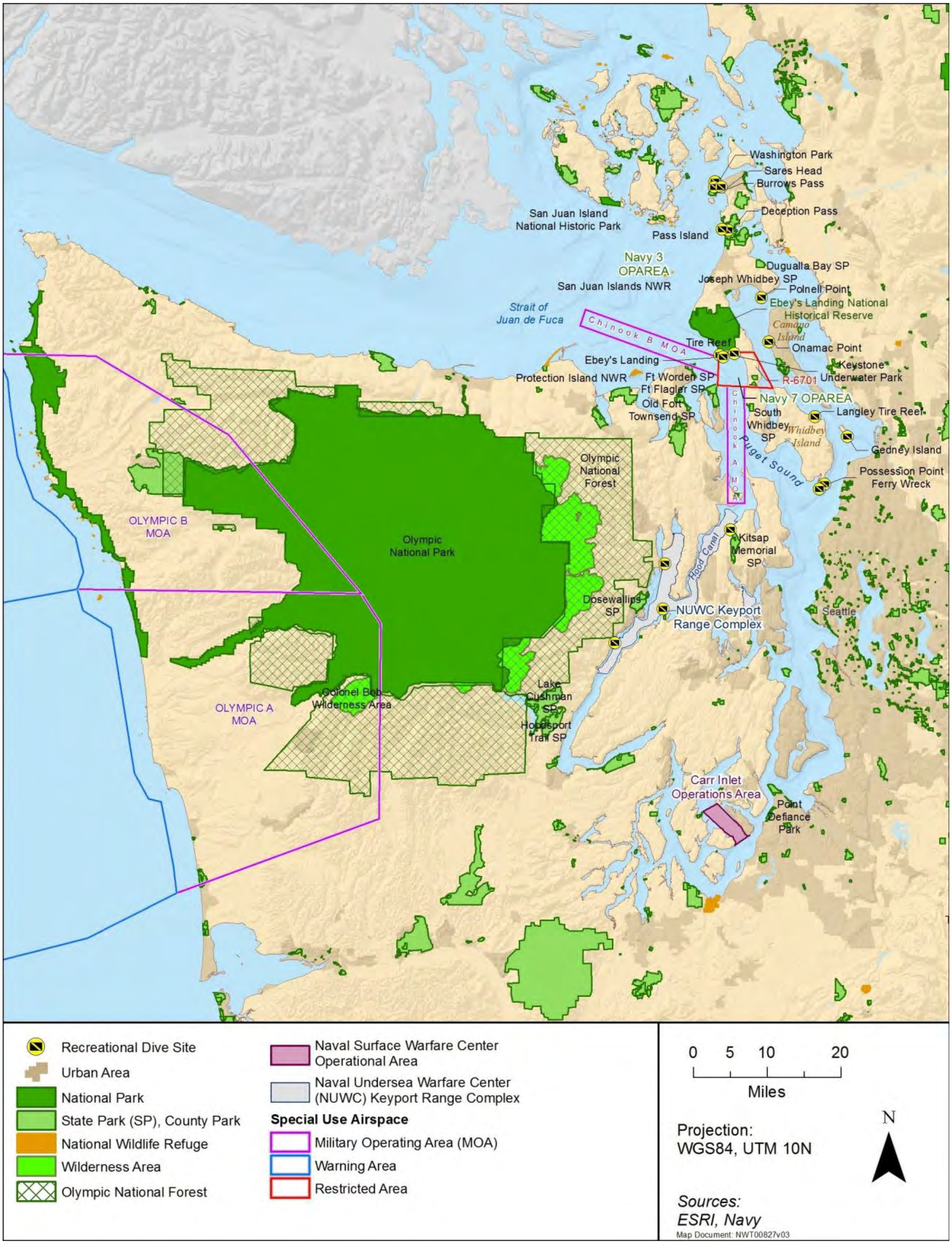


**Figure 3.12-3: Recreational Areas in Puget Sound**

Puget Sound has 244 marinas with 39,400 moorage slips and another 331 launch sites for smaller boats. Statewide, approximately 180,000 boats are registered, not counting thousands more small boats and watercraft that do not require registration. An estimated $464 million in combined boat, motor, and related purchases ranks Washington 10th highest in the nation for boating-related expenditures (Washington Department of Ecology 2012).

Areas that contribute to recreational activity within Puget Sound include Cama Beach and Camano Island State Parks on Camano Island; Ft. Worden, Miller Peninsula, Anderson Lake, Shine Tidelands, and Sequim Bay State Parks on the Olympic Peninsula; and Mystery Bay and Ft. Flagler State Parks on Indian Island. To the south, near the DBRC Site, the Kitsap Memorial State Park and other regional parks on the Kitsap peninsula also allow beach and water access (Figure 3.12-3). Puget Sound's good underwater visibility, rich sea life, and largely pristine diving conditions make it a popular destination for divers in the northwest. Charter dive trips to specific sites (Figure 3.12-3) are often published and booked as many as six months in advance. Most dive charters are scheduled for weekends. Diving occurs year-round, though the number of trips to popular dive sites peak during the summer. To facilitate such interests, many boat ramps have been placed in sheltered areas of the Puget Sound to allow access from different points around the bays, straights, and canals of the Study Area. These are maintained and controlled by the local, state, or federal ownership of the location. Boat licenses are controlled by the state, and permits for launching are controlled by the jurisdiction where the site is located. These launch points see increased activity on the weekends and during the summer.

#### 3.12.2.3.3 Western Behm Canal, Alaska

In general, tourism has increased in Southeast Alaska in the last two decades, but statewide declines were observed in 2009 (McDowell Group 2010). Tourism generates substantial income for Ketchikan and creates employment in a variety of industries, such as transportation, retail trade, and services. Many of the visitors to Ketchikan arrive via cruise ship. Eleven cruise lines provide approximately 20 cruise ships per week to dock in Ketchikan from May through September 2012 (Experience Ketchikan 2013).

There are no protected recreational areas within the Western Behm Canal portion of the Study Area, but it is near the Misty Fjords National Monument and the major cruise ship stopover in Ketchikan, Alaska.

Many visitors and Ketchikan residents participate in outdoor recreational activities, including water-based activities such as fishing, boating, kayaking, wildlife viewing, SCUBA diving, and snorkeling. Numerous designated recreation areas are in the area, including several near the SEAFAC. The Ketchikan Coastal Management Program Plan (Ketchikan Gateway Borough 2007) identifies several open-water areas near the SEAFAC as heavy or moderate recreational boating and fishing areas. These waters include portions of Western Behm Canal around Betton and Back Islands, Clover Passage, Clover Pass, Smuggler's Cove, and Helm Bay. Clover Pass, which is immediately west of the SEAFAC, is one of the borough's main boating and sport fishing areas and is highly regarded for its scenic value. With its three marinas and three resorts, the area is also very popular with sport fishermen for nearshore and open-water fishing, as well as for diving (Ketchikan Gateway Borough 2007). Some of the popular recreational areas in the immediate vicinity of the SEAFAC include the following:

- Betton Island State Marine Park consists of 280 acres (ac.) (113 hectares [ha]) of undeveloped land with no facilities and 408 ac. (165 ha) of tidelands and marine waters on the southeastern shoreline of Betton Island. Uses include kayaking, boating, beachcombing, SCUBA diving, camping, fishing, hunting, wildlife viewing, and commercial guide activity (Ketchikan Gateway Borough 2007).

- Grant and Joe Islands State Marine Park has approximately 592 ac. (240 ha) of undeveloped uplands on the islands and surrounding tidelands. It is well known as a kayak resting area and for picnicking and camping. This park is accessible by boat and float plane only (Ketchikan Gateway Borough 2007).

Settler's Cove State Recreation Area consists of 275 ac. (111 ha), including a sandy beach, Clover Passage. It is accessible by road or boat and has developed campsites, a picnic area, and a waterfall (Ketchikan Gateway Borough 2007).

### 3.12.3 Environmental Consequences

This section evaluates how and to what degree the activities described in Chapter 2 (Description of Proposed Action and Alternatives) could impact socioeconomic resources of the Study Area. Tables 2.8-1 through 2.8-3 present the baseline and proposed training and testing activity locations for each alternative (including number of events and ordnance expended). Each socioeconomic resource stressor is introduced and, within the Offshore Area, Inland Waters, and Southeast Alaska areas, analyzed by alternative for training and testing activities. Table E-3 in Appendix E shows the warfare areas and associated stressors that were considered for analysis of socioeconomic resources. The stressors vary in intensity, frequency, duration, and location within the Study Area. Table 3.12-3 shows the number of components or activities for each stressor with respect to location and changes among the alternatives. The analysis of training and testing activities presented in this section considers relevant components and data associated with the geographic location of the activity and the resource. Training activities are not proposed in the Western Behm Canal; therefore, only activities in the Offshore Area and the Inland Waters will be analyzed under training activities. The primary stressors applicable to socioeconomic resources in the Study Area and that are analyzed include the following:

- Accessibility
- Physical disturbances and interactions
- Airborne acoustics (aircraft and vessel noise)
- Secondary impacts from changes to the availability of marine resources

Secondary stressors resulting in indirect impacts on socioeconomic resources are discussed in Section 3.12.3.4 (Secondary Impacts). Analysis of economic impacts evaluates the impacts of the alternatives on the economy of the region of influence, while analysis of social impacts considers the change to human populations and how the action alters the way individuals live, work, play, relate to one another, and function as members of society. Because proposed NWTT activities are predominantly offshore and within inland waters, socioeconomic impacts would be associated with economic activity, employment, income, and social conditions (e.g., livelihoods) of industries or operations that use the ocean and inland waterways (Puget Sound and Western Behm Canal) within the Study Area. Although no permanent population centers are within the region of influence and the typical socioeconomic considerations such as population, housing, and employment are not applicable, this section will analyze the potential for fiscal impacts on marine-based activities and coastal communities. When considering impacts on recreational activities such as fishing, boating, and tourism, both the economic impact associated with revenue from recreational tourism and public enjoyment of recreational activities are considered.

**Table 3.12-3: Stressor Table for Socioeconomic Resources**

| Components | Area | Number of Components or Events | | | | | |
|---|---|---|---|---|---|---|---|
| | | No Action Alternative | | Alternative 1 | | Alternative 2 | |
| | | Training | Testing | Training | Testing | Training | Testing |
| **Accessibility** | | | | | | | |
| Activities including vessels | Offshore Area | 996 | 37 | 1,108 | 138 | 1,108 | 162 |
| | Inland Waters | 4 | 337 | 310 | 582 | 310 | 640 |
| | W. Behm Canal | 0 | 28 | 0 | 60 | 0 | 83 |
| Activities including aircraft | Offshore Area | 5,342 | 2 | 8,040 | 80 | 8,040 | 92 |
| | Inland Waters | 196 | 2 | 117 | 20 | 117 | 25 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Airborne Acoustics (Aircraft and Vessel Noise)** | | | | | | | |
| Activities including aircraft | Offshore Area | 5,342 | 2 | 8,040 | 80 | 8,040 | 92 |
| | Inland Waters | 196 | 2 | 117 | 20 | 117 | 25 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Physical Disturbance and Interactions** | | | | | | | |
| Activities including vessels | Offshore Area | 1,003 | 39 | 1,116 | 158 | 1,116 | 187 |
| | Inland Waters | 4 | 339 | 310 | 602 | 310 | 665 |
| | W. Behm Canal | 0 | 28 | 0 | 60 | 0 | 83 |
| Activities including in-water devices | Offshore Area | 387 | 38 | 493 | 134 | 493 | 158 |
| | Inland Waters | 0 | 377 | 1 | 628 | 1 | 691 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Military expended materials | Offshore Area | 189,815 | 604 | 198,028 | 3,922 | 198,028 | 4,325 |
| | Inland Waters | 8 | 442 | 3,085 | 513 | 3,085 | 563 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Secondary Impacts** | | | | | | | |
| Availability of resources | Offshore Area | Qualitative | | | | | |
| | Inland Waters | | | | | | |
| | W. Behm Canal | | | | | | |

The proposed NWTT activities were evaluated to identify specific components that could act as stressors by having direct or indirect effects on sources of transportation and shipping, commercial and recreational fishing, and tourism. For each stressor, a discussion of impacts on these sources is included for each alternative.

Inland portions of the Study Area also include Navy pierside locations, where sonar maintenance and testing occur, at NAVBASE Kitsap Bremerton, NAVBASE Kitsap Bangor, and Naval Station Everett. The Navy has specific locations in the Inland Waters that are used for both training and testing. The primary activities within the Inland Waters are testing. The Navy piers, known as waterfront restricted areas, are restricted for physical security and law enforcement. The overarching requirements for safety and security at the Navy piers minimize the potential for socioeconomic impacts from Navy activities. Therefore, the potential socioeconomic impacts of training and testing activities at Navy piers are not analyzed further.

#### 3.12.3.1 Accessibility

Navy training and testing activities have the potential to temporarily limit access to areas of the ocean for a variety of human activities associated with transportation and shipping, commercial and recreational fishing, and tourism in the Study Area. Access is most often affected when the Navy establishes a temporary, localized safety zone or buffer zone around certain activities and actively restricts non-Navy activities within the zone.

The purpose of restricting marine traffic in some instances is to eliminate acoustic interference during noise-sensitive testing. Typically, marine traffic is allowed to pass during the interval between test activities. When training or testing activities are scheduled that require specific areas to be free of nonparticipating vessels because of possible hazards to navigation, the Navy may request that the USCG issue NTMs to notify the public of upcoming Navy activities. Training and testing activities occur in established restricted or danger areas, as published on navigation charts. For most testing activities, restricting marine traffic is typically not required because activities run at sufficient depth and have no live warheads that would present a risk to surface vessels. The DBRC Site has unique fixed warning lights that notify nonmilitary craft of the status of Navy activities. The descriptions of the lights are posted at local boat ramps and marinas and are clearly indicated on standard National Oceanic and Atmospheric Administration charts (e.g., National Oceanic and Atmospheric Administration Nautical Chart No. 18458).

In accordance with 32 C.F.R. Part 761, a 500 yd. (457 m) protection zone is established around all U.S. Navy vessels in navigable waters of the United States and within the boundaries of U.S. Coast Guard Pacific Area. All vessels must proceed at a no-wake speed within a protection zone. Nonmilitary vessels are not permitted to enter within 100 yd. (91 m) of a U.S. naval vessel, whether underway or moored, unless authorized by an official patrol. The changes in accessibility to human activities in the ocean or inland waterways would be an impact if it directly contributed to loss of income, revenue, or employment. Disturbance to human activities that result in impacts on payrolls, revenue, or employment is quantified by the amount of time the activity may be restricted or rerouted or the ability to move to another location.

Maritime Security Operations (MSO) may impact bridge closures and accessibility. The category of MSO includes several different components. One component of MSO is Transit Protection System (TPS). Each TPS event includes up to nine security vessels moving within Puget Sound and the Strait of Juan de Fuca. USCG personnel and their ancillary equipment and weapons systems are involved in these events. Generally, the escorts establish a moving perimeter (security zone) around the vessel to prevent other vessels from entering that security zone. Depending on the type of vessel escort being conducted and other conditions, the security zone could be from a 100-yard to a 1,000-yard radius around the escorted vessel. Other vessels may be ordered to move. Every two years, a training event occurs which involves up to 16 vessels, transiting from Hood Canal to Admiralty Inlet. During this biennial event, boat crews train to engage surface targets by firing small-caliber (blank) weapons.

Similar maritime security escort training occurs with Coastal Riverine Group (CRG) boat crews conducting force protection for designated vessels and movements. Using up to four vessels per event, these CRG boat crews train to protect ships while entering and leaving ports. Other missions include ensuring compliance with vessel security zones for ships in port and at anchor, conducting patrols to counter waterborne threats, and conducting harbor approach defense.

NTMs are issued in advance of TPS events only on a case-by-case basis due to national security reasons. If present, all other vessels would be required to exit the security zone in accordance with general regulations in 33 C.F.R. Section 165, Subpart D. Along the route between the homeport and the dive/surface point, recreational or commercial vessels would be required to move outside the security zone of the designated Navy vessel, where conditions permit. Most often, this would mean temporarily relocating to a point closer to the shoreline. The impact to other vessels would last until the transiting vessels have passed.

During MSO events, both draw spans of the Hood Canal Bridge would be required for openings. Vehicular traffic on State Route 104 (which includes the Hood Canal Bridge) queues and back-ups occur. Normal bridge openings range from 30–60 minutes (Washington State Department of Transportation 2014); however, openings during MSO events would be longer due to the number of escort vessels and the slow speeds necessary to navigate safely through the corridor. These openings would last up to 60 minutes, leading to longer traffic queues. Advanced notice of bridge openings is limited for national security reasons and transits could occur any time of day and any day of the week. The Washington Department of Transportation has a website that provides the public with notification of bridge openings.

#### 3.12.3.1.1 No Action Alternative

##### 3.12.3.1.1.1 Training

**<u>Offshore Area</u>**

Under the No Action Alternative, potential accessibility impacts would be associated primarily with anti-air warfare (AAW), anti-surface warfare (ASUW), and anti-submarine warfare (ASW). Training activities would continue at baseline levels and within Pacific Northwest OPAREA. There would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) and the large expanse area, accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

**<u>Inland Waters</u>**

Under the No Action Alternative, potential accessibility impacts would be associated primarily with MIW, naval special warfare, and search and rescue. Training activities would continue at baseline levels and within established ranges and training locations. There would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) and the large expanse area, accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

##### 3.12.3.1.1.2 Testing

**<u>Offshore Area</u>**

Under the No Action Alternative, potential accessibility impacts would be associated primarily with testing conducted in the surf zone at Pacific Beach. Access to the work area would be limited during the event, for public safety and to prevent damage to test equipment. Notices to Mariners would be posted for testing in the Quinault Range Site, but this testing does not require significant safety zones or buffers. Systems and subsystems testing would continue to occur in the Quinault Range Site. No testing activities involving underwater explosions, such as ASW, would be conducted under the No Action Alternative. There would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) and the large expanse area, accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

**Inland Waters**

Under the No Action Alternative, potential accessibility impacts would be associated primarily with torpedo testing and ASUW/ASW. Torpedo testing, unmanned aircraft system testing, unmanned underwater vehicle testing, and miscellaneous testing in the DBRC Site and Keyport Range Site could cause temporary delays in access to these areas. Navy procedures for limiting access during testing events are described in Section 3.13.2.2 (Safety and Inspection Procedures). There would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures to provide Notices to Mariners in advance of activities (which may involve establishing safety or buffer zones [Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring] or applying restrictions only while the event is active) and, due to the small size of areas that would be restricted, accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

**Western Behm Canal**

Under the No Action Alternative, potential accessibility impacts would be associated with enforcing the restricted areas established by 33 C.F.R. 334.1275 during the hours a test event is in progress. Acoustic measurements would be conducted at baseline levels (28 events per year) at SEAFAC under the No Action Alternative. Proposed activities include surface vessel acoustic measurement, underwater vessel acoustic measurement, underwater vessel hydrodynamic performance measurement, component system testing, and measurement system repair and replacement.

The relatively small restricted areas provide for vessel and public safety, lessen acoustic encroachment from nonparticipating vessels, and prohibit certain activities that could damage SEAFAC's sensitive in-water acoustic instruments and associated cables. The restrictions during testing potentially conflict with other uses of Western Behm Canal, including commercial and recreational fishing, marine transportation, pleasure boating, and touring. Potential accessibility impacts are minimized through specific provisions in 33 C.F.R. Section 334, including the following:

- Each closure of the area by the Navy will normally not exceed 20 minutes. This provision minimizes the effects of the temporary restrictions to a minor inconvenience. Also, small craft may operate within 500 yd. (457 m) of the shoreline at speeds no greater than 5 knots. This greatly reduces the potential for conflicts with users such as recreational fishermen, charter fishing guides, kayakers, and other small craft users that normally transit the area close to the shoreline.

- From May 1 through September 15 annually, the Navy conducts acoustic measurement tests that result in transitory restrictions in Area 5 for a total of no more than 15 days. This falls within the cruise ship season, when visitation and recreational use of Western Behm Canal is highest and when vessel traffic associated with commercial fishing is most likely. This provision ensures that at least 89 percent of the days during this important time would be free of transit restrictions.
- Public notification that the Navy will conduct operations in Western Behm Canal is given at least 72 hours in advance to the following Ketchikan contacts: USCG, Ketchikan Gateway Borough Planning Department, Harbor Master, Alaska Department of Fish and Game, KRBD radio, KTKN radio, and the *Ketchikan Daily News*. Public notification may also be obtained by monitoring very high frequency channel 16.
- Vessels are allowed to transit Restricted Area 5 within 20 minutes of marine radio or telephone notification to the Navy range operations officer.

The restricted area requirements outlined above have allowed the Navy to conduct acoustic testing in Western Behm Canal for about 20 years while minimizing conflicts with and impacts on other users. There would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) and the large expanse area, accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

#### 3.12.3.1.2 Alternative 1

##### 3.12.3.1.2.1 Training

**<u>Offshore Area</u>**

Under Alternative 1, air combat maneuvers, missile exercises, helicopter tracking exercises, electronic warfare exercises, submarine mine exercises, and ship sonar maintenance would increase but would continue within established locations. The number of activities involving aircraft or vessels that may impact accessibility increases from 6,338 under the No Action Alternative to 9,148 under Alternative 1 (see Table 3.12-3). Although the number of training events would increase significantly, the number of aircraft flights would not increase as much because multiple training events are frequently combined during one flight. Half of the increase would be for air combat maneuvers and electronic warfare operations. The remainder of the training activities would remain the same as the No Action Alternative. As with the No Action Alternative, potential accessibility impacts would be associated primarily with AAW, ASUW, and ASW. No sinking exercises would be performed under Alternative 1. There would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) and the large expanse area, accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

**<u>Inland Waters</u>**

The proposed adjustments to baseline training activities include ASUW activities and MIW activities. Alternative 1 includes the addition of MSO, maritime homeland defense/security mine countermeasures integrated exercises, and small-boat attack events. Training events in Inland Waters would increase compared to the No Action Alternative. The number of activities involving aircraft or vessels that may impact accessibility increases from 200 under the No Action Alternative to 427 under Alternative 1. The number of activities proposed involving aircraft or vessels does not translate into an equal number of vessel movements/flights because multiple activities can occur during one vessel movement/flight. The naval special warfare activities would not change from the No Action Alternative.

NTMs are issued in advance of MSO events only on a case-by-case basis due to national security reasons. Recreational and commercial vessels would be required to avoid a 1,000-yard radius security zone during MSO events. The general regulations in 33 C.F.R. Section 165, Subpart D, state no person or vessel may enter or remain in the 1,000-yard security zone unless authorized by the USCG patrol commander. If present, recreational and commercial vessels would be required to temporarily exit the security zone as the escorts traverse between the dive/surface sites and NAVBASE Kitsap Bangor. The International Regulations for Prevention of Collisions at Sea, 1972 (72 COLREGS), sometimes called the International Rules of the Road, provide regulations that ensure the safe passage of vessels. Neither commercial nor recreational vessels are allowed to create congestion in the waterways and must cooperate with approaching through-traffic to permit safe passage as stated in Rules 9(a), 9(c), 10, and 18(c). Most often, this is accomplished by the commercial or recreational vessel (including fishing gear, if applicable) maneuvering out of the way of a transiting vessel. The impact to other vessels would typically last no more than 15 minutes, until the transiting vessels have passed.

Security zone closures imposed during MSO events would be short-term and transitory, but could impact a variety of users. During these events, commercial and recreational vessels would need to provide a larger clearance for a longer time compared to occasions when they would simply need to provide passage for through-traffic. As described above, some vessels may be required to temporarily relocate as the transiting convoy approaches. Smaller, more maneuverable boats can easily relocate out of the path of the security zone, potentially burning more fuel than otherwise necessary. However, larger, less maneuverable boats would require more time and fuel to reposition. At full throttle, the average four-stroke gasoline engine burns about a half pound[2] of fuel per hour for each unit of horsepower (diesel burns about 0.4 pound per hour per unit of horsepower) (Boating Magazine 2000). Assuming fuel prices of $3.82 per gallon (diesel rates of $3.57) (Defense Logistics Agency 2014), and assuming a vessel with 185-horsepower vessel expends 92 pounds of gasoline over the course of an hour, it would cost about $59 and an hour of time ($47 for diesel). This is an overestimate because it is based on the vessel being at full throttle; vessels waiting for the safety zone to pass would likely idle or cut their engines, thereby reducing fuel consumption. The impacts would be considered localized because only those vessels in the path of the security zone at the time of transit would be impacted.

Additional fuel costs to commercial shipping would occur if these ships had to hold in place as the safety zone passed, rather than following behind the safety zone or moving laterally along the shipping channel to accommodate the safety zone. Once the shipping channels narrow, tugboats maneuver large commercial shipping vessels to port. In this instance, fuel consumption costs of the larger commercial ship is minor.

Vehicular traffic on State Route 104 (which includes the Hood Canal Bridge) queues for longer periods than normal bridge openings due to the number of escort vessels and the slow speeds necessary to navigate safely through the corridor. This leads to longer traffic queues. Because advanced notice is limited for security reasons, vehicles and vessels may be less able to choose to avoid the area during

[2] Gasoline weighs about 6 pounds per gallon and diesel fuel 7 pounds per gallon.

these events. Under Alternative 1, approximately 100 annual bridge openings would occur. This would be an average of approximately two bridge openings per week. In 2010, there were 335 bridge openings on State Route 104 over Hood Canal, 100 of which were for Transit Protection System events; Alternative 1 proposes to maintain this level of bridge openings associated with these events. Of these 100 events, it is estimated that 60 will require a 60-minute opening and the remaining would require 40-minute openings, based on the training scenario. Depending on the timing of the openings, traffic queues on State Route 104 could be heavily impacted as rush-hour queues have been estimated to reach several miles (Heath 2011). County and local emergency response services on either side of the bridge have built their response plans around bridge openings and the untimely nature of emergencies. Bridge openings associated with Alternative 1 would not impact the effectiveness of these response plans.

While Alternative 1 would adjust the location and frequency of some activities, the Navy would continue to implement strict standard operating procedures. Despite the increase in frequency of activities, anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism would be minor because inaccessibility to areas of co-use would affect limited areas at a time and would be of short duration (hours). Based on the Navy's standard operating procedures to provide Notices to Mariners in advance of activities (which may involve establishing safety or buffer zones [Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring] or applying restrictions only while the event is active) and, due to the small size of areas that would be restricted, accessibility impacts would be minor. No disproportionately high or adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

#### 3.12.3.1.2.2 Testing

**Offshore Area**

Under Alternative 1, the number and type of testing activities would increase; half of the events would be ASW testing conducted by Naval Air Systems Command (NAVAIR) in the Pacific Northwest OPAREA. The number of activities involving aircraft or vessels that may impact accessibility increases from 39 under the No Action Alternative to 218 under Alternative 1 (see Table 3.12-3). Despite the increase in testing, there would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) and the large expanse area, accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

**Inland Waters**

Testing events in the Washington state Inland Waters would increase under Alternative 1 over the No Action Alternative. The number of activities involving aircraft (unmanned aircraft systems [UAS] only) or vessels that may impact accessibility increases from 339 under the No Action Alternative to 602 under Alternative 1. The increase would allow for future testing requirements. Despite the increase, there would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures to provide Notices to Mariners in advance of activities (which may involve establishing safety or buffer zones [Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring] or applying restrictions only while the event is active) and, due to the small size of areas that would be restricted, accessibility impacts would remain negligible.

Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

**Western Behm Canal**

Under Alternative 1, the number of activities that may impact accessibility increases from 28 under the No Action Alternative to 60 under Alternative 1. Despite the increase, there would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

#### 3.12.3.1.3 Alternative 2

##### 3.12.3.1.3.1 Training

**Offshore Area**

The proposed numbers of events for training activities for Alternative 2 would increase compared to the No Action Alternative and are identical to the numbers proposed under Alternative 1 (Table 3.12-3). Therefore, the impacts from Alternative 2 compared to the No Action Alternative would be the same as described under Alternative 1. There would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) and the large expanse area, accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

**Inland Waters**

The proposed adjustments to baseline training activities include ASUW activities, MIW activities, maritime homeland defense/security mine countermeasures integrated exercises, small-boat attack events, and MSO. Under Alternative 2, the number of events involving aircraft and vessels that could impact accessibility in Inland waters would be the same as Alternative 1, with the exception of increasing the integrated maritime homeland defense/security mine countermeasures exercise frequency to an annual event. Therefore, the impacts from Alternative 2 compared to the No Action Alternative would be the same as described under Alternative 1. While Alternative 2 would adjust the location and frequency of some training activities, the Navy would continue to implement strict standard operating procedures. Despite the increase in frequency of training activities, anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism would be minor because inaccessibility to areas of co-use would affect limited areas at a time and would be of short duration (hours). Based on the Navy's standard operating procedures to provide Notices to Mariners in advance of activities (which may involve establishing safety or buffer zones [Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring] or applying restrictions only while the event is active) and, due to the small size of areas that would be restricted, accessibility impacts would be minor. No disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

#### 3.12.3.1.3.2 Testing

**Offshore Area**

The number of testing events would increase under Alternative 2 compared to the No Action Alternative and Alternative 1. The number of activities involving aircraft or vessels that may impact accessibility increases from 39 under the No Action Alternative to 254 under Alternative 2 (see Table 3.12-3). Despite the increase in testing, there would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would remain infrequent and of short duration (hours). Based on the Navy's standard operating procedures (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) and the large expanse area, accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

**Inland Waters**

Testing activities would increase under Alternative 2. The increase would allow for future testing requirements. The number of activities involving aircraft or vessels that may impact accessibility increases from 339 under the No Action Alternative to 665 under Alternative 2. Despite the increase, there would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would be infrequent and of short duration (hours). Based on the Navy's standard operating procedures to provide Notices to Mariners in advance of activities (which may involve establishing safety or buffer zones [Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring] or applying restrictions only while the event is active) and, due to the small size of areas that would be restricted, accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

**Western Behm Canal**

Under Alternative 2, the number of testing events would increase compared with the No Action Alternative and Alternative 1 to allow for future testing requirements. The number of activities involving aircraft or vessels that may impact accessibility increases from 28 under the No Action Alternative to 83 under Alternative 2. The restricted area requirements and measures that minimize conflicts would continue to be implemented. There would be no anticipated impacts on transportation and shipping, commercial and recreational fishing, or tourism because inaccessibility to areas of co-use would still be infrequent and of short duration (hours). Based on the Navy's standard operating procedures (Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) accessibility impacts would remain negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

### 3.12.3.2 Physical Disturbance and Interactions

The evaluation of impacts on socioeconomic resources from physical disturbance and interaction stressors focuses on direct physical encounters or collisions with objects moving through the water or air (e.g., vessels, aircraft, unmanned devices, and towed devices), dropped or fired into the water (e.g., non-explosive practice munitions, other military expended materials, and ocean bottom deployed devices), or resting on the ocean floor (e.g., anchors, mines, and targets) that may damage or encounter civilian equipment. At SEAFAC, vessel movement is confined to the relatively small restricted areas and no military materials are expended; therefore, the likelihood of physical disturbance or interaction is remote and this location will not be analyzed.

Physical disturbances that damage equipment and infrastructure could disrupt the collection and transport of products, which may impact industry revenue or operating costs. Interactions may involve training or testing activities that do not physically interact with socioeconomic resources but may interact in a way that affects the resources. Included in this category of stressors is the use of sonar. For sonar to affect socioeconomic resources, the underwater acoustic sound would have to alter transportation, commercial or recreational fishing, or tourism in a way that causes an economic impact. Most recreational fishing in the Study Area takes place in state waters, where the Navy conducts very limited training. Less than 10 percent of recreational fishing takes place in federal waters, which are beyond 3 nm from shore. Recreational fishing typically occurs within 3 nm of shore. Therefore, most recreational fishing in the Offshore Area would occur away from physical disturbances and interactions associated with training and testing activities. Most commercial fishing occurs beyond 3 nm in Navy training and testing areas and could be affected by proposed activities if those activities were to alter fish population levels in those areas to such an extent that commercial fishers could no longer find their target species. As described in Section 3.9.3 (Fish – Environmental Consequences), the behavioral responses that could occur from various types of physical stressors associated with training and testing activities would not compromise the general health or condition of fish and, therefore, commercial or recreational fishing resources.

Commercial fishing activities have the potential to interact with equipment placed in the ocean or on the ocean floor for use during proposed Navy training and testing activities. This equipment could include ship anchors, moored or bottom-mounted targets, mines and mine shapes, tripods, and towed-system and attachment cables. Many different types of commercial fishing gear are used in the Study Area, including gillnets, longline gear, troll gear, trawls, seines, and traps or pots. Commercial bottom-fishing activities that use these types of gear have a greater potential to be affected by interaction with Navy training and testing equipment, resulting in the loss of or damage to both the Navy equipment and the commercial fishing gear. The Navy recovers many of the targets (e.g., mines and mine shapes) and target fragments used in training and testing activities, and it would continue to do so to minimize the potential for interaction with fishing gear and fishing vessels.

Unrecoverable items are typically small, constructed of soft materials (such as target cardboard boxes or tethered target balloons), or intentionally designed to sink to the bottom after serving their purpose (such as expended 55-gallon steel drums), so they would not represent a collision risk to vessels, including commercial fishing vessels. Commercial fishing activities that drag gear along the bottom could snag unrecoverable items such as expended 55-gallon steel drums and damage their gear. As discussed in Section 3.1 (Sediments and Water Quality), a west coast study categorized types of marine debris collected by a trawler during a groundfish survey. Military expended materials categorized as plastic, metal, fabric and fiber, and rubber accounted for 7.4, 6.2, 13.2, and 4.7 percent, respectively, of the total count of items collected. The footprint of military expended materials in the Study Area is discussed in Section 3.3 (Marine Habitats), which concludes that if all military expended materials were placed side by side in the Study Area, the footprint would be approximately 0.04 $nm^2$. Because this footprint is so small relative to the size of the Study Area, recreational and commercial fishers probably would not encounter military expended materials. Damage to fishing gear from Navy mine and submarine warfare activities in the Offshore Area is rare. When damage does occur to commercial fishing gear due to Navy actions (e.g., net entanglement, destructions of buoys), the fishermen (or the owner of the property damaged) can file a claim with the Department of the Navy under the Federal

Tort Claims Act under the provisions of 28 U.S. Code Section 2671, et seq. and request reimbursement. Forms for filing a claim under the act can be obtained from any Regional Legal Service Office. Reimbursement requests must be made within 2 years of incurring damage.

Military expended materials can physically interact with civilian equipment and infrastructure. Almost all training and testing activities produce military expended materials such as chaff, flares, projectiles, casings, target fragments, missile fragments, rocket fragments, and ballast weights. There would be a remote chance that fishermen using nets could recover military expended materials. No military expended materials would be associated with activities at the SEAFAC.

While Navy training and testing activities can occur throughout the Study Area, most (especially hazardous) activities occur well out to sea. Most civilian recreational activities engaged in by tourists and residents take place within a few miles of land. Snorkeling and diving take place primarily at known recreational sites, including shipwrecks and reefs. Temporary range clearance procedures in these areas do not adversely affect tourism activities because displacement is of short duration (typically less than 24 hours) and is in areas where tourism activities are not as prevalent. The Navy temporarily limits public access to areas where there is a risk of injury or property damage by using NTMs. Published notices allow recreational users to adjust their routes to avoid temporary restricted areas. If civilian vessels are within a testing or training area at the time of a scheduled operation, Navy personnel continue operations and avoid them if it is safe and possible to do so. If avoidance is not safe or possible, the operation may relocate or be delayed. In some instances when safety requires exclusive use of a specific area, nonparticipants in the area are asked to temporarily relocate to a safer area for the duration of the operation. Because Navy training and testing activities vary in location and are primarily short term in duration, impacts on tourism activities from rerouting or postponing activities would be negligible.

Other commercial tourism activities such as whale watching tours occur around the San Juan Islands and within Puget Sound by boat or aircraft. These activities would be conducted with boats that are typically well marked and visible to Navy ships conducting training and testing activities. Individual boaters engaged in tourism activities, such as whale watching, plan and monitor navigational information to avoid Navy training and testing areas. Vessels are responsible for being aware of designated danger areas in surface waters and any NTMs that are in effect. Operators of recreational or commercial vessels have a duty to abide by maritime requirements as administered by the USCG. At the same time, Navy vessels ensure that an area is clear of nonparticipants before training and testing exercises. As a result, conflicts between Navy training and testing activities in the Offshore Area and whale watching or other offshore recreational use would not occur. Changes to current offshore tourism activities in the Study Area would not be expected from proposed training and testing activities. Therefore, loss of revenue or employment associated with tourism would not occur.

Navy training and testing equipment and vessels moving through the water could collide with non-Navy vessels and equipment. Training and testing activities that involve equipment and vessel movement operate under Navy standard operating procedures as described in Section 3.13.2.2 (Safety and Inspection Procedures). The likelihood that Navy equipment or vessels would collide with a non-Navy vessel is remote because of the prevalent use of navigational aids or buoys separating vessel traffic, shipboard Lookouts, radar, and marine band radio communications by both Navy and civilians. Therefore, the potential to impact transportation and shipping by physical disturbance or interaction is negligible and requires no further analysis.

Aircraft conducting training or testing activities in the Study Area operate in designated military special use airspace (e.g., warning areas, restricted areas). All aircraft (military and civilian) are subject to FAA regulations, which define permissible uses of designated airspace and are implemented to control those uses. These regulations are intended to accommodate the various categories of aviation, whether military, commercial, or general aviation. By adhering to these regulations, the likelihood of civilian aircraft encountering military aircraft or ordnance is remote. In addition, Navy aircraft follow procedures outlined in Navy and FAA Instructions, which are specific to a warning area or other special use airspace and which describe procedures for operating safely when civilian aircraft are in the vicinity.

#### 3.12.3.2.1 No Action Alternative

##### 3.12.3.2.1.1 Training

**Offshore Area**

Weapons firing exercises and ordnance use in the Pacific Northwest OPAREA would generally be conducted beyond 12 nm of shore (outside U.S. territorial waters) under the No Action Alternative. Under this alternative, active sonar training activities such as ASW and MIW would continue at baseline levels and within the established NWTRC. Most of the active sonar activities are conducted in the Pacific Northwest OPAREA. The Navy’s implementation of strict operating procedures protects public health and safety from any training activities that would occur within U.S. territorial waters. These operating procedures include ensuring clearance of the area before commencing training activities involving physical interactions. Because of the Navy’s strict operating procedures, the potential for impacts on the public from physical disturbances or interactions because of Navy training activities under the No Action Alternative is negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

MIW activities, as well as naval special warfare activities, could impact socioeconomic resources by direct physical disturbances or interactions. However, the Navy’s implementation of strict operating procedures would protect the public from direct physical disturbances or interactions with Navy training activities. Prior public notification of hazardous Navy activities, use of known training areas, avoidance of nonmilitary vessels and personnel, maintenance of minimum separation distances between nonmilitary vessels and Navy vessels, use of standard operating procedures for clearance of ranges, and use of restricted access areas reduce the potential for interaction between the public and Navy activities. With the implementation of the Navy’s strict operating procedures, the potential for training activities to increase the public’s physical disturbances or interactions with Navy training activities under the No Action Alternative would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

##### 3.12.3.2.1.2 Testing

**Offshore Area**

Under the No Action Alternative, active sonar testing activities such as unmanned underwater vehicles and countermeasure testing would continue at baseline levels (see Table 3.12-3). The Navy’s implementation of strict operating procedures protects public interactions with any Navy testing activities that would occur within U.S. territorial waters. These operating procedures include ensuring clearance of the area before commencing with testing activities. Because of the Navy’s strict operating procedures, the potential for impacts from physical disturbances or interactions for the public because of Navy testing activities under the No Action Alternative is negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

**Inland Waters**

Testing activities could impact socioeconomic resources by direct physical disturbances or interactions. Countermeasure materials expended during testing are sought for recovery and test evaluation. Torpedoes used for testing do not contain explosives and are recovered for reuse and performance evaluation. However, materials such as decelerator/parachutes, guidance wires, and ballast weights are expended. Targets may be temporarily deployed and then recovered. Stationary targets may be floating either suspended or anchored in the water column. If there is a navigational hazard, then an NTM is issued for advisory notice to the public. Because of the Navy's strict operating procedures, the potential for testing activities to increase the public's physical disturbances or interactions with Navy testing activities under the No Action Alternative would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

#### 3.12.3.2.2 Alternative 1

##### 3.12.3.2.2.1 Training

**Offshore Area**

Under Alternative 1, the number of training events would increase but would continue within established locations. The number of activities involving vessels, in-water devices, or military expended materials that have potential for physical disturbance or interaction would increase from 191,205 under the No Action Alternative to 199,637 under Alternative 1 (see Table 3.12-3). However, the increased number of aircraft and vessel movements and the use of targets and expended materials would be conducted under the same safety and inspection procedures as under the No Action Alternative. Under Alternative 1, training activities in the Pacific Northwest OPAREA that could increase risk of physical disturbances or interactions with the public would likely be conducted outside U.S. territorial waters. Active sonar training would continue at current locations as described under the No Action Alternative. While Alternative 1 would adjust the frequency of training activities, the Navy would continue to implement strict standard operating procedures. Therefore, the potential for impacts of physical interactions with Navy training activities beyond those identified under the No Action Alternative would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

The proposed adjustments to baseline training activities would increase Inland Waters training and include ASUW activities, MIW activities, and maritime homeland defense/security mine countermeasures integrated exercises. Alternative 1 also includes the addition of small boat attack events, which will occur in areas where restrictions are in place to avoid encounters with nonparticipants. Activities involving vessels, in-water devices, and military expended materials with the potential for physical disturbance and interaction would increase from 12 under the No Action Alternative to 3,396 under Alternative 1. While Alternative 1 would adjust the frequency of training activities, the Navy would continue to implement strict standard operating procedures (U.S. Department of the Navy 2009). Therefore, the potential for training activities under Alternative 1 to increase the public's physical disturbances or interactions with Navy training beyond those identified under the No

Action Alternative would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

##### 3.12.3.2.2.2 Testing

**Offshore Area**

The frequency of testing activities would increase under Alternative 1; half of the increase would be for ASW activities in the Pacific Northwest OPAREA. The frequency of active sonar testing activities would increase over the No Action Alternative, allowing for future testing requirements by Naval Sea Systems Command and NAVAIR. The number of activities involving vessels, in-water devices, or military expended materials that have potential for physical disturbance or interaction would increase from 681 under the No Action Alternative to 4,214 under Alternative 1 (see Table 3.12-3). Because of the Navy's strict operating procedures, the potential for testing activities to increase the public's risk of physical disturbances or interactions with Navy testing activities under Alternative 1 would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

**Inland Waters**

Testing activities would increase under Alternative 1 and would occur in new locations such as Carr Inlet and within the restricted pierside area. Sonar use for testing activities and miscellaneous testing activities would be similar to that described under the No Action Alternative. The increase would allow for future testing requirements. Activities involving vessels, in-water devices, and military expended materials with the potential for physical disturbance and interaction would increase from 1,158 under the No Action Alternative to 1,743 under Alternative 1. Despite the increase in the number of testing events, the potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to the No Action Alternative due to the continued implementation of strict operating procedures that ensure that these areas are clear of nonparticipants (U.S. Department of the Navy 2009). Therefore, the potential for testing activities under Alternative 1 to increase the public's risk of physical disturbances or interactions with Navy testing activities beyond those identified under the No Action Alternative would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

#### 3.12.3.2.3 Alternative 2

##### 3.12.3.2.3.1 Training

**Offshore Area**

The proposed numbers of events for training activities for Alternative 2 would increase compared to the No Action Alternative and are identical to the numbers proposed under Alternative 1 (see Table 3.12-3). Therefore, the impacts from Alternative 2 compared to the No Action Alternative would be the same as described under Alternative 1. The potential for a direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar under Alternative 2 to those under Alternative 1. The Navy would continue to implement strict standard operating procedures. Therefore, the potential for impacts under Alternative 2 due to physical disturbances or interactions with the public beyond those identified under the No Action Alternative would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

The only proposed adjustment to training activities that could increase the risk of physical disturbances or interactions is an increase from three exercises per 5-year period to annually for maritime homeland defense/security mine countermeasures integrated exercises. The Navy would continue to implement strict standard operating procedures. The potential for training activities under Alternative 2 to increase the public's physical interactions with Navy training beyond those identified under the No Action Alternative would be negligible. Therefore, implementation of Alternative 2 would have negligible impacts on socioeconomic resources. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

#### 3.12.3.2.3.2 Testing

**Offshore Area**

The frequency of testing activities would increase under Alternative 2. The number of activities involving vessels, in-water devices, or military expended materials that have potential for physical disturbance or interaction would increase from 681 under the No Action Alternative to 4,670 under Alternative 2 (see Table 3.12-3). The increase would allow for future testing requirements. Because of the Navy's strict operating procedures, the potential for impacts under Alternative 2 due to physical disturbances or interactions with the public beyond those identified under the No Action Alternative would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

**Inland Waters**

Testing activities would increase under Alternative 2 and would occur in the same locations in the Inland Waters to allow for future testing requirements. Activities involving vessels, in-water devices, and military expended materials with the potential for physical disturbance and interaction would increase from 1,158 under the No Action Alternative to 1,919 under Alternative 2. The potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to the No Action Alternative due to the continued implementation of strict operating procedures that ensure that these areas are clear of nonparticipants (U.S. Department of the Navy 2009). Therefore, the potential for testing activities under Alternative 2 to increase the public's physical interactions with Navy testing beyond those identified under the No Action Alternative would be negligible and would have negligible impacts on socioeconomic resources. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

### 3.12.3.3 Aircraft and Vessel Noise

Loud noises and vibrations generated from aircraft overflights and vessel activities, such as the Navy's training and testing activities, have the potential to be heard by people and wildlife in the Study Area.

Noise interference could decrease public enjoyment of recreational activities. The public would hear noise from aircraft overflights and other training and testing activities if they are in the vicinity of an event. However, these effects would occur on a temporary basis, when Navy activities are occurring, and are of short duration in any given immediate location. Most Navy at-sea training and testing activities require the area to be clear of nonparticipants, reducing the potential that noise from these activities would disturb people. Further, most Navy training and testing aircraft activities would occur well out to sea, while tourism and civilian recreational activities are largely conducted on land or within a few miles of shore.

Some of the Olympic MOAs airspace is above portions of the Olympic National Park, a World Heritage Site. The analysis of impacts to the value of this World Heritage Site are included in Appendix K (World Heritage Site Analysis).

For the purposes of aircraft noise impact analysis, activities conducted in the Olympic MOAs are described and analyzed under the Offshore Area.

Aircraft and vessel noise is not anticipated to impact transportation and shipping, or commercial fishing within the Study Area; therefore, no further analysis of those impacts is needed.

#### 3.12.3.3.1 No Action Alternative

Exposure to fixed-wing aircraft noise in the Study Area would be brief (seconds) as an aircraft quickly passes overhead. Exposures would be infrequent based on the transitory and dispersed nature of the overflights. Repeated exposure of individuals over a short period (hours or days) is unlikely. Most aircraft overflights in the Study Area are not expected to result in meaningful exposures to humans based on typical flight altitudes (6,000–30,000 ft. MSL).

##### 3.12.3.3.1.1 Training

**Offshore Area**

Under the No Action Alternative, potential airborne noise impacts would be associated primarily with AAW, ASUW, ASW, and MIW. Most activities in the Offshore Area occur within W-237, at least 3 nm offshore, and would continue at baseline levels and within established ranges and training locations. There would be no anticipated impacts on offshore socioeconomic resources because Navy training in W-237 occurs well out to sea, while most tourism and recreational activities occur near shore.

Electronic Warfare and Air Combat Maneuver activities are conducted in the Olympic MOAs (Table 2.8-1), which overlays the western edge of the Olympic National Park and national and state forest land (Figure 3.12-4). Approximately 24 percent of the park lies beneath the MOAs. The Olympic MOAs were established in 1977, and the Navy has flown in the region for more than 40 years, flying the same types of training activities.

The aircraft that train in the Olympic MOAs arrive in the MOAs airspace via established FAA flight routes with FAA flight handling. That phase of each flight is under the direct control of the FAA and is not analyzed as training activities in the NWTT EIS. However, the cumulative impacts of aircraft transits to and from the MOAs are analyzed in Chapter 4 (Cumulative Impacts). It is important to recognize that in accordance with the Northwest Training Range Complex Range User's Manual (U.S. Department of the Navy 2014a), supersonic flights are not conducted in the Olympic MOAs or anywhere over the Olympic Peninsula.

After arriving at the MOAs, training flights are confined to that airspace. The floor of the MOAs is 6,000 ft. MSL. The ceiling of the MOAs is at 18,000 ft. MSL. Above the Olympic MOAs, the Olympic Air Traffic Control Assigned Airspace (ATCAA) extends the upper altitude limit of the combined airspace to 35,000 ft. MSL. The terrain beneath the MOAs is mountainous, with the land on the eastern boundary of the MOAs at the highest elevations. The distribution of terrain elevations beneath the MOAs is approximately as follows:

- 75.7 percent of the MOAs lies within the elevation range of 0–1,000 ft. (MSL),
- 14.5 percent at 1,000–2,000 ft. MSL,
- 7.5 percent at 2,000–3,000 ft. MSL,
- 2.0 percent at 3,000–4,000 ft. MSL, and
- 0.3 percent at 4,000–5,000 ft. MSL.

These altitude distributions are shown graphically in Figure 3.12-4.

The altitude flown by Navy aircraft depends on the training mission. When conducting training for suppression of enemy air defenses or electronic warfare close air support, EA-18G aircraft have historically flown and would continue to fly at greater than 20,000 ft. MSL for 69 percent of the time the aircraft is in the MOAs. For advanced air combat tactics training, EA-18G aircraft fly at or above 12,000 ft. MSL for 90 percent of the time the aircraft is in the MOAs. When considered in the context of terrain elevation under the MOAs, EA-18G aircraft fly no lower than 6,000 ft. above ground level for more than 90 percent of the time the MOAs are active (see Appendix J, Airspace Noise Analysis for the Olympic Military Operations Areas, for more information about aircraft altitudes).

There are two locations within the Olympic MOAs where aircraft could be as low as 1,200–1,400 ft. above ground level—5,300 ft. Pelton Peak and 4,492 ft. Colonel Bob, which are both within the Olympic National Park. However, these peaks lie along the eastern boundary of the Olympic B MOA, where flight activity rarely takes place. Aircrews fly their training missions in a manner that reduces the possibility of spilling out of assigned airspace. One technique is to plan maneuvers to avoid airspace boundaries by 3 nm; therefore, overflight of these two peaks, both of which are within 3 nm of the MOA boundary, is unlikely.

To understand the impacts of aircraft noise on residents, tourists, and recreationists on the Olympic Peninsula beneath the Olympic MOAs, the Navy completed an airspace noise analysis. This analysis compared the modeled noise environment between the baseline and the Proposed Action (Appendix J, Airspace Noise Analysis for the Olympic Military Operations Areas). The Department of Defense-approved model used the Day Night Average Sound Level (DNL), which is the federally recommended noise measure for assessing cumulative sound levels. This measure accounts for the exposure of all noise events in an average 24-hour period. DNL (which is also denoted as $L_{dn}$) is an average sound level expressed in decibels (dB). DNL is commonly used to assess aircraft noise exposures under special use airspace, such as the Olympic MOAs. The model used an "A-weighting" filter to assess sound levels based on human frequency sensitivity. These "A-weighted" sound levels are expressed as dBA.

High airspeed flyovers in the Olympic MOAs could result in a sudden onset of aircraft noise. In consideration of this "surprise" effect, a penalty of up to 11 dB is added for individual occurrences. This onset-rate adjusted day-night average sound level is expressed as $L_{dnr}$. Finally, $L_{max}$ is calculated, representing the loudest event that could happen anywhere within the Olympic MOAs. An observer would have to be directly below an aircraft flying at its highest power setting and lowest altitude to experience this sound level, which is unlikely considering the size of the Olympic MOAs, the number of annual activities (refer to Appendix J, Airspace Noise Analysis for the Olympic Military Operations Areas), and the amount of time aircraft spend at higher altitudes, as previously discussed.

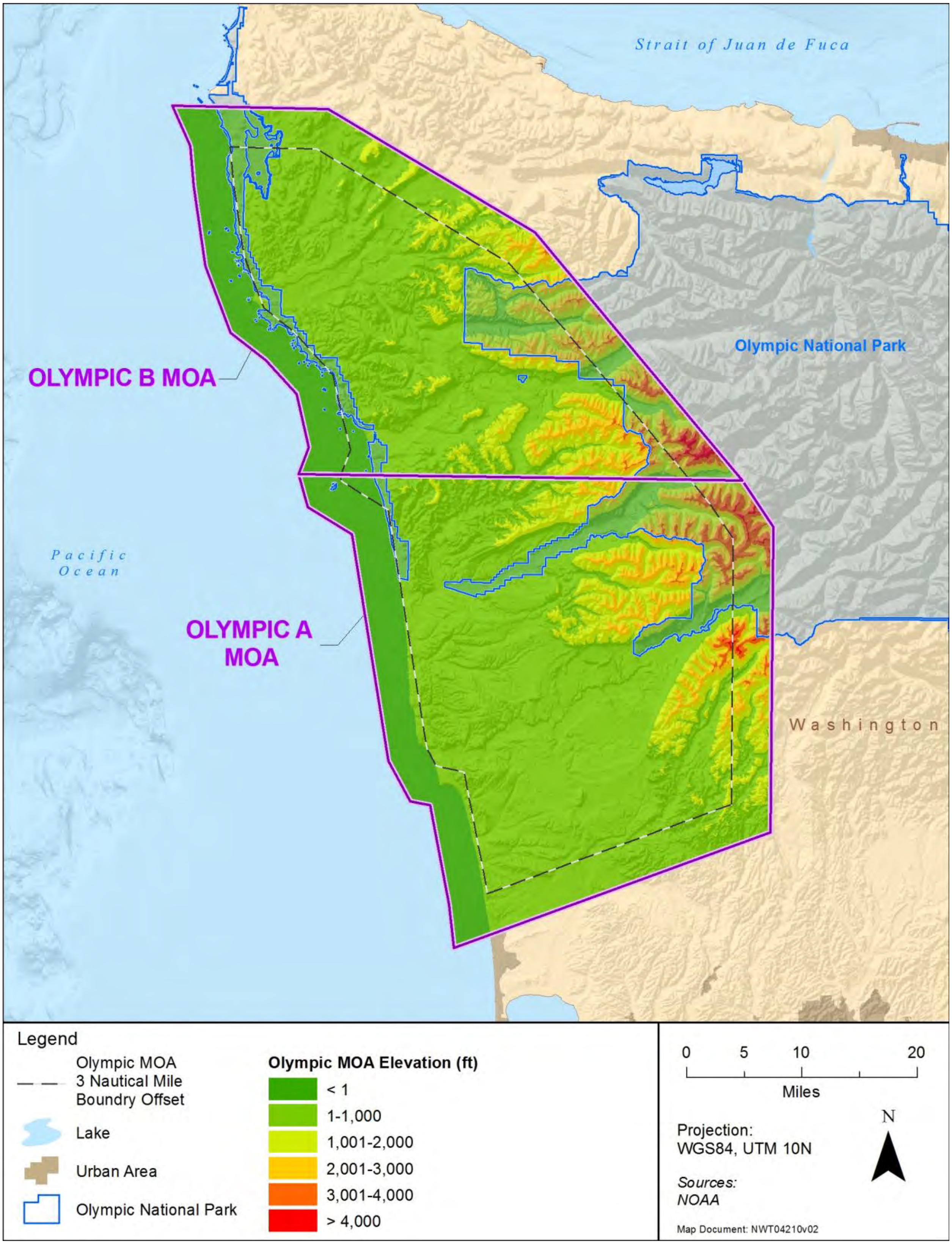


**Figure 3.12-4: The Olympic Military Operations Area and Terrain Elevations beneath it**

Under the No Action Alternative, aircraft activities would continue at baseline levels in the Olympic MOAs (refer to Tables 3.1 through 3.6 in Appendix J). The results of the noise modeling show that, for the cumulative noise metrics ($L_{dn}$) and ($L_{dnr}$), the highest level of noise exposure was computed to be 40 dBA for areas of highest elevation beneath the Olympic MOAs. For the lower ground elevations, the computed noise levels are correspondingly lower.

The results of the noise modeling also included a second metric, presented as $L_{max}$ and provided in Table 3.12-4. These results show that the maximum noise level that can be experienced beneath 90 percent of the MOAs with terrain at or below 2,000 ft. would be 88 dBA. The greatest $L_{max}$ of 105 dBA could only be experienced in the 0.3 percent of the MOAs where the terrain elevation is above 4,000 ft. Table 3.12-4 also shows that for the No Action Alternative, this greatest $L_{max}$ is predicted to occur for only 3 minutes during an entire year.

**Table 3.12-4: Noise Modeling Results for the Olympic Military Operations Area**

| Terrain Elevation | Percent of MOA area | $L_{max}$ (dBA) | Time at this $L_{max}$ (sec) per aircraft sortie | Total time at this $L_{max}$ (min) per year | |
|---|---|---|---|---|---|
| | | | | No Action Alternative | Alternative 1 & Alternative 2 |
| 0–1,000 ft. MSL | 75.7% | 84 | 115.2 | 1,187 | 1,423 |
| 1,000–2,000 ft. MSL | 14.5% | 88 | 28.0 | 288 | 345 |
| 2,000–3,000 ft. MSL | 7.5% | 92 | 11.3 | 116 | 139 |
| 3,000–4,000 ft. MSL | 2.0% | 97 | 2.6 | 27 | 32 |
| 4,000–5,000 ft. MSL | 0.3% | 105 | 0.3 | 3 | 4 |

The A-weighted $L_{dnr}$ is predicted to be 40 dBA throughout the Olympic MOAs. Aircraft noise generated from Navy aviation training activities is intermittent, occurring mostly at high altitudes, and there would be no supersonic flights. While individuals each have their own sensitivities to noise and noise levels that can impact a recreation experience, there is one comparison that can put these levels into context. In land use planning, Noise Zone 1 (DNL limit of 65 dBA) is the least likely to result in impacts and is considered to be compatible with most land uses. The 40 dBA predicted for the No Action Alternative is significantly lower than this 65 dBA threshold for Noise Zone 1. For activities occurring in the Olympic MOAs, there would be no anticipated impacts on socioeconomic resources because of the predicted low cumulative noise levels (nowhere greater than 40 dBA).

While it is predicted that some people beneath the Olympic MOAs could experience intermittent and brief $L_{max}$ levels as high as 105 dBA, more than 90 percent of the land beneath the MOAs would never exceed 88 dBA. Also, the $L_{max}$ level of 105 dBA is extremely unlikely to be experienced, given that would occur only at the highest elevation beneath the Olympic MOAs, which is also very near the boundary of the MOAs, a region that aircrew typically avoid. Since attendance within the National Park has been steadily increasing since 2010, concurrent with these activities, it is unlikely these activities are impacting tourism in the area.

Therefore, airborne noise impacts on socioeconomic resources under the No Action Alternative would be negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

**Inland Waters**

MIW activities, as well as naval special warfare activities, could cause temporary increases in airborne noise from vessels and helicopters. The airborne noise would be for short duration, localized, and away from areas where people are located.

The potential for training activities under the No Action Alternative to impact socioeconomic resources is negligible. Therefore, the potential impacts of airborne noise under the No Action Alternative are negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

#### 3.12.3.3.1.2 Testing

**Offshore Area**

All offshore testing under the No Action Alternative would be within the Quinault Range Site. Testing activities would not produce high levels of airborne noise due to the nature of the tests, which primarily occur underwater. Helicopters or surface vessels could be used in these tests. Aircraft and vessel noise from these tests is not expected to impact tourism because the testing would not be near people or areas of tourism, and the tests are infrequent. Further, noise from these activities is similar to sounds generated from non-Navy helicopters and vessels generally found in the area. Therefore, airborne noise impacts on socioeconomic resources under the No Action Alternative would be negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

**Inland Waters**

Torpedo testing and miscellaneous testing would be conducted at baseline levels. The airborne noise produced from surface vessels would be consistent with noise from non-Navy vessels common in the area, would be for short durations, localized, and away from people and tourism areas. The potential for testing activities under the No Action Alternative to impact tourism is negligible. Therefore, the potential impacts of airborne noise under the No Action Alternative are negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

**Western Behm Canal**

There are no activities including aircraft that produce airborne noise in the Western Behm Canal. Navy vessel activities include only sounds common to non-Navy vessels and are therefore not a significant source of airborne noise.

### 3.12.3.3.2 Alternative 1

#### 3.12.3.3.2.1 Training

**Offshore Area**

Under Alternative 1, there would be no change to the location where training activities occur; there are no changes to the airspace, which has been in place and used by the Navy for the past 40 years, and Navy vessels would continue to train in the same areas. Activities involving aircraft and vessels would increase from 6,338 under the No Action Alternative to 9,148 under Alternative 1 (see Table 3.12-3). Although the number of training events would increase, the number of aircraft flights would not increase as much because multiple training events are frequently combined during one flight. Generally, these training flights are at high altitudes and offshore. As discussed in Section 3.0.5.3.1.5 (Aircraft Noise), air combat maneuver flights are conducted between 5,000 and 30,000 ft. MSL. Airborne noise is attenuated substantially before reaching the surface, and exposure to the noise would be brief (seconds) as an aircraft quickly passes overhead.

Most activities in the Offshore Area occur within W-237, at least 3 nm offshore, and would continue within established ranges and training locations. There would be no anticipated impacts on socioeconomic resources because most Navy training occurs well out to sea, while most tourism and recreational activities occur near shore.

Under Alternative 1, the Navy proposes an increase in Electronic Warfare training with the proposed availability of additional electronic threat transmitters in the Study Area (Department of the Navy 2014b). Though there is a proposed increase in Electronic Warfare training events associated with the range enhancements, this does not equate to a comparable increase in the number of aircraft flights or in the duration of flights. Actual flight altitudes for Electronic Warfare events depend on training requirements. Many of the training activities conducted in the Olympic MOAs, such as Electronic Warfare, are conducted more than 10,000 ft. above ground level. In fact, approximately 95 percent of Navy training flights in the Olympic MOAs have been and would continue to be conducted above 10,000 ft. MSL with approximately 70 percent conducted above 20,000 ft. MSL. Electronic Warfare training flights are already occurring in the Olympic MOAs, and it is estimated that Alternative 1 will result in an approximately 10 percent annual increase in actual flights, which averages approximately one to two additional flights per day. This is because each flight will be able to accommodate multiple Electronic Warfare training events.

In addition to the increased number of flights, Alternative 1 analysis considers the recent change in aircraft type that are most commonly involved in Olympic MOAs training activities. The Navy completed its transition from the EA-6B Prowler to the EA-18G Growler aircraft, based at Naval Air Station Whidbey Island. The EA-18G was the aircraft analyzed in the Navy's noise model for Alternative 1 and Alternative 2. The increased frequency of flights (approximately one per day) and the different aircraft type (EA-18G replacing the EA-6B) could result in greater airborne noise exposure of residents on the Olympic Peninsula and tourists visiting the Olympic National Park and Olympic National Forest. However, flights occurring over the Olympic Peninsula are confined to the Olympic MOAs and therefore would generally occur at high altitudes; aircraft are required to remain above 6,000 ft. MSL, and never lower than 1,200 ft. above ground level. As described above under No Action Alternative, there are only two locations within the Olympic MOAs where aircraft could be as low as 1,200 ft. above ground level, but flight activity rarely takes place in either area. No supersonic flights would occur within or near the Olympic MOAs.

Under Alternative 1, the A-weighted $L_{dnr}$ is predicted to be 41 dBA throughout the Olympic MOAs, a slight increase from the No Action Alternative level of 40 dBA. Airborne noise generated from the activities is intermittent, mostly high-altitude overflights; occurs in remote areas; and does not involve high noise levels (i.e., flights are generally greater than 3,000 ft. above ground level and no supersonic flights occur). As shown in Table 3.12-4, the onset-rate adjusted day-night average sound level is 41 dBA, an increase of 1 dBA from the No Action Alternative.

For activities occurring in the Olympic MOAs, there would be no anticipated impacts on socioeconomic resources because of the predicted low cumulative noise levels (never greater than 41 dBA). The maximum noise levels ($L_{max}$) would not change from the No Action Alternative.

Therefore, airborne noise impacts on socioeconomic resources under Alternative 1 would be negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

#### Inland Waters

Under Alternative 1 the number of MIW training activities would increase in the Crescent Harbor and Hood Canal underwater training ranges. These infrequent, localized activities could be a source of airborne noise. Other activities that include aircraft or vessels generating airborne noise with the potential to impact tourism would increase from 200 under the No Action Alternative to 427 under Alternative 1. Rotary-wing aircraft and Navy vessels may be used during these training activities, which would be a source of airborne noise in these ranges. The airborne noise would be for short duration, localized, and away from people and areas of tourism. For these reasons, the potential for training activities to impact socioeconomic resources under Alternative 1 would be negligible.

### 3.12.3.3.2.2 Testing

#### Offshore Area

Activities that include aircraft or vessels generating airborne noise with the potential to impact tourism increase from 39 under the No Action Alternative to 218 under Alternative 1. Most of the increased number of events would be conducted more than 3 nm offshore and, for the aircraft, at high altitudes. These testing activities would not cause substantial increases in airborne noise. Therefore, airborne noise impacts on socioeconomic resources under Alternative 1 would be negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

#### Inland Waters

Activities that include aircraft (UASs) or vessels with the potential to impact tourism increase from 339 under the No Action Alternative to 602 under Alternative 1. Most of the increased number of events would involve vessels, but would still be within the norm of non-Navy vessel activity in the area. These testing activities would not cause substantial increases in airborne noise. Therefore, airborne noise impacts on socioeconomic resources under Alternative 1 would be negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

#### Western Behm Canal

There are no activities including aircraft that produce airborne noise in the Western Behm Canal. Navy vessel activities include only sounds common to non-Navy vessels and are therefore not a significant source of airborne noise.

### 3.12.3.3.3 Alternative 2

### 3.12.3.3.3.1 Training

#### Offshore Area

The proposed numbers of events for Alternative 2 would increase compared to the No Action Alternative and are the same as the numbers proposed under Alternative 1 (see Table 3.12-3). Impacts from Alternative 2 compared to the No Action Alternative would be the same as described under Alternative 1. Therefore, airborne noise impacts on socioeconomic resources under Alternative 2 would be negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

**Inland Waters**

The proposed numbers of events for Alternative 2 would increase compared to the No Action Alternative and are the same as the numbers proposed under Alternative 1. Impacts from Alternative 2 compared to the No Action Alternative would be the same as described under Alternative 1. The airborne noise resulting from surface vessels would be for short durations, localized, and away from tourism areas. For these reasons, the potential for training activities to impact socioeconomic resources under Alternative 2 would be negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

#### 3.12.3.3.3.2 Testing

**Offshore Area**

The proposed numbers of aircraft (UAS) and vessel events for Alternative 2 would increase compared to the No Action Alternative and would increase from the numbers proposed under Alternative 1 (see Table 3.12-3). Impacts from Alternative 2 compared to the No Action Alternative would be the same as described under Alternative 1. Aircraft and vessel noise from these testing activities would not cause substantial increases in airborne noise. Therefore, airborne noise impacts on socioeconomic resources under Alternative 2 would be negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

**Inland Waters**

The proposed numbers of events for Alternative 2 would increase compared to the No Action Alternative and would increase from the numbers proposed under Alternative 1. Impacts from Alternative 2 compared to the No Action Alternative would be the same as described under Alternative 1. The aircraft (UAS) and vessel noise resulting from surface vessels would still be within the norm of non-Navy vessel activity in the area, would be for short durations, localized, and away from tourism areas. For these reasons, the potential for testing activities to impact socioeconomic resources under Alternative 2 would be negligible. Because impacts are negligible, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

**Western Behm Canal**

There are no activities including aircraft that produce airborne noise in the Western Behm Canal. Navy vessel activities include only sounds common to non-Navy vessels and are therefore not a significant source of airborne noise.

### 3.12.3.4 Secondary Impacts

Socioeconomic resources could be impacted if proposed activities led to changes to physical and biological resources and if these activities acted as secondary stressors to the extent that they would alter the way industries can use those resources. The secondary impacts on marine resource availability pertain to the potential for loss of fisheries resources within the Study Area.

Transportation and shipping would not be affected by changes to physical or biological resources. Fishing and tourism could be impacted if proposed activities altered fish and other marine species population levels to such an extent that these activities could no longer find their target species. Similarly, disturbances to marine mammal populations could impact the whale watching industry. Analyses in Sections 3.4 (Marine Mammals), 3.8 (Marine Invertebrates), and 3.9 (Fish) concluded that impacts on marine species from training and testing activities are not anticipated. Based on these conclusions, secondary impacts on transportation or shipping, commercial or recreational fishing, or tourism are not anticipated. Because impacts are not anticipated, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of these activities.

#### 3.12.3.5 Summary of Potential Impacts of All Stressors on Socioeconomic Resources

Stressors described in this EIS/OEIS that could result in potential impacts on socioeconomic resources include accessibility to areas within the Study Area, physical disturbances and interactions, aircraft and vessel noise, and secondary impacts resulting from effects on marine species populations. Under the No Action Alternative, Alternative 1, and Alternative 2, these activities would be widely dispersed throughout the Study Area. These activities are also dispersed temporally (i.e., few stressors would occur in the same location at the same time). Therefore, no greater impacts from the combined operation of more than one stressor are expected. The aggregate impact on socioeconomic resources would not observably differ from existing conditions.

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# 3.13 Public Health and Safety

## TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES

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# 3.13 PUBLIC HEALTH AND SAFETY

**PUBLIC HEALTH AND SAFETY SYNOPSIS**

The United States Department of the Navy (Navy) considered all potential stressors, and the following have been analyzed for public health and safety:

- Underwater Energy
- In-Air Energy
- Physical Interactions
- Secondary Impacts (from sediment and water quality changes)

**Preferred Alternative (Alternative 1)**

- Because of the Navy's standard operating procedures, impacts on public health and safety would be unlikely. Further, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations.

## 3.13.1 INTRODUCTION AND METHODS

### 3.13.1.1 Introduction

This section of the Environmental Impact Statement (EIS)/Overseas EIS (OEIS) analyzes potential impacts on public health and safety within the Northwest Training and Testing (NWTT) Study Area (hereafter referred to as the Study Area). The Study Area is described in Section 2.1 (Description of the Northwest Training and Testing Study Area) and depicted in Figure 2.1-1.

This section also addresses the potential to impact the health and safety of children. Executive Order (EO) 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children and to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. People, including children, may be present in residential areas or on board private or commercial vessels near some training or testing areas; however, the United States (U.S.) Department of the Navy's (Navy's) safety measures that protect adults from potential impacts also protect children. Therefore, the Proposed Action would not disproportionately expose children to environmental health or safety risks.

Unlike military training and testing activities conducted within the boundaries of a fenced land installation, public access to ocean areas or the overlying airspace cannot be physically controlled. An exception to this situation is the pierside maintenance and testing at Naval Base (NAVBASE) Kitsap Bangor, NAVBASE Kitsap Bremerton, and Naval Station Everett that is conducted within the waterfront restricted area. The Navy coordinates use of these restricted areas by activity and issues warnings and notices, such as Notices to Mariners (NTMs), to the public before conducting potentially hazardous activities (Section 3.13.2.2). Sensitivity to public health and safety concerns within the Study Area is heightened in areas where the public may be close to certain activities (e.g., Puget Sound). Most testing occurs in Washington and Alaska State waters (within 3 nautical miles [nm] of shore) and areas where there could be interaction with the public. Most training occurs outside of state waters, where there is less potential for interaction with the public.

Generally, the greatest potential for a proposed activity to affect the public is near the coasts and shorelines because that is where public activities are concentrated. These coastal and shoreline areas could include dive sites; American Indian recreational, ceremonial or extractive areas; or other recreational areas where the collective health and safety of groups or individuals that could be exposed to the hazards of training and testing would be of concern. Most commercial and recreational marine activities are close to shore and are usually limited by the capabilities of the boat used. Commercial and recreational fishing may extend as far as 100 nm from shore but is concentrated near the coast.

The alternatives were also reviewed for any disproportionately high or adverse effects on any low-income populations or minority populations in accordance with EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This EO requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions. The Council on Environmental Quality has emphasized the importance of incorporating environmental justice review in the analyses conducted by federal agencies under the National Environmental Policy Act and of developing protective measures that avoid disproportionate environmental effects on minority or and low-income populations.

#### 3.13.1.2 Methods

Baseline public health and safety conditions were derived from the current training and testing activities in the Study Area. Existing procedures for ensuring public health and safety and other elements of the baseline (e.g., restricted areas) were derived from federal regulations, Department of Defense (DoD) directives, and Navy instructions for training and testing. These directives and instructions include criteria for public health and safety considerations for planning and execution of training and testing.

The Navy's safety measures implemented as part of standard operating procedures (SOPs) were considered relevant to the analysis of potential impacts on public health and safety from the underwater energy and physical interactions stressors. The analyses in Section 3.1 (Sediments and Water Quality) were used to determine the potential for secondary impacts from sediment and water quality changes to impact public health and safety.

The alternatives were evaluated based on two factors: (1) the probability for a training or testing activity to impact public health and safety, and (2) the degree to which those activities could have an impact. The likelihood that the public would be near a training or testing activity determines the potential for exposure to the activity. If the potential for exposure exists, the degree of the potential impacts on public health and safety, including increased risk of injury or loss of life, is determined. If the potential for exposure were zero, then public health and safety would not be affected. Isolated incidents and other conditions that affect single individuals, although important for safety awareness, may not rise to the level of a public health and safety issue and are not considered in this assessment (e.g., airborne noise effects are not addressed in this section).

Factors used to assess the significance of impacts on environmental justice in accordance with EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* include the extent or degree to which an alternative would have a disproportionately high and adverse human health or environmental effects on minority populations or low-income populations. If the analysis shows the environmental effects are significant (as employed by the National Environmental Policy Act [NEPA]) and are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population, then the impacts would be considered disproportionately high. If the environmental effects are not significant (as employed by NEPA), then the impacts on minority or low-income populations are not likely to exceed those of the general population.

## 3.13.2 AFFECTED ENVIRONMENT

### 3.13.2.1 Overview

All of the training and testing activities proposed in this EIS/OEIS would occur in one or more of these three range subdivisions:

- Offshore Area (Pacific Northwest Operating Area [OPAREA], including the Olympic MOAs and surf zone at Pacific Beach)
- Inland Waters (Washington State inland waters)
- Western Behm Canal, Alaska (Southeast Alaska Acoustic Measurement Facility [SEAFAC])

The areas of interest for assessing potential impacts on public health and safety are the Washington State inland waters and the U.S. territorial waters (seaward of the mean high water line to 12 nm) in the Study Area. Section 2.1 (Description of the Northwest Training and Testing Study Area) describes the Study Area in detail. Descriptions of the affected environment are presented for three distinct areas of the Study Area because, for the most part, the three areas have distinct activities and resources. Safety and inspection procedures are described for specific areas where appropriate; otherwise, the affected environment descriptions apply to all areas.

The Offshore Area of the Study Area includes air, surface, and subsurface operating areas extending generally west from the coastline of Washington, Oregon, and Northern California for a distance of approximately 250 nm into international waters. The eastern boundary of the Offshore Area lies 12 nm off the coastline for most of the Study Area, including southern Washington, Oregon, and Northern California. The Offshore Area includes the ocean all the way to the coastline only along the Washington coast beneath the airspace of W-237 and the Olympic Military Operations Area (MOA) and the Washington coastline north of the Olympic MOA. The Offshore Area is further described in Section 2.1.1 (Description of the Offshore Area).

The Inland Waters includes air, sea, and undersea space inland of the coastline and eastward to include the Strait of Juan de Fuca, the Puget Sound, and the Strait of Georgia. None of this area extends into Oregon or California. The Inland Waters are further described in Section 2.1.2 (Description of the Inland Waters).

SEAFAC has three major functional components: (1) Back Island Operations Center and supporting facilities, (2) Underway Measurement Site, and (3) Static Site (see Figure 2.1-4). The three major functional components are within the five restricted areas in Western Behm Canal. The main purposes of the restricted areas are to lessen acoustic encroachment from nonparticipating vessels and prohibit certain activities that could damage SEAFAC's sensitive in-water acoustic instruments and associated cables. The perimeter of Restricted Area 5 constitutes the Study Area boundary, and the Study Area will not include land-based support facilities or operations. The sensors at SEAFAC are passive and measure radiated noise in the water, such as from machinery on submarines or other underwater vessels. SEAFAC does not use tactical mid-frequency active sonar (sound navigation and ranging). Active acoustic sources are used for communications and range calibration and to provide position information for units operating submerged on the range. Further description of the Western Behm Canal is in Section 2.1.3 (Description of the Western Behm Canal, Alaska).

Military, commercial, institutional (including American Indian activities), and recreational activities take place simultaneously in the Study Area (Figure 3.13-1) and have coexisted safely for decades because established rules and practices lead to safe use of the waterway and airspace. The following paragraphs briefly discuss the rules and practices for recreational, commercial, institutional, and military use in sea surface areas and airspace. The safety and inspection procedures are implemented for training and testing activities. Each commanding officer is responsible for implementing safety and inspection procedures for activities inside and outside established ranges. In the absence of specific guidance on matters of safety, the Navy follows the most prudent course of action.


**Figure 3.13-1: Simultaneous Activities within the Northwest Training and Testing Study Area**

### 3.13.2.1.1 Sea Space

Most of the sea space in the Study Area is accessible to recreational and commercial activities. However, some activities are prohibited or restricted in certain areas (e.g., danger zones and restricted areas) in accordance with Title 33 Code of Federal Regulations (C.F.R.) Part 334, *Danger Zone and Restricted Area Regulations*. These restrictions can be permanent or temporary. Nautical charts issued by the National Oceanic and Atmospheric Administration (NOAA) include these federally designated zones and areas. Operators of private and commercial vessels have a duty to abide by maritime regulations administered by the U.S. Coast Guard. The Navy's safety measures ensure public health and safety primarily through SOPs to minimize or avoid civilian exposure to training and testing activities.

In accordance with Title 33 C.F.R. 72, *Marine Information*, the U.S. Coast Guard and the Department of Homeland Security inform private and commercial vessels about temporary closures via NTMs, which provide information about durations and locations of closures because of activities that are hazardous to surface vessels. Restricting marine traffic is typically not required as a safety measure for private and commercial vessels. In cases where certain activities involve navigational hazards, such as explosive ordnance disposal (EOD), the Navy coordinates with the U.S. Coast Guard to issue NTMs. In other cases, NTMs identify locations of planned Navy activities and alert the public to the need to temporarily avoid those locations. During any potentially hazardous surface activity at the Quinault Range Site, public safety is ensured by coordinating with Naval Air Station (NAS) Whidbey Island. Broadcast notices on maritime frequency radio, weekly publications by the appropriate U.S. Coast Guard Navigation Center, and global positioning system navigation charts disseminate these navigational warnings.

#### 3.13.2.1.2 Airspace

Most of the airspace in the Study Area is accessible to general aviation (recreational, private, corporate) and commercial aircraft. Like waterways, however, some areas are temporarily restricted from civilian and commercial use. The Federal Aviation Administration has established Special Use Airspace—airspace of defined dimensions within which activities must be confined because of their nature or, within which, limitations may be imposed upon aircraft operations that are not part of those activities (Federal Aviation Administration 2011). Special Use Airspace in the Study Area includes the following:

- **Restricted Airspace:** Airspace designated under 14 C.F.R. Part 73. Flights are prohibited during published periods of use unless permission is obtained from controlling authority..
- **Military Operations Areas:** Airspace established outside positive control to separate or segregate certain nonhazardous military activities from instrument flight rules traffic and to identify for visual flight rules traffic where these activities are conducted..
- **Warning Areas:** Airspace of defined dimensions extending from 3 or 12 nm outward from the coast of the U.S. that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning area is to warn nonparticipating pilots of the potential danger.
- **Air Traffic Control Assigned Airspace**: This airspace is used to contain specified activities, such as military flight training, and segregate it from other instrument flight rules air traffic.

Notices to Airmen (NOTAMs) are created and transmitted by government agencies and airport operators to alert aircraft pilots of any hazards en route to or at a specific location. The Federal Aviation Administration issues NOTAMs to disseminate information on upcoming or ongoing military exercises with airspace restrictions. Operators of civilian aircraft are responsible for being aware of restricted airspace and any NOTAMs that are in effect. Pilots have a duty to abide by aviation rules as administered by the Federal Aviation Administration.

Weather conditions dictate whether pilots (general aviation, commercial, or military) fly under visual flight rules or instrument flight rules. Under visual flight rules, the weather is favorable and the pilot is required to remain clear of clouds by specified distances to ensure separation from other aircraft using see and avoid procedures. Pilots flying under visual flight rules must be able to see outside the cockpit, control the aircraft’s attitude, navigate, and avoid obstacles and other aircraft based on visual cues. Pilots flying under visual flight rules assume responsibility for their separation from all other aircraft and are generally not assigned routes or altitudes by air traffic control. During unfavorable weather and as required by Federal Aviation Administration (FAA) airspace regulations, pilots will follow instrument flight rules. Factors such as visibility, cloud distance, cloud ceilings, and weather phenomena cause visual conditions to drop below the minimums required to operate by visual flight referencing. Instrument flight rules are the regulations and restrictions a pilot must comply with when flying in weather conditions that restrict visibility. Pilots can fly under instrument flight rules in visual flight rules weather conditions; however, pilots cannot fly under visual flight rules in instrument flight rules weather conditions.

### 3.13.2.2 Safety and Inspection Procedures

During training and testing, Navy policy is to ensure the safety and health of personnel and the general public (U.S. Department of the Navy 2011a). The Navy achieves these conditions by considering a location when planning activities, scheduling and notifying potential users of an area, and ensuring that an area is clear of nonparticipants. The Navy also has a proactive and comprehensive program of compliance with applicable standards and implementation of safety management systems.

#### 3.13.2.2.1 Offshore Area

The Pacific Northwest OPAREA comprises the Offshore Area. The area of interest for assessing potential impacts on public health and safety is the U.S. territorial waters; therefore, only the coastal areas beneath the airspace of W-237 and the Olympic MOA and the Washington coastline north of the Olympic peninsula are considered here. As discussed in Section 3.13.1.1 (Introduction), training or testing activity in the coastal area has the potential to affect the public because of the greater potential for public activities. When planning a training or testing event, the Navy considers proximity of the activity to public areas in choosing a location. Important factors considered include the ability to control access to an area; schedule (time of day, day of week); frequency, duration, and intensity of activities; range safety procedures; operational control of activities or events; and safety history.

The Federal Aviation Administration and the U.S. Coast Guard issue NOTAMs and NTMs, respectively. The Navy works closely with the Seattle Air Route Traffic Control Center (Seattle Center) for scheduling and control of W-237. Airspace scheduling and management of Warning Area W-570 and W-93 in the Pacific Northwest OPAREA are handled by the U.S. Air Force.

Most fleet training activities are conducted in the Pacific Northwest OPAREA. Testing conducted by Naval Sea Systems Command (NAVSEA) in the Offshore Area is limited torpedo testing activities and Naval Undersea Warfare Center (NUWC) Division, Keyport activities in the Quinault Range Site. Both sea- and air-based testing activities occur in this area. The activities that occur in the Olympic MOAs do not include weapons firing.

During training and testing activities in the Study Area, the Navy SOPs require that the appropriate safety zone is clear of nonparticipants before engaging in certain activities, such as firing weapons. Inability to obtain a “clear range” could cause an event to be delayed, cancelled, or relocated. Navy uses visual look-outs, sensors and other devices (e.g., radar) to maintain a clear range during activities, thereby ensuring public health and safety. The following outline some of the range safety procedures, range inspection procedures, exercise planning, and scheduling and coordinating procedures for the Navy.

Training activities comply with the *Northwest Training Range Complex Range User’s Manual* (NASWHIDBEYINST 3770.1G, U.S. Department of the Navy 2014), which prescribes a thorough environmental and safety review for all activities before being conducted. This manual incorporates guidance and outlines safety precautions and procedures that apply to range users including, but are not limited to, the following:

- The operational commander conducting an exercise shall be satisfied that the range is clear before beginning the exercise.
- Surface or air firing exercises shall be suspended at any time visual or radar warning indicates the presence of any vessel or aircraft within firing range.
- A sufficient number of qualified Lookouts shall be posted during all firing exercises.

- During surface gunnery exercises involving a towed target, two-way communications must be maintained between the firing unit and the towing vessel.
- Users shall be responsible for separation of their units from other air units, both military and civilian.
- Aircraft carrying service or practice ordnance shall avoid passing over ships.

Training and testing activities in the W-237A airspace and seaspace are scheduled and coordinated with NAS Whidbey Island and Commander Submarine Force. The Quinault Range Site is within the Pacific Northwest OPAREA that underlies W-237A and has a mile-wide stretch of surf zone at Pacific Beach.

NAVSEA testing activities in the Offshore Area are conducted in accordance with safety guidance. For the most part, Naval Air Systems Command (NAVAIR) conducts its testing activities in the same way the fleet conducts its training activities. Therefore, the same safety planning and procedures implemented for training activities in the Study Area apply to NAVAIR testing activities that are proposed for the Pacific Northwest OPAREA. Use of the W-237 range is coordinated through Range Schedules at NAS Whidbey Island, which would request the issuing of a NOTAM for air events. For surface events, the *Northwest Training Range Complex User's Manual* states NTMs are the responsibility of the scheduling entity (U.S. Department of the Navy 2014). Range users are responsible for their own range clearance and de-confliction prior to any live fire events.

#### 3.13.2.2.2 Inland Waters

Washington State inland waters include the Strait of Juan de Fuca to its mouth and the Puget Sound region. The Keyport Range Site, Dabob Bay Range Complex (DBRC) Site, Carr Inlet OPAREA, Navy 3 and Navy 7 OPAREAs, and pierside locations are all within the inland waters of Washington State. Two EOD ranges are in the Inland Waters: Hood Canal EOD Range and Crescent Harbor EOD Range.

The Navy uses specific locations in the Inland Waters for both training and testing. Although it is not a restricted area, the Navy limits or restricts access to Crescent Harbor as a safety protocol during mine warfare training. Access to pierside locations is also restricted. Training or testing activities in these inland areas have the potential to affect the public because of the concentration of public activities.

Training exercises within the Washington State inland waters of the Study Area are conducted in accordance with the *Northwest Training Range Complex User's Manual* (U.S. Department of the Navy 2014). The precautions for public health and safety include, but are not limited to, the following:

- Training exercises can only occur when all nonparticipating vessels and persons are clear of the area.
- Underwater demolition training is authorized only in the designated EOD ranges and must observe 700-yard (yd.) (640 m) radius exclusion zones around the detonation site.

NUWC Division Keyport's water-based test activities within the Washington State inland waters of the Study Area are conducted in compliance with NUWC Division Keyport safety guidance to protect the health and safety of the public. The precautions for public health and safety include, but are not limited to, the following:

- NUWC Division Keyport's safety policy is to observe every reasonable precaution in the planning and execution of all activities to prevent injury to people and damage to property.

- Access to the shoreline and pier at NUWC Division Keyport is heavily restricted, and security police personnel are posted at the main gate for additional security. Guards patrol the perimeter of the base, including the shoreline.

Procedures to initiate active sonar transmission operations pierside at Puget Sound Naval Shipyard and Intermediate Facility and at NAVBASE Kitsap Bangor are provided in Puget Sound Naval Shipyard and Intermediate Maintenance Facility Instruction (PSNS&IMFINST) 10552.1A, *Active sonar transmission operations* (U.S. Department of the Navy 2009). The Intermediate Maintenance Facility also does testing at Naval Station Everett. Because the area is restricted, there is no safety risk to the public.

The Navy performs a thorough safety review before conducting any testing activities in Inland Waters. Other procedures to ensure public safety include communicating activities to tribes, regulators, and the public. The Navy operates in cooperation with local maritime activities and rarely requires completely restricted access from OPAREAs.

Testing sites within Puget Sound have shore-to-shore surveillance capability because of the proximity of land on both sides. This provides the Navy a unique opportunity to implement highly effective visual surveillance procedures for public health and safety. Navy personnel on guard boats may advise nonmilitary vessel operators of test restrictions, request that they shut off their engines for a short time to eliminate acoustical interference during noise-sensitive testing, or restrict them from entering the testing area until the activity is completed.

The Keyport Range Site is charted as a restricted area on NOAA Navigation Chart 18446. The Dabob Bay and Hood Canal restricted areas are charted as Naval Operating Areas on NOAA Navigation Chart 18458. These designations help ensure public safety by promoting public awareness to avoid training and testing areas. In addition, the U.S. Coast Guard has published a final rule establishing protection zones extending 500 yd. (457 m) around all Navy vessels in navigable waters of the U.S. and within the boundaries of Coast Guard Pacific Area (32 C.F.R. Part 761), where all vessels must proceed at a no-wake speed when within this 500 yd. protection zone. Nonmilitary vessels are not allowed to approach within 100 yd. (91 m) of a U.S. naval vessel, whether underway or moored, unless authorized by an official patrol.

The Navy maintains yellow, white, and red lights to warn nonmilitary craft of the status of Navy activities within the Dabob Bay portion of the DBRC Site. Red or alternating white and red lights indicate that range activities involving critical measurements are in progress, engines should be stopped until red beacons have been shut off to indicate the test is completed, and advice of Navy personnel on guard boats should be followed when in or near the range site. Typically, boat passage is permitted between tests when the yellow beacons are operating. The descriptions of the lights are posted at local boat ramps and marinas and are clearly indicated on NOAA Nautical Chart 18458.

Public use restrictions associated with Carr Inlet are codified in U.S. Code Title 33 § 334.1250. These restrictions were established for the level and type of activity that existed when the Navy's Fox Island Laboratory was in place. Since the dis-establishment of the shore lab in 2009, the nature of activity and the in-water infrastructure has changed. Fixed buoys and hydrophones are no longer in place. As such, the restrictions that were in place that pertained to this equipment will be relaxed in an upcoming revision to the C.F.R. The Navy and the Army Corps of Engineers have been in discussion on this matter. The Navy is retaining the Carr Inlet operational area for infrequent operational and acoustic research studies; no explosives are used. The area is open to navigation at all times. Some restrictions may be instituted when the range is in use. Commercial traffic to points within Carr Inlet and through Carr Inlet to adjacent waters is permitted free access. Whenever the Navy plans operations for the Carr Inlet operational area, the public will be notified via published announcement in local newspapers and in the local U.S. Coast Guard NTM.

#### 3.13.2.2.3 Western Behm Canal, Alaska

Five restricted areas are established (33 C.F.R. § 334) in Behm Canal to ensure public safety and successful completion of mission activities at SEAFAC. The restricted areas provide the Navy with a means to control access to the testing area. In addition, the Navy's SOPs outlined above help to ensure health and safety.

Testing areas are monitored from the shore facility by radar electronically and visually. Radio contact for alert advisories is established with vessels that could be subject to unsafe conditions. Test area lights alert local traffic when SEAFAC is operational, and vessels must coordinate their passage with the SEAFAC facility control officer. The U.S. Coast Guard may also provide support to protect public safety.

### 3.13.2.3 Aviation Safety

Navy procedures on planning and managing Special Use Airspace are provided in Chief of Naval Operations Instruction (OPNAVINST) 3770.2K, *Airspace Procedures and Planning Manual* (U.S. Department of the Navy 2007). Scheduling and planning procedures for both training and testing air operations in the Study Area are issued through NAS Whidbey Island.

Aircrews involved in a training or testing exercise are aware that nonparticipating aircraft and ships are not precluded from entering the area and may not comply with NOTAMs or NTMs. Aircrews are required to maintain a continuous lookout for nonparticipating aircraft while operating in warning areas under visual flight rules. A qualified safety officer is assigned to each event or exercise and can terminate activities if unsafe conditions exist. In general, aircraft carrying ordnance will attempt to avoid overflight of surface vessels.

### 3.13.2.4 Submarine Navigation Safety

Submarine crews use various methods to avoid collisions while they are surfaced, including visual and radar scanning, acoustic depth finders, and state-of-the-art satellite navigational systems. When submerged, submarines use all available ocean navigation tools, including inertial navigation systems that calculate position based on the movement of the submarine. The surface is scanned for the presence of nonparticipating vessels before and during activities. Training and testing activities are delayed, cancelled, or relocated if range areas are not clear of nonparticipants. Procedures for safely transitioning to the surface include vertical separation of at least 100 ft. (30.5 m) between the top of a submarine's sail and the depth of a surface ship's keel and at least a 1,500 yd. (1,372 m) horizontal separation from other vessels. Areas with surface vessels can then be avoided to protect both the submarines and surface vessels.

### 3.13.2.5 Surface Vessel Navigational Safety

The Navy practices the fundamentals of safe navigation; this policy applies to all areas in the Study Area. While in transit, Navy surface vessel operators are alert at all times, use extreme caution, use state-of-the-art satellite navigational systems, and are trained to take proper action if there is a risk. Surface vessels are also equipped with trained and qualified Navy Lookouts. Individuals trained as

Lookouts have the necessary skills to detect objects or activity in the water that could be a risk for the vessel.

#### 3.13.2.5.1 Offshore Area

Before launching a weapon or sensors and other packages, Navy personnel on the vessels are required to determine that all safety criteria have been satisfied, the weapons and target recovery conditions are satisfactory, and recovery helicopters and vessels are ready to be employed. Live fire events are strictly controlled and executed in accordance with detailed standard operating and range safety procedures.

#### 3.13.2.5.2 Inland Waters

For specific testing activities, such as unmanned surface and underwater vehicle testing, a support boat would be used near the testing to ensure safe navigation by participants. Before firing or launching a weapon, Navy surface vessels are required to determine that all safety criteria have been satisfied. When applicable, the surface vessel would use aircraft and other vessels to aid navigation. In accordance with Navy instructions presented in this chapter, safety and inspection procedures ensure consideration for public health and safety.

#### 3.13.2.5.3 Western Behm Canal, Alaska

For specific activities, surface craft conduct visual surveillance before and during testing activities. The facility control officer in the SEAFAC facility operations building maintains visual surveillance of the site. In accordance with Navy instructions presented in this chapter, safety and inspection procedures ensure consideration of public health and safety.

### 3.13.2.6 Sound Navigation and Ranging (Sonar) Safety

#### 3.13.2.6.1 Offshore Area

Sonar training activities are conducted in accordance with the *Northwest Training Range Complex User's Manual* (U.S. Department of the Navy 2014). Among the various safety precautions, sonar is operated at the lowest practicable level required to meet tactical training objectives, and operators ensure that the safety zone radius around the sound source is clear prior to start up or restart of active sonar.

#### 3.13.2.6.2 Inland Waters

Surface vessels and submarines may use active sonar at the pierside locations listed in Chapter 2 (Description of Proposed Action and Alternatives). Procedures for NAVSEA to initiate active sonar transmission activities pierside are provided in PSNS&IMFINST 10552.1A, *Active sonar transmission operations* (U.S. Department of the Navy 2009). Procedures for training activities in the Inland Waters can be found in the *Northwest Training Range Complex User's Manual* (U.S. Department of the Navy 2014). To ensure safe and effective sonar use, the Navy applies the same safety procedures for pierside sonar use described for sonar use in the presence of Navy divers.

The *U.S. Navy Dive Manual*, Appendix 1A, Safe Diving Distances from Transmitting Sonar, is the Navy is governing document for protecting divers during active sonar use (U.S. Department of the Navy 2011b). Precautions are taken to ensure that divers or swimmers are not exposed to sonar. Before the use of active sonar, Navy observers ensure that there are no non-Navy divers or swimmers in the water within a safe standoff distance. The safe standoff distances vary with sonar and diver characteristics. This instruction provides procedures for calculating safe distances from active sonar, as derived from experimental and theoretical research conducted at the Naval Submarine Medical Research Laboratory and the Navy Experimental Diving Unit. Safety distances vary based on conditions that include diver attire, type of sonar, and duration of time in the water. Some safety procedures include onsite measurements during testing activities to identify an exclusion area for nonparticipating swimmers and divers (e.g., recreational and shellfish harvest divers).

### 3.13.2.7 Explosive Ordnance Detonation Safety

#### 3.13.2.7.1 Offshore Area and Inland Waters

Pressure waves from underwater detonations can pose a physical hazard in surrounding waters. Before conducting an underwater training or testing activity, Navy personnel establish an appropriately sized exclusion zone to avoid exposure of nonparticipants to the harmful intensities of pressure. The *U.S. Navy Dive Manual*, Chapter 2, Underwater Physics, provides procedures for determining safe distances from underwater explosions (U.S. Department of the Navy 2011b). In accordance with training and testing procedures for safety planning related to detonations (U.S. Department of the Navy 2011a), the Navy uses the following general and underwater detonation procedures:

- Navy personnel are responsible for ensuring that impact areas and targets are clear before commencing hazardous activities.
- The use of underwater ordnance must be coordinated with submarine operational authorities.
- Aircraft or vessels expending ordnance shall not commence firing without permission of the range safety officer or test safety officer for their specific range area.
- Firing units and targets must remain in their assigned areas, and units must fire in accordance with current safety instructions.
- Detonation activities will be conducted during daylight hours.

### 3.13.2.8 Weapons Firing and Ordnance Expenditure Safety

#### 3.13.2.8.1 Offshore Area and Inland Waters

In accordance with safety and inspection procedures (U.S. Department of the Navy 2011a), any unit firing or expending ordnance shall ensure that all possible safety precautions are taken to prevent accidental injury or property damage. The officer conducting the exercise shall permit firing or jettisoning of aerial targets only when the area is confirmed to be clear of nonparticipating units, both civilian and military.

Safety is a primary consideration for all training and testing activities. The range must be able to safely contain the hazard area of the weapons and equipment employed. The type of activity determines the size of the buffer zone. For activities with a large hazard area, special sea and air surveillance measures are implemented to ensure that the area is clear before activities commence. Before aircraft can drop ordnance, they are required to make a preliminary pass over the intended target area to ensure that it is clear of boats, divers, or other nonparticipants. Aircraft carrying ordnance to avoid overflight of surface vessels.

Training and testing activities are delayed, moved, or cancelled if there is a question about the safety of the public. Target areas must be clear of nonparticipants before conducting training and testing. If a restriction is in place and not being observed during a NAVSEA testing activity, the nonparticipant will be asked to move out of the safety buffer area. However, the NAVSEA activity will be delayed, moved, or cancelled if the restriction is not observed. When using ordnance with flight termination systems (which terminate the flight of airborne missiles or launch vehicles when they veer from their targeted path), the Navy is required to follow SOPs to ensure public health and safety. In those cases where a weapons system does not have a flight termination system, the size of the target area that needs to be clear of nonparticipants is based on the flight distance of the weapon plus an additional distance beyond the system's performance capability.

### 3.13.3 Environmental Consequences

This section evaluates how and to what degree the activities described in Chapter 2 (Description of Proposed Action and Alternatives) could impact public health and safety. In this section, each public health and safety stressor is introduced, analyzed by alternative, and analyzed for relevant training and testing activities. Tables 2.8-1 through 2.8-3 present the baseline and proposed training and testing activity locations for each alternative (including the number of events and ordnance expended). Tables E-1 and E-2 in Appendix E (Training and Testing Activities Matrices) describe the warfare areas and associated stressors that were considered for analysis of public health and safety. The stressors vary in intensity, frequency, duration, and location within the Study Area. Four stressors are applicable to public health and safety:

- Underwater energy
- In-air energy
- Physical interactions
- Secondary impacts from sediment and water quality changes

Alternatives 1 and 2 provide for inclusion of activities pierside, in Puget Sound, and at the Carr Inlet OPAREA, as described in Chapter 2 (Description of Proposed Action and Alternatives). Alternatives 1 and 2 would adjust locations and frequency of training and testing activities but would employ existing safety procedures and SOPs such that no new or additional risks to the public health and safety would be created.

Potential public health and safety impacts were evaluated assuming continued implementation of the Navy's current safety procedures for each training and testing activity or group of similar activities. Generally, the greatest potential for the proposed activities to be co-located with public activities would be in coastal areas because the intensity of commercial and recreational activities declines with increasing distance from the coast.

Training and testing activities in the Study Area are conducted in accordance with guidance provided in *Northwest Training Range Complex Range User's Manual* (NASWHIDBEYINST 3770.1G, *Navy Safety and Occupational Health Program Manual* (OPNAVINST 5100.23G CH-1), *Active sonar transmission operations* (PSNS&IMFINST 10552.1A, U.S. Department of the Navy 2009), range operating procedures, SEAFAC SOPs, and NUWC Division Keyport safety guidance. These manuals and instructions provide operational and safety procedures for all normal Navy events. They also provide information to range users that is necessary to operate safely and avoid affecting nonmilitary activities such as shipping, recreational boating, diving, and commercial or recreational fishing. Ranges are managed in accordance with SOPs that ensure public health and safety. Current requirements and practices (e.g., SOPs) designed to prevent public health and safety impacts discussed in Section 3.13.2 (Affected Environment) are incorporated in Chapter 5 (Standard Operating Procedures, Mitigation, and Monitoring).

Table 3.13-1 contains the number of components or activities for each of the stressors with respect to their location and changes among the alternatives. The specific analysis of the training and testing activities presented in this section considers relevant components and associated data with the geographic location of the activity and the resource. Training activities are not proposed in the Western

Behm Canal; therefore, only activities in the Offshore Area and the Inland Waters will be analyzed under Training Activities.

#### 3.13.3.1 Underwater Energy

Underwater energy can come from acoustic sources or underwater explosions. Active sonar, underwater explosions, and vessel movements all produce underwater acoustic energy. A negligible amount of energy from sound will travel from air to water during aircraft overflights because of refraction. Electromagnetic energy can enter the water from mine warfare training devices and from unmanned underwater systems. The potential for the public to be exposed to this stressor would be limited to individuals, such as recreational swimmers or self-contained underwater breathing apparatus (SCUBA) divers, that are under water and within unsafe proximity of a training or testing event.

Non-Navy swimmers and SCUBA divers (e.g., recreational and shellfish harvest divers) are not expected to be near Navy pierside locations (which include shipyards) because access to these areas is controlled for safety and security reasons. Locations of popular offshore diving spots are well documented, and dive boats (typically well marked) and diver-down flags would be visible from the vessels conducting the training and testing. Swimmers and divers are not expected to be near training and testing locations where active sonar activities and underwater explosions would occur because of the strict procedures for clearance of nonparticipants before conducting activities. Therefore, co-occurrence of divers and Navy activities is unlikely.

The *U.S. Navy Dive Manual* (U.S. Department of the Navy 2011b) prescribes safe distances for divers from active sonar sources and underwater explosions. Safety precautions specified in DoD Instruction 6055.11 (U.S. Department of Defense 2009) would be used as the standard safety buffers for underwater energy to protect public health and safety. If unauthorized personnel were detected within the exercise area, the activity would be promptly halted until the area was again clear. Therefore, the public is unlikely to be exposed to underwater energy at Navy pierside locations, in training or testing areas, or in ports.

Many of the proposed activities generate underwater acoustic energy; however, not all sources rise to the level of consideration in this EIS/OEIS as a risk to public health and safety. Swimmers or divers (e.g., recreational and shellfish harvest divers) might intermittently hear ship noise or underwater acoustic energy from aircraft overflights if they are near a training or testing event, but public health and safety would not be affected because aircraft or ship movement near an individual would be transitory. Because of the transitory nature of aircraft or ship movement, potential impacts on public health and safety of underwater acoustic energy from vessel movements and aircraft overflights would not be substantial and are not analyzed in further detail.

**Table 3.13-1: Stressor Table for Public Health and Safety**

| Component | Area | Number of Components or Events | | | | | |
|---|---|---|---|---|---|---|---|
| | | No Action Alternative | | Alternative 1 | | Alternative 2 | |
| | | Training | Testing | Training | Testing | Training | Testing |
| **Underwater Energy** | | | | | | | |
| Sonar and other active sources (hours) | Offshore Area | 332 | 24 | 551 | 977 | 551 | 1,073 |
| | Inland Waters | 0 | 2,061 | 407 | 5,448 | 407 | 5,939 |
| | W. Behm Canal | 0 | 0 | 0 | 2,762 | 0 | 3,838 |
| Sonar and other active sources (items) | Offshore Area | 880 | 364 | 1,616 | 773 | 1,616 | 837 |
| | Inland Waters | 0 | 1,188 | 0 | 1,308 | 0 | 1,410 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Explosives | Offshore Area | 209 | 0 | 142 | 148 | 142 | 164 |
| | Inland Waters | 4 | 0 | 42 | 0 | 42 | 0 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **In-Air Energy** | | | | | | | |
| Various sources of electromagnetic energy | Offshore Area | Qualitative | | | | | |
| | Inland Waters | | | | | | |
| | W. Behm Canal | | | | | | |
| **Physical Interactions** | | | | | | | |
| Activities including aircraft | Offshore Area | 5,342 | 2 | 8,040 | 80 | 8,040 | 92 |
| | 1 | 196 | 2 | 117 | 20 | 117 | 25 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Activities including vessels | Offshore Area | 1,003 | 39 | 1,116 | 158 | 1,116 | 187 |
| | Inland Waters | 4 | 339 | 310 | 602 | 310 | 665 |
| | W. Behm Canal | 0 | 28 | 0 | 60 | 0 | 83 |
| Activities including in-water devices | Offshore Area | 387 | 38 | 493 | 134 | 493 | 158 |
| | Inland Waters | 0 | 377 | 1 | 628 | 1 | 691 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| Military expended materials | Offshore Area | 189,815 | 604 | 198,028 | 3,922 | 198,028 | 4,325 |
| | Inland Waters | 8 | 442 | 3,085 | 513 | 3,085 | 563 |
| | W. Behm Canal | 0 | 0 | 0 | 0 | 0 | 0 |
| **Secondary Stressors** | | | | | | | |
| Sediment and water quality changes | Offshore Area | Qualitative | | | | | |
| | Inland Waters | | | | | | |
| | W. Behm Canal | | | | | | |

Active sonar and underwater explosions are the only sources of underwater acoustic energy evaluated for potential impacts on public health and safety. Various training and testing activities result in underwater acoustic activity; these activities are listed in Section 3.0.5.3.1 (Acoustic Stressors). Activities beyond U.S. territorial waters are not considered in the analysis of potential impacts on public health and safety, including most anti-surface warfare activities associated with weapons firing and anti-submarine warfare events that occur beyond 12 nm from shore.

The impacts on public health and safety from underwater energy depend on many factors. The effects of active sonar on humans vary with the sonar frequency. Of the four types of sonar (very high-, high-, mid-, and low-frequency), mid-frequency and low-frequency sonar have the greatest potential to impact humans because of the range of human hearing. Underwater explosives cause a physical shock front that compresses the explosive material, and the pressure wave then passes into the surrounding water. Generally, the pressure wave would be the primary cause of injury. The effects of an underwater explosion depend on several factors, including the size, type, and depth of the explosive charge and where it is in the water column.

#### 3.13.3.1.1 No Action Alternative

##### 3.13.3.1.1.1 Training Activities

**Offshore Area**

Under the No Action Alternative, active sonar training activities would continue at baseline levels and within the established Northwest Training Range Complex. Most of the active sonar activities are conducted beyond 12 nm in the Pacific Northwest OPAREA. Activities involving underwater explosions would continue at baseline levels within the Northwest Training Range Complex; however, most activities involving weapons firing and ordnance use would be conducted beyond 12 nm from shore (outside U.S. territorial waters).

Because most of these activities will occur beyond 12 nm from shore, and because the implementation of strict operating procedures will protect public health and safety, the potential for training activities emitting underwater energy to impact public health and safety under the No Action Alternative is low. These operating procedures include ensuring clearance of the area before commencing training activities involving underwater energy. Because the potential for impacts are low, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

Current locations for underwater explosions include specific training areas in the underwater training ranges at Crescent Harbor and Hood Canal. The EOD activities would include four training events per year: two events at Crescent Harbor EOD training area with net explosive weight at a maximum of 2.5 pounds (lb.) (1.1 kilograms [kg]), and two events in the Hood Canal EOD training area with net explosive weight at a maximum of 1.5 lb. (0.68 kg). Extensive onsite surveillance to protect threatened and endangered species would also protect public safety and health. Because of the Navy's safety procedures, the potential for training activities emitting underwater energy to impact public health and safety under the No Action Alternative is low. Because the potential for impacts are low, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

##### 3.13.3.1.1.2 Testing Activities

**Offshore Area**

Under the No Action Alternative, active acoustic testing activities would continue at baseline levels. No testing activities involving underwater explosions would be conducted under the No Action Alternative.

Surf zone activities at Pacific Beach Safety would be conducted after the area is free of nonparticipants. SOPs and visual surveillance are also implemented. The surf zone would be kept clear of nonparticipants prior to, during, and immediately after each test to avoid potential safety issues.

Implementation of strict operating procedures would protect public health and safety under the No Action Alternative. Therefore, the potential for adverse impacts is low. These operating procedures include ensuring clearance of the area before commencing testing activities involving underwater energy. Because the potential for impacts is low, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

#### Inland Waters

Under the No Action Alternative, sonar use for NUWC Division Keyport unmanned underwater devices and miscellaneous testing would occur at DBRC Site and Keyport Range Site. Because of the Navy's safety procedures, the potential for testing activities emitting underwater energy to impact public health and safety is low. Because the potential for impacts is negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

#### Western Behm Canal

The acoustic sensors at SEAFAC are passive; active acoustic sources are used for communications, for range calibration, and to provide position information for units operating submerged on the range. Activities would be conducted in the five restricted areas within Western Behm Canal. The restricted areas provide for vessel and public safety, lessen acoustic encroachment from nonparticipating vessels, and prohibit certain activities that could damage SEAFAC's sensitive in-water acoustic instruments and associated cables. Acoustic measurements would be conducted at baseline levels, with 28 events per year at SEAFAC. Proposed activities include surface vessel acoustic measurement, underwater vessel acoustic measurement, underwater vessel hydrodynamic performance measurement, component system testing, and measurement system repair and replacement. Because of the Navy's safety procedures, the potential for testing activities to impact public health and safety is low. Because the potential for impacts is low, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

### 3.13.3.1.2 Alternative 1

### 3.13.3.1.2.1 Training Activities

#### Offshore Area

The proposed adjustments to baseline training activities under Alternative 1 include an increase in active sonar training and a decrease in activities involving underwater explosions, including the elimination of sinking exercises, as described in Tables 3.0-11 and 3.13-1. However, most of these activities would occur beyond 12 nm from shore. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure training areas are clear of nonparticipants, the potential for impacts on public health and safety beyond those identified under the No Action Alternative would not likely increase. Because the potential for impacts are low, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

#### Inland Waters

Alternative 1 would adjust and introduce training activities, as described in Tables 3.0-11 and 3.13-1. None of the additional activities include live fire. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety beyond those identified under the

No Action Alternative would not likely increase. Because the potential for impacts are low, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

#### 3.13.3.1.2.2 Testing Activities

**Offshore Area**

The proposed adjustments to baseline testing activities under Alternative 1 include increases in active sonar testing and activities involving underwater explosions plus the addition of aircraft and aircraft system testing, as described in Tables 3.0-11 and 3.13-1. The frequency of active sonar testing activities in the Quinault Range Site would increase over the No Action Alternative. The number of components or activities involving the use of explosives would increases from none in the Offshore Area to 148. The Navy's existing safety procedures would ensure that the potential for these activities to impact public health and safety would be low.

NAVAIR would conduct activities to evaluate the sensors and systems (sonobuoys) used by maritime patrol aircraft and improved extended echo ranging sonobuoys in the Pacific Northwest OPAREA. These NAVAIR activities would likely be conducted outside U.S. territorial waters. NAVSEA testing activities would increase under Alternative 1 but would continue to occur beyond 12 nm from shore. NUWC Division Keyport activities such as torpedo testing, countermeasures testing, and other miscellaneous tests would increase in the Quinault Range Site. These tests use active acoustic systems. The amount of underwater energy, including sonar, emitted by these activities would increase over the No Action Alternative. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety beyond those identified under the No Action Alternative would not likely increase. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

**Inland Waters**

Sonar use for NUWC Division Keyport testing activities would be similar as described under the No Action Alternative. NAVSEA pierside testing while ships are in port at Navy piers would occur at NAVBASE Kitsap Bremerton, NAVBASE Kitsap Bangor, and Naval Station Everett. Naval Surface Warfare Center, Carderock Division, Detachment Puget Sound would conduct acoustic testing activities in Hood Canal and resume testing activities at Carr Inlet OPAREAs. Although the Naval Surface Warfare Center, Carderock Division, Detachment Puget Sound activities have not previously been assessed, they are on-going activities. The type and tempo of activity contemplated in Alternative 1 is similar to the existing level of activity; Alternative 1 would therefore not represent a significant change in activity visible to the public in Hood Canal. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety beyond those identified under the No Action Alternative would not likely increase. Resuming use of Carr Inlet would be a minor change in activity visible to the public; however, because use of Carr Inlet would be limited to no more than 2 weeks of the year, and the same SOPs for notifying and working safely with the public would apply, the level of impacts would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

**Western Behm Canal**

The proposed adjustment to Alternative 1 testing activities includes an increased frequency of operations at SEAFAC. The small increase would allow for future testing requirements. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety beyond those identified under the No Action Alternative would not likely increase. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

#### 3.13.3.1.3 Alternative 2

##### 3.13.3.1.3.1 Training Activities

**Offshore Area**

The proposed adjustments to baseline training activities under Alternative 2 include increases in active sonar training and activities involving underwater explosions, including sinking exercises, as described in Tables 3.0-11 and 3.13-1. However, most of these activities would occur beyond 12 nm from shore. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure training areas are clear of nonparticipants, the potential for impacts on public health and safety beyond those identified under the No Action Alternative would not likely increase. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

The proposed adjustments to Alternative 2 training activities include increasing the integrated maritime homeland defense/security mine countermeasures exercise frequency to an annual event. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety beyond those identified under the No Action Alternative would not likely increase. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

##### 3.13.3.1.3.2 Testing Activities

**Offshore Area**

The proposed adjustments to the levels and tempo of testing include an increased frequency of testing operations. The proposed activities under Alternative 2 are similar to Alternative 1, as described in Tables 3.0-11 and 3.13-1. The proposed testing activities involving underwater explosions are similar to Alternative 1, which would occur within established ranges and locations. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety beyond those identified under the No Action Alternative would not likely increase. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

**Inland Waters**

The proposed adjustments to the levels and tempo of testing activities include an increase in the number of events for NUWC Division Keyport unmanned underwater vehicles testing and miscellaneous testing activities. The small increase would allow for future testing requirements. The frequency of pierside sonar testing at NAVBASE Kitsap Bremerton, NAVBASE Kitsap Bangor, and Naval Station Everett would increase under Alternative 2. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety beyond those identified under the No Action Alternative would not likely increase. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

**Western Behm Canal**

The proposed adjustments to the levels and tempo of testing activities includes an increased frequency of operations at SEAFAC. The small increase would allow for future testing requirements. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety beyond those identified under the No Action Alternative would not likely increase. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

### 3.13.3.2 In-Air Energy

In-air energy stressors include sources of electromagnetic energy and lasers. As described in Section 3.0.5.3.2.1 (Electromagnetic), emission of electromagnetic energy by magnetic influence mine neutralization systems occur only in training activities in Inland Waters. As described in Section 3.0.5.3.2.2 (Lasers), only low-energy lasers are used under the Proposed Action. Low-energy lasers are used to illuminate or designate targets, to guide weapons, and to detect or classify mines. Lasers are only used to guide bombing exercises for training in the Offshore Area. Laser safety requirements for aircraft require verification that target areas are clear before commencement of the exercise. In addition, during actual laser use, the aircraft run-in headings are restricted to preclude inadvertent lasing of areas where the public may be present.

#### 3.13.3.2.1 No Action Alternative

##### 3.13.3.2.1.1 Training

**Offshore Area**

Thirty bombing exercises using low energy targeting lasers are proposed per year. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, there is no difference among the alternatives and no difference in the types of impacts as described in Section 3.0.5.3.2.2 (Lasers). Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

There are no training activities that include in-air energy.

##### 3.13.3.2.1.2 Testing

There are no testing activities that include in-air energy.

#### 3.13.3.2.2 Alternative 1

##### 3.13.3.2.2.1 Training

**Offshore Area**

Thirty events are proposed per year. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, there is no difference among the alternatives and no difference in the types of impacts as described in Section 3.0.5.3.2.2 (Lasers). Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

Alternative 1 would introduce the use of electromagnetic energy under maritime homeland defense/security mine countermeasures. One event is proposed every other year (three in 5 years). Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

##### 3.13.3.2.2.2 Testing

There are no testing activities that include in-air energy.

#### 3.13.3.2.3 Alternative 2

##### 3.13.3.2.3.1 Training

**Offshore Area**

Thirty events are proposed per year. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, there is no difference among the alternatives and no difference in the types of impacts as described in Section 3.0.5.3.2.2 (Lasers). Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

Alternative 2 would increase in frequency to one event each year. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

##### 3.13.3.2.3.2 Testing

There are no testing activities that include in-air energy.

### 3.13.3.3 Physical Interactions

Public health and safety could be impacted by direct physical interactions with Navy activities. Navy aircraft, vessels, targets, munitions, towed devices, seafloor devices, and other expended materials resulting from training and testing activities could have direct physical encounters with recreational, commercial, or institutional aircraft, vessels, and users such as swimmers, divers (e.g., recreational and shell fish harvest divers), and anglers. Because of the nature of vessel movements during SEAFAC testing, the lack of military expended materials, and the remote likelihood of physical disturbance or interaction, physical interactions related to SEAFAC testing will not be analyzed.

Both Navy and private aircraft operate under FAA regulations requiring them to observe and avoid other aircraft. In addition, NOTAMs advise pilots about when and where Navy training and testing activities are scheduled. Finally, Navy personnel are required to verify that the range is clear of nonparticipants before initiating any potentially hazardous activity. Together, these procedures minimize the potential for adverse interactions between Navy and nonparticipant aircraft. The Navy's SOPs minimize the potential for private and commercial aircraft traversing the Study Area during training or testing activities to interact with Navy aircraft, ordnance, or aerial targets.

Both Navy and private vessels operate under maritime navigational rules requiring them to observe and avoid other vessels. In addition, NTMs advise vessel operators about when and where navigational hazards exist because of Navy training and testing activities. Finally, Navy personnel are required to verify that the range is clear of nonparticipants before initiating any potentially hazardous activity. Together, these procedures minimize the potential for adverse interactions between Navy and nonparticipant vessels. The Navy's SOPs minimize the potential for private and commercial vessels traversing the Study Area during training or testing activities to interact with Navy vessels, ordnance, or surface targets.

Recreational diving within the Study Area takes place primarily at known diving sites such as shipwrecks and reefs. The locations of these popular dive sites are well documented, dive boats are typically well marked, and diver-down flags are visible from a distance. As a result, ships conducting training or testing activities would easily avoid dive sites. Interactions between training and testing activities and divers thus would be minimized, reducing the potential for collisions or ship strikes.

Commercial and recreational fishers could encounter military expended materials that could entangle fishing gear and could pose a safety risk. The Navy would continue to recover targets at or near the surface that were used during training or testing to ensure that they would not pose a collision risk. Unrecoverable pieces of military expended materials are typically small (such as sonobuoys), constructed of soft materials (such as target cardboard boxes), or intended to sink to the bottom after use, so they would not be a collision risk to civilian vessels or equipment. Thus, these targets do not pose a safety risk to individuals using the area for recreation because the public would not likely be exposed to these items before they sank to the seafloor.

As discussed in Section 3.1 (Sediments and Water Quality), a west coast study categorized types of marine debris collected by a trawler during a groundfish survey. Military expended materials categorized as plastic, metal, fabric and fiber, and rubber accounted for 7.4, 6.2, 13.2, and 4.7 percent, respectively, of the total count of items collected. The footprint of military expended materials in the Study Area is discussed in Section 3.3 (Marine Habitats), which concludes that if all military expended materials were placed side by side in the Study Area, the footprint would be approximately 0.04 square nautical mile. Because this footprint is so small relative to the size of the Study Area, recreational and commercial fishers probably would not encounter military expended materials.

Section 3.1 (Sediments and Water Quality) also discussed the low failure rates of munitions, which indicate that most munitions function as intended. Practically all of the munitions are consumed in an exercise, and training ordnance is usually recovered. While fish trawls may encounter undetonated ordnance lying on the ocean floor, such an encounter would be unlikely because the density of munitions in the Study Area is low. Further, activities involving live ordnance occur further offshore, which further reduces the potential for risk. The U.S. Army Corps of Engineers prescribes safety procedures to the public if military munitions are encountered.

The analysis focuses on the potential for a direct physical interaction between the public and an aircraft, vessel, target, underwater devices, or expended training or testing item. All proposed activities have some potential for a direct physical interaction that could pose a risk to public health and safety, so the following analysis is not activity specific. While some of the activities may not pose a potential for a direct physical interaction (like pierside testing) the platforms used in the activity (aircraft, vessel, towed device) could have a direct physical interaction that could pose a risk. The greatest potential for a physical interaction would be in nearshore areas because of the higher concentration of public activities, leading to a greater potential for co-occurrence.

#### 3.13.3.3.1 No Action Alternative

##### 3.13.3.3.1.1 Training

**Offshore Area**

The potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to baseline conditions due to the continued implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants. The potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

Mine warfare activities in Crescent Harbor EOD Range and Hood Canal EOD Range, as well as naval special warfare activities, could impact public health and safety by direct physical interactions. However, the Navy's implementation of strict operating procedures would protect public health and safety from training activities. Because of the implementation of these strict operating procedures, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

##### 3.13.3.3.1.2 Testing

**Offshore Area**

Additional activities under this alternative that could impact public health and safety by direct physical interactions include torpedo testing and miscellaneous testing in the Quinault Range Site. In-water testing of non-explosive torpedoes, unmanned underwater devices, and anti-submarine warfare activities in the surf zone at Pacific Beach could also impact public health and safety. Because the potential for a physical interaction is not activity specific or location specific, the analysis of the training activities above applies to testing activities under the No Action Alternative. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

**Inland Waters**

Testing in the DBRC Site and Keyport Range Site could impact public health and safety by direct physical interactions. Countermeasure materials expended during testing are sought for recovery and test evaluation. Sonobuoys are recovered for further analysis after testing. Torpedoes and unmanned undersea vehicles used for testing do not contain explosives and are recovered for reuse and for performance evaluation. However, materials such as decelerator/parachutes, guidance wires, and ballast weights are expended. Targets may be temporarily deployed and then recovered. Stationery targets may be in the water column either floating suspended or anchored. If there is a navigational hazard, then an NTM is issued for advisory notice to the public. Because of the implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

#### 3.13.3.3.2 Alternative 1

##### 3.13.3.3.2.1 Training

**Offshore Area**

Under Alternative 1, the number of events involving aircraft, vessels, and in-water devices would increase from the No Action Alternative (see Table 3.13-1). The amount of military expended materials is expected to decrease from the No Action Alternative. The increased number of aircraft, vessel, and in-water device movements would be conducted under the same safety and inspection procedures as under the No Action Alternative. Under Alternative 1, most activities in the Pacific Northwest OPAREA that could impact public health and safety would likely be conducted outside U.S. territorial waters. The potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to baseline conditions due to the continued implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants. Because of these strict operating procedures, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

Under Alternative 1, the number of events involving aircraft, vessels, in-water devices, and military expended materials would increase from the No Action Alternative and Alternative 1 (see Table 3.13-1). The proposed adjustments to baseline training activities include anti-surface warfare activities at Crescent Harbor, mine warfare activities in Crescent Harbor EOD Range and Hood Canal EOD Range, and maritime homeland defense/security mine countermeasures exercises inside Puget Sound and Strait of Juan de Fuca. Alternative 1 includes the addition of Transit Protection System (TPS) and Coastal Riverine Group (CRG) events in Inland Waters that will increase the number of vessel movements. Despite the increase in the number of vessels and vessel movements, the potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to baseline conditions due to the continued implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants. Because of these strict operating procedures, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

#### 3.13.3.3.2.2 Testing

**Offshore Area**

Under Alternative 1, the number and type of events involving aircraft, vessels, in-water devices, and military expended materials would increase from the No Action Alternative (see Table 3.13-1). The types and frequency of testing activities in the Offshore Area would increase under Alternative 1. The potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to baseline conditions due to the continued implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants. Because of these strict operating procedures, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

**Inland Waters**

Under Alternative 1, the number and type of events involving aircraft, vessels, in-water devices, and military expended materials would increase from the No Action Alternative (see Table 3.13-1). The number of events for testing in the DBRC Site and Keyport Range Site would increase under Alternative 1. The potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to baseline conditions due to the continued implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants. Because of these strict operating procedures, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

### 3.13.3.3.3 Alternative 2

#### 3.13.3.3.3.1 Training

**Offshore Area**

Under Alternative 2, the number of events involving aircraft, vessels, in-water devices, and military expended materials would be the same as Alternative 1 (see Table 3.13-1). The potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to baseline conditions due to the continued implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants. Because of these strict operating procedures, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

**Inland Waters**

Under Alternative 2, the number of events involving aircraft, vessels, in-water devices, and military expended materials would be the same as Alternative 1 (see Table 3.13-1). The only proposed adjustment to Alternative 1 training activities that could impact public health and safety by physical interactions is an increased frequency of maritime homeland defense/security mine countermeasures exercises inside Puget Sound and Strait of Juan de Fuca to an annual event. The potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to baseline conditions due to the continued implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants. Because of these strict operating procedures, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of training activities.

#### 3.13.3.3.3.2 Testing

**Offshore Area**

Under Alternative 2, the number and type of events involving aircraft, vessels, in-water devices, and military expended materials would increase from the No Action Alternative (see Table 3.13-1). The potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to baseline conditions due to the continued implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants. Because of these strict operating procedures, including procedures to make sure areas are clear of nonparticipants, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

**Inland Waters**

Under Alternative 2, the number and type of events involving aircraft, vessels, in-water devices, and military expended materials would be greater than under No Action Alternative (see Table 3.13-1). Testing in Inland Waters would increase slightly under Alternative 1. The potential for direct physical interaction between the public and aircraft, vessels, targets, or expended materials would be similar to baseline conditions due to the continued implementation of strict operating procedures that protect public health and safety, including procedures to make sure areas are clear of nonparticipants. Because of these strict operating procedures, the potential for impacts on public health and safety would be negligible. Because impacts are negligible, no disproportionately high and adverse effects on any low-income populations or minority populations would occur as a result of implementation of testing activities.

### 3.13.3.4 Secondary Impacts

Public health and safety could be impacted in all areas (offshore, inland, and southeast Alaska) of the Study Area if sediment or water quality were degraded. Section 3.1 (Sediments and Water Quality) considered the impacts on marine sediments and water quality of explosives and explosion byproducts, metals, chemicals other than explosives, and other materials (marine markers, flares, chaff, targets, and miscellaneous components of other materials). The analysis determined that neither state nor federal standards or guidelines would be violated by the No Action Alternative, Alternative 1, or Alternative 2. Because these standards and guidelines are structured to protect human health, and the proposed activities do not violate them, no secondary impacts on public health and safety would result from the training and testing activities proposed by the No Action Alternative, Alternative 1, or Alternative 2.

#### 3.13.3.5 Summary of Potential Impacts of All Stressors on Public Health and Safety

Activities described in this EIS/OEIS that could affect public health and safety in offshore, inland, and southeast Alaska portions of the Study Area include those that emit underwater energy, in-air energy, cause physical interactions, or have secondary impacts from changes in sediment or water quality. Under the No Action Alternative, Alternative 1, or Alternative 2, these activities would either be widely dispersed throughout the Study Area or confined to very specific areas. Such activities also are dispersed temporally (i.e., few stressors would be present at the same time). For these reasons, no greater impacts from the combined presence (geographical or temporal) of more than one stressor are expected. The aggregate impact on public health and safety would not observably differ.

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# 4 Cumulative Impacts

# TABLE OF CONTENTS

## LIST OF TABLES



## LIST OF FIGURES

There are no figures in this section.

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# 4 CUMULATIVE IMPACTS

## 4.1 INTRODUCTION

The analysis of cumulative impacts (or cumulative effects)[1] presented in this section follows the requirements of the National Environmental Policy Act (NEPA) and Council on Environmental Quality guidance (Council on Environmental Quality 1997). The Council on Environmental Quality regulations (40 Code of Federal Regulations [C.F.R.] §§ 1500-1508) provide the implementing regulations for NEPA. The regulations define cumulative impacts as:

> "…the impact on the environment which results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 C.F.R. § 1508.7)."

While a single project may have minor impacts, overall impacts may be collectively significant when the project is considered together with other projects on a regional scale. A cumulative impact is the additive effect of all actions in the geographic area. The Council on Environmental Quality provides guidance on cumulative impact analysis in *Considering Cumulative Impacts under the National Environmental Policy Act* (Council on Environmental Quality 1997). This guidance further identifies cumulative impacts as those environmental impacts resulting "from spatial and temporal crowding of environmental perturbations. The impacts of human activities will accumulate when a second perturbation occurs at a site before the ecosystem can fully rebound from the impacts of the first perturbation." This guidance observes that "no universally accepted framework for cumulative impacts analysis exists…" while noting that certain general principles have gained acceptance. The Council on Environmental Quality provides guidance on the extent to which agencies of the federal government are required to analyze the environmental impacts of past actions when they describe the cumulative environmental effect of an action. This guidance provides that an analysis of cumulative impacts might encompass geographic boundaries beyond the immediate area of an action and a timeframe that includes past actions and foreseeable future actions. Thus, the Council on Environmental Quality guidelines observe, "[it] is not practical to analyze cumulative impacts of an action on the universe; the list of environmental impacts must focus on those that are truly meaningful."

## 4.2 APPROACH TO ANALYSIS

### 4.2.1 OVERVIEW

Cumulative impacts were analyzed for each resource addressed in Chapter 3 (Affected Environment and Environmental Consequences) for the No Action Alternative, Alternative 1, and Alternative 2 (the alternatives) in combination with past, present, and reasonably foreseeable future actions. The cumulative impacts analysis included the following steps, described in more detail below:

1. Identify appropriate level of analysis for each resource.
2. Define the geographic boundaries and timeframe for the cumulative impacts analysis.
3. Describe current resource conditions and trends.

[1] Council on Environmental Quality regulations provide that the terms "cumulative effects" and "cumulative impacts" are synonymous (40 C.F.R. § 1508.8[b]); the terms are used interchangeably by various sources, but the term "cumulative impacts" will be used in this document except for quotations, for continuity.

4. Identify potential impacts of each alternative that might contribute to cumulative impacts.
5. Identify past, present, and other reasonably foreseeable future actions that affect each resource.
6. Analyze potential cumulative impacts.

### 4.2.2 Identify Appropriate Level of Analysis for Each Resource

In accordance with guidance set forth by the Council on Environmental Quality, the cumulative impacts analysis focused on impacts that are "truly meaningful" (Council on Environmental Quality 1997). The level of analysis for each resource was commensurate with the intensity of the impacts identified in Chapter 3 (Affected Environment and Environmental Consequences). The rationale for the level of analysis applied to each resource is described in Section 4.4 (Resource-Specific Cumulative Impacts).

### 4.2.3 Define the Geographic Boundaries and Timeframe for Analysis

The geographic boundaries for the cumulative impacts analysis include the entire Northwest Training and Testing (NWTT) Study Area (Study Area) (see Figure 2.1-1). The geographic boundaries for cumulative impacts analysis for marine mammals and sea turtles were expanded to include activities outside the Study Area that might impact migratory marine mammals and sea turtles. Primary considerations from outside the Study Area include impacts associated with maritime traffic (e.g., vessel strikes and underwater noise) and commercial fishing (e.g., bycatch and entanglement).

Determining the timeframe for the cumulative impacts analysis requires estimating the length of time the impacts of the Proposed Action would last and considering the specific resource in terms of its history of degradation (Council on Environmental Quality 1997). The Proposed Action includes ongoing and anticipated future training and testing activities. While the United States (U.S.) Department of the Navy (Navy) training and testing requirements change over time in response to global events, geopolitical events, or other factors, the general types of activities addressed by this Environmental Impact Statement (EIS)/Overseas EIS (OEIS) are expected to continue into the reasonably foreseeable future, along with the associated impacts. Likewise, some non-military activities addressed in this cumulative impacts analysis (e.g., oil and gas production, maritime traffic, commercial fishing) are expected to continue into the reasonably foreseeable future. Therefore, the cumulative impacts analysis is not bounded by a specific future timeframe. For past actions, the cumulative impacts analysis only considers those actions or activities that have ongoing impacts.

While the cumulative impacts analysis is not limited by a specific timeframe, it should be recognized that available information, uncertainties, and other practical constraints limit the ability to analyze cumulative impacts for the future. Navy environmental planning and compliance for training and testing activities is an ongoing process. The Navy intends to submit applications to the National Marine Fisheries Service (NMFS) for Marine Mammal Protection Act (MMPA) authorizations supported by this EIS/OEIS. The anticipated effective dates for these MMPA authorizations would be a 5-year period from October 2015 through October 2020. Future Federal actions that are unrelated to the action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act (ESA). Similarly, and in accordance with 40 C.F.R. § 1502.9, if the Navy makes substantial changes in the preferred alternative or there are significant new circumstances or information that are relevant to environmental concerns, the Navy must supplement the Final Environmental Impact Statement. Future environmental planning documents will include cumulative impacts analysis based on information available at that time.

### 4.2.4 DESCRIBE CURRENT RESOURCE CONDITIONS AND TRENDS

Chapter 3 (Affected Environment and Environmental Consequences) describes current resource conditions and trends, and they discuss how past and present human activities influence each resource. The aggregate impacts of past and present actions are reflected in the baseline information presented in Chapter 3 (Affected Environment and Environmental Consequences). This information is used in the cumulative impacts analysis to understand how past and present actions are currently impacting each resource and to provide the context for the cumulative impacts analysis.

### 4.2.5 IDENTIFY POTENTIAL IMPACTS OF THE ALTERNATIVES THAT MIGHT CONTRIBUTE TO CUMULATIVE IMPACTS

Direct and indirect impacts of the alternatives, presented in Chapter 3 (Affected Environment and Environmental Consequences), were reviewed to identify impacts relevant to the cumulative impacts analysis. Key factors considered included the current status and sensitivity of the resource and the intensity, duration, and spatial extent of the impacts for each stressor. In general, long-term rather than short-term impacts and widespread rather than localized impacts were considered more likely to contribute to cumulative impacts. For example, for biological resources, population-level impacts were considered more likely to contribute to cumulative impacts than were individual-level impacts. Negligible impacts were not considered further in the cumulative impacts analysis. For marine mammals, any stressor that is expected to result in Level A harassment or Level B harassment, as defined by MMPA, was considered in the cumulative impacts analysis. The vast majority of impacts expected from sonar exposure and underwater detonations are behavioral in nature, temporary and comparatively short in duration, relatively infrequent, and not of the type or severity that would be expected to be additive for the small portion of the stocks and species likely to be exposed either annually or in the reasonably foreseeable future. For ESA-listed species, any stressor that may affect and is likely to adversely affect the species was considered in the cumulative impacts analysis. Stressors that were determined by the Navy to have no effect or that may affect but are not likely to adversely affect ESA-listed species were not analyzed in detail in the cumulative impacts analysis.

### 4.2.6 IDENTIFY OTHER ACTIONS AND OTHER ENVIRONMENTAL CONSIDERATIONS THAT AFFECT EACH RESOURCE

A list of other actions was compiled for the Study Area and surrounding areas based on information obtained during the scoping process (Appendix I, Public Participation), communications with other agencies, a review of other military activities, literature review, previous NEPA analyses for actions not included in this document, and other available information. Identified future actions were reviewed to determine if they should be considered further in the cumulative impacts analysis. Factors considered when identifying other actions to be included in the cumulative impacts analysis included the following:

- Whether the other action is reasonably foreseeable, rather than merely possible or speculative
- The timing and location of the other action in relation to proposed training and testing activities
- Whether the other action and each alternative would affect the same resources
- The current conditions, trends, and vulnerability of resources affected by the other action
- The duration and intensity of the impacts of the other action
- Whether the impacts have been truly meaningful, historically significant, or identified previously as a cumulative impact concern

In addition to identifying reasonably foreseeable future actions, other environmental considerations for the cumulative impacts analysis were identified and described. These other considerations include major stressors or issues (e.g., ocean pollution, ocean noise, coastal development, etc.) that tend to be widespread and arise from routine human activities and multiple past, present, and future actions. Including these other environmental considerations allows an analysis of the current aggregate impacts of past and present actions, as well as reasonably foreseeable actions.

### 4.2.7 ANALYZE POTENTIAL CUMULATIVE IMPACTS

The impacts of past and present actions and the anticipated impacts of reasonably foreseeable future actions were characterized and summarized. The incremental impacts of each alternative were then added to the combined impacts of all other actions to describe the cumulative impacts that would result if the No Action Alternative, Alternative 1, or Alternative 2 were implemented. The cumulative impacts analysis considered additive, synergistic, and antagonistic impacts. A qualitative analysis was conducted in most cases based on the available information. The analysis in Chapter 3 (Affected Environment and Environmental Consequences) indicates that the direct and indirect impacts of the No Action Alternative, Alternative 1, and Alternative 2 would be similar for many of the stressors. Therefore, much of the cumulative impacts discussion applies to all three alternatives. Specific differences between the alternatives are discussed when appropriate.

## 4.3 OTHER ACTIONS ANALYZED IN THE CUMULATIVE IMPACTS ANALYSIS

### 4.3.1 OVERVIEW

Table 4.3-1 lists the other actions and other environmental considerations identified for the cumulative impacts analysis. Descriptions of each action and environmental consideration carried forward for analysis are provided in the following sections. The Keyport and Northwest Training Range Complex activities and analysis are incorporated into the NWTT proposed action and analysis. Thus, the Keyport and Northwest Training Range Complex are not considered or analyzed as cumulative impacts.

**Table 4.3-1: Other Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis**

| # | Name of Action | Lead Agency or Proponent | Location in the Study Area | Timeframe | Retained for Further Analysis? |
|---|---|---|---|---|---|
| **Restoration, Research, and Conservation Projects and Programs** | | | | | |
| 1 | Hood Canal Bedlands Encroachment Protection Easement | U.S. Department of the Navy | Hood Canal | Present and future | Retained |
| 2 | Readiness and Environmental Protection Integration Program/Encroachment Protection Partnering Agreement Transactions-Hood Canal | U.S. Department of the Navy | Hood Canal and Dosewallips River | Present and future | Retained |
| 3 | Hood Canal In-Lieu Fee Mitigation Program | Hood Canal Coordinating Council | Hood Canal | Present and future | Retained |
| 4 | The Crescent Harbor Salt Marsh and Salmon Restoration Project | U.S. Department of the Navy | Crescent Harbor Marsh on Whidbey Island in Puget Sound | Past, present, and future | Dismissed because of negligible to minor impacts on resources in the area affected by this activity and the Proposed Action |
| 5 | Maylor Beach Restoration Program | U.S. Department of the Navy | Crescent Harbor and Maylor Beach | Past, present, and future | Dismissed because of negligible to minor impacts on resources in the area affected by this activity and the Proposed Action |
| 6 | Hood Canal Dissolved Oxygen Program | Partnership of 28 Organizations (local, state, federal, and tribal government) | Hood Canal | Past, present, and future | Dismissed because this is a program and not a specific action |
| 7 | Deep Sea Corals Study | National Center for Coastal Ocean Science | Olympic Coast National Marine Sanctuary | Past, present, and future | Dismissed because this is a study which does not have any associated actions |
| 8 | Washington Islands National Wildlife Refuge Comprehensive Conservation Plan | U.S. Fish and Wildlife Service | Flattery Rocks National Wildlife Refuge, Quillayute Needles National Wildlife Refuge, Copalis National Wildlife Refuge | Past | Dismissed because the actions associated with this plan will not affect resources affected by the Proposed Action |
| 9 | Olympic Coast National Marine Sanctuary Management Plan Update | Olympic Coast National Marine Sanctuary | Olympic Coast National marine Sanctuary | Past | Retained |
| 10 | Olympic National Park Final General Management Plan | National Park Service | Olympic National Park | Past | Retained |

**Table 4.3-1: Other Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)**

| # | Name of Action | Lead Agency or Proponent | Location in the Study Area | Timeframe | Retained for Further Analysis? |
|---|---|---|---|---|---|
| **Other Military Activities** | | | | | |
| 11 | Surveillance Towed Array Sensor System Low Frequency Active Sonar | U.S. Department of the Navy | Pacific-Indian Ocean | Past, present, and future | Retained |
| 12 | U.S. Coast Guard Training | U.S. Coast Guard | Washington, Oregon, and California | Past, present, and future | Retained for Coast Guard training that is not included in the NWTT EIS/OEIS proposed action |
| 13 | Oregon Air National Guard Flight Training | Oregon Air National Guard | Offshore Area (W-93, W-570) | Past, present, and future | Retained |
| 14 | Pile Repair and Replacement Program | U.S. Department of the Navy | Inland Waters (various locations in Puget Sound) | Past, present, and future | Retained |
| 15 | NAVBASE Kitsap Bangor, Indian Island, Whidbey, Everett, and Bremerton Waterfront Facilities Maintenance | U.S. Department of the Navy | Bangor, Indian Island, Whidbey, Everett, and Bremerton waterfront | Past, present, and future | Dismissed. Maintenance of facilities includes pressure washing of piers, and repair and replacement of structures as needed; however, measures that would cause cumulative impacts are not projected. |
| 16 | Force Protection and Weapons Security Measures | U.S. Department of the Navy | Waterfront Restricted Area of NAVBASE Kitsap Bangor and other Navy waterfront facilities | Past, present, and future | Retained |
| 17 | Barge Mooring Project Environmental Assessment/Incidental Harassment Authorization | U.S. Department of the Navy | NAVBASE Kitsap Bangor | Present and future | Retained |
| 18 | Underwater Surveillance System | U.S. Department of the Navy | Restricted Area at NAVBASE Kitsap Bangor | Past, present, and future | Dismissed. The system operates at the same frequency and range (generally 50–200 kHz as a commercial “fish finder” and has been in operation since April 2006. Therefore, impacts should be negligible. |

**Table 4.3-1: Other Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)**

| # | Name of Action | Lead Agency or Proponent | Location in the Study Area | Timeframe | Retained for Further Analysis? |
|---|---|---|---|---|---|
| **Other Military Activities (continued)** | | | | | |
| 19 | Waterfront Restricted Area Land-Water Interface, NAVBASE Kitsap Bangor | U.S. Department of the Navy | NAVBASE Kitsap Bangor | Present and future | Retained |
| 20 | Waterfront Restricted Area Service Pier Extension, NAVBASE Kitsap Bangor | U.S. Department of the Navy | NAVBASE Kitsap Bangor | Present and future | Retained |
| 21 | Explosives Handling Wharf 1 Maintenance | U.S. Department of the Navy | NAVBASE Kitsap Bangor | Past, present, and future | Retained |
| 22 | NAVBASE Kitsap Bangor Test Pile Program | U.S. Department of the Navy | NAVBASE Kitsap Bangor | Past | Dismissed because the duration of this project spanned only a month, and pile programs at Kitsap Bangor are discussed in the analysis of the Explosives Handling Wharf 1 Maintenance (Section 4.3.4.10). |
| 23 | Electromagnetic Measurement Ranging System Project | U.S. Department of the Navy | Hood Canal | Future | Retained |
| 24 | Breakwater Construction and Pier Demolition at Naval Air Station Whidbey Island | U.S. Department of the Navy | Crescent Harbor | Future | Retained |
| 25 | Swimmer Interdiction Security System EIS, NAVBASE Kitsap Bangor | U.S. Department of the Navy | NAVBASE Kitsap Bangor | Present and future | Retained |
| 26 | Explosives Handling Wharf 2, NAVBASE Kitsap Bangor EIS | U.S. Department of the Navy | NAVBASE Kitsap Bangor | Present and future | Retained |

**Table 4.3-1: Other Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)**

| # | Name of Action | Lead Agency or Proponent | Location in the Study Area | Timeframe | Retained for Further Analysis? |
|---|---|---|---|---|---|
| **Other Military Activities (continued)** | | | | | |
| 27 | P-8A Multi-Mission Aircraft (MMA) Supplemental EIS | U.S. Department of the Navy | Naval Air Station Whidbey Island | Present and future | Retained. However, their training is covered in the proposed action of this EIS/OEIS, and other activities are not in the Study Area (e.g., take offs and landings at Ault Field |
| 28 | Environmental Assessment for Replacement of EA-6B Aircraft with EA-18G Aircraft at Naval Air Station Whidbey Island, Washington | U.S. Department of the Navy | Naval Air Station Whidbey Island | Past, present, and future | Retained. However, training requirements in the NWTT Study Area are covered in the Proposed Action of this EIS/OEIS. |
| 29 | Environmental Impact Statement for the EA-18G Growler Airfield Operations | U.S. Department of the Navy | Naval Air Station Whidbey Island | Present and future | Retained. The number of operations analyzed in this document would accommodate the operations associated with the potential increase in aircraft and aircrew training requirements within the NWTT Study Area. |
| 30 | VAQ Expeditionary Wing Environmental Assessment | U.S. Department of the Navy | Naval Air Station Whidbey Island | Past, present, and future | Retained |
| 31 | Pacific Northwest Electronic Warfare Environmental Assessment | U.S. Department of the Navy | Air space of the Olympic Peninsula | Future | Retained |
| 32 | Pier and Support Facilities for Transit Protection System at U.S. Coast Guard Air Station/Sector Field Office | U.S. Department of the Navy | Port Angeles | Future | Retained |

**Table 4.3-1: Other Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)**

| # | Name of Action | Lead Agency or Proponent | Location in the Study Area | Timeframe | Retained for Further Analysis? |
|---|---|---|---|---|---|
| **Environmental Regulations and Planning** | | | | | |
| 33 | Coastal and Marine Spatial Planning | Regional Ocean Commissions | All of Study Area | Future | Retained |
| 34 | Marine Mammal Protection Act incidental take authorizations | National Marine Fisheries Service | All of Study Area | Past, present, and future | Retained |
| **Other Environmental Considerations** | | | | | |
| 35 | Gateway Pacific Terminal at Cherry Point, WA | Pacific International Terminals | Cherry Point, WA | Future | Retained |
| 36 | Hood Canal In-Lieu Fee Mitigation (HCCC ILF) Program | Hood Canal Coordinating council | Hood Canal | Past, present, and future | Dismissed. The HCCC is a non-profit organization with no regulatory authority and the HCCC ILF Program is voluntary and therefore will not impact the cumulative analysis. |
| 37 | Jefferson County Black Point Master Planned Resort | Statesman Group of Companies, LTD, and Black Point Properties, LLC | Black Point, Brinnon, and Navy Range Dabob Bay | Present and future | Retained |
| 38 | Trans-Pacific fiber optic cable | Pacific Crossing Ltd. | Olympic Coast National Marine Sanctuary/Whidbey Island | Past, present, and future | Dismissed. The trans-Pacific fiber optic cable was laid in 1999–2000 and re-buried in 2005 to comply with existing permits and mitigation. Therefore, the cable's existence in the Study Area should not have a significant impact on resources |
| 39 | Commercial and Recreational Fishing | National Marine Fisheries Service and private industry | All of Study Area and open ocean areas | Past, present, and future | Retained |
| 40 | Maritime Traffic | Not applicable | All of Study Area and open ocean areas | Past, present, and future | Retained |
| 41 | Shoreline Development | Local regulatory agencies | Inland Areas, Puget Sound | Past, present, and future | Retained |
| 42 | Oceanographic Research | Numerous | All of Study Area and open ocean areas | Past, present, and future | Retained |

**Table 4.3-1: Other Actions and Other Environmental Considerations Identified for the Cumulative Impacts Analysis (continued)**

| # | Name of Action | Lead Agency or Proponent | Location in the Study Area | Timeframe | Retained for Further Analysis? |
|---|---|---|---|---|---|
| **Other Environmental Considerations (continued)** | | | | | |
| 43 | Ocean Noise | Not applicable | All of Study Area and open ocean areas | Past, present, and future | Retained |
| 44 | Ocean Acidification Effects on Noise in the Ocean | Not applicable | All of Study Area and open ocean areas | Past, present, and future | Retained |
| 45 | Ocean Pollution | U.S. Environmental Protection Agency<br>Applicable State Agencies | All of Study Area and open ocean areas | Past, present, and future | Retained |
| 46 | Washington State Department of Transportation Manette Bridge Replacement Project | Washington State Department of Transportation | Bremerton, Olympic Peninsula, Washington | Past | Dismissed, as the Bridge Replacement Project was completed in February 2012, and there are no present or future impacts to contribute to the cumulative impacts in the analysis. |
| 47 | Washington State Department of Transportation Hood Canal Bridge West-Half Retrofit and East-Half Replacement Project | Washington State Department of Transportation | Between Kitsap and Jefferson counties at the mouth of the Hood Canal | Past | Dismissed, as the Bridge Retrofit and Replacement Project was completed in June 2009 and there are no present or future impacts to contribute to the cumulative impacts in the analysis. |
| 48 | Marine Tourism and Recreation | Numerous | All of Study Area | Past, present, and future | Retained |
| 49 | Commercial and General Aviation | Not applicable | All of Study Area and open ocean areas | Past, present, and future | Retained |
| 50 | 2013 Bremerton Ferry Terminal Construction by the Washington State Department of Transportation | Washington State Department of Transportation | Bremerton ferry terminal | Future | Retained |

Notes: EIS = Environmental Impact Statement, kHz = kilohertz, LLC = Limited Liability Company, NAVBASE = Naval Base, NAVSEA = Naval Sea Systems Command, NUWC = Naval Undersea Warfare Center, NWTRC = Northwest Training Range Complex, OEIS = Overseas EIS, U.S. = United States, VAQ = Electronic Attack Squadron, W = Warning Area, WA = Washington

### 4.3.2 Restoration, Research, and Conservation Projects and Programs

#### 4.3.2.1 Hood Canal Bedlands Encroachment Protection Easement

The Navy and Washington Department of Natural Resources signed a restrictive easement on 7 July 2014. The Navy paid $720,000 for the easement, which precludes construction in the easement area. The easement covers 4,804 acres (ac.) of aquatic land, which extends from the Hood Canal Bridge to just south of the Hama Hama River Delta. The easement covers a strip of land, from -18 feet (ft.) mean low low water (MLLW) down to 70 ft. MLLW. The restrictive easement will prevent construction and development in the footprint of the easement. It will not, affect public access, privately owned lands, recreational uses, aquaculture or geoduck harvest. All 4,804 ac. overlays designated critical habitat for ESA listed salmonid species. The restrictive easement area also protects large tracts of wild stock geoduck and extensive Eelgrass habitat. The easement will protect the area for 55 years. Department of Natural Resources will continue to manage the land under its aquatic lands program.

#### 4.3.2.2 Readiness and Environmental Protection Integration Program/Encroachment Protection Partnering Agreement Transactions-Hood Canal

Under the Readiness and Environmental Protection Integration Program, the Navy has established a multi-year agreement with The Trust for Public Lands, Washington Department of Natural Resources and Jefferson Land Trust. To date, the Navy and its partners have purchased protective easements on 5,149 ac. of upland and shoreline properties around Hood Canal including protection of approximately two miles of the riparian corridor along the Dosewallips River. The Dosewallips transaction completed the protection of the riparian corridor from the shoreline of Hood Canal to the Olympic National Forest. Beyond the riparian corridor which is protected by an easement and managed by Washington State Parks, the Navy purchased a restrictive easement to maintain 3,607 ac. of working forest as a buffer and permanently protect these lands from development. Within the Dabob Bay Natural Area, the Navy and Department of Natural Resources have partnered on transactions which protect 122 ac. These areas provide protection for designated critical habitat for ESA listed salmonid species. Additional Readiness and Environmental Protection Initiative transactions are underway within the agreement area around Hood Canal.

#### 4.3.2.3 Hood Canal In-Lieu Fee Mitigation Program

The Hood Canal In-Lieu Fee Mitigation Program is a voluntary program sponsored by the Hood Canal Coordinating Council, where entities can purchase mitigation credits to offset unavoidable adverse impacts to aquatic resources within the Hood Canal watershed. The primary goal of the Hood Canal Coordinating Council In-Lieu Fee Program for Hood Canal is to increase aquatic resource functions in the Hood Canal watershed. The Hood Canal Coordinating Council In-Lieu Fee Program is intended to ensure no net loss through the preservation, enhancement, establishment, and restoration of ecological functions within target watersheds through the establishment and management of mitigation sites. The service area for the Hood Canal Coordinating Council In-Lieu Fee Program encompasses Hood Canal and those portions of Water Resource Inventory Areas 14, 15, 16, and 17 draining to Hood Canal, defined by a line extending from Foulweather Bluff to Tala Point, south through the Great Bend to its terminus near the town of Belfair, Washington. The service area is divided into two components for the In-Lieu Fee Program: Freshwater Environment, which generally includes areas landward of the marine riparian zone including freshwater and estuarine wetlands and streams up to and excluding any National Park or National Forest Lands; and Marine/Nearshore Environment, which extends from the marine riparian area at the top of the coastal bluffs to the adjacent aquatic intertidal and subtidal zones. The mitigation strategy selected for each permitted impact will be based on an assessment of type and degree of disturbance to the landscape and/or drift cell (Hood Canal Coordinating Council 2014).

#### 4.3.2.4 Olympic Coast National Marine Sanctuary Management Plan Update

The Olympic Coast National Marine Sanctuary Management Plan was updated in 2011. This update to the Sanctuary's management plan is dismissed from further cumulative analysis because the update did not alter regulations to Navy actions within the Sanctuary. The Management Plan Update also does not contribute to the overall cumulative impact of activities on marine resources in the Study Area, and therefore results in negligible to minor impacts on resources in the area affected by the activity and the Proposed Action. The Management Plan update is discussed further in Section 6.1.2.1 (Olympic Coast National Marine Sanctuary).

#### 4.3.2.5 Olympic National Park Final General Plan/Environmental Impact Statement

In March 2008, the National Park Service completed a General Management Plan for Olympic National Park that provided a framework for managing the park. The plan established a direction for resource preservation and visitor use, proposed management strategies, and was developed in consultation with interested parties, including federal, state, and local agencies, tribal governments, and the public. The General Management Plan was needed to address issues, concerns, and problems related to the management of the Olympic National Park. The plan was also needed to meet the requirements of the National Parks and Recreation Act of 1978 and National Park Service policy (National Park Service 2008). A Final EIS was prepared for the Olympic National Park General Management Plan and a Record of Decision (ROD) was signed on 8 August 2008.

### 4.3.3 Other Military Activities

#### 4.3.3.1 Surveillance Towed Array Sensor System Low Frequency Active Sonar

The NMFS published a biological opinion on the Navy's proposed use of the Surveillance Towed Array Sensor System Low Frequency Active Sonar from August 2012 through August 2017. The NMFS Office of Protected Resources promulgation of regulations pursuant to the MMPA and subsequent issuance of Letters of Authorization pursuant to the MMPA regulations for the U.S. Navy to "take" marine mammals incidental to its employment in areas of the Atlantic, Pacific, and Indian Oceans and the Mediterranean Sea happened on 13 August 2014. In August 2011, the Navy released a Draft Supplemental EIS/Supplemental OEIS that evaluated the potential environmental impacts of employing the Surveillance Towed Array Sensor System Low Frequency Active Sonar (U.S. Department of the Navy 2011). The Navy currently plans to operate up to four Surveillance Towed Array Sensor System Low Frequency Active Sonar systems for routine training, testing, and military operations. Based on current Navy national security and operational requirements, routine training, testing, and military operations using these sonar systems could occur in the Pacific Ocean (including the Study Area).

#### 4.3.3.2 United States Coast Guard

The U.S. Coast Guard (USCG) conducts training throughout the Study Area. In California, District 11 conducts search and rescue, homeland security, law enforcement, marine safety, and aids to navigation missions over 3.3 million square miles (mi.$^2$) of water. The District 13 Coast Guard unit is located in the Pacific Northwest along the coasts of Oregon and Washington. District 13 conducts the same operational duties as the units in District 11 and covers more than 460,000 mi.$^2$ of the Pacific Ocean.

USCG activities covered by the NWTT EIS/OEIS includes Maritime Security Operations, where USCG personnel participate. Those USCG activities analyzed only for their cumulative impact as they are not analyzed in the NWTT EIS/OEIS include:

- Small- and medium-caliber weapons firing from ships, similar to the Navy's Gunnery Exercise (Surface-to-Surface) Ship.
- Flight training in W-237. This flight training includes low-altitude helicopter flights but does not include expenditure of munitions or any other materials.
- Shipboard aircraft operations, such as deck landing qualification training.
- Shipboard maneuvering and engineering training (e.g., abandon ship, anchoring, full power trials, man overboard, and flooding).
- Search and rescue training.

#### 4.3.3.3 Oregon Air National Guard Flight Training

The Oregon Air National Guard is the primary user of W-93 and W-570 special use airspace in the Offshore Area. Oregon Air National Guard flights in W-93 and W-570 are primarily air combat maneuver training flights, similar to those conducted by the Navy and described in Chapter 2 (Description of Proposed Action and Alternatives). These flights occur throughout the year but do not include any weapons firing or release of chaff. On rare occasions, self-defense flares may be used during training.

#### 4.3.3.4 Pile Repair and Replacement Program

Under the Pile Repair and Replacement Program, the Navy plans to repair or replace structurally unsound piles at various Navy installations in the Puget Sound areas over a 5-year period beginning July 2017. A future Programmatic Environmental Assessment (EA) will be prepared for the 5-year program starting in fiscal year 2017. Installations include Naval Base (NAVBASE) Kitsap Bangor, NAVBASE Kitsap Bremerton, NAVBASE Kitsap Keyport, Manchester Fuel Depot, and Naval Station (NAVSTA) Everett. The Action involves pile removal, installation, and disposal, and in-place pile repair. The Action also includes individual actions currently planned and estimates for contingency requirements at Naval Air Station Whidbey Island (NASWI), NAVSTA Everett, NAVBASE Kitsap Bangor, NAVBASE Kitsap Bremerton, NAVBASE Kitsap Keyport, NAVBASE Kitsap Manchester, and Zelatched Point.

#### 4.3.3.5 Force Protection and Weapons Security Measures

The Force Protection and Weapons Security Measures project involves installation and operation of facilities, including 14 ft. (4.3 m) high above-water fencing on pontoons along the Waterfront Restricted Area. It also involves the construction of an Auxiliary Reaction Force Facility (14,000 $ft.^2$ [1,300 $m^2$]) and an Armored Fighting Vehicle Operational Storage Facility (16,146 $ft.^2$ [1,500 $m^2$]). It also includes the alteration of two buildings for a new armory (2,500 $ft.^2$ [232 $m^2$]) and the replacement of an Alert Force Garage (2,530 $ft.^2$ [235 $m^2$]) that includes a new paved access road (U.S. Department of the Navy 2012a). These in-water fence structures do not contribute to habitat degradation and are maintained onshore. The repaired fence pieces are then barged out to the in-water fence and reattached. Possible habitat loss and/or barrier loss are not likely because the fence floats on the water surface and is passable by birds above the water surface. The construction of the two facilities and the paved access road will increase the impervious footprint near open surface waters, but minimal vehicle traffic and containment of other possible contaminants is likely to result in minimal contribution to the overall contaminant load within the waters of the Puget Sound.

#### 4.3.3.6 Barge Mooring Project Environmental Assessment

Between July and September 2013, the Navy replaced an existing research barge at the Service Pier in order to support the mission and operations of Commander, Submarine Development Squadron Five at NAVBASE Kitsap Bangor. A Finding of No Significant Impact (FONSI) on Issuance of an Incidental Harassment Authorization (IHA) to the Navy for take of marine mammals incidental to a barge mooring project was published by NMFS on 3 July 2013. The action included vibratory installation of 20 hollow steel piles that range in diameter from 18 to 48 inches (in.) (46 to 122 centimeters [cm]). The 36 in. (91 cm) diameter and 48 in. (122 cm) diameter piles were used to moor the new 260 ft. (79 m) by 85 ft. (26 m) barge, which replaced a 115 ft. (35 m) by 35 ft. (11 m) barge that was previously located at the Service Pier. To allow space for the larger barge, the existing floating pier sections used by Port Operations were relocated to the opposite side of the Service Pier trestle. Additional floating sections were attached and supported by 18 in. (46 cm) and 24 in. (61 cm) diameter steel piles. Previously existing infrastructure that was not needed to support the new Service Pier configuration was removed. The infrastructure includes a gangway, fenders, pedestals, and a mooring dolphin. The mooring dolphin has a concrete platform supported by eight 24–30 in. (61–76 cm) diameter steel piles. The platform was carefully cut into sections and removed. One 24 in. (61 cm) steel pile was removed using vibratory pile driving equipment. The remaining piles were cut off at the mudline and extracted (U.S. Department of the Navy 2012b).

Removal and installation of the pier piles would likely have disturbed the sea floor and caused elevated turbidity into the water column but this effect would be temporary and minimal to existing background turbidity levels. Sound levels from vibratory hammers are low and emit different sound frequencies than impact hammers, which are more likely to cause barotraumas and other disruptions to fish. Sound pressure levels (SPLs) from the use of the vibratory hammer are non-lethal to fish in the area and short-lived in duration.

#### 4.3.3.7 Waterfront Restricted Area Land-Water Interface, Naval Base Kitsap Bangor

The Navy proposes to construct two land-water interface structures and modify the existing floating port security barrier system for improved protection of TRIDENT submarines. Construction of the land-water interface structures would enclose the Navy waterfront restricted area on NAVBASE Kitsap Bangor by constructing security barriers in the intertidal zone at the Bangor waterfront. Construction is anticipated to take 2 years. Construction activities occurring in the water during the first year may involve pile driving and would be conducted from July 2015 through February 2016. Once the pile driving is complete, activities other than pile driving may occur in the water up until February 2017.

#### 4.3.3.8 Waterfront Restricted Area Service Pier Extension, Naval Base Kitsap Bangor

The Navy proposes to extend the existing service pier, construct associated support facilities, and relocate two SEAWOLF Class submarines from NAVBASE Kitsap Bremerton to join a third SEAWOLF Class submarine at NAVBASE Kitsap Bangor. The existing service pier would be extended; land-based associated support facilities would be constructed, including a maintenance support facility; and utility upgrades would include an emergency power generator and a parking lot. Shore-based facilities constructed on the pier would include a pier services and compressor building and a pier crane. Construction would occur from April 2015 to March 2017. Construction in the water is planned for July through February of each year, beginning in July 2015 and concluding in February 2017. The relocation would result in the consolidation of berthing and support for the SEAWOLF Class submarines at NAVBASE Kitsap Bangor.

#### 4.3.3.9 Explosives Handling Wharf 1 Maintenance

The Navy is continuing a construction project to conduct necessary repairs and maintenance on the Explosive Handling Wharf 1 (EHW-1) facility. This multiyear project involves removal and replacement of deteriorated steel and/or concrete piles. NMFS has issued an IHA to the Navy to incidentally harass, by Level B harassment, five species of marine mammals incidental to pile driving and removal associated with the project. This is the third such IHA for similar work on the same structure. Previously, the Navy received IHAs for a 2-year maintenance project at EHW-1 conducted in 2011-12 and 2012-13 (76 Federal Register (FR) 30130 and 77 FR 43049). Additional IHAs were issued to the Navy for marine construction projects on the waterfront, including the construction of a second explosives handling wharf (EHW-2) (discussed in Section 4.3.3.13, Explosives Handling Wharf 2, Naval Base Kitsap Bangor Environmental Impact Statement) immediately adjacent to EHW-1.

The next phase includes demolishing four 24-in. hollow prestressed octagonal concrete piles and installing four 30-in. concrete-filled steel piles adjacent to the demolished piles at the outboard support of the EHW-1. Additionally, the project includes replacement of structural elements such as decking and pile caps, installation of cathodic protection, repair of a concrete wetwell, and recoating of the tops of fender piles and steel mooring fittings. The next phase began in July 2015 and is to be completed in January 2016 within the allowable season for in-water work at Naval Base Kitsap Bangor. The window is established by the Washington Department of Fish and Wildlife in coordination with NMFS and U.S. Fish and Wildlife Services (USFWS) in order to protect juvenile salmon.

Phased repair of this structure is expected to continue until 2024 (U.S. Department of the Navy 2012a). The wharf is a U-shaped concrete structure built in 1977 for ordnance handling operations in support of the TRIDENT Submarine squadron, which is home ported at the NAVBASE Kitsap Bangor. The EHW-1's structural integrity is compromised due to deterioration of the wharf's piling sub-structure. The purpose of the project is to maintain the structural integrity of the wharf and ensure its continued functionality to support the operational requirements of the TRIDENT program (U.S. Department of the Navy 2012a). Direct and indirect effects that are likely to occur include periodic and temporary increases in turbidity in the water column from pile removal and installation and underwater sound; however, these effects would be intermittent and of short duration.

Mitigation measures for this action include marine mammal zones of influence or mitigation zones that would be established around each pile to prevent Level A harassment to marine mammals. The shutdown zones include all areas where the underwater sound pressure levels are anticipated to equal or exceed level A harassment criteria for marine mammals. The buffer zones include all areas where the underwater or airborne sound pressure levels are anticipated to equal or exceed level B harassment criteria for marine mammals. The shutdown and buffer zones are monitored throughout the project: if an animal enters the buffer zone, a "take" would be recorded and behaviors documented. An animal that enters or approaches the shutdown zone would cause all pile driving activities to be halted. Other mitigation measures for marine mammals include visual monitoring, sound attenuation devices, acoustic measurements, timing restrictions (to avoid migratory ESA-listed species), the soft-start procedure (a warning or innate noise before beginning pile driving), and daylight construction. Along with marine mammal mitigation measures, there are also mitigation measures in place to protect fish and the marbled murrelet in the project area (U.S. Department of the Navy 2012a).

#### 4.3.3.10 Electromagnetic Measurement Ranging System, Hood Canal

A Draft EA was prepared for the construction and operation of an Electromagnetic Measurement Ranging System located on NAVBASE Kitsap Bangor lands and adjacent waters in Hood Canal (Hood Canal Military Operating Area North) Bangor, Washington. This future project would include construction of a 15 ft. by 15 ft. (4.5 meter [m] by 4.5 m) offshore platform with utilities, requiring installation of five 24 in. (61 cm) square batter precast concrete piles (one for each corner and one in the center of the platform). The five piles would be impact driven. The project also would include installation of the sensor array system and approximately 8,000 ft. (2,438 m) of cable on the bottom of Hood Canal.

#### 4.3.3.11 Breakwater Construction and Pier Demolition at Naval Air Station Whidbey Island

The Navy proposes to construct a new pile-supported breakwater; demolish an existing 536 ft. (163 m) long by 50 ft. (15 m) wide finger pier breakwater; install a fuel pier sheet pile cut-off wall at the existing fuel pier; install new anchor buoys; and dredge a 3.9 ac. (1.6-hectare [ha]) access channel at NASWI's Seaplane Base at Whidbey Island, Washington. The Action is taking place within Crescent Harbor. The new breakwater would replace the existing structurally unsound finger pier breakwater to ensure continued safe and uninterrupted jet fuel delivery for NASWI. Dredging would improve access to the fuel pier during low tides, reduce the frequency of future maintenance dredging, and enable fuel pier access for vessels with drafts of up to 16 ft. (5 m) (U.S. Department of the Navy 2014d). The Navy is applying for an IHA under the MMPA, as amended. The concurrence letter was received from the USFWS on January 16, 2014, and biological opinion was received from NMFS on May 9, 2014 (U.S. Department of the Navy 2012c). The proposed in-water work would occur between June 2015 and be completed by spring of 2016 (Reid 2014). Direct and indirect effects that are likely to occur include increases in turbidity in the water column from pile removal and installation and the dredging operations. Habitat loss from the increased amount of piles and shading of the water surface from the pier structure overhead is likely to decrease algae and zooplankton that play an integral role in the food chain.

#### 4.3.3.12 Swimmer Interdiction Security System, Naval Base Kitsap Bangor

The Navy implemented a Swimmer Interdiction Security System at NAVBASE Kitsap Bangor, Silverdale, WA, after an EIS written in 2009 followed by the ROD (74 FR 60244) in November 2009, in order to meet the increased U.S. security requirements for military installations in response to the terrorist attacks of September 11, 2001. The Marine Mammal Alternative (the preferred alternative) is composed of human/marine mammal teams that support Navy operations and respond rapidly to security alerts. The Swimmer Interdiction Security System protects waterside Navy assets and will remain in operation as long as valuable naval assets are at NAVBASE Kitsap Bangor (U.S. Department of the Navy 2009).

Movement of watercraft in the training area of Puget Sound could possibly disturb listed marine mammals and fish, but that is not likely due to the short lengths of the trainings and the low disturbance of the training watercraft relative to other watercraft disturbances in the vicinity.

#### 4.3.3.13 Explosives Handling Wharf 2, Naval Base Kitsap Bangor Environmental Impact Statement

The Navy is building and will operate a second Explosives Handling Wharf (EHW-2) immediately south of the existing EHW at NAVBASE Kitsap Bangor. EHW-2 will be a large pile-supported structure to support TRIDENT submarines homeported at Bangor. The in-water facility will cover 6.3 ac. (2.5 ha), and will be supported by up to 1,250 hollow steel piles. Construction began in fall 2012, and completion is expected in 2016. EHW-2 consists of in-water structures and onshore support facilities including roads, utilities, and security features. Approximately 20 existing facilities and/or structures in proximity of EHW-2 will be modified or demolished, and 4 new on-shore facilities will be constructed. Environmental impacts during construction include: disturbance to fish, bird, and marine mammals from pile driving noise; turbidity; air pollutant emissions; and temporary loss of brush and forest. Long-term impacts include shading of marine habitat, loss of seafloor due to pile placement, interference with migration of juvenile salmon, and loss of upland wetlands. The Navy obtained permits and authorizations for impacts to aquatic habitats, ESA-listed species, and marine mammals. Mitigation measures include purchase of aquatic habitat credits from the Hood Canal In-Lieu Fee Program, use of bubble curtains and equipment procedures to reduce species impacts from pile driving noise, marine species monitoring and reporting, revegetation of temporarily disturbed upland areas, public and mariner notification of upcoming construction activities, and specific mitigation actions to compensate for impacts to tribal treaty resources (U.S. Department of the Navy 2012a).

#### 4.3.3.13.1 Mitigation for Explosive Handling Wharf 2

The Navy will implement the following mitigation actions in the form of funded programs to compensate for impacts to tribal treaty resources.

##### 4.3.3.13.1.1 Fishery Improvements

The Navy will provide funding for infrastructure improvements at three existing hatcheries owned and operated by Washington Department of Fish and Wildlife (Hoodsport, McKernan, and George Adams) and one existing fish capture facility owned and operated by the Skokomish Indian Tribe (Enetai Creek) to improve salmon production and associated harvest opportunities in Hood Canal. Improvements to the Washington Department of Fish and Wildlife facilities may include repair or restoration, but will not include recurring annual costs. These projects, funded by the Navy, will help improve the fisheries in the Skokomish tribal facilities, and increase the number of spawned fish available for harvest.

##### 4.3.3.13.1.2 Shore and Benthic Improvements

**Beach Enhancement**

The Navy will provide funding for beach enhancements to include substrate improvements and 3 years of shellfish seeding on 24 ac. (9.7 ha) of beach. This action will occur on lands owned by the Skokomish Tribal Nation that will be transferred to the Department of Interior, Bureau of Indian Affairs to be held in trust for the tribe.

**Shellfish Enhancement**

The Navy will provide funding for a 5-year program for seeding of shellfish including manila clams, bagged and single Pacific oyster seed, and Olympia oysters on priority shellfish enhancement areas in Hood Canal and adjacent Admiralty Inlet. The Tribes are solely responsible for selecting the beaches to be seeded and coordinating these efforts with the land owners and responsible agencies.

**Shellfish Nursery, Floating Upweller System**

The Navy will provide funding for construction and operation of a 75 ft. by 30 ft. (23 m by 9 m) Shellfish Nursery, Floating Upweller System, a 30 ft. by 100 ft. (9 m by 31 m) grated work-deck attached to the Port Gamble S'Klallam Tribe's existing net pens in Port Gamble Bay, associated mooring and underwater power supply systems, and four 50 ft. by 50 ft. (15 m by 15 m) steel net pen cages to replace the existing deteriorated cages. The nursery will be capable of accommodating approximately 8–12 million shellfish seed annually. The Port Gamble S'Klallam Foundation or designated entity pursuant to the Memorandum of Agreement will acquire and comply with all required permits, leases, and entitlements as part of this project.

**Subtidal Geoduck Enhancement Survey and Study**

The Navy will provide funding for geoduck enhancement surveys within the Tribes' usual and accustomed fishing grounds and stations, and for a pilot research study to provide information on new locations for geoduck planting, and to develop sustainable geoduck growing, planting, and other enhancement methodologies. The majority of surveys will occur on tracts having limited survey information. Some surveys will occur on previously harvested tracts. The pilot study will include a literature review and testing of long-term geoduck production processes and enhancement through systematic trials and a comparison of techniques. The Tribes are solely responsible for coordinating survey efforts with land owners.

#### 4.3.3.13.1.3 Wet Lab Building and Research, Education, and Training

The Navy will provide funding to construct a shellfish wet lab, education, and training building in an upland location at Port Gamble. The research, education, and training program will be developed by the Port Gamble S'Klallam Tribe and will provide education and training for members of the Tribes and the community and research on the health of Hood Canal and marine systems and on shellfish and finfish management. The program may include field training, outreach, shoreline habitat projects, shellfish seed production, and other activities. The wet lab building will be a minimum of 40 ft. by 80 ft. (12 m by 24 m) and will provide a space for facilitating the shellfish seed planting, for equipment storage, and for the Education and Training program, including a small classroom and public meeting space and staff offices.

#### 4.3.3.13.1.4 Land Conservation

The Navy will provide funding for the acquisition and conservation of lands on the west shore of Port Gamble Bay. The funds for the purchase of lands may be used within two designated blocks of land. The two areas include the 566 ac. (229 ha) shoreline block which includes approximately 26 parcels and the 678 ac. (274 ha) Maritime Forest Block which includes approximately 34 parcels.

### 4.3.3.14 P-8A Multi-Mission Aircraft

The Navy decided in 2008 to provide facilities and functions to support homebasing twelve P-8A Multi-Mission Maritime Aircraft (MMA) squadrons and one Fleet Replacement Squadron into the U.S. Navy Fleet. The P-8A MMA will replace the current maritime patrol aircraft, the P-3C Orion, at existing maritime patrol homebases. The action will result in the homebasing of six fleet squadrons (42 aircraft) at NASWI, Washington. The introduction of the MMA squadrons in the U.S. Navy Fleet was analyzed in an EIS (U.S. Department of the Navy 2008). Since the completion of the original EIS, the Navy prepared a Supplemental EIS (U.S. Department of the Navy 2014a). The change in aircraft stationed at NASWI has been incorporated into the Action. Informal consultation with the USFWS in accordance with section 7(a)(2) of the ESA for the proposed action concluded with a letter of concurrence from the USFWS on 13 May 2013. The ROD was signed in June 2014, and the transition to the P-8A aircraft is currently underway. Based on the ROD, P-8A aircraft arrive at NASWI in 2016. There will be an overall increase of 18 aircraft by 2020.

### 4.3.3.15 Environmental Assessment for Replacement of EA-6B Aircraft with EA-18G Aircraft

In this 2005 EA the Navy analyzed the replacement of Prowler aircraft with Growler aircraft, including the disestablishment of three expeditionary squadrons. The primary types of Airborne Electronic Attack (AEA) mission training and readiness requirements for the EA-18G remained virtually the same as those for the EA-6B that were stationed at NASWI. However, the airframe, aircraft components, and aircraft performance of the EA-18G differs from those of the EA-6B. Existing facilities and functions at NASWI were modified to accommodate the replacement airframe. Additionally, implementation of the EA for the replacement of the EA-6B squadrons with the EA-18G squadrons resulted in a decrease in the number of aircraft and personnel associated with the AEA squadrons and a reduction in flight training operations at NASWI.

#### 4.3.3.16 Environmental Impact Statement for the EA-18G Growler Airfield Operations

Since 1970, NASWI has been home to all of the Navy's electronic attack (VAQ) squadrons in the U.S., and the need for ongoing use of Ault Field and Outlying Landing Field Coupeville will continue into the foreseeable future. The mission of VAQ has evolved over time and, in 2005, the replacement of Prowler aircraft with Growlers was analyzed in an EA. In 2009, the Department of Defense (DoD) was directed to maintain the expeditionary VAQ capabilities indefinitely, and this resulted in a 2012 EA that analyzed retaining the relocation of Andrews Air Force Base, Maryland reserve Prowler squadron and the transition of that squadron to Growlers at NASWI (U.S. Department of the Navy 2014b, e).

After conducting scoping between September 2013 and January 2014 for the potential environmental impacts associated with the addition of two new expeditionary squadrons and additional Growler aircraft, the Navy is preparing an EIS to meet current and future mission and training requirements at NASWI. The Navy is proposing to continue and increase the existing VAQ operations at NASWI's Ault Field and Outlying Field Coupeville; increase VAQ capabilities and augment the training squadron by adding up to 36 aircraft to support an expanded DoD mission for identifying, tracking, and targeting in a complex electronic warfare (EW) environment; construct and renovate facilities at Ault Field to accommodate additional aircraft; and station additional personnel at, and relocate family members to, NASWI and the surrounding community. The EIS is building upon analyses that were completed in 2005 and 2012 and will assess the noise environment as well as specific airfield operations at NASWI. The EIS will be considering public comments received during both the 2013 and 2015 public scoping periods (U.S. Department of the Navy 2014b).

#### 4.3.3.17 VAQ Electronic Attack Squadron Expeditionary Wing Environmental Assessment

The Navy prepared an EA to analyze the transition of the Expeditionary Electronic Attack squadrons at NASWI from the aging EA-6B Prowler to the newer EA-18G Growler in the 2012–2014 timeframe (U.S. Department of the Navy 2012d). The 2012 EA analyzed retaining 3 expeditionary VAQ squadrons that operated Prowlers, and their transition to Growler, in addition to relocating a reserve squadron to NASWI, and resulted in a finding of no significant impact. Training for these Growler aircrew is included as part of the Proposed Action in the NWTT EIS/OEIS.

#### 4.3.3.18 Pacific Northwest Electronic Warfare Environmental Assessment

The Navy published the Pacific Northwest Electronic Warfare Final EA in September 2014. The purpose and need for the proposed action is to sustain and enhance the level and type of EW training currently being conducted by Navy assets using the Northwest Training Range Complex (NWTRC), to provide the ability to accommodate growth in future training requirements, and to maximize the ability of local units to achieve their training requirements on local ranges. The EA analyzed land-based enhancements to existing EW training, including the installation of one fixed transmitter and operation of up to three mobile signal transmitter trucks. The EA supported a finding of no significant impact (U.S. Department of the Navy 2014c).

#### 4.3.3.19 Pier and Support Facilities for Transit Protection System at U.S. Coast Guard Air Station/Sector Field Office

The Navy is preparing an EA, with the USCG as a cooperating agency, to construct a pier and support facilities at the USCG Air Station/Sector Field Office Port Angeles, which is located in Clallam County, Washington. The Description of the Proposed Action and Alternatives document was published in January 2015 for initial public and agency review and comment. The reason for the Proposed Action is to provide a staging location for Transit Protection System (TPS) crews and vessels that escort naval submarines to and from their dive/surface points in the Strait of Juan de Fuca and NAVBASE Kitsap Bangor. The new pier and support facilities would allow the USCG to comply with requirements for underway hour (time required for USCG crews to prepare for, perform, and complete small boat operations) limitations and required crew rest between escort missions.

The Navy is proposing to construct a pier; an Alert Forces Facility (single-story sleeping and administration building); a Ready Service Armory (an ammunition and weapons storage facility); diesel fuel, marine storage tank and distribution system; and site improvements including utilities, parking, lighting, security improvements, and landscaping at the USCG AIRSTA/SFO Port Angeles to support the USCG Maritime Force Protection Unit mission. The TPS pier would be designed to provide full hotel services (hotel services include electricity, potable water, sewer, internet, phone, fire protection, pier lighting, and fueling lines) and dedicated mooring for up to seven TPS vessels. Construction of the project is anticipated to start in the summer of 2016 and last approximately 2 years. The new pier and support facilities would have a design life of 50 years (U.S. Department of the Navy 2015)

## 4.3.4 Environmental Regulations and Planning

### 4.3.4.1 Coastal and Marine Spatial Planning

Coastal and Marine Spatial Planning is a comprehensive, transparent, adaptive, and science-based process to analyze and allocate the spatial and temporal distribution of human activities in marine areas. In 2009, President Obama signed a memorandum establishing the Interagency Ocean Policy Task Force; in 2010, the task force released a set of final recommendations known as the National Policy for the Stewardship of Our Oceans, Coasts, and Great Lakes. The policy adopted an ecosystem-based approach to management and an overarching framework of regional-scale coastal marine special planning. In the Pacific Northwest, efforts in coastal and marine spatial planning include the creation of the West Coast Governor's Agreement in 2006 to cohesively manage and protect the West Coast's ocean and coastal resources. Specific projects include the updating of the Territorial Sea Plan and designating marine reserves in Oregon, and the passing of a law in Washington to create a state Marine Spatial Planning plan (NANOOS 2014).

Current projects in Washington State include the Baseline Characterization of Coastal and Ocean Recreational Use Patterns and Mapping Marine Mammals and Identifying Ecologically Important Areas. The Recreational Use Patterns project is being launched by the Surfrider Foundation and is an Internet survey for coastal and ocean recreational users to summarize the intensity with which certain coastal areas are used for recreational activities, and the specific recreational activities they participate in along the Washington coast. The Washington Department of Fish and Wildlife is continuing a forage fish survey along the Washington coast, creating a bird and mammal geodatabase while conducting marine mammal aerial surveys, and using existing data to identify Ecologically Important Areas off of the Washington Coast for the Mapping Project (Washington Marine Spatial Planning 2014).

### 4.3.4.2 Marine Mammal Protection Act Incidental Take Authorizations

The MMPA generally prohibits "takes" of marine mammals in U.S. waters by any person and by U.S. citizens in international waters. The National Oceanic and Atmospheric Administration (NOAA) can authorize "takes" for specific activities (National Oceanic and Atmospheric Administration 2012c). Take authorizations are expected to be issued for the Proposed Action in the NWTT Study Area. Take authorizations not related to the Navy's Proposed Action are also expected to be issued for other actions occurring inside and outside of the Study Area.

## 4.3.5 Other Environmental Considerations

### 4.3.5.1 Gateway Pacific Terminal Cherry Point, Washington

A subsidiary of SSA Marine, Pacific International Terminals, is proposing to build a deep-water marine terminal at Cherry Point in Whatcom County, Washington. Cherry Point is 17 mi. (27.4 km) south of the Canadian border. The site is 1500 ac. (607.02 ha) and is located between the BP Cherry Point Refinery and the Alcoa-Intalco Works with access to industrial utilities such as BNSF Railway tracks. The proximity of naturally deep moorage would allow large vessels to access the terminal without the need to dredge (Gateway Pacific Terminal 2014). The project is in the draft stages of preparing an EIS under NEPA and the State Environmental Policy Act. The Final EIS is expected to be released in 2017 (Washington State Department of Ecology 2015).

According to the Vessel Traffic and Risk Assessment Study published in 2014, the siting of the wharf and trestle at the proposed Gateway Pacific Terminal and the potential increased anchorage use by bulkers will interfere with Lummi access to fishing sites (Environmental Research Consulting, Inc. and Northern Economies, Inc. 2014). The Study showed that the Juan de Fuca East subarea would see the greatest increase in disruption due to the time and area occupied by Gateway Pacific Terminal vessels at anchor and bunkering activity. The study also found that the disruption has the potential for loss of Lummi fishing gear due to Gateway Pacific Terminal vessel traffic (Environmental Research Consulting, Inc. and Northern Economies, Inc. 2014).

### 4.3.5.2 Jefferson County Black Point Master Planned Resort

On 27 November 2007 a programmatic Final EIS was issued in association with a Comprehensive Plan Amendment to re-designate the 256 acres from rural residential to Master Planned Resort. The Jefferson County Board of Commissioners approved the request on 28 January 2008 with Ordinance No. 01-0128-08, stipulating through conditions that any subsequent project level action would require a Supplemental EIS (SEIS). An optional scoping process occurred from 13 October 2009, with a Scoping Public Meeting on 28 October 2009 and Scoping Memo issued 31 March 2010. There were issues identified through the scoping process, and they are addressed in the Draft SEIS (DSEIS) that was released to the public in November 2014. The issues identified and addressed in the DSEIS include sediment and air quality—greenhouse gas emissions, plants, energy and natural resources, housing and employment, light and glare, aesthetics, and utilities and transportation.

The DSEIS was prepared by Jefferson County in compliance with the State Environmental Policy Act of 1971 (Chapter 43.21C, Revised Code of Washington) and the SEPA Rules, effective April 4, 1984, as amended (Chapter 197-11, Washington Administrative Code). The document is not an authorization for the action, nor does it constitute a decision or a recommendation for the action; in its final form, it will accompany the Proposed Actions and will be considered in making the final decisions on the proposal. The proposed Master Planned Resort is located south of Brinnon, Washington, on the Black Point Peninsula, on the western shore of the Hood Canal.

Under Alternative 1, an 18-hole golf course, 890 residential units, 49,772 $ft.^2$ of commercial space, and resort-related amenities on a 231 ac. Site (with 33 ac. of natural area preserved and 2.2 million cubic yards of earthwork required for golf course grading) would be built. Alternative 2 consists of the golf course, 890 residential units, 52,650 $ft.^2$ of commercial space with resort-related amenities, and 80 ac. of natural area preserved with 1 million cubic yards of earthwork for golf course grading. Finally, under the No Action Alternative, the Master Planned Resort would not be constructed. A written public comment on the DSEIS began on 19 November 2014 and ended on 5 January 2015, for a 45-day comment period (Jefferson County 2014).

#### 4.3.5.3 Commercial and Recreational Fishing

Commercial and recreational fishing constitutes an important and widespread use of the ocean resources throughout the Study Area. Fishing can adversely affect fish populations, other species, and habitats. Potential impacts of fishing include overfishing of targeted species, bycatch, entanglement, and habitat destruction, all of which negatively affect fish stocks and other marine resources. Bycatch is the capture of fish, marine mammals, sea turtles, seabirds, and other nontargeted species that occur incidentally to normal fishing operations. Use of mobile fishing gear such as bottom trawls disturbs the seafloor and reduces habitat structural complexity. Indirect impacts of trawls include increased turbidity, alteration of surface sediment, removal of prey (leading to declines in predator abundance), removal of predators, ghost fishing (i.e., lost fishing gear continuing to ensnare fish and other marine animals), habitat destruction, and the generation of marine debris. Lost gill nets, purse seines, and long-lines may foul and disrupt bottom habitats and have the potential to entangle or be ingested by marine animals.

Fishing can also have a profound influence on individual targeted species populations. In a study of retrospective data, Jackson et al. (2001) analyzed paleoecological records of marine sediments from 125,000 years ago to present, archaeological records from 10,000 years before the present, historical documents, and ecological records from scientific literature sources over the past century. Examining this longer-term data and information, they concluded that ecological extinction caused by overfishing precedes all other pervasive human disturbance of coastal ecosystems, including pollution and anthropogenic climatic change. Fisheries bycatch has been identified as a primary driver of population declines in several marine species, including sharks, mammals, seabirds, and sea turtles (Wallace et al. 2010). For example, entanglement in nets from the Pacific Northwest coastal salmon fisheries has been shown to increase mortality in seabirds (Hamel et al. 2009). Habitat destruction caused by bottom trawling and other fishing methods also contributes to the negative effects of commercial and recreation fishing on multiple species, such as the North American groundfish (Melnychuk et al. 2013).

#### 4.3.5.4 Maritime Traffic

Portions of the Study Area are heavily traveled by commercial, recreational, and government marine vessels, with several commercial ports occurring in or near the Study Area. Several harbor facilities of interest to the U.S. Navy are located in the Puget Sound: NAVSTA Everett; NAVBASE Kitsap Bremerton, NAVBASE Kitsap Bangor, Naval Undersea Warfare Center Keyport, Naval Magazine Indian Island, NASWI, the Port of Seattle, and the Port of Tacoma. Maritime traffic on the Puget Sound is heavy, many large commercial vessels use the Ports of Everett, Seattle, Tacoma, and others in the area, and they enter and depart Puget Sound each day. Additional traffic on the Sound is created by the frequent runs of large Washington State vehicle and passenger ferries as they cross the Sound on generally east-west traffic routes that are perpendicular to normal inbound and outbound maritime traffic channels. Additionally, many recreational and commercial small craft operate throughout the Puget Sound and adjacent waters.

Ocean shipping is a significant component of the regional economy. Washington State handles 7 percent of the country's exports and 6 percent of its imports. The maritime Port of Seattle was the nation’s 11th-busiest waterborne freight gateway for international merchandise trade by value of shipments in 2008. More than 1,000 vessels called at the Port of Seattle in 2008 (U.S. Department of Transportation 2009). Container vessels made the most calls at the port, accounting for 64 percent, while 28 percent of the calls were by dry-bulk ships. Seattle and Tacoma were ranked 7th and 11th, respectively, among U.S. ports for total cargo imported and exported in 2011. Taken together, these two ports make up the nation's fourth-largest container load center in the United States (American Association of Port Authorities 2012).

Large ports in Canadian Waters that contribute to traffic transiting into and out of the Strait and through the Study Area include existing ports and oil and coal terminals that may increase in size or number due to existing proposals. The Gateway Pacific Terminal in Cherry Point, Washington (discussed in Section 4.3.5.1) is the only such proposal located in the Study Area. Other proposed coal terminals are geographically outside the Study Area but could result in additional vessel traffic in the Study Area. These proposed projects are located in Vancouver B.C (Neptune and Westshore – Kinder Morgan Trans-Mountain Pipeline) and Vancouver and Grays Harbor, Washington (Tesoro-Savage Unrefined Oil-Rail Port). Additional vessels using the Canadian terminals will transit in the Study Area and have the potential to increase the cumulative impacts of ocean shipping traffic. Other key ports in the region include:

- Bellingham (Whatcom County, Washington)
- Orcas, Friday Harbor, and Lopez (San Juan County, Washington)
- Anacortes and Skagit County (Skagit County, Washington)
- Coupeville and South Whidbey Island (Island County, Washington)
- Port Angeles (Clallam County, Washington)
- Port Townsend (Jefferson County, Washington)
- Everett and Edmonds (Snohomish County, Washington)
- Olympia (Thurston County, Washington)
- Shelton, Allyn, Grapeview, Dewatto, and Hoodsport (Mason County, Washington)
- Kingston, Indianola, Keyport, Poulsbo, Brownsville, Tracyton, Waterman, Bremerton, Silverdale, and Manchester (Kitsap County, Washington)
- Grays Harbor (Grays Harbor County, Washington)
- Port of Astoria (Clatsup County, Oregon)
- Port of Newport (Lincoln County, Oregon)
- Coos Bay (Coos County, Oregon)
- Port Orford (Curry County, Oregon)
- Eureka (Humboldt County, California)

The United States has grown increasingly dependent on international trade over the past 50 years. Section 3.12 (Socioeconomic Resources) provides additional information for marine vessel traffic in the Study Area. Primary concerns for the cumulative impacts analysis include vessels striking marine mammals and sea turtles, introduction of non-native species through hull fouling and ballast water, and underwater sound from ships and other vessels.

#### 4.3.5.5 Shoreline Development

Shoreline development adjacent to the Study Area is both intensive and extensive. Development has impacted and continues to impact coastal resources through point and nonpoint source pollution; concentrated recreational use; and intensive ship traffic using major port facilities. The Study Area also includes extensive coastal tourism development (hotels, resorts, restaurants, food industry, residential homes, etc.) and the infrastructure supporting coastal development (retail businesses, marinas, fishing tackle stores, dive shops, fishing piers, recreational boating harbors, beaches, recreational fishing facilities, etc.). The focus of this analysis is on shoreline development in Washington because of the close proximity of the Study Area to the shores of Washington. The offshore portion of the Study Area is 12 nm off the coast of Oregon, and California, and therefore shoreline development in that part of the Study Area will have minimal impact on resources in the Study Area.

Coastal development intensifies use of coastal resources, resulting in potential impacts on water quality, marine habitat, and air quality. Coastal development is therefore closely regulated by Washington, Oregon, and California through the Coastal Zone Management Act. New development in the coastal zone requires a permit from the state or local government to which permitting authority has been delegated (Chapter 6, Additional Regulatory Considerations, provides additional information on coastal zone management in each state).

#### 4.3.5.6 Oceanographic Research

There are currently scientific research permits and General Authorizations for research issued by NMFS for cetacean work in the North Pacific. The most invasive research involves tagging or biopsy while the remainder focuses on vessel and aerial surveys and close approach for photo-identification. Species covered by these permits and authorizations include small odontocetes, sperm whales, and large mysticetes. One permit issued to the Office of Protected Resources of NMFS allows for responses to strandings and entanglements of listed marine mammals. NMFS has also issued General Authorizations for commercial photography of non-listed marine mammals, provided that the activity does not rise to Level A Harassment of the animals. These authorizations are usually issued for no more than 1 or 2 years, depending on the project.

Three consecutive marine geophysical (seismic) surveys are authorized to be conducted in the Northeast Pacific Ocean, for the time period of June–August 2012. Three Level B harassment incidental take authorizations for marine mammals are issued to the Lamont-Doherty Earth Observatory, a part of Columbia University. The Observatory with research funding from the U.S. National Science Foundation, plans to conduct three research studies on the Juan de Fuca Plate, the Cascadia thrust zone, and the Cascadia subduction margin in waters off the Oregon and Washington coasts. The Observatory will use one source vessel, a seismic airgun array, a single hydrophone streamer, and the ocean bottom seismometers to conduct the seismic surveys. They also intend to operate a multibeam echosounder and a subbottom profiler continuously throughout the surveys (FR 77: 136 2012).

These acoustic stimuli generated during the operation of the seismic airgun arrays may have the potential to cause a short-term behavioral disturbance for marine mammals in the survey area. The surveys should provide data to characterize the evolution and state of hydration of the Juan de Fuca plate at the Cascadia subduction zone, provide information on the buried structures in the region, and assess the location, physical state, fluid budget, and methane systems of the Juan de Fuca plate boundary and overlying crust. The results of the three studies will also provide background information for generating improved earthquake hazards analyses and a better understanding of the processes that control megathrust earthquakes, which are produced by a sudden slip along the boundary between a subducting and an overriding plate (FR 77: 136 2012).

The impacts of this type of research are largely unmeasured. However, given the analysis and scrutiny given to permit applications, it is assumed that any adverse effects are largely transitory (e.g., inadvertent harassment, biopsy effects, etc.). Data to assess population level effects from research are not currently available, and it is uncertain that research effects could be separately identified from other adverse effects on cetacean populations in Pacific Northwest waters.

#### 4.3.5.7 Ocean Noise

Noise is generally described as unwanted sound—sound that clutters and masks other sounds of interest (Richardson et al. 1995). Anthropogenic sources of noise that are most likely to contribute to increases in ocean noise are vessel noise from commercial shipping and general vessel traffic, oceanographic research, oil and gas exploration, underwater construction, and naval and other use of sound navigation and ranging (sonar).

Any potential for cumulative impact should be put into the context of recent changes to ambient sound levels in the world's oceans as a result of anthropogenic activities. However, there is a large and variable natural component to the ambient noise level as a result of events such as earthquakes, rainfall, waves breaking, and lightning hitting the ocean as well as biological noises such as those from snapping shrimp and the vocalizations of marine mammals.

Andrew et al. (2002) compared ocean ambient sound from the 1960s to the 1990s from a receiver approximately 25 mi. (40 km) west of Point Sur, California. The data showed an increase in ambient noise of approximately 10 decibels (dB) in the frequency ranges of 20–80 Hertz (Hz) and 200–300 Hz, and about 3 dB at 100 Hz over a 33-year period. Each 3 dB increase is noticeable to the human ear as a doubling in sound level. A possible explanation for the rise in ambient noise is the increase in shipping noise. There are approximately 11,000 supertankers worldwide, each operating 300 days per year, producing constant broadband noise at source levels of 198 dB (Hildebrand 2004).

Appendix F (Acoustic and Explosives Primer) provides additional information about sources of anthropogenic sound in the ocean and other background information about underwater noise. This appendix describes the different types of effects that are possible and the potential relationships between sound stimuli and long-term consequences for individual animals and populations. A variety of impacts may result from exposure to sound-producing activities. The severity of these impacts can vary greatly between minor impacts that have no real cost to the animal, to more severe impacts that may have lasting consequences. The major categories of potential impacts are: behavioral reactions, physiological stress, auditory fatigue, auditory masking, and direct trauma.

#### 4.3.5.8 Ocean Acidification Effects on Noise in the Ocean

Since the Industrial Revolution in the mid-19th century, the world's oceans have become increasingly acidic as a result of anthropogenic emissions of carbon (e.g., carbon dioxide [$CO_2$]) from the burning of fossil fuels (Feely et al. 2012 Reeder and Chiu 2010). Public comments received by the Navy on recently published EISs have expressed concerns that the increase in the acidity of ocean waters could potentially lead to an increase in the propagation of underwater sound associated with Navy activities (e.g., ship noise, sonar) and then have a greater potential to acoustically impact marine species (e.g., marine mammals, fish, turtles).

Although an increase in the acidity of seawater reduces the availability of boron ions that absorb sound (see Urick 1983), the effect that ionic absorption has on sound propagation is very small and overall transmission loss is dominated by other mechanisms (see Hester et al. 2008; Ilyina et al. 2010; Reeder and Chiu 2010). Reeder and Chiu (2010) demonstrated that even if there is a continual increase in ocean acidity over decades, there would still be no significant changes to average background noise levels in the ocean. Furthermore, they conclude that even with a large increase in acidity, there would be no change in ocean noise levels in shallow water and in near surface habitats frequented by marine mammals. The Navy's proposed actions in the NWTT Study Area would not significantly contribute to ocean acidification, and the potential cumulative effects of ocean acidification would not perceptibly change ocean noise levels; therefore, the effect of ocean acidification need not be considered further in this analysis.

#### 4.3.5.9 Ocean Pollution

Pollution is the introduction of harmful contaminants that are outside the norm for a given ecosystem. Ocean pollution has and will continue to have serious impacts on marine ecosystem. Common ocean pollutants include toxic compounds such as metals, pesticides, and other organic chemicals; excess nutrients from fertilizers and sewage; detergents; oil; plastics; and other solids. Pollutants enter oceans from non-point sources (i.e., storm water runoff from watersheds), point sources (i.e., wastewater treatment plant discharges), other land-based sources (i.e., windblown debris), spills, dumping, vessels, and atmospheric deposition.

##### 4.3.5.9.1 Non-Point Sources, Point Sources, and Atmospheric Deposition

Storm water runoff, wastewater, and nonpoint source pollution, are considered major causes of impairment of ocean waters. Storm water runoff from coastal urban areas and beaches carries waste such as plastics and Styrofoam into coastal waters. Sewer outfalls also are a source of ocean pollution. Sewage can be treated to eliminate potentially harmful releases of contaminants; however, releases of untreated sewage occur due to malfunctions or overloads to the infrastructure, resulting in releases of bacteria usually associated with feces, such as *Escherichia coli* and *Enterococci spp*. Bacteria levels are used routinely to determine the quality of water at recreational beaches and as indicators of the possible presence of other harmful microorganisms. In the past, toxic chemicals have been released into sewer systems. While such dumping has long been forbidden by law, the practice left ocean outflow sites contaminated. Sewage treatment facilities generally do not treat or remove persistent organic pollutants, such as polychlorinated biphenyl (PCB) and dichlorodiphenyltrichloroethane (DDT), or other toxins.

Hypoxia (low dissolved oxygen concentration) is a major impact associated with point and non-point sources of pollution. Hypoxia occurs when waters become overloaded with nutrients from pesticides such as nitrogen and phosphorus, which enter oceans from non-point source runoff, wastewater treatment plants, and atmospheric deposition. Too many nutrients can stimulate algal blooms—the rapid expansion of microscopic algae (phytoplankton). When excess nutrients are consumed, the algae population dies off and the remains are consumed by bacteria. Bacterial consumption causes dissolved oxygen in the water to decline to the point where marine life that depends on oxygen can no longer survive (Boesch et al. 1997).

Almost 200 million tons of criteria pollutants (sulfur dioxide, nitrogen dioxide, carbon monoxide, lead, volatile organic compounds, and particulate matter) were emitted into the United States Atmosphere in 1997 (U.S. Environmental Protection Agency 1998). Through the process of wet and dry atmospheric deposition, these and other pollutants can return to the earth and the waters. Wet deposition removes gases and particles from the atmosphere and deposits them on the surface of the earth through rain, sleet, snow, and fog. While dry deposition is a process through which particles and gases are deposited in the absence of precipitation, such as through dust (U.S. Geological Survey 2000). This atmospheric deposition also contributes to the buildup of pollutants in the Study Area. Non-point sources, point sources, and atmospheric deposition also contribute toxic pollutants such as metals, pesticides, and other organic compounds to the marine environment. Toxic pollutants may cause lethal or sublethal effects if present in high concentrations, and can build up in tissues over time and suppress immune system function, resulting in disease and death for marine organisms. The main causes of pollution in the Study Area are oil spills, stormwater run-off, dairy farm run-off, hazardous waste sites, combined sewer overflows, and highway stormwater outfalls (Puget Soundkeeper Alliance 2012).

#### 4.3.5.9.2 Marine Debris

Marine debris is any anthropogenic object intentionally or unintentionally discarded, disposed of, or abandoned in the marine environment. Common types of marine debris include various forms of plastic and abandoned fishing gear, as well as clothing, metal, glass, and other debris. Marine debris degrades marine habitat quality and poses ingestion and entanglement risks to marine life and birds (National Marine Fisheries Service 2006).

Plastic marine debris is a major concern because it degrades slowly and many plastics float, allowing the debris to be transported by currents throughout the oceans. Currents in the oceanic convergence zone in the North Pacific Subtropical Gyre act to accumulate the floating plastic marine debris. These debris carrying currents include the south-flowing California Current, and the north-flowing Gulf of Alaska Current. These currents distribute debris throughout the Study Area. Debris found in the Puget Sound (inland waters) portion of the Study Area, include pieces of hard plastic, insulation, pre-production plastic pellets, pieces of bags or wrappers, fishing line, rope, or synthetic cloth, cigarette butts and filters, glass fragments and shards, rubber, metal, and "other" unclassified debris (Kingfisher 2011).

Additionally, plastic waste in the ocean chemically attracts hydrocarbon pollutants such as PCB and DDT, which accumulate up to one million times more in plastic than in ocean water (Mato et al. 2001). Fish, marine animals, and birds can mistakenly consume these wastes containing elevated levels of toxins instead of their prey. In the North Pacific Subtropical Gyre it is estimated that the fishes in this area are ingesting 12,000–24,000 U.S. tons (10,886,216–21,772,433 kilograms [kg]) of plastic debris a year (Davison and Asch 2011).

Debris that sinks to the seafloor is also a concern for ingestion and entanglement by fish, invertebrates, sea turtles, marine mammals, and marine vegetation. Sunken debris is also a contributor to marine habitat degradation. Military expended materials will also contribute to the marine debris loading of the seafloor in the Study Area. In the U.S. west coast Groundfish Bottom Trawl Surveys of 2007 and 2008, anthropogenic debris was observed at depths of 55–1,280 m (180.5–4,199.5 ft.). The density of debris increased with depth, and the majority of the debris was plastic and metallic, while the rest of it was fabric and glass (Keller et al. 2010).

### 4.3.5.10 Marine Tourism and Recreation

Tourism is Alaska's second biggest industry in terms of employment, and is the main industry of many small and isolated communities. The coast and some major rivers are the center of Alaska's tourism. Sport fishing is one of the biggest industries along with the growing number of ecotourists visiting the state. In the summer of 2011 alone, there were a total of 1,556,800 visitors to the state. Cruise ship visitors make up a majority of 57 percent or 883,000 of those visitors. The second most popular activity of tourists in Alaska is wildlife viewing (52 percent), much of which occurs on the coast. Between 2006 and 2011, the percentage of visitors from the United States fell by 2 percent, while Canada and the other International categories each increased by 1 percent.

In 2009, visitors to Washington spent $14.2 billion; although this is a decrease from 2008 it was reflective of national trends at the time. Travel and tourism is Washington's fourth largest export industry which supports jobs, bolsters local economies and small businesses and contributes tax revenue for state and local governments. Seattle itself attracts about 9.9 million visitors annually, which contributes about $463 million in state and local tax revenues. Washington attracts tourists through water trails, the Cascadia Marine Trail, and other ocean tourism ventures that are based on conservation, environmental impact, visitor management, and community relations and education (Labor 1999).

The total overnight trips to the Oregon Coast totaled 9.6 million visitors, which was about 35 percent of the total visitors in 2009. Spending on the coast in 2009 totaled $1.37 billion, with only 10 percent of that total being spent on Recreation and 36 percent on Lodging. Sixty-seven percent of visitors spent their time at the Beach or Waterfront, while 16 percent spent time swimming and 11 percent went fishing (Regional Visitor Research, Oregon 2009). The majority of the tourism industry’s employment in Oregon is in accommodation and food services, while 15 percent are in travel and transportation, and the remaining 25 percent is divided between retail trade and arts, entertainment, and recreation. In 2010 there were approximately 161,900 workers in the leisure and hospitality industry, the majority of which were service workers whose wages are low, resulting in a lower average wage. The most recent employment projections forecast that leisure and hospitality will grow about 19 percent from 2010 to 2020. This $2 billion travel and tourism industry plays an important role in Oregon’s economy (Jackson-Winegardner 2012).

Between 1990 and 2000, the ocean-related gross state product for California grew by 10.6 percent with one of the largest growth trends experienced in coastal recreation and tourism. California’s trend reflects the international trend of coastal tourism and recreation growth which has continued in past decades while other industries have declined. Additionally, the growth is seen in the development of “services” rather than “goods-related” activities (Kildow and Colgan 2005). Stakeholders in tourism services have economical motivation to ensure positive management of marine resources on which their industries are based, therefore the impacts of marine tourism is generally localized and of small magnitude.

Rapid expansion of tourism could increase pressure for additional coastal and urban development which would result in potential indirect and cumulative effects on marine resources (Harriott 2002). The Marine Institute found that the issues relating to tourism included visitor pressures on coastal ecology; carrying capacity; information gap (i.e., insufficient data to assess impacts of tourism); anthropogenic impacts (i.e., displacement of seabirds, habitat and roosting opportunities, conflicts with users and wildlife, altering food sources); threats to ecology; development pressure; infrastructural support; user conflicts; and motorized crafts (Connolly et al. 2001). Naval ship movement in the Study Area may contribute to the cumulative effects of Marine Tourism, as discussed in Section 4.3.5.2 (Commercial and Recreational Fishing) and Section 4.3.5.3 (Maritime Traffic).

#### 4.3.5.11 Commercial and General Aviation

Commercial and general aviation are retained for analysis and discussion due to associated emissions from aviation activities and effects on greenhouse gas. An analysis of greenhouse gas is presented in Section 4.4.4.1 (Greenhouse Gases).

#### 4.3.5.12 2013 Bremerton Ferry Terminal Construction by the Washington State Department of Transportation

To improve, maintain, and preserve the terminals, Washington State Department of Transportation conducts construction, repair and maintenance activities as part of its regular operations. One of these projects is the replacement of wingwall structures at the Bremerton ferry terminal. The Washington State Department of Transportation has received an IHA request for in-water construction from

September 2014 to August 2015. The proposed project will occur in marine waters that support several marine mammal species. The project's timing and duration and specific types of activities (such as pile driving) may result in the incidental taking by acoustical harassment (Level B take) of marine mammals protected under the MMPA. The IHA is for Level B harassment only of six marine mammal species (harbor seal, California sea lion, Steller sea lion, killer whale, gray whale, humpback whale) that may occur in the vicinity of the projects. The current timber wingwalls at the Bremerton terminal are near the end of their design life and are being replaced with steel wingwalls to ensure safe and reliable functioning of the terminal (Washington State Ferries 2012).

## 4.4 Resource-Specific Cumulative Impacts

### 4.4.1 Resource Areas Dismissed from Cumulative Impacts Analysis

In accordance with Council on Environmental Quality guidance (Council on Environmental Quality 2010), the cumulative impacts analysis focused on impacts that are "truly meaningful." The level of analysis for each resource was commensurate with the intensity of the impacts identified in Chapter 3 (Affected Environment and Environmental Consequences). The analysis focused on marine mammals, sea turtles, and cultural resources. While each of the following resources is discussed briefly in the following sections, detailed analysis of cumulative impacts on the following resources was not necessary as the incremental contribution of Alternatives 1 and 2 to cumulative impacts would be low. Further analysis of cumulative impacts is not warranted on the following resources:

- Sediments and water quality
- Marine habitats
- Marine vegetation
- Marine invertebrates
- Public health and safety

### 4.4.2 Sediments and Water Quality

The analysis in Section 3.1 (Sediments and Water Quality) indicates that the alternatives could result in local, short- and long-term changes in sediment and water quality. However, chemical, physical, or biological changes to sediments or water quality would be below applicable standards, regulations, and guidelines and would be within existing conditions or designated uses (Section 3.1.1.2, Methods, lists applicable standards, regulations, and guidelines). The short-term impacts would arise from explosions and the byproducts of explosions and combusted propellants. It is unlikely these short-term impacts would overlap in time and space with other future actions that produce similar constituents. For example, training and testing with explosives would not be expected to occur near operations like the 2013 Bremerton Ferry Terminal Construction, where explosives are already being used. Therefore, the short-term impacts described in Section 3.1 (Sediments and Water Quality) are not expected to contribute to cumulative impacts.

The long-term impacts would arise from unexploded ordnance, noncombusted propellant, metals, and other materials. Long-term impacts of each alternative would be cumulative with other actions that cause increases in similar constituents. However, the incremental contribution of the No Action Alternative, Alternative 1, or Alternative 2 to long-term cumulative impacts would be negligible because

- most training and testing activities are widely dispersed in space and time;
- most components of expended materials are inert or corrode slowly;

- numerically, most of the metals expended are small- and medium-caliber projectiles; metals of concern comprise a small portion of the alloys used in expended materials, and metal corrosion is a slow process that allows for dilution;
- most of the components are subject to a variety of physical, chemical, and biological processes that render them benign; and
- potential areas of impacts would be limited to small zones immediately adjacent to the explosive, metals, or chemicals other than explosives.

Furthermore, none of the alternatives would result in long-term and widespread changes in environmental conditions, such as nutrient loading, turbidity, salinity, or pH (a measure of the degree to which a solution is either acidic [pH less than 7.0] or basic [pH greater than 7.0]).

Based on the analysis presented in Section 3.1 (Sediments and Water Quality) and the reasons summarized above, the changes in sediment or water quality would be measurable, but would still be below applicable state, federal, and U.S. Environmental Protection Agency (USEPA) standards and guidelines; therefore the incremental contribution of Alternatives 1 and 2 to cumulative impacts would be low and further analysis of cumulative impacts is not warranted.

### 4.4.3 AIR QUALITY

As detailed in Section 3.2 (Air Quality), increased training and testing activities conducted under Alternatives 1 and 2 would result in increased criteria pollutant emissions and hazardous air pollutant emissions throughout the Study Area. Sources of the increased emissions would include vessels and aircraft, and to a lesser extent munitions. Potential impacts include localized and temporarily elevated pollutant concentrations. Recovery would occur quickly as emissions disperse, and there would be no significant impact on air quality. The impacts of Alternatives 1 or 2 would be cumulative with other actions that involve criteria air pollutant and hazardous air pollutant emissions. However, the incremental contribution of Alternatives 1 or 2 to cumulative impacts would be low for the following reasons:

- All of the air emissions sources proposed in this EIS/ OEIS are mobile sources and do not impact the current attainment status.
- Few stationary offshore air pollutant emission sources exist within the Study Area and few are expected in the foreseeable future.
- International regulations by the International Maritime Organization require commercial shipping vessels to switch to lower-sulfur fuel near U.S. and international coasts beginning in 2012 (National Oceanic and Atmospheric Administration 2011a). The DoD has released the Operational Energy Strategy: Implementation Plan which will reduce demand, diversify energy sources, and integrate energy consideration into planning (U.S. Department of Defense 2012). The U.S. Department of the Navy policy commits to a reduction of oil consumption by 50 percent by 2015, 40 percent of the Navy's total energy will come from fossil fuel alternatives and 50 percent of its onshore energy will come from renewable sources by 2020 (Environmental and Energy Study Institute 2009; Paige 2009). Similar low-sulfur fuel regulations in California, including a voluntary state slowdown policy, were found to reduce several pollutants, including sulfur dioxide and particulate matter by as much as 90 percent (Lack et al. 2011).

Based on the analysis presented in Section 3.2 (Air Quality) and the reasons summarized above, the incremental contribution of Alternatives 1 or 2 to cumulative impacts would be low and would still be below applicable state, federal, and USEPA standards and guidelines. Therefore, further analysis of cumulative impacts on air quality is not warranted. Regulatory framework for greenhouse gases that are related to air quality are discussed below in Section 4.4.4.1.1 (Regulatory Framework).

## 4.4.4 CLIMATE CHANGE

This section provides background information and an analysis of the cumulative impacts of climate change and greenhouse gas emissions for the Proposed Action. Climate change is also considered in the overall cumulative impacts analysis as another environmental consideration. The Intergovernmental Panel on Climate Change (2007) reports that physical and biological systems on all continents and in most oceans are already being affected by recent climate changes. Global-scale assessment of observed changes shows that it is likely that the increase in greenhouse gas emissions from anthropogenic activities over the last three decades has resulted in an increased temperature, which had a discernible influence on many physical and biological systems. Some of the major potential concerns for the marine environment include sea temperature rise, melting of polar ice, rising sea levels, changes to major ocean current systems, and ocean acidification.

### 4.4.4.1 Greenhouse Gases

Greenhouse gases are compounds that contribute to the greenhouse effect. The greenhouse effect is a natural phenomenon in which these gases trap heat within the surface-troposphere (lowest portion of the earth's atmosphere) system, causing heating (radiative forcing) at the surface of the earth. The projected warming and more extensive climate-related changes could dramatically alter the region's economy, landscape, character, and quality of life (Le Treut et al. 2007). Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in greenhouse gas emissions from human activities (U.S. Environmental Protection Agency 2012). Without greenhouse gases the planet's surface would be about 60 degrees Fahrenheit (°F) cooler than present; according to the NOAA and National Aeronautics and Space Administration data, the average surface temperature has increased by about 1.2–1.4°F since 1900. If greenhouse gases continue to increase, models predict that the average temperature at the earth's surface could increase from 2.0 to 11.5°F above the 1990 levels by the end of this century (Le Treut et al. 2007).

Predictions of long-term negative environmental impacts due to global warming include sea level rise, changing weather patterns with increases in the severity of storms and droughts, changes to local and regional ecosystems (including the potential loss of species), melting glaciers and sea ice, thawing permafrost, a longer growing season, and shifts in plant and animal ranges.

In 2009, the United States generated about 6,633.2 teragrams (Tg) (or million metric tons) of carbon dioxide ($CO_2$) equivalents ($Co_2e$) (U.S. Environmental Protection Agency 2012). The 2009 inventory data (U.S. Environmental Protection Agency 2012) show that greenhouse gases (carbon dioxide [$CO_2$], methane [$CH_4$], and nitrous oxide [$N_2O$]) contributed from fossil fuel combustion processes from mobile and stationary sources (all sectors) include approximately:

- 5,505.2 Tg of $CO_2$
- 686.3 Tg $CH_4$
- 295.6 Tg $N_2O$

The 6,633.2 Tg $CO_2e$ generated in 2009 was a decrease from the 7,263.4 Tg $CO_2e$ generated in 2007 (U.S. Environmental Protection Agency 2011). Among domestic transportation sources, light-duty vehicles (including passenger cars and light-duty trucks) represented 64 percent of $CO_2$ emissions, medium- and heavy-duty trucks 20 percent, commercial aircraft 6 percent, and other sources 9 percent. Across all categories of aviation, $CO_2$ emissions decreased by 21.6 percent (38.7 Tg) between 1990 and 2009, including a 59 percent (20.3 Tg) decrease in emission from domestic military operations. To place military aircraft in context with other aircraft $CO_2$ emissions, in 2009, commercial aircraft generated 111.4 Tg $CO_2e$, military aircraft generated 14.1 Tg $CO_2e$, and general aviation aircraft generated 13.3 Tg $CO_2e$. Military aircraft represent roughly 10 percent of emissions from the overall jet fuel combustion category (U.S. Environmental Protection Agency 2012).

This section begins by providing the background and regulatory framework for greenhouse gases. It then provides a quantitative evaluation of changes in greenhouse gas emissions that would occur under the Proposed Action and analyzes the cumulative impacts of greenhouse gas emissions.

#### 4.4.4.1.1 Regulatory Framework

This section addresses and summarizes documents that provide a framework for addressing the effects of climate change and greenhouse gas emissions on training and testing activities in the NWTT Study Area.

Executive Order (EO) 13653, *Preparing the United States for the Impacts of Climate Change*, of November 2013 directs federal agencies to improve preparedness to address the impacts of climate change on human and natural resources. Federal agencies must implement coordinated planning, including cooperation with state, local, private-sector, and non-profit stakeholders to enhance the country's resilience to the effects of climate change. Federal agencies must promote partnerships and information sharing with all levels of government, engage in risk-informed decision-making and develop tools to facilitate decision-making, employ experience-based adaptive management practices, and carry out preparedness planning.

The Department of Defense prepared a Climate Change Adaptation Roadmap in 2014 to implement the directives in EO 13653 (U.S. Department of Defense 2014). The policies and plans outlined in the Roadmap will increase the Department's resilience to the impacts of climate change, which is key to sustaining mission capabilities into the future. The Roadmap establishes three goals: (1) to identify and assess the impacts of climate change on the Department's ability to accomplish its mission, (2) to implement policies and plans to manage short- and long-term risks associated with climate change, and (3) to collaborate with internal and external stakeholders on climate change challenges. The Department identified four "lines of effort" that support these goals, one of which is training and testing, which the Roadmap describes as, "critical to maintaining a capable and ready Force in the face of a rapidly changing strategic setting. Access to land, air, and sea space that replicate the operational environment for training and testing is essential to readiness."

In fulfillment of the first goal, the Roadmap identifies four main climate related phenomena likely to impact the Department's activities: rising global temperatures, changing participation patterns, increasing frequency or intensity of extreme weather events, and sea level rise associated with storm surge. These phenomena have the potential to affect military training and testing activities by increasing the number of days activities are suspended due to adverse weather conditions, further stressing ESA-listed species and dependent ecosystems where training and testing occur, increasing health and safety risks to personnel, and increasing maintenance and repair of infrastructure and equipment used to conduct training and testing. To manage risks associated with climate change (Goal 2), the Department will continue to carry out its sustainable range program, which includes updating and revising its range complex master plans to incorporate new climate change initiatives and processes.

Climate change effects will drive collaboration with stakeholders (Goal 3) and may include shared use of training and testing assets within the military and with our allies, collaboration with maritime and land management agencies, and collaboration with the medical community to address health surveillance and disease treatment programs.

Federal agencies address emissions of greenhouse gases by reporting and meeting reductions mandated in laws, executive orders, and policies. The most recent of these is EO 13693, *Planning for Federal Sustainability in the Next Decade*, issued March 2015. EO 13693 shifts the way the government operates by establishing target greenhouse gas reduction goals for federal agencies. As outlined in the policy, goals shall be achieved by increasing efficiency, reducing energy use, and finding renewable or alternative energy solutions.

Finally, the Council on Environmental Quality Memo, *Draft NEPA Guidance on Consideration of the Impacts of Climate Change and Greenhouse Gas Emissions* states that "if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of $CO_2$e greenhouse gas emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public" (Council on Environmental Quality 2010).

The Navy is committed to improving energy security and environmental stewardship by reducing reliance on fossil fuels and implementing policies, plans, and programs to prepare for the impacts of climate change on the Navy's mission. The Navy is actively developing and participating in energy, environmental, and climate change initiatives that will increase use of alternative energy and help conserve the world's resources for future generations.

#### 4.4.4.2 Cumulative Greenhouse Gas Impacts

Climate change is a global issue, and greenhouse gas emissions are a concern from a cumulative perspective because individual sources of greenhouse gas emissions are not large enough to have an appreciable impact on climate change. This greenhouse gas analysis considers the incremental contribution of Alternatives 1 and 2 to total estimated U.S. greenhouse emissions and their significance on climate change as compared to the No Action Alternative.

To estimate total greenhouse gas emissions, each greenhouse gas was assigned a global warming potential; that is, the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to $CO_2$, which has a value of one. For example, $CH_4$ has a global warming potential of 21, which means that it has a global warming effect 21 times greater than $CO_2$ on an equal-mass basis (Intergovernmental Panel on Climate Change 2007). To simplify greenhouse gas analyses, total greenhouse gas emissions from a source are often expressed as $CO_2$ Eq. The $CO_2$ Eq is calculated by multiplying the emissions of each greenhouse gas by its global warming potential and adding the results together to produce a single, combined emission rate representing all greenhouse gases. While $CH_4$ and $N_2O$ have much higher global warming potentials than $CO_2$, $CO_2$ is emitted in much higher quantities, so it is the overwhelming contributor to $CO_2$ Eq from both natural processes and human activities. Global warming potential-weighted emissions are presented in terms of equivalent emissions of $CO_2$, using units of Tg (1 million metric tons, or 1 billion kg) of carbon dioxide equivalents (Tg $CO_2$ Eq).

Greenhouse gas emissions were calculated (Appendix D, Air Quality Example Calculations) for ships and aircraft, which contribute the majority of emissions associated with training and testing in the Study

Area. Greenhouse gas emissions from minor sources such as munitions, weapons platforms, and auxiliary equipment are considered negligible and were not calculated. Ship greenhouse gas emissions were estimated by determining annual ship fuel (typically diesel) use based on proposed activities and multiplying total annual ship fuel consumption by the corresponding emission factors for $CO_2$, $CH_4$, and $N_2O$. Aircraft greenhouse gas emissions were calculated by multiplying jet fuel use rates by the total operating hours, by the corresponding jet fuel emission factors for $CO_2$, $CH_4$, and $N_2O$, and by the total annual sorties. Ship and aircraft greenhouse gas emissions are compared to U.S. 2010 greenhouse gas emissions in Table 4.4-1. The estimated $CO_2$ Eq emissions from the No Action Alternative are 0.0016 percent of the total $CO_2$ Eq emissions generated by the United States in 2010. The estimated $CO_2$ Eq emissions from Alternative 1 and Alternative 2 would increase as a result of increased training and testing activities to about 0.0023 percent of the total $CO_2$ Eq emissions generated by the United States in 2010.

**Table 4.4-1: Comparison of Ship and Aircraft Greenhouse Gas Emissions to United States 2010 Greenhouse Gas Emissions**

| Alternative | Annual Greenhouse Gas Emissions (teragrams $CO_2$ Eq) | Percentage of U.S. 2010 Greenhouse Gas Emissions |
|---|---|---|
| No Action Alternative | 0.107 | 0.0016 |
| Alternative 1 | 0.154 | 0.0023 |
| Alternative 2 | 0.157 | 0.0023 |
| U.S. 2010 Greenhouse Gas Emissions | 6,821.8 | |

Notes: $CO_2$ Eq = carbon dioxide equivalent, U.S. = United States
Source: U.S. Environmental Protection Agency 2012

Based on the analysis presented in Section 3.2 (Air Quality) and the reasons summarized above, the changes in air quality would be measurable, but would still be below applicable standards and guidelines; therefore the incremental contribution of Alternatives 1 and 2 to cumulative greenhouse gas impacts would be low and further analysis of cumulative impacts is not warranted.

### 4.4.5 MARINE HABITATS

The analysis presented in Section 3.3 (Marine Habitats) indicates that marine habitats would be affected by acoustic stressors (underwater detonations) and physical disturbance or strikes (interactions with vessels and in-water devices, military expended materials, or seafloor devices). Potential impacts include localized disturbance of the seafloor, cratering of soft-bottom sediments, and structural damage to hard-bottom habitats. Impacts on soft-bottom habitats would be short-term, and impacts on hard bottom would be long-term. The impacts of Alternatives 1 and 2 would be cumulative with other actions that cause similar disturbances. However, the incremental contribution of Alternatives 1 or 2 to cumulative impacts would be low for the following reasons:

- Most of the proposed activities that might affect marine habitats would occur in areas where hard bottom does not occur.
- Impacts on soft-bottom habitats would be confined to a limited area, and recovery would occur quickly.

Based on the analysis presented in Section 3.3 (Marine Habitats) and the reasons summarized above, the incremental contribution of Alternatives 1 and 2 to cumulative impacts would be low. Further analysis of cumulative impacts on marine habitats is not warranted.

## 4.4.6 MARINE MAMMALS

### 4.4.6.1 Impacts of Alternatives 1 and 2 That May Contribute to Cumulative Impacts

Based on the analysis presented in Section 3.4 (Marine Mammals), impacts of Alternatives 1 and 2 that might contribute to cumulative impacts on marine mammals include injury (Level A harassment under the MMPA) and disturbance or behavioral modification (MMPA Level B harassment). Underwater explosions and sonar have the potential to cause injury or MMPA level A or B harassment, including Permanent Threshold Shift (PTS). However, NMFS has concluded that for Navy activities in the NWTT Study Area, the effects of multiple exposures to active sonar or underwater detonations are not likely to accumulate through altered energy budgets caused by avoidance behavior, physiological stress responses, or the canonical costs of changing behavioral states (National Marine Fisheries Service 2014a). Other relatively short-term activities that might inadvertently harass marine mammals meet the definition of MMPA IHAs. The remaining stressors analyzed in Section 3.4 (Marine Mammals) are not expected to result in mortality or Level A or B harassment. The incremental contribution of these remaining stressors discussed in Sections 3.4.3.3 through 3.4.3.7, to cumulative impacts on marine mammals, would be negligible. The impacts of Alternatives 1 and 2 considered in the cumulative impacts analysis of this Section 4.4.6 are summarized in Chapter 3, Section 3.4 (Marine Mammals).

### 4.4.6.2 Impacts of Other Actions

#### 4.4.6.2.1 Overview

The potential impacts of other actions that are relevant to the cumulative impact analysis for marine mammals include the following:

- Mortality associated with non-Navy vessel strikes, bycatch in fisheries, and entanglement in fishing and other gear
- Injury associated with non-Navy vessel strikes, bycatch, entanglement, and underwater sound
- Disturbance, behavioral modifications, and reduced animal fitness associated with underwater noise
- Reduced animal fitness associated with water pollution

Most of the other actions and considerations retained for analysis in Table 4.3-1 would include operation of marine vessels. Exceptions include the actions listed under environmental regulations and permitting. Stressors associated with marine vessel operations that are of primary concern for the cumulative impacts analysis includes vessel strikes and underwater noise. Many of the actions would also result in underwater noise from sources other than vessels, seismic surveys, and construction activities. Rather than discussing these stressors for individual actions, their aggregate impacts are considered below as “other environmental considerations” in the maritime traffic and ocean noise subsections. Similarly, many of the actions would result in water pollution. The aggregate impacts of water pollution are addressed in the ocean pollution section (Section 4.4.6.2.5). Bycatch is associated with commercial fishing, and the primary cause of entanglement is commercial fishing. Therefore, these stressors are discussed in the commercial fishing section (Section 4.4.6.3.1).

#### 4.4.6.2.2 Surveillance Towed Array Sensor System Low Frequency Active Sonar

Potential impacts on marine mammals from Surveillance Towed Array Sensor System Low Frequency Active Sonar operations include (1) nonauditory injury,[2] (2) permanent loss of hearing, (3) temporary loss of hearing, (4) behavioral change, and (5) masking. The potential effects from Surveillance Towed Array Sensor System Low Frequency Active Sonar operations on any stock of marine mammals from injury (nonauditory or permanent loss of hearing) are considered negligible, and the potential effects on the stock of any marine mammal from temporary loss of hearing or behavioral change (significant change in a biologically important behavior) are considered minimal. Any auditory masking in marine mammals due to low-frequency active sonar signal transmissions is not expected to be severe and would be temporary. The operation of Surveillance Towed Array Sensor System Low Frequency Active Sonar with monitoring and mitigation would result in no mortality. The likelihood of low-frequency active sonar transmissions causing marine mammals to strand is negligible (U.S. Department of the Navy 2011).

#### 4.4.6.2.3 Maritime Traffic and Vessel Strikes

Vessel strikes have been and will continue to be a cause of marine mammal mortality and injury throughout the Study Area. A review of the impacts of vessel strikes on marine mammals is presented in Section 3.4.3.4.1 (Impacts from Vessel Strikes). In particular, certain large whales, such as the blue whale, are more prone to vessel strikes (Berman-Kowalewski et al. 2010; Betz et al. 2011). The most vulnerable marine mammals are thought to be those that spend extended periods at the surface or species whose unresponsiveness to vessel sound makes them more susceptible to vessel collisions (Gerstein 2002; Laist and Shaw 2006; Nowacek et al. 2004). Marine mammals such as dolphins, porpoises, and pinnipeds that can move quickly throughout the water column are not as susceptible to vessel strikes. Most vessel strikes of marine mammals reported involve commercial vessels and occur over or near the continental shelf (Laist et al. 2001). The literature review by Laist et al. (2001) concluded that vessel strikes likely have a negligible impact on the status of most whale populations, but that for small populations, vessel strikes may have considerable population-level impacts. The conservation status and abundance of the species struck would determine in large part whether the injury would have population-level impacts on that species (Laist et al. 2001; Vanderlaan and Taggart 2009). There has never been a Navy vessel strike to a marine mammal in the Study Area during any previous training or testing activities.

**<u>Mysticetes</u>**

Virtually all of the rorqual whale species have been documented to have been hit by vessels. This includes blue whales (Berman-Kowalewski et al. 2010; Van Waerebeek et al. 2007; Calambokidis 2012), fin whales (as recently as November 2011 in San Diego) (Van Waerebeek et al. 2007; Douglas et al. 2008), sei whales (Felix and Van Waerebeek 2005; Van Waerebeek et al. 2007), Bryde’s whales (Felix and Van Waerebeek 2005; Van Waerebeek et al. 2007), minke whales (Van Waerebeek et al. 2007), and humpback whales (Lammers et al. 2003; Van Waerebeek et al. 2007; Douglas et al. 2008).

**<u>Odontocetes</u>**

Sperm whales may be exceptionally vulnerable to vessel strikes as they spend extended periods of time “rafting” at the surface in order to restore oxygen levels within their tissues after deep dives (Jaquet and Whitehead 1996; Watkins et al. 1999). There were also instances in which sperm whales approached

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[2] Nonauditory injury can be defined as not relating to or functioning in hearing (Merriam-Webster 2012); this includes mortality, strike, and lung injury.

vessels too closely and were cut by the propellers (Aguilar de Soto et al. 2006). In general, odontocetes move quickly and seem to be less vulnerable to vessel strikes than other cetaceans; however, most small whale and dolphin species have at least occasionally suffered from vessel strikes including: killer whale (Visser and Fertl 2000; Van Waerebeek et al. 2007); short-finned and long-finned pilot whales (Aguilar et al. 2000; Van Waerebeek et al. 2007); bottlenose dolphin (Bloom and Jager 1994; Wells and Scott 1997; Van Waerebeek et al. 2007); white-beaked dolphin, short-beaked common dolphin, striped dolphin, Atlantic spotted dolphin, and pygmy sperm whales (*Kogia breviceps*) (Van Waerebeek et al. 2007); and spinner dolphin (Camargo and Bellini 2007; Van Waerebeek et al. 2007). Beaked whales documented in vessel strikes include: Arnoux's beaked whale (Van Waerebeek et al. 2007), Cuvier's beaked whale (Aguilar et al. 2000; Van Waerebeek et al. 2007), and several species of *Mesoplodon* (Van Waerebeek et al. 2007). However, evidence suggests that beaked whales may be able to hear the low-frequency sounds of large vessels and thus avoid collision (Ketten 1998).

**Pinnipeds**

Pinnipeds in general appear to suffer fewer impacts from ship strikes than do cetaceans. This may be due, at least in part, to the large amount of time they spend on land (especially when resting and breeding), and their high maneuverability in the water. However, California sea lions are often attracted to fishing vessels or when food is available onboard or nearby (Hanan et al. 1989), and this may make them somewhat more at risk of being hit by a vessel during these times. Ship strikes are not a major concern for pinnipeds in general (Antonelis et al. 2006; Marine Mammal Commission 2002; National Marine Fisheries Service 2007).

**Sea Otter**

Sea otter are not expected to be at risk from vessel strike since they spend the majority of time in the water in nearshore and shallow water areas where vessels generally are not present.

#### 4.4.6.2.4 Ocean Noise

As summarized by the National Academies of Science, the possibility that anthropogenic sound could harm marine mammals or significantly interfere with their normal activities is an issue of concern (National Research Council of the National Academies 2005). Noise is of particular concern to marine mammals because many species use sound as a primary sense for navigating, finding prey, and communicating with other individuals. Noise can cause behavioral disturbances, mask other sounds (including their own vocalizations), result in injury, and in some cases, even lead to death (Tyack 2009a; Tyack 2009b; Würsig and Richardson 2008). Human-caused noises in the marine environment come from shipping, seismic and geologic exploration, military training, and other types of pulses produced by government, commercial, industry, and private sources. In addition, noise from whale-watching vessels near marine mammals has received a great deal of attention (Wartzok 2009).

NMFS currently states that underwater SPLs above 190 dB root mean square (rms) could cause injury (Level A harassment) in pinnipeds and SPLs above 180 dB rms could cause injury (Level A harassment) in cetaceans. Federal Register Notice (Vol. 70 pp. 1871-1875) established thresholds for behavioral harassment of marine mammals (Level B harassment) at 160 dB rms for pulsed sounds, such as those produced by impact pile driving, and at 120 dB rms for continuous sounds, such as those produced by vibratory pile driving. Based on the established thresholds, the pile driving and construction noise from projects in the Hood Canal and Puget Sound have the potential to impact pinnipeds and cetaceans.

Assessing whether a sound may disturb or injure a marine mammal involves understanding the characteristics of the acoustic sources, the marine mammals that may be present near the sound, and the effects that sound may have on the physiology and behavior of those marine mammals. Although it is known that sound is important for marine mammal communication, navigation, and foraging, there are many unknowns in assessing the specific effects and significance of responses by marine mammals to sound exposures such as what activity the animal is engaged in at the time of the exposure (National Research Council of the National Academies 2003, 2005; Nowacek et al. 2007; Southall et al. 2007). Potential impacts on marine mammals from ocean noise include behavioral reactions, hearing loss in the form of Temporary Threshold Shift (TTS) or PTS, auditory masking, injury, and mortality. Section 3.4.3.1 (Acoustic Stressors) discusses these and other possible impacts of ocean noise on marine mammals.

#### 4.4.6.2.5 Ocean Pollution

As discussed in Section 3.4.3 (Environmental Consequences), pollutants from multiple sources are present in, and continue to be released into, the oceans. Elevated concentrations of certain compounds have been measured in tissue samples from marine mammals. Long-term exposure to pollutants poses potential risks to the health of marine mammals, although for the most part, the impacts are just starting to be understood (Reijnders et al. 2008). Section 3.4.3 (Environmental Consequences) provides an overview of these potential impacts, which include organ anomalies and impaired reproduction and immune function (Reijnders et al. 2008).

Oil spills are also a risk for marine mammals. Whales, dolphins, and pinnipeds are all air breathers and must come to the surface frequently to take a breath of air. In a large oil spill, these animals may be exposed to volatile chemicals during inhalation. Cetaceans have no fur that could be oiled and do not depend on fur for insulation. They are not susceptible to the insulation effects (hypothermia); however, haired marine mammals such as fur seals or sea otters would be at risk of insulation effects. Oil and other chemicals on skin and body may result in skin and eye irritation, burns to mucous membranes of eyes and mouth, and increased susceptibility to infection. For large whales, oil can foul the baleen they use to filter-feed, thereby potentially decreasing their ability to eat. Inhalation of volatile organics from oil or dispersants can result in respiratory irritation, inflammation, emphysema, or pneumonia. Ingestion of oil or dispersants may result in gastrointestinal inflammation, ulcers, bleeding, diarrhea, and maldigestion. Finally, absorption of inhaled and ingested chemicals may damage organs such as the liver or kidney, result in anemia and immune suppression, or lead to reproductive failure or death (National Marine Fisheries Service 2010). If the health of an individual marine mammal were compromised by long-term exposure to pollutants, it is possible that this condition could alter the animal's expected response to stressors associated with Alternatives 1 and 2. The behavioral and physiological responses of any marine mammal to a potential stressor, such as underwater sound, could be influenced by a number of other factors, including disease, dietary stress, body burden of toxic chemicals, energetic stress, percentage body fat, age, reproductive state, size, and social position. Synergistic impacts are also possible. For example, animals exposed to some chemicals may be more susceptible to noise-induced loss of hearing sensitivity (Fechter 2005). While the response of a previously stressed animal might be different than the response of an unstressed animal, there are no data available at this time to accurately predict how stress caused by various ocean pollutants would alter a marine mammal's response to stressors associated with Alternatives 1 and 2.

### 4.4.6.3 Coastal Development

Coastal development and increased human populations in coastal areas will continue to have impacts on marine mammals such as increased tourism, non-point source pollution and runoff, power plant entrainment, and degradation of nearshore water quality and seagrass beds (see Section 3.4, Marine Mammals, for more information on impacts on marine mammals).

#### 4.4.6.3.1 Commercial Fishing

Several commercial fisheries operate in the Study Area. Potential impacts from these activities include marine mammal injury and mortality from bycatch and entanglement. Fisheries have also resulted in profound changes to the structure and function of marine ecosystems that adversely affect marine mammals.

Numerous ports in or near the Study Area contain both commercial and commercial passenger vessel (i.e., recreational) fishing fleets that use the ocean areas within the Study Area.

Fisheries activities on a global scale remain a key threat for a number of marine mammal species; however, the best available data indicates that the majority of commercial fisheries operating within the Study Area rarely take marine mammals. In those instances where fisheries interactions rise to the level of “occasional” mortalities or serious injuries, NOAA is working to identify and reduce mortality to insignificant levels as mandated by the MMPA (78 FR 53336). In 1994, the MMPA was amended to formally address bycatch. Estimates of bycatch in the Pacific declined by a total of 96 percent from 1994 to 2006 (Geijer and Read 2013). Cetacean bycatch declined by 85 percent from 342 in 1994 to 53 in 2006, and pinniped bycatch declined from 1,332 to 53 over the same time period (Northridge 2008, Read 2008, Hamer et al. 2010; Geijer and Read 2013).

As discussed in Section 3.4.3.5 (Entanglement Stressors), entanglement in fishing gear is another major threat to marine mammals in the Study Area. Along the U.S. west coast, from 1982 to 2010, there have been 272 reported entangled whales (Saez et al. 2012). Entanglements were seen throughout the coast with concentrations near areas where there is higher human population. Identified entangling gear types have included trap/pot, bottom set longline, and gillnets. Gillnets were the entangling gear type in the majority of reports pre-2000 (64 percent) and trap/pot are the majority post-2000 (45 percent). In the late 1990s, California gillnet regulations changed, resulting in a shift and reduction of gillnet fishing effort. Gray and humpback whales are the most frequently reported entangled large whale species along the U.S. west coast. In California, there were a reported 150 gray whales, 47 humpback whales, 27 unidentified whales, 14 sperm whales, 6 minke whales, and 3 fin whales entangled in fishing gear (Saez et al. 2012).

Overfishing of many fish stocks has resulted in significant changes in trophic structure, species assemblages, and pathways of energy flow in marine ecosystems (Jackson et al. 2001; Myers and Worm 2003; Pauly et al. 1998). These ecological changes may have important and likely adverse consequences for populations of marine mammals (DeMaster et al. 2001). However, fish stocks within the Study Area are recovering from their overfished status and contributing to the overall trend of increasing abundance of U.S. marine fish stocks (National Marine Fisheries Service 2013; National Marine Fisheries Service 2014b).

In summary, future commercial fishing activities in the Study Area are expected to result in negative effects on individual animals of some marine mammal species because some injury and mortality is likely to occur for animals taken as fisheries bycatch or entangled in lost fishing gear. Fisheries-associated mortality for marine mammals within the Study Area is not expected to contribute to population declines for marine mammal species (78 FR 53336). Ecological changes brought about by commercial fishing may also adversely affect marine mammals in the Study Area.

#### 4.4.6.4 Cumulative Impacts on Marine Mammals

The aggregate impacts of past, present, and reasonably foreseeable future actions are expected to result in significant impacts on some marine mammal species in the Study Area. The impacts are considered significant because the cumulative effects of vessel strikes, bycatch, and entanglement associated with other actions are expected to result in relatively high rates of injury and mortality that could cause population declines in some species. Alternatives 1 and 2 could also result in injury or behavioral impacts to individuals of some marine mammal species from underwater explosions and sonar. Injury that might occur under Alternatives 1 and 2 would be additive to injury and mortality associated with other actions. However, the relative contribution of the Proposed Action to the overall injury and mortality would be low compared to other actions. The Navy does not anticipate mortalities to marine mammals within the Study Area as a result of training or testing activities under any of the alternatives. While quantitative estimates of marine mammal mortality from other actions are not available, the total bycatch estimate (lethal takes and serious injuries) for marine mammals for 39 fisheries and 54 marine mammal stocks throughout the United States was 1,887 individual animals in 2005 (National Oceanic and Atmospheric Administration 2011c). Some of these mortalities likely occurred in the Study Area or affected individuals that used the Study Area seasonally.

Ocean noise associated with other actions (see Section 4.4.6.2.4, Ocean Noise) and acoustic stressors (underwater explosions and sonar) associated with Alternatives 1 and 2 would not result in additive behavioral impacts on marine mammals. The vast majority of impacts expected from sonar exposure and underwater detonations are behavioral in nature, temporary and comparatively short in duration, relatively infrequent, and not of the type or severity that would be expected to be additive for the small portion of the stocks and species likely to be exposed either annually or over the remaining period of the 5-year MMPA regulations or in the reasonably foreseeable future. Other future actions such as pier construction would be expected to result in MMPA Level B harassment. However in the Offshore Area, it is unlikely that these actions and underwater explosions or sonar use would overlap in time and space because these activities are dispersed and the sound sources are intermittent. Training and testing Activities in the Hood Canal may overlap with previously discussed construction events, such as the EHW-2 construction activities. The noise from these activities could combine with training and testing events to make impacts more intense, or cause additive impacts over time to the marine mammals in the area. However, most of these other actions are not compatible and therefore construction and training and testing activities are not likely to take place at the same time.

It is likely that distant shipping noise, which is more universal and continuous, and sound associated with underwater explosions and sonar would overlap in time and space. However, there is no evidence indicating that the co-occurrence of shipping noise and sounds associated with underwater explosions and sonar use would result in harmful additive impacts on marine mammals.

As discussed in Section 4.4.6.2.5 (Ocean Pollution), the potential also exists for the impacts of ocean pollution and acoustic stressors associated with Alternatives 1 and 2 to be additive or synergistic. It is possible that the response of a previously stressed animal would be more severe than the response of an unstressed animal.

In summary, based on the analysis presented in Section 3.4 (Marine Mammals), the current aggregate impacts of past and present actions and reasonably foreseeable future actions are expected to result in recoverable impacts to most marine mammal species, and significant impacts on some in the Study Area. Therefore, cumulative impacts on marine mammals would be significant without consideration of the impacts of Alternatives 1 or 2. Alternatives 1 and 2 would contribute to and have the potential to increase cumulative impacts, but the relative contribution would be low compared to other actions.

## 4.4.7 Sea Turtles

### 4.4.7.1 Impacts of Alternatives 1 and 2 That May Contribute to Cumulative Impacts

Impacts of Alternatives 1 and 2 that might contribute to cumulative impacts on sea turtles include mortality, injury, and short-term disturbance or behavioral modification. Under Alternatives 1 and 2, one sea turtle is modeled to experience TTS from the use of Sonar and Other Active Non-Impulse Acoustic Sources in the Offshore Area during training activities, and five sea turtles are modeled to experience TTS under Alternative 1 and 2 for testing activities. However, results from Navy modeling indicate no leatherback sea turtles are predicted to be exposed to impulse levels associated with the onset of mortality and gastrointestinal tract injury over any training year for explosives use in open ocean habitats. Pronounced reactions to acoustic stimuli could lead to a sea turtle expending energy and missing opportunities to forage or breed. In most cases, acoustic exposures are intermittent, allowing time to recover from an incurred energetic cost, resulting in no long-term consequence. Because model-predicted impacts are conservative and any impacts would be short-term, potential impacts are not expected to result in substantial changes to behavior, growth, survival, annual reproductive success, lifetime reproductive success (fitness), or species recruitment, and are not expected to result in population-level impacts. Under Alternative 1, and Alternative 2, exposure to vessels used in training and testing activities may cause short-term disturbance to an individual turtle because, if a turtle were struck, it could lead to injury or death. As demonstrated by scars on all species of sea turtles, they are not always able to avoid being struck; therefore, vessel strikes are a potential cause of mortality for these species. Although the likelihood of being struck is minimal, sea turtles that overlap with Navy exercises are more likely to encounter vessels. Exposure to vessels may change an individual's behavior, growth, survival, annual reproductive success, or lifetime reproductive success (fitness). Exposure to vessels is not expected to result in population-level impacts.

The Navy's Annual Model-Predicted Impacts on Leatherback Sea Turtles (*Dermochelys coriacea*) from Explosions for Training and Testing Activities under the No Action Alternative, Alternative 1, and Alternative 2 are presented in Table 3.5-7 and are predicted to be zero for TTS, PTS, Gastrointestinal Tract Injury, Slight Lung Injury, and Mortality. Leatherback sea turtles (*Dermochelys coriacea*) are found in the Study Area while other species of sea turtle were found to be extralimital species to the Study Area. Therefore the Leatherback sea turtle would be more likely to be affected, but is still not likely to be adversely affected, by the remaining stressors analyzed in Section 3.5 (Sea Turtles). The incremental contribution of these remaining stressors to cumulative impacts on sea turtles would be negligible. Therefore, these stressors are not considered further in the cumulative impacts analysis.

### 4.4.7.2 Impacts of Other Actions

The potential impacts of other actions that are relevant to the cumulative impact analysis for sea turtles include the following:

- Mortality associated with vessel strikes, bycatch in fisheries, entanglement, and stressors associated with coastal development and human use of coastal environments (e.g., beach vehicular driving, power plant entrainment [sea turtles being caught in power plant outflow water], etc.)
- Injury associated with vessel strikes, bycatch, entanglement, and underwater sound

- Disturbance, behavioral modifications, and reduced animal fitness associated with underwater noise
- Reduced animal fitness associated with ocean pollution
- Habitat loss related to coastal development

Most of the other actions and considerations retained for analysis in Section 3.5 (Sea Turtles) would include operation of marine vessels. Exceptions include the actions listed under environmental regulations and planning. Stressors associated with marine vessel operations that are of primary concern for the cumulative impacts analysis includes vessel strikes and underwater noise. Many of the actions would also result in underwater noise from sources other than vessels. Rather than discussing these stressors for individual actions, their aggregate impacts are considered below as “other environmental considerations” in maritime traffic (see Section 4.4.6.2.3, Maritime Traffic and Vessel Strikes) and ocean noise (see Section 4.4.6.2.4, Ocean Noise). Similarly, many of the actions would result in ocean pollution. The aggregate impacts of water pollution are addressed below in the ocean pollution section (see Section 4.4.6.2.5, Ocean Pollution). Bycatch is associated with commercial fishing, and the primary cause of entanglement is commercial fishing. Therefore, these stressors are discussed below in the commercial fishing section (see Section 4.4.6.3.1, Commercial Fishing).

#### 4.4.7.3 Maritime Traffic and Vessel Strikes

Maritime traffic has increased over the past 50 years, and continued increases are expected in the future. Vessel strikes have been and will continue to be a cause of sea turtle mortality and injury throughout portions of the Study Area. Though it is unlikely due to the widespread, scattered distribution of turtles and vessels at sea, strikes do occur in the Offshore Area of the Study Area where sea turtles are regularly found.

Some vessel strikes would cause temporary reversible impacts, such as diverting the turtle from its previous activity or causing minor injury. A National Research Council report qualitatively ranked the relative importance of various mortality factors for sea turtles. Vessel strikes were ranked 10th, behind leading factors of shrimp trawling and other fisheries (National Research Council 1990). Major strikes would cause permanent injury or death from bleeding, infection, or inability to feed. Apart from the severity of the physical strike, the likelihood and rate of a turtle’s recovery from a strike may be influenced by its age, reproductive state, and general condition. Much of what is written about recovery from vessel strikes is inferred from observing individuals some time after a strike. Numerous living sea turtles bear scars that appear to have been caused by propeller cuts or collisions with vessel hulls, suggesting that not all vessel strikes are lethal (Hazel et al. 2007, Lutcavage et al. 1997). Conversely, fresh wounds on some stranded animals may strongly suggest a vessel strike as the cause of death. The actual incidence of recovery versus death is not known, given available data.

#### 4.4.7.4 Ocean Noise

Potential impacts on sea turtles from ocean noise include behavioral reactions, hearing loss in the form of TTS or PTS, auditory masking, injury, and mortality. Section 3.5.3.1 (Acoustic Stressors) discusses these and other possible impacts of ocean noise on sea turtles.

#### 4.4.7.5 Ocean Pollution

Marine debris can also be a problem for sea turtles through entanglement or ingestion. Sea turtles can mistake debris for prey; one study found 37 percent of dead leatherbacks to have ingested various types of plastic (Mrosovsky et al. 2009). Other marine debris, including abandoned fishing gear and cargo nets, can entangle and drown turtles in all life stages. Oil spills are also a risk for sea turtles. Several aspects of sea turtles' life histories put them at risk, including the lack of avoidance behavior of oiled waters and indiscriminate feeding in convergence zones. Sea turtles are air breathers and come to the surface frequently to breathe. In a large oil spill, these animals may be exposed to volatile chemicals during inhalation (National Marine Fisheries Service 2010).

Oil and other chemicals on skin and body may result in skin and eye irritation, burns to mucous membranes of eyes and mouth, and increased susceptibility to infection. Inhalation of volatile organics from oil or dispersants may result in respiratory irritation, tissue injury, and pneumonia. Ingestion of oil or dispersants may result in gastrointestinal inflammation, ulcers, bleeding, diarrhea, and maldigestion. Absorption of inhaled and ingested chemicals may damage organs such as the liver or kidney, result in anemia and immune suppression, or lead to reproductive failure or death (National Marine Fisheries Service 2010).

#### 4.4.7.6 Commercial Fishing

Bycatch is one of the most serious threats to the recovery and conservation of sea turtle populations worldwide (National Research Council 1990; Wallace et al. 2010). Among fisheries that incidentally capture sea turtles, certain types of trawl, gillnet, and longline fisheries generally pose the greatest threat. One comprehensive study estimated that worldwide, 447,000 turtles are killed each year from bycatch in commercial fisheries (Wallace et al. 2010). Other fisheries that result in sea turtle bycatch in the Study Area include pelagic fisheries for swordfish, tuna, shark, and billfish; purse seine fisheries for tuna; commercial and recreational rod and reel fisheries; gillnet fisheries for shark; driftnet fisheries; and bottom longline fisheries (Jannot et al. 2011).Marine waters of the Study Area are too cold for most turtle species, and the only sea turtle species that regularly occurs during warmer periods within the Study Area is the leatherback turtle, *Dermochelys coriacea*. In a report of bycatch of marine mammals, seabirds, and sea turtles in the U.S. West Coast commercial groundfish fisheries over 2002–2009, NMFS noted that one leatherback turtle had been recorded as bycatch over the 8-year study period (Jannot et al. 2011).

#### 4.4.7.7 Coastal Development

Coastal development and increased human populations in coastal areas will continue to have impacts on sea turtles such as increased tourism, non-point source pollution and runoff, power plant entrainment, and degradation of nearshore water quality and seagrass beds (see Section 3.5, Sea Turtles, for more information on impacts on sea turtles).

#### 4.4.7.8 Cumulative Impacts on Sea Turtles

Cumulative aggregate non-Navy impacts to sea turtles are considered significant because bycatch, vessel strikes, entanglement, and other stressors associated with other non-Navy actions may result in high rates of injury and mortality that could cause population declines or inhibit recovery of ESA-listed species, such as the leatherback sea turtle (*Dermochelys coriacea*). Modeling for the Proposed Action indicated that leatherback sea turtles would have the potential to experience only TTS from Sonar and Other Active Non-Impulse Acoustic Sources, and no injuries or mortalities from underwater explosions or sonar would occur. Although potential impacts on the leatherback sea turtle from the other activities of the Navy's Proposed Action could include injury or mortality, impacts are not expected to decrease the overall fitness or result in long-term population-level impacts on any given population. Therefore, the relative contribution of Alternatives 1 and 2 to aggregate impacts to sea turtles would be minimal compared to other non-Navy actions.

The vast majority of impacts expected from ocean noise (see Section 4.4.6.2.4, Ocean Noise) and acoustic stressors (underwater explosions and sonar) associated with Alternatives 1 and 2 are behavioral in nature, temporary and comparatively short in duration, relatively infrequent, and not of the type or severity that would be expected to be additive for the small number of turtles and species likely to be exposed either annually or in the reasonably foreseeable future. Other future actions such as operation of wave and tidal energy facilities would be expected to result in similar impacts. However, it is unlikely that these actions and underwater explosions or sonar use would overlap in time and space because all of these activities are widespread and the sound sources are intermittent. Furthermore, most of these other actions are not compatible with or could interfere with training and testing activities that involve underwater explosions and sonar use. The Navy takes appropriate steps to avoid activities that interfere with or are not compatible with training and testing.

It is likely that distant shipping noise (which is more pervasive and continuous) and sound associated with underwater explosions and sonar would overlap in time and space. However, there is no evidence indicating that the co-occurrence of shipping noise and sounds associated with underwater explosions and sonar use would result in harmful additive impacts on sea turtles. Most underwater explosions and sonar activities would consist of a limited number of detonations, and exposures would not occur over long durations; therefore, there would be an opportunity for sea turtles to recover from an incurred energetic cost of any significant behavioral reactions.

The potential also exists for the impacts of ocean pollution and acoustic stressors associated with Alternatives 1 and 2 to be additive or synergistic. It is possible that the response of a previously stressed animal would be more severe than the response of an unstressed animal. However, there are no data indicating that a sea turtle affected by ocean pollution would be more susceptible to stressors associated with Alternatives 1 and 2.

In summary, cumulative impacts on sea turtles would be significant without consideration of the impacts of Alternatives 1 and 2, which would be intermittent, allowing time for recovery and resulting in no cumulative consequence. Alternatives 1 and 2 would contribute to and have the potential to increase cumulative impacts, but the relative contribution would be low compared to other actions.

## 4.4.8 BIRDS

### 4.4.8.1 Impacts of Alternatives 1 and 2 That May Contribute to Cumulative Impacts

Impacts of Alternatives 1 and 2 that might contribute to cumulative impacts on birds include mortality, injury, and short-term disturbance or behavioral modification. Mortality or injury could be caused by underwater explosions, air strikes, or vessel strikes. Noninjurious impacts of underwater explosions and sonar use would include short-term disturbance or behavioral modification. The Navy's ESA determinations presented in Table 3.6-3 are "no effect" or "may affect, not likely to adversely affect" for the remaining stressors analyzed in Section 3.6 (Birds). The incremental contribution of these remaining stressors to cumulative impacts on Birds would be negligible. Therefore, these stressors are not considered further in the cumulative impacts analysis. The impacts of Alternatives 1 and 2 considered in the cumulative impacts analysis are summarized in Table 3.6-10 (Summary of Endangered Species Act Effects Determinations for Birds, for the Preferred Alternative).

### 4.4.8.2 Impacts of Other Actions

The potential impacts of other actions that are relevant to the cumulative impact analysis for birds include the following:

- Incidental mortality from interactions with commercial and recreational fishing gear
- Predation by introduced species
- Disturbance and degradation of nesting and foraging areas by humans and domesticated animals
- Noise from construction and other human activities
- Nocturnal collisions with power lines and artificial lights
- Collisions with aircraft
- Pollution such as that from oil spills and plastic debris
- Disease, storms, and harmful algal blooms
- Long-term climate change

Most of the other actions and considerations retained for analysis in Section 3.6 (Birds) would include acoustic stressors (sonar and other underwater active acoustic sources, explosive detonations, vessel noise, and aircraft noise), physical disturbance and strikes (aircraft, vessels and in-water devices, military expended materials [non-explosive]), and ingestion (military expended materials other than ordnance). Exceptions include the actions listed under environmental regulations and planning. Many of the actions would also result in noise from sources other than vessels. Rather than discussing these stressors for individual actions, their aggregate impacts are considered below as “other environmental considerations.” Similarly, many of the actions would result in ocean pollution. The aggregate impacts of water pollution are addressed below in the ocean pollution section (Section 4.4.8.2.3, Ocean Pollution).

#### 4.4.8.2.1 Maritime Traffic, Vessel Strikes, Air Traffic, and Air Strikes

Maritime traffic has increased over the past 50 years, and continued increases are expected in the future. Vessel strikes have been and will continue to be a cause of seabird mortality and injury throughout portions of the Study Area. Though it is unlikely due to the widespread, scattered distribution of seabirds and vessels at sea, strikes do occur in the offshore area of the Study Area where seabirds are regularly found.

Some vessel strikes would cause temporary reversible impacts, such as diverting the seabird from its previous activity or causing minor injury. Major strikes would cause permanent injury or death from bleeding, infection, or inability to feed. Apart from the severity of the physical strike, the likelihood and rate of a seabird’s recovery from a strike may be influenced by its age, reproductive state, and general condition. Much of what is written about recovery from vessel strikes is inferred from observing individuals some time after a strike. Fresh wounds on some stranded animals may strongly suggest a vessel strike as the cause of death. The actual incidence of recovery versus death is not known, given available data.

Thousands of birds are struck each year by civilian and military aircraft. The Federal Aviation Administration annually reports at least 2,300 wildlife related strikes involving civilian aircraft, and the Air Force and Navy report at least an additional 3,000 strikes a year. Pilots and crew use the same airspace as large concentrations of birds, and in an effort to provide the safest conditions for flying possible, the DoD continually implements and improves its aviation programs. One program that it implements is called the Bird Aircraft Strike Hazard (BASH) prevention program. Radar is one of the most effective tools for detecting bird movements. Many types of radar are used at different scales; the Doppler capability of weather surveillance can show the direction and speed of migrating bird flocks up to 60 nm from an airfield during the day or the night (U.S. Department of Defense 2010).

In local airfield environments, mobile marine radars can track real-time movements of individual birds or flocks adjacent to and in a 6–8 mi. (9.7–12.9 km) radius of runways. The Air Force and Navy are developing and testing several "bird radars" to determine which models and configurations can best isolate specific locations of birds where aircraft operations can be modified and environmental management strategies applied to reduce air strikes. Computer models use radar data, historic weather conditions, Audubon Society Christmas Bird Count Data, bird strike reports, and other historical data to help predict spatial and temporal patterns of bird movements. One model, a predictive Bird Avoidance Model (BAM), was developed using geographic information system (GIS) technology as a key tool for analysis and correlation of bird habitat, migration, and breeding characteristics, combined with key environmental and geospatial data. Integral to a successful BASH program is a good working relationship with airport managers and the consistent reporting and identification of species involved in strike events. By identifying the wildlife species involved and the location of the strike, researchers and airport managers can better understand why the species is attracted to a particular area of the airport or training route (U.S. Department of Defense 2010).

##### 4.4.8.2.2 Noise

Potential impacts on birds from ocean noise include behavioral reactions, hearing loss in the form of TTS or PTS, auditory masking, injury, and mortality. Section 3.6.3.1 (Acoustic Stressors) discusses these and other possible impacts of ocean noise on seabirds.

##### 4.4.8.2.3 Ocean Pollution

Marine debris can also be a problem for seabirds through entanglement or ingestion. Seabirds can mistake debris for prey and 44 percent of seabirds are affected by plastic marine debris (Cousteau 2012). Other marine debris, including abandoned fishing gear and cargo nets, can entangle and drown seabirds in all life stages. Oil spills are also a risk for seabirds. Oil sticks to a bird's feathers, which causes them to mat and separate, impairing waterproofing and exposing the bird's skin to extremes in temperature. The result can be hypothermia, meaning the bird becomes cold, or hyperthermia, which results in overheating. Instinctively, birds try to get the oil off their feathers by preening, which results in the animals ingesting the oil and causes severe damage to internal organs. Many oil-soaked birds lose their buoyancy and beach themselves in their attempt to escape the cold water (International Bird Rescue 2014).

##### 4.4.8.2.4 Coastal Development

Coastal development and increased human population in coastal areas will continue to have impacts on birds related to increased tourism, non-point source pollution and runoff, habitat encroachment, and degradation of nearshore water quality and seagrass beds (see Section 3.6, Birds, for more information on Coastal Development and its impacts on birds).

#### 4.4.8.3 Cumulative Impacts on Birds

The aggregate impacts of past, present, and reasonably foreseeable future actions may have a significant effect on birds. These aggregate impacts are considered significant because air strikes, vessel strikes, entanglement and other stressors associated with other actions are expected to result in high rates of injury and mortality that could cause population declines to ESA-listed species or inhibit species recovery. Alternatives 1 and 2 could also result in injury and mortality to individual birds from underwater explosions, sonar, and strikes. Injury and mortality that might occur under Alternatives 1 and 2 would be additive to injury and mortality associated with other actions. However, the relative contribution of Alternatives 1 and 2 to the overall injury and mortality would be low compared to other actions such as bycatch, storm runoff, plastic debris, and other non-military activities.

Seabird distribution, abundance, breeding, and other behaviors are affected by cyclical environmental events such as the El Niño Southern Oscillation and Pacific Decadal Oscillation in the Pacific Ocean (Vandenbosch 2000). In the long term, climate change could be the largest threat to seabirds (North American Bird Conservation Initiative 2010). Climate change effects include changes in air and sea temperatures, precipitation, the frequency and intensity of storms, pH level of sea water, and sea level. These changes could affect overall marine productivity, which could affect the food resources, distribution, and reproductive success of seabirds (Aebischer et al. 1990; Congdon et al. 2007). The projection for global sea levels rise from 2090 to 2099 is up to 1 ft. (0.3 m) relative to 1980 to 1999 levels (Church and White 2006; Solomon et al. 2007). As a result, seabird nesting colonies that occur along sections of coastlines undergoing sea level rise may experience a loss of nesting habitat (Congdon et al. 2007; Gilman and Ellison 2009; Gilman et al. 2008; Hitipeuw et al. 2007; Mullane and Suzuki 1997).

Ocean noise associated with other actions and acoustic stressors (underwater explosions and sonar) associated with Alternatives 1 and 2 could also result in additive behavioral impacts on birds. Other future actions, such as construction of wharfs, would be expected to result in similar impacts. These actions and underwater explosions or sonar use may overlap in time and space; however, all of these activities are widespread, and the sound sources are intermittent. Furthermore, most of these other actions are not compatible with or could interfere with training and testing activities that involve underwater explosions and sonar use. The Navy takes appropriate steps to avoid activities that interfere with or are not compatible with training and testing.

It is likely that distant shipping and aircraft noise (which is more pervasive and continuous) and sound associated with underwater explosions and sonar would overlap in time and space. However, there is no evidence indicating that the co-occurrence of shipping and aircraft noise, and sounds associated with underwater explosions and sonar use, would result in harmful additive impacts on birds.

The potential also exists for the impacts of ocean pollution and acoustic stressors associated with Alternatives 1 and 2 to be additive or synergistic. It is possible that the response of a previously stressed animal would be more severe than the response of an unstressed animal. However, there are no data indicating that a seabird affected by ocean pollution would be more susceptible to stressors associated with Alternatives 1 and 2.

In summary, based upon the analysis in Section 3.6 (Birds), and the reasons summarized above, the incremental contribution of Alternatives 1 and 2 to cumulative impacts to bird populations would be low. Therefore, further analysis of cumulative impacts on birds is not warranted.

### 4.4.9 MARINE VEGETATION

The analysis presented in Section 3.7 (Marine Vegetation) indicates that marine vegetation could be affected by acoustic stressors (underwater explosions) and physical stressors (interactions with vessels and in-water devices, military expended materials, or seafloor devices). Potential impacts include localized disturbance and mortality. Recovery would occur quickly, and population level impacts are not anticipated. The impacts of Alternatives 1 or 2 would be cumulative with other actions that cause disturbance and mortality of marine vegetation. However, the incremental contribution of Alternatives 1 and 2 to cumulative impacts would be low for the following reasons:

- Most of the proposed activities would occur in areas where seagrasses and other attached marine vegetation do not grow.
- Impacts would be localized, recovery would occur quickly, and no population level impacts would be expected.
- Alternatives 1 and 2 would not result in impacts that have been historically significant to marine vegetation. For example, Alternatives 1 and 2 would not increase nutrient loading, which can cause algal blooms, decrease light penetration, and impact photosynthesis of seagrasses. Furthermore, Alternatives 1 and 2 would not result in long-term or widespread changes in environmental conditions, such as turbidity, salinity, pH, or water temperature that could impact marine vegetation.
- The Proposed Action would have no effect on ESA-listed species of marine vegetation and would not result in the destruction or adverse modification of critical habitat.

Based on the analysis presented in Section 3.7 (Marine Vegetation) and the reasons summarized above, the incremental contribution of Alternatives 1 and 2 to cumulative impacts would be low. Further analysis of cumulative impacts on marine vegetation is not warranted.

### 4.4.10 Marine Invertebrates

The analysis presented in Section 3.8 (Marine Invertebrates) indicates that marine invertebrates could be affected by acoustic stressors (tactical acoustic sonar, other acoustic devices, pile driving, underwater explosions, weapons firing noise, aircraft noise, vessel noise), electromagnetic stressors, physical disturbance or strikes (vessels and in-water devices, military expended materials, seafloor devices), entanglement (cables and wires, parachutes), and ingestion (military expended materials). Potential impacts include short-term behavioral and physiological responses. Some stressors could also result in injury or mortality to a relatively small number of individuals, but not to ESA-listed corals. No population-level impacts are anticipated. Stressors from Alternatives 1 and 2 would have no effect or would be not likely to adversely affect ESA-listed corals.

Based upon the analysis in Section 3.8 (Marine Invertebrates), the invertebrate mortality impacts of Alternatives 1 and 2 would be cumulative with other actions that cause mortality (e.g., commercial fishing). However, the incremental contribution of Alternatives 1 and 2 to cumulative impacts would be negligible. Therefore, further analysis of cumulative impacts on marine invertebrates is not warranted.

### 4.4.11 Fish

#### 4.4.11.1 Impacts of Alternatives 1 and 2 That May Contribute to Cumulative Impacts

Based on the analysis presented in Section 3.9 (Fish), impacts of Alternatives 1 and 2 that might contribute to cumulative impacts on fish include direct injury, hearing loss, auditory masking, and physiological stress and behavior reactions. Mortality or injury could be caused by underwater explosions or vessel strikes; however, impacts are not expected to decrease the overall fitness of any given population. The remaining stressors analyzed in Section 3.9 (Fish) are not expected to result in mortality. The incremental contribution of these remaining stressors to cumulative impacts on fish would be negligible. These stressors are discussed in Sections 3.9.3.1 through 3.9.3.6. The impacts of Alternatives 1 and 2 considered in the cumulative impacts analysis are summarized in Section 3.9 (Fish).

#### 4.4.11.2 Impacts of Other Actions

##### 4.4.11.2.1 Overview

The potential impacts of other actions that are relevant to the cumulative impact analysis for fish include the following:

- Mortality associated with vessel strikes, commercial fisheries, bycatch, and entanglement in fishing and other gear
- Injury associated with vessel strikes, bycatch, entanglement, and underwater sound
- Disturbance, behavioral modifications, and reduced animal fitness associated with underwater noise
- Reduced animal fitness associated with water pollution

Most of the other actions and considerations retained for analysis in Table 4.3-1 would include operation of marine vessels. Exceptions include the actions listed under environmental regulations and permitting. Stressors associated with marine vessel operations that are of primary concern for the cumulative impacts analysis includes vessel strikes and underwater noise. Many of the actions would also result in underwater noise from sources other than vessels, seismic surveys, and construction activities. Rather than discussing these stressors for individual actions, their aggregate impacts are considered below as “other environmental considerations” in the maritime traffic and ocean noise subsections. Similarly, many of the actions would result in water pollution. The aggregate impacts of water pollution are addressed in the ocean pollution section (see Section 4.4.6.2.5). Commercial fishing and overfishing is the primary cause of stress and entanglement. Therefore, these stressors are discussed in the commercial fishing section (see Section 4.4.6.3.1).

##### 4.4.11.2.2 Surveillance Towed Array Sensor System Low Frequency Active Sonar

Potential impacts on fish from Surveillance Towed Array Sensor System Low Frequency Active Sonar operations include (1) nonauditory injury, (2) permanent loss of hearing, (3) temporary loss of hearing, (4) behavioral change, and (5) masking.

Studies have examined the effects of the sound exposures from Surveillance Towed Array Sensor System Low-Frequency Active sonar on fish hearing (Kane et al. 2010; Popper et al. 2007). Hearing was measured both immediately post exposure and for several days thereafter. Maximum received sound pressure levels were 193 dB referenced to 1 micropascal for 324 or 628 seconds. Catfish and some specimens of rainbow trout showed 10–20 dB of hearing loss immediately after exposure to the low-frequency active sonar when compared to baseline and control animals; however, another group of rainbow trout showed no hearing loss. Recovery in trout took at least 48 hours, but studies were not completed. The different results between rainbow trout groups is difficult to understand, but may be due to developmental or genetic differences in the various groups of fish. Catfish hearing returned to, or close to, normal within about 24 hours after exposure to low-frequency active sonar. Furthermore, examination of the inner ears of the fish during necropsy (note: maximum time fish were held post exposure before sacrifice was 96 hours) revealed no differences from the control groups in ciliary bundles or other features indicative of hearing loss (Kane et al. 2010).

The potential effects from Surveillance Towed Array Sensor System Low Frequency Active Sonar operations on any stock of fish from injury (nonauditory or permanent loss of hearing) are considered negligible, and the potential effects on the stock of any fish from temporary loss of hearing or behavioral change (significant change in a biologically important behavior) are considered minimal. Any auditory masking in fish due to low-frequency active sonar signal transmissions is not expected to be severe and would be temporary. The operation of Surveillance Towed Array Sensor System Low Frequency Active Sonar with monitoring and mitigation could result in temporary or permanent hearing loss, or could not affect them at all depending on the species and proximity to the Sonar.

#### 4.4.11.2.3 Maritime Traffic and Vessel Strikes

Vessels and in-water devices do not normally collide with adult fish, most of which can detect and avoid them. One study on fishes' behavioral responses to vessels showed that most adults exhibit avoidance responses to engine noise, sonar, depth finders, and fish finders, reducing the potential for vessel strikes (Jørgensen et al. 2004). Misund (1997) found that fishes ahead of a ship that showed avoidance reactions did so at ranges of 160–490 ft. (48.8–149.4 m). When the vessel passed over them, some fishes responded with sudden escape responses that included lateral avoidance or downward compression of the school. Conversely, Rostad et al. (2006) observed that some fishes are attracted to different types of vessels (e.g., research vessels, commercial vessels) of varying sizes, noise levels, and habitat locations. Fish behavior in the vicinity of a vessel is therefore quite variable, depending on the type of fish, its life history stage, behavior, time of day, and the sound propagation characteristics of the water (Schwartz 1985). Early life stages of most fishes could be displaced by vessels and not struck in the same manner as adults of larger species. However, a vessel's propeller movement or propeller wash could entrain early life stages. The low-frequency sounds of large vessels or accelerating small vessels caused avoidance responses among herring, but avoidance ended within 10 seconds after the vessel departed (Chapman and Hawkins 1973). Because a towed in-water device is continuously moving, most fishes are expected to move away from it or to follow behind it, in a manner similar to their responses to a vessel. When the device is removed, most fishes would simply move to another area.

#### 4.4.11.2.4 Ocean Noise

Underwater noise is a threat to marine fishes. However, the physiological and behavioral responses of marine fishes to underwater noise have been investigated for only a limited number of species (Codarin et al. 2009, Popper 2003, Slabbekoorn et al. 2010, Wright et al. 2010, Popper and Hastings 2009a, b). In addition to vessels, other sources of underwater noise include seismic activity (Popper and Hastings 2009a). Information on fish hearing is provided in Section 3.9.2.1 (Hearing and Vocalization), with further discussion in Section 3.9.3.1 (Acoustic Stressors).

#### 4.4.11.2.5 Ocean Pollution

Pollution primarily impacts coastal fishes that occur near the sources of pollution. However, global oceanic circulation patterns result in a considerable amount of marine pollutants and debris scattered throughout the open ocean (Crain et al. 2009). Pollutants in the marine environment that may impact marine fishes include organic pollutants (e.g., pesticides, herbicides, polycyclic aromatic hydrocarbons, flame retardants, and oil), inorganic pollutants (e.g., heavy metals), and debris (e.g., plastics and wastes from dumping at sea) (Pews Oceans Commission 2003). High chemical pollutant levels in marine fishes may cause behavioral changes, physiological changes, or genetic damage in some species (Goncalves et al. 2008, Moore 2008, Pews Oceans Commission 2003, van der Oost et al. 2003). Bioaccumulation of pollutants (e.g., metals and organic pollutants) is also a concern, particularly in terms of human health, because people consume top predators with high pollutant loads. Bioaccumulation is the net buildup of substances (e.g., chemicals or metals) in an organism directly from contaminated water or sediment through the gills or skin, from ingesting food containing the substance, or from ingestion of the substance itself (Newman 1998, Moore 2008). Entanglement in abandoned commercial and recreational fishing gear has also caused pollution-related declines for some marine fishes; some species are more susceptible to entanglement by marine debris than others (Musick et al. 2000).

#### 4.4.11.3 Coastal Development

Coastal development and increased human population activities in coastal areas, such as increased tourism, non-point source pollution and runoff, power plant entrainment, and degradation of nearshore water quality and seagrass beds, will continue to have impacts on fish (see Section 3.9, Fish, for more information on impacts on fish).

##### 4.4.11.3.1 Commercial Fishing

Overfishing is the most serious threat that has led to the listing of ESA-protected marine species, with habitat loss also contributing to extinction risk (Crain et al. 2009, Kappel 2005, Cheung et al. 2007, Dulvy et al. 2003, Jonsson et al. 1999, Limburg and Waldman 2009, Musick et al. 2000). Approximately 17 percent of the United States-managed fish stocks are overfished. However, none of the U.S.-managed fish stock off the U.S. West Coast are subject to overfishing, so the 17 percent that are overfished occur elsewhere in the U.S. (National Marine Fisheries Service 2013). Overfishing occurs when fishes are harvested in quantities above a sustainable level. Overfishing impacts targeted species, and non-targeted species (or "bycatch" species) that often are prey for other fishes and marine organisms. Bycatch may also include seabirds, turtles, and marine mammals. Additionally, in recent decades the marine fishes being targeted have changed such that when higher-level predators become scarce, different organisms on the food chain are subsequently targeted; this has negative implications for entire marine food webs (Crain et al. 2009, Pauly and Palomares 2005). Other factors, such as fisheries-induced evolution and intrinsic vulnerability to overfishing, have been shown to reduce the abundance of some populations (Kauparinen and Merila 2007). Fisheries-induced evolution describes a change in genetic composition of the population that results from intense fishing pressure, such as a reduction in the overall size and growth rates of fish in a population. Intrinsic vulnerability describes certain life history traits (e.g., large body size, late maturity age, low growth rate) that result in a species being more susceptible to overfishing than others (Cheung et al. 2007).

Although these factors are a concern for fisheries worldwide, fisheries off the U.S. West Coast are managed conservatively, in keeping with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act. Fish stocks within the Study Area that were historically overfished have recovered or are recovering from their overfished status and contributing to the overall trend of increasing abundance of U.S. marine fish stocks (National Marine Fisheries Service 2013, National Marine Fisheries Service 2014b).

#### 4.4.11.4 Cumulative Impacts on Fish

The aggregate impacts of past, present, and reasonably foreseeable future actions may have a significant impact to fish. These aggregate impacts are considered significant because overfishing, vessel strikes, entanglement and other stressors associated with other actions are expected to result in high rates of injury and mortality that could cause population declines to ESA-listed species or inhibit species recovery. Alternatives 1 and 2 could also result in injury and mortality to individual fish from underwater explosions, sonar, and strikes. Injury and mortality that might occur under Alternatives 1 and 2 would be additive to injury and mortality associated with other actions. However, the relative contribution of Alternatives 1 and 2 to the overall injury and mortality would be low compared to other actions.

It is likely that distant shipping and aircraft noise (which is more pervasive and continuous) and sound associated with underwater explosions and sonar would overlap in time and space. However, there is no evidence indicating that the co-occurrence of shipping and aircraft noise, and sounds associated with underwater explosions and sonar use would result in harmful additive impacts on fish.

The potential also exists for the impacts of ocean pollution and acoustic stressors associated with Alternatives 1 and 2 to be additive or synergistic. It is possible that the response of a previously stressed animal would be more severe than the response of an unstressed animal. However, there are no data indicating that a fish affected by ocean pollution would be more susceptible to stressors associated with Alternatives 1 and 2.

In summary, based upon the analysis in Section 3.9 (Fish), the current aggregate impacts of past, present, and reasonably foreseeable future actions may have a significant effect, but are not likely to adversely affect fish. Therefore, cumulative impacts on fish would be significant without consideration of the impacts of Alternatives 1 and 2. Alternatives 1 and 2 would contribute to, and increase, cumulative impacts, but the relative contribution would be low compared to other actions. Further analysis of cumulative impacts on fish is not warranted.

## 4.4.12 CULTURAL RESOURCES

### 4.4.12.1 Impacts of Alternatives 1 and 2 That May Contribute to Cumulative Impacts

As discussed in Section 3.10 (Cultural Resources), Alternatives 1 and 2 could result in impacts on submerged prehistoric sites and previously unidentified submerged historic resources if certain training and testing activities are conducted where these resources occur. Stressors that could impact cultural resources include underwater explosions on or near the bottom, use of towed-in-water devices, and use of ocean bottom deployed devices. Because cultural resources are considered nonrenewable resources, these impacts would be considered long-term and permanent.

The Navy routinely avoids locations of known obstructions to prevent damage to sensitive Navy equipment and vessels and to ensure the accuracy of training and testing exercises. Known obstructions include some historic shipwrecks; however, it is unknown if all submerged obstructions, historic shipwrecks, or other cultural resources have yet been discovered in the Study Area.

### 4.4.12.2 Impacts of Other Actions

With a few exceptions, most of the other actions retained for cumulative impacts analysis (see Table 4.3-1) would involve some form of disturbance to the ocean bottom. Exceptions include environmental regulations and planning actions, ocean pollution, and most forms of ocean noise. Actions that would disturb the ocean bottom could impact submerged cultural resources. For example, ocean bottom disturbance would occur from construction related activities such as ship anchoring, and installation of wind turbine piers. Any physical disturbance on the continental shelf and ocean floor could inadvertently damage or destroy submerged prehistoric sites and submerged historic resources.

The other actions that result in ocean bottom disturbance require some form of federal authorization or permitting. Therefore, requirements of the National Historic Preservation Act (NHPA) apply to actions in territorial waters. Federal agency procedures have been implemented to identify cultural resources, avoid impacts, and mitigate if impacts cannot be avoided. For example, the Bureau of Ocean Energy Management, Regulation and Enforcement has procedures in place to identify the probability for the presence of submerged historic resources and the locations submerged prehistoric sites shoreward from the 148 ft. (45.1 m) isobath, and for project redesign and relocation to avoid identified resources (Minerals Management Service 2007). Nonetheless, inadvertent impacts could occur if unidentified submerged cultural resources are present.

#### 4.4.12.3 Cumulative Impacts on Cultural Resources

Impacts on submerged cultural resources from other actions would typically be avoided or mitigated through implementing federal agency programs. However, impacts could occur if avoidance or mitigation measures are not implemented or if inadvertent disturbance or destruction of unidentified resources occurs. Disturbance or destruction of submerged prehistoric sites would diminish the overall archaeological record and decrease the potential for meaningful research on Paleomarine traditions (6,500–5,000 Before Present) and early explorers of the Northwest coast (1700s–1800s) occupations. Disturbance or destruction of submerged historic sites, including shipwrecks, would diminish the overall record for these resources and decrease the potential for meaningful research on these resources. Based upon the analysis in Section 3.10 (Cultural Resources), when considered with other actions, Alternatives 1 and 2 would contribute to and increase the cumulative impacts on submerged prehistoric and historic resources. Further analysis of cumulative impacts on cultural resources is not warranted.

Olympic National Park was accepted as a World Heritage Site in 1981. Because most of the Olympic National Park is designated as wilderness, the natural soundscape is an important element and prevalent in much of the park. The National Park Service regards natural and cultural sounds as part of a web of resources that must be protected. Threats to natural soundscape come from development and other human activities inside and outside the park (National Park Service 2008). Based on the analysis presented in Appendix K (World Heritage Site Analysis), noise impacts associated with military aircraft overflight activities within the park would be minor; when considered with other actions, the contribution of Alternatives 1 and 2 to these effects would be very small. Alternatives 1 and 2 would not result in major adverse impacts (as defined in Appendix K, World Heritage Site Analysis) on key resources or the value of the Olympic National Park.

### 4.4.13 American Indian and Alaska Native Traditional Resources

#### 4.4.13.1 Impacts of Alternatives 1 and 2 That May Contribute to Cumulative Impacts

As discussed in Section 3.11 (American Indian and Alaska Native Traditional Resources), Alternatives 1 and 2 could result in impacts on American Indian and Alaska Native protected tribal resources and other traditional resources, because impeding access to areas of co-use such as usual and accustomed fishing grounds, even of short duration, may prevent fishing in limited seasons. Stressors that could impact American Indian and Alaska Native Traditional resources include impeding access to usual and accustomed fishing grounds or traditional fishing areas, changes in the availability of marine resources or habitat, and loss of fishing gear.

The Navy has established protective measures to reduce potential effects on cultural and natural resources from training and testing exercises. While most of these protective measures focus on protection of the natural environment, they also benefit culturally valued natural resources, such as salmon and shellfish. Some of the protective measures include avoidance of known submerged obstructions, use of inert ordnance and passive tracking and acoustical tools, and avoidance of sensitive habitats to ensure that significant concentrations of sea life are not present.

The Navy strives to maintain safety and accommodate, to the extent possible, access to tribes’ usual and accustomed areas. The Navy provides the U.S. Coast Guard with information on the locations of potentially hazardous training or testing activities at sea so the Coast Guard can issue Notices to Mariners. In some instances, the Navy has directly notified affected American Indian tribes and nations to ensure that their activities in usual and accustomed fishing areas can avoid any potentially hazardous training or testing locations at sea. The changes in accessibility to human activities in the ocean or inland waterways would be an impact if they directly contributed to loss of income, revenue, or employment, or if cultural knowledge is lost because tribal members cannot teach their children and grandchildren to fish in areas where they were taught by their ancestors.

#### Impacts of Other Actions

With a few exceptions, most of the other actions retained for cumulative impacts analysis (see Table 4.3-1) would involve some form of disturbance to the ocean bottom. Exceptions include environmental regulations and planning actions, ocean pollution, and most forms of ocean noise. Actions that would disturb the ocean bottom could impact submerged American Indian and Alaska Native Traditional resources. For example, ocean bottom disturbance would occur from construction-related activities such as ship anchoring and installation of wind turbines. Any physical disturbance on the continental shelf and ocean floor (including the Inland Waters and the Western Behm Canal) could inadvertently damage or destroy submerged fishing gear, or areas of traditional or cultural significance.

The construction of the Gateway Pacific Terminal, along with other terminals outside of the Study Area, has the potential to impact American Indian Traditional Resources. The siting of the wharf and trestle at the proposed Gateway Pacific Terminal and the potential increased anchorage use by bulkers would interfere with Lummi access to fishing sites (Environmental Research Consulting, Inc. and Northern Economies, Inc. 2014). The Juan de Fuca East subarea would see the greatest increase in disruption due to the time and area occupied by Gateway Pacific Terminal vessels at anchor and bunkering activity. Furthermore, the increased vessel traffic has the potential for loss of Lummi fishing gear (Environmental Research Consulting, Inc. and Northern Economies, Inc. 2014).

The other actions that result in ocean bottom disturbance require some form of federal authorization or permitting. Therefore, requirements of the NHPA apply to actions in territorial waters. Federal agency procedures have been implemented to identify American Indian and Alaska Native Traditional resources, avoid impacts, and mitigate if impacts cannot be avoided. For example, traditional resources along with archaeological and architectural resources are protected by various laws and their implementing regulations: the NHPA of 1966 as amended in 2006, the American Indian Religious Freedom Act of 1978, and the Native American Graves Protection and Repatriation Act of 1990. Within state territorial waters (0–3 nm), the NHPA is the guiding mandate; within U.S. territorial waters (0–12 nm), the NEPA is the primary mandate. Areas beyond 12 nm in the open ocean are beyond the jurisdiction of NEPA, but they are covered by EO 12114. Nonetheless, inadvertent impacts could occur if unidentified submerged tribal or traditional resources are present.

### 4.4.13.2 Cumulative Impacts on American Indian and Alaska Native Traditional Resources

The success of American Indian tribal fisheries has been impacted by long-term changes in the environment that can reduce fish stocks due to impacted water quality, reduced habitat—especially spawning habitat for salmon runs, and increased commercial harvests. The Navy has an active consultation process in place and will continue to consult on a government-to-government basis with potentially affected American Indian tribes and nations regarding Navy activities that may have the potential to impact protected tribal treaty rights and resources. The Navy's other measures to prevent pollution from its own operations and sustain or improve habitat value help to offset some of the cumulative impacts. Pursuant to the Navy's government-to-government consultation with federally-recognized American Indian and Alaska Native tribes, agreements (both formal and informal) regarding protocols or tribal mitigations may be developed to reduce or eliminate impacts on protected tribal treaty reserved rights and protected tribal resources.

### 4.4.14 Socioeconomics

#### 4.4.14.1 Impacts of Alternatives 1 and 2 That Might Contribute to Cumulative Impacts

As discussed in Section 3.12 (Socioeconomic Resources), Alternatives 1 and 2 could contribute to impacts on accessibility to areas within the Study Area, physical disturbances and interactions, aircraft and vessel noise, and secondary impacts resulting from effects on marine species populations. However, impacts on socioeconomic resources are expected to be minor. Inaccessibility to areas of co-use would be localized and temporary. Direct physical interaction between the public and the Navy's proposed activities would continue to be unlikely. Aircraft and vessel noise impacts would continue to be negligible because vessel activities that produce significant noise are conducted well out to sea, far from people; aircraft activities would continue to occur either at sea far from land or, when overland, consistent with flights conducted for the past 40 years; the number of aircraft activities would be similar to those currently conducted; and proposed aircraft would continue to occur at high altitudes that result in reduced noise levels on land. Impacts on marine species critical to socioeconomic activities such as fishing, geoduck, and other marine invertebrate gathering, and tourism activities such as whale watching, are not expected. Further, there are no disproportionately high impacts or adverse effects on any low-income populations or minority populations. Cumulative impacts on socioeconomic resources in the Study Area are not expected to occur as a result of the proposed action.

#### 4.4.14.2 Impacts of Other Actions

Portions of the Study Area are heavily traveled by commercial, recreational, and government marine vessels, with several commercial ports occurring in or near the Study Area, including the seventh and 11th ranked U.S. ports for total cargo imported and exported in 2011 (Seattle and Tacoma respectively). From September 2014 to August 2015, construction at the Bremerton ferry terminal may result in the incidental taking by acoustical harassment (Level B take) of marine mammals. However, the improved, maintained, and repaired terminals have the potential to benefit both tourism activities and commercial shipping by improving accessibility to transportation and marine resources. A proposed Master Planned Resort in Jefferson County is located south of Brinnon, Washington, on the Black Point Peninsula, on the western shore of the Hood Canal. This resort would include an 18-hole golf course, 890 residential units, and commercial space with related resort amenities. This would increase tourism in that County and be beneficial to socioeconomic resources through the creation of jobs, business growth, and increased housing.

##### 4.4.14.2.1 Other Military Actions

The Hood Canal Conservation Easement will prevent new large-scale industrial or commercial development in the footprint of the easement, possibly negatively impacting socioeconomic development in the footprint of the easement. Beneficial effects of the easement would be the conservation of marine species for tourism and recreation locations. The Hood Canal In-Lieu Fee Mitigation Program has had a positive impact on socioeconomic resources with Navy projects in 2012 and 2013. The In-Lieu Fee Mitigation Program has beneficial impacts on socioeconomic resources by being a source of income for the local economy.

Movement of watercraft in the training area for the Swimmer Interdiction Security System at Naval Base Kitsap Bangor in the Puget Sound could possibly disturb listed marine mammals and fish during activities; however, disturbances are unlikely due to the short lengths of the trainings and low disturbance of small training watercraft relative to other watercraft disturbances in the vicinity.

Other military projects include construction of facilities for Force Protection and Weapons Security Measures along the Waterfront Restricted Area of Hood Canal. The construction of the two facilities and paved access road with minimal vehicle traffic would not contribute to overall on-land or water traffic and would not negatively impact socioeconomic resources. Other construction projects in the Study Area include the Explosives Handling Wharf 1 Maintenance, the Electromagnetic Ranging System (which is on hold), Breakwater Construction and Pier Demolition at NASWI in Crescent Harbor, Pacific Northwest EW fixed emitter at Naval Station Everett Transit Protection Systems Facilities at Naval Base Kitsap Bangor, and finally, the EHW-2 at Naval Base Kitsap Bangor. Mitigation measures to offset the cumulative effects of these construction projects are in place.

Mitigation measures, including marine mammal mitigation zones, are in place to prevent Level A and reduce Level B harassment to marine mammals. Protective mitigation measures for marine mammals during the Explosives Handling Wharf 2 activity include purchase of aquatic habitat credits from the Hood Canal In-Lieu Fee Program, use of bubble curtains and equipment procedures to reduce species impacts from pile driving noise, marine species monitoring and reporting, revegetation of temporarily disturbed upland areas, public and mariner notification of upcoming construction activities, and specific mitigation actions to compensate for impacts to tribal treaty resources. The mitigation measures in place for the protection of marine mammals and tribal treaty resources as a result of the EHW-2 activity, will also have a positive impact on socioeconomic resources in the Study Area.

Currently the Navy is proposing to continue and increase the existing VAQ operations at NASWI. This increase would add up to 36 aircraft to support expanded DoD missions to identify, track, and target in a complex EW environment. This action would potentially result in additional personnel at and relocate family members to NASWI and the surrounding community. Both adverse and beneficial socioeconomic effects would occur. Potential adverse effects relevant to resources analyzed in Section 3.12 (Socioeconomics) of the NWTT EIS/OEIS would include increased demand on public services, including infrastructure, access to recreational areas (e.g., fishing sites), competition for tourism-related activities (e.g., whale watching), and potential competition between recreational and subsistence fishers at popular nearshore sites. Beneficial effects of the population increase would be increased demand and potentially greater revenue for tourism-related and commercial fishing businesses as well as local retail business, which could lead to an increase in employment opportunities. Over time, economic adjustments to meet the additional demands of a larger population on Whidbey Island would be expected, as well as mitigation measures that minimize impacts from construction and increased vessel movement.

Other military actions in the area occur in W-93 and W-570 special use airspace in the Offshore Area by the Oregon Air National Guard. Flights in these areas are similar to those conducted by the Navy and described in Chapter 2 (Description of Proposed Action and Alternatives) and should not impact air transportation or commercial air traffic, and therefore should not have a cumulative impact on Socioeconomic Resources.

#### 4.4.14.3 Cumulative Impacts on Socioeconomic Resources

The analysis in Section 3.12 (Socioeconomic Resources) indicates that the impacts of Alternatives 1 and 2 on socioeconomic resources would be negligible. Alternatives 1 and 2 are not expected to contribute to cumulative socioeconomic impacts. Cumulative effects on socioeconomic resources may have intermittent and short-term impacts to accessibility to areas within the Study Area, physical disturbances and interactions, airborne acoustics, and secondary impacts (e.g., to tourism) resulting from effects on marine species populations, but they are not expected to have long-term negative impacts on these resources or the economies of Northern California, Oregon, Washington, or Alaska.

### 4.4.15 PUBLIC HEALTH AND SAFETY

The analysis presented in Section 3.13 (Public Health and Safety) indicates that the impacts of Alternatives 1 and 2 on public health and safety would be negligible. Alternatives 1 and 2 are not expected to contribute incrementally to cumulative health and safety impacts. Therefore, further analysis of cumulative impacts on public health and safety is not warranted.

## 4.5 SUMMARY OF CUMULATIVE IMPACTS

American Indian and Alaska Native traditional use areas and subsistence resources, marine mammals, sea turtles, birds, and fish are the primary resources of concern for cumulative impacts analysis:

- Impacts on American Indian traditional resources could occur during training and testing activities due to short-term reduced access to tribal usual and accustomed fishing grounds in the Inland Waters. Impacts from training and testing activities would not alter fish and other marine species population levels or the availability of these resources for tribal use. Loss or damage to American Indian fishing equipment from vessel and in-water device strikes, and inadvertent snagging of military expended materials, could occur in the Offshore Area and in the Inland Waters, reducing fishing opportunities while fishing equipment is being replaced or repaired and increasing the amount of effort and resources required to catch the same amount of fish.
- Due to past and present activities, several marine mammal species, all sea turtles, one bird, and multiple fish species occurring in the Study Area are ESA-listed.
- These resources would be impacted by multiple present and reasonably foreseeable future actions.
- Explosive detonations and vessel strikes under the No Action Alternative, Alternative 1, and Alternative 2 have the potential to disturb, injure, or kill sea turtles, birds, and fish.
- The use of sonar and other non-impulsive sound sources under the No Action Alternative, Alternative 1, and Alternative 2 has the potential to disturb or injure marine mammals and sea turtles.

The aggregate impacts of past, present, and other reasonably foreseeable future actions are expected to result in significant impacts on American Indian and Alaska Native traditional use areas and subsistence resources, some marine mammals, Leatherback sea turtles (*Dermochelys coriacea*), some birds, some fish species, and socioeconomic resources in the Study Area. The No Action Alternative, Alternative 1, or Alternative 2 would contribute to cumulative impacts, but the relative contribution would be low compared to other actions. Compared to the potential mortality, stranding, and injury resulting from commercial ship strikes and bycatch, entanglement, ocean pollution and other human causes, the potential for mortality, strandings or injury resulting from Navy training and testing activities is estimated to be orders of magnitude lower (tens of animals versus hundreds of thousands of animals) (Culik 2004, International Council for the Exploration of the Sea 2005, Read et al. 2006).

The analysis presented in this chapter and Chapter 3 (Affected Environment and Environmental Consequences) indicates that the incremental contribution of the No Action Alternative, Alternative 1, or Alternative 2 to cumulative impacts on sediments and water quality, air quality (greenhouse gas emissions), marine habitats, marine vegetation, marine invertebrates, and public health and safety would be negligible. When considered with other actions, the No Action Alternative, Alternative 1, or Alternative 2 might contribute to cumulative impacts on submerged prehistoric and historic resources, if such resources are present in areas where bottom-disturbing training and testing activities take place.

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# 5 Standard Operating Procedures, Mitigation, and Monitoring

# TABLE OF CONTENTS

## LIST OF TABLES



## LIST OF FIGURES

# 5 STANDARD OPERATING PROCEDURES, MITIGATION, AND MONITORING

This chapter describes the United States (U.S.) Department of the Navy (Navy) standard operating procedures, mitigation measures, and marine species monitoring and reporting efforts. Standard operating procedures are essential to maintaining safety and mission success, and in many cases have the added benefit of reducing potential environmental impacts. Mitigation measures are designed to reduce or avoid potential impacts on marine resources. Marine species monitoring efforts are designed to track compliance with take authorizations, evaluate the effectiveness of mitigation measures, and improve understanding of the impacts of training and testing activities on marine resources within the Northwest Training and Testing (NWTT) Study Area (Study Area).

## 5.1 STANDARD OPERATING PROCEDURES

Effective training, maintenance, research, development, testing, and evaluation (hereafter referred to collectively as the Proposed Action) require that participants utilize their sensors and weapon systems to their optimum capabilities as required by the activity objectives. The Navy currently employs standard practices to provide for the safety of personnel and equipment, including vessels and aircraft, as well as the success of the training and testing activities. For the purpose of this document, standard practices are referred to as standard operating procedures. Because of their importance for maintaining safety and mission success, standard operating procedures have been considered as part of the Proposed Action under each alternative, and therefore are included in the Chapter 3 (Affected Environment and Environmental Consequences) environmental analyses for each resource.

Navy standard operating procedures have been developed and refined over years of experience, and are broadcast via numerous naval instructions and manuals, including the following sources:

- Navy Range User's Manuals
- Ship, Submarine and Aircraft Safety Manuals
- Ship, Submarine and Aircraft Standard Operating Manuals
- Fleet Area Control and Surveillance Facility Range Operating Instructions
- Fleet Exercise Publications and Instructions
- Naval Sea Systems Command Test Range Safety and Standard Operating Instructions
- Navy Instrumented Range Operating Procedures
- Research, Development, Test and Evaluation Plans
- Naval Gunfire Safety Instructions
- Navy Planned Maintenance System Instructions and Requirements
- Federal Aviation Administration Regulations

In many cases, there are incidental environmental, socioeconomic, and cultural benefits resulting from standard operating procedures. Standard operating procedures serve the primary purpose of providing for safety and mission success, and are implemented regardless of their secondary benefits. This is what distinguishes standard operating procedures, which are a component of the Proposed Action, from mitigation measures, which are designed entirely for the purpose of reducing environmental impacts resulting from the Proposed Action. Because standard operating procedures are crucial to safety and mission success, the Navy will not modify them as a way to further reduce effects to environmental resources. Rather, mitigation measures will be used as the tool for avoiding and reducing potential environmental impacts. Standard operating procedures are internal documents and are under the cognizance of the individual commands. Standard operating procedures that are recognized as providing a potential secondary benefit are provided below.

### 5.1.1 General Safety

In the development of standard operating procedures and measures to protect the safety of its people, the Navy follows the guidance set forth in the Chief of Naval Operations Instructions (OPNAVINST) 5100.19 (Navy Safety and Occupational Health Program Manual for Forces Afloat) and 5100.23 (Navy Safety and Occupational Health Program Manual). These instructions provide minimum requirements under which organizations may develop procedures that delineate additional organizational specific requirements. These two instructions include policies for public safety; laser procedures; weapons firing procedures; and unmanned aircraft, surface, and underwater vehicle activities.

Unless otherwise noted, the following general procedures and practices are paralleled between the training community and the testing community. Some minor differences in terminology and requirements exist that tailor the procedure either for uniformed Navy personnel (training) or civilian science and technical personnel (testing). The same goals apply to both communities.

### 5.1.2 Vessel Safety

For the purposes of this chapter, the term “ship” is inclusive of surface ships and surfaced submarines. The term “vessel” is inclusive of ships and small boats (e.g., rigid-hull inflatable boats or commercially available boats used to support test operations).

Ships operated by or for the Navy have personnel assigned to stand watch at all times, day and night, when moving through the water (underway). Watch personnel undertake extensive training in accordance with the U.S. Navy Lookout Training Handbook or civilian equivalent, including on-the-job instruction and a formal Personal Qualification Standard Program (or equivalent program for supporting contractors or civilians), to certify that they have demonstrated all necessary skills (such as detection and reporting of floating or partially submerged objects). Watch personnel are composed of officers, enlisted men and women, and civilian equivalents. Their duties may be performed in conjunction with other job responsibilities, such as navigating the ship or supervising other personnel. While on watch, personnel employ visual search techniques, including the use of binoculars, using a scanning method in accordance with the U.S. Navy Lookout Training Handbook or civilian equivalent. After sunset and prior to sunrise, watch personnel employ night visual search techniques, which could include the use of night vision devices.

A primary duty of watch personnel is to detect and report all objects and disturbances sighted in the water that may be indicative of a threat to the ship and its crew, such as debris, a periscope, surfaced submarine, or surface disturbance. Per safety requirements, watch personnel also report any marine mammals sighted that have the potential to be in the direct path of the ship as a standard collision avoidance procedure. Because watch personnel are primarily posted for safety of navigation, range clearance, and man-overboard precautions, they are not normally posted while ships are moored to a pier. When anchored or moored to a buoy, a watch team is still maintained but with fewer personnel than when underway. When moored or at anchor, watch personnel may maintain security and safety of the ship by scanning the water for any indications of a threat (as described above).

While underway, Navy ships (with the exception of submarines) greater than 65 feet (ft.) (20 meters [m]) in length have at least two personnel standing watch; Navy ships less than 65 ft. (20 m) in length, submarines, and contractor vessels have at least one person standing watch. While underway, personnel standing watch are alert at all times and have access to binoculars. Due to limited manning and space limitations, small boats do not have dedicated personnel standing watch, and the boat crew is responsible for maintaining the safety of the boat and surrounding environment.

All vessels use appropriate caution and proceed at a "safe speed" so they can take proper and effective action to avoid a collision with any sighted object or disturbance, and can be stopped within a distance appropriate to the prevailing circumstances and conditions.

### 5.1.3 Aircraft Safety

Pilots of Navy aircraft make every attempt to avoid large flocks of birds in order to reduce the safety risk involved with a potential bird strike. The Department of Defense (DoD) continually implements and improves aviation safety programs in an effort to provide the safest flying conditions possible. One of these programs is the Bird/Wildlife Aircraft Strike Hazard prevention program. Throughout the military, air operations, aviation safety, and natural resources personnel work together to reduce the risk of bird and wildlife strikes through the Operational Risk Management process.

### 5.1.4 Laser Procedures

As described in Section 3.0.5.3.2.2 (Lasers), only low energy lasers, some of which could be hazardous to human eyes, are proposed for use. The following procedures are applicable to lasers of sufficient intensity to cause human eye damage.

#### 5.1.4.1 Laser Operators

Only properly trained and authorized personnel operate lasers.

#### 5.1.4.2 Laser Activity Clearance

Prior to commencing activities involving lasers, the operator ensures that the area is clear of unprotected or unauthorized personnel in the laser impact area by performing a visual inspection or a flyover. The operator also ensures that any personnel within the area are aware of laser activities and are properly protected.

### 5.1.5 Weapons Firing Procedures

When the Navy conducts any potentially hazardous training or testing activity, such as weapons firing, personnel are assigned to fulfill critical safety functions. A Range Safety Officer is responsible for the safe conduct of all activities on the range on which activities are being conducted. For activities conducted off of designated ranges, an officer (or civilian equivalent) on a ship or aircraft engaged in the activity or within visual range of the activity may function as the Range Safety Officer. Either the Officer Conducting the Exercise or the Range Safety Officer assigned to the event can terminate activities if unsafe conditions exist.

#### 5.1.5.1 Notice to Mariners

A Notice to Mariners (NTM) is routinely issued in advance of missile firing activities or explosive bombing activities. For activities involving gunnery, the Navy evaluates the need to publish a NTM based on the scale, location, and timing of the activity. More information on the NTM is found in Chapter 3, Section 3.13 (Public Health and Safety).

#### 5.1.5.2 Weapons Firing Range Clearance

The weapons firing hazard range must be clear of non-participating vessels and aircraft before firing activities will commence. The size of the firing hazard range is based on the farthest firing range capability of the weapon being used. All missile and rocket firing activities are carefully planned in advance and conducted under strict procedures that place the ultimate responsibility for range safety on the officer conducting the exercise or civilian equivalent. All weapons firing is secured when cease fire orders are received from the Range Safety Officer or when the line of fire is endangering any object other than the designated target.

Pilots of Navy aircraft are not authorized to expend ordnance, fire missiles, or drop other airborne devices through any cloud cover where visual clearance of the air and surface area is not possible. The two exceptions to this requirement are: (1) when operating in the open ocean, air, and surface clearance through visual means or radar surveillance is acceptable; and (2) when the officer conducting the exercise accepts responsibility for the safeguarding of airborne and surface traffic.

During activities that involve recoverable targets, (e.g., aerial drones), the Navy recovers the target and any associated parachutes to the maximum extent practicable consistent with operational requirements and personnel safety.

### 5.1.6 Swimmer Defense Testing Procedures

A daily in situ calibration of the source levels is used to establish a clearance area to the 145 decibels (dB) referenced to (re) 1 micropascal (µPa) sound pressure level threshold for non-participant personnel safety. A hydrophone is stationed during the calibration sequences in order to confirm the clearance area. Small boats patrol the 145 dB re 1 µPa sound pressure level area during all test activities. Boat crews are equipped with binoculars and remain vigilant for non-participant divers and boats, swimmers, snorkelers, and dive flags. If a non-participating swimmer, snorkeler, or diver is observed entering into the area of the swimmer defense system, the power levels of the defense system are reduced. An additional 100-yard (yd.) (91 m) buffer is applied to the initial sighting location of the non-participant as an additional precaution. If the area cannot be maintained free of non-participating swimmers, snorkelers, and divers, testing will cease until the non-participant has moved outside the area.

### 5.1.7 Unmanned Aircraft System Procedures

The Navy operates unmanned aircraft systems in accordance with Federal Aviation Administration regulations.

### 5.1.8 Unmanned Surface Vehicle and Unmanned Underwater Vehicle Procedures

Standard safety requirements and operational restrictions apply for all types of unmanned underwater vehicles (UUVs) during training and testing activities including, but not limited to, torpedoes, mobile anti-submarine warfare (ASW) targets, inert mines, and research and development vehicles.

### 5.1.9 Towed In-Water Device Procedures

Prior to deploying a towed device from a manned platform, there is a standard operating procedure to search the intended path of the device for any floating debris (e.g., driftwood) or other potential obstructions (e.g., animals), since they have the potential to cause damage to the device.

### 5.1.10 Best Management Practices

Best management practices include measures that regulate operations to ensure compliance with pollution emission requirements and general resource conservation goals. In the development of best management practices, the Navy will utilize and implement all applicable sections of OPNAV M-5090.1 (Environmental Readiness Program Manual). This instruction provides minimum requirements, under which organizations may develop procedures that delineate additional organizational specific requirements. Some standard operating procedures also provide best management practices value.

In Chapter 3 of this Environmental Impact Statement (EIS)/Overseas EIS (OEIS), the Navy analyzed environmental resources for potential impacts resulting from the Navy’s Proposed Action. All of the Navy’s best management practices provide protection to environmental resources. For example, Navy policies and procedures identified in Navy instructions such as the Environmental Readiness Program Manual, include directives regarding waste management, pollution prevention, and recycling, all of which benefit sediments and water quality in the ocean. Any procedures or practices that benefit ocean sediments and water quality in turn benefit all marine life in the ocean, from plants and invertebrates, to fish and marine mammals.

Some examples of standard operating procedures that also contribute to best management practices are pollution control programs. The Navy’s compliance with the Clean Air Act and its implementing regulations has resulted in comprehensive air quality management programs, helping to ensure minimum impacts to air quality.

Many of the Navy’s standard operating procedures are directed at enhancing safety, both for the Sailors involved in the activities as well as non-participant members of the public. As an example, the Navy’s Bird/Wildlife Aircraft Strike Hazard prevention program was intended as a safety procedure and has the added benefit of reducing bird injuries and fatalities. This program has resulted in reduced incidents of aircraft striking birds.

These examples illustrate common Navy procedures and practices that can often reduce impacts to environmental resources. The following section will describe procedures implemented specifically to mitigate environmental impacts.

## 5.2 Introduction to Mitigation

The Navy recognizes that the Proposed Action has the potential to impact the environment. Mitigation measures are modifications to the Proposed Action that are implemented for the sole purpose of reducing a specific potential environmental impact on a particular resource. The procedures discussed in this chapter, most of which are currently or were previously implemented as a result of past environmental compliance documents, Endangered Species Act (ESA) biological opinions, Marine Mammal Protection Act (MMPA) Letters of Authorization, or other formal or informal consultations with regulatory agencies, are being coordinated with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) through the consultation and permitting process.

In order to make the findings necessary to issue an MMPA letter of authorization, it may be necessary for NMFS to require additional mitigation measures or monitoring beyond those contained in this Final EIS/OEIS. These could include measures considered, but eliminated in this EIS/OEIS, or as yet undeveloped measures. The public will have an opportunity to provide information to NMFS through the MMPA process, both during the comment period following NMFS' notice of receipt of the application for a letter of authorization, and during the comment period following publication of the proposed rule. NMFS may propose additional mitigation measures or monitoring in the proposed rule.

Additionally, the Navy is engaging in consultation processes under the ESA with regard to listed species that may be affected by the Proposed Action described in this EIS/OEIS. For the purposes of the ESA Section 7 consultation, the mitigation measures proposed here may be considered by NMFS or USFWS as beneficial actions taken by the Federal agency or applicant (50 Code of Federal Regulations 402.14(g)(8)). If required to satisfy requirements of the ESA, NMFS or USFWS may develop an additional set of measures contained in terms and conditions, reasonable and prudent measures, or conservation recommendations in any biological opinion issued for the Proposed Action.

The Navy also considered public comments and government to government negotiations on proposed mitigation measures described in the Draft EIS/OEIS. Many public comments addressed issues already explained in the Draft EIS/OEIS, often those described in Section 5.3.4 (Mitigation Measures Considered but Eliminated). A number of comments also questioned the mitigation zones used by the Navy (see Section 5.3.2, Mitigation Zone Procedural Measures). Each of these comments have been responded to in Appendix I (Public Participation). Several comments led the Navy to make improvements in the description or explanation of the measures.

### 5.2.1 Regulatory Requirements for Mitigation

An EIS must analyze the affected environment, discuss the environmental impacts of the Proposed Action and each alternative, and assess the significance of the impacts to the environment. Mitigation measures are designed to help reduce the severity or intensity of impacts of the Proposed Action and can occur early in the planning process. An agency may choose not to take the action or to move the location of the action. Mitigation measure development also occurs throughout the analysis process whenever an impact is minimized by limiting the degree or magnitude of the action or its implementation. Mitigation measures can also include actions that repair, rehabilitate, or restore the affected environment or reduce impacts over time through constant monitoring and corrective adjustments.

In accordance with the National Environmental Policy Act (NEPA) requirement, the environmental benefit of all Navy recommended proposed mitigation measures will apply to all alternatives analyzed in this EIS, and according to Navy policy, will also apply to the OEIS where applicable and appropriate. Additionally, the White House Council on Environmental Quality (CEQ) issued guidance for mitigation and monitoring on 14 January 2011. This guidance affirms that federal agencies, including the Navy, should:

- commit to mitigation in decision documents when they have based environmental analysis upon such mitigation (by including appropriate conditions on grants, permits, or other agency approvals, and making funding or approvals for implementing the Proposed Action contingent on implementation of the mitigation commitments);
- monitor the implementation and effectiveness of mitigation commitments;
- make information on mitigation and monitoring available to the public, preferably through agency web sites; and
- remedy ineffective mitigation when the federal action is not yet complete.

The CEQ guidance encourages federal agencies to develop internal processes for post-decision monitoring to ensure the implementation and effectiveness of the mitigation. It also states that federal agencies may use adaptive management as part of an agency's action. Adaptive management, when included in the NEPA analysis, allows for the agency to take alternate mitigation actions if mitigation commitments originally made in the planning and decision documents fail to achieve projected environmental outcomes. Adaptive management generally involves four phases: plan, act, monitor, and evaluate. This process allows the use of the results to update knowledge and adjust future management actions accordingly. Through implementing mitigation measures from the Navy's previous planning, consultations, permits, and monitoring of those efforts, the Navy has collected data to further refine proposed mitigation measures.

Through the planning, consultation, and permitting processes, federal regulatory agencies may also suggest that the Navy analyze additional mitigation measures for inclusion in Final EIS/OEISs and associated consultation and permitting documents. Any proposals for additional mitigation measures should be based on the federal agency's assessment of the likelihood that such measures will contribute to a notable reduction of the environmental impact. If additional measures are identified, the Navy will apply the effectiveness and operational assessment protocol discussed in Section 5.3 (Mitigation Assessment) to determine whether the additional measure will be proposed for implementation. This additional analysis will be presented in the Final EIS/OEIS, and, the final suite of mitigations resulting from the ongoing planning, consultation, and permitting processes will be documented in the Record of Decision (ROD).

### 5.2.2 Overview of Mitigation Approach

This section describes the approach that the Navy took to develop its recommended mitigation measures. The Navy's overall approach to assessing potential mitigation measures was based on two principles: (1) mitigations will be effective at reducing potential impacts on the resource; and (2) from a military perspective, the mitigations are practical to implement, executable, and personnel safety and readiness will not be impacted. The assessment process involved using information directly from Chapter 3 (Affected Environment and Environmental Consequences) and assessing all existing mitigation and proposals for new or modified mitigation in order to determine if recommending a mitigation measure for implementation would be appropriate.

This document organized, and where appropriate, analyzed training and testing activities separately. This separation was needed because the training and testing communities perform activities for differing purposes, and in some cases, with different personnel and in different locations. For example, there is a fundamental difference between the testing of a new antisubmarine warfare system with civilian scientists and engineers, and the eventual training of sailors and aviators with that same system. As such, mitigations that the Navy recommends for both training and testing activities are presented together, while mitigations that are designed for and executable only by the training or testing community are presented separately based on location.

#### 5.2.2.1 Lessons Learned from Previous Environmental Impact Statements/Overseas Environmental Impact Statements

In an effort to improve upon past processes, the Navy considered all mitigations previously implemented and adapted its mitigation assessment approach based on lessons learned from previous EISs, ESA biological opinions, MMPA Letters of Authorization, and other formal or informal consultations with regulatory agencies. For example, during the development of the Northwest Training Range Complex EIS/OEIS the Navy determined that relocation of activities to another range complex was not possible due to a number of factors. The Navy considered reduction or elimination of training in the Northwest Training Range Complex, but determined that the amount and cost of travel to other range complexes to fulfill training requirements would result in an unacceptable increase in time away from the homeport. While some Pacific-Northwest-based units do travel to other ranges for certain training activities, all locally based units must continue to train locally for most routine activities.

Navy planners, scientists, and the operational community assessed the effectiveness of a full suite of potential mitigation measures (a portion of which were specific mitigation areas) on a case-by-case basis, using information and lessons learned from the Navy's internal adaptive management process. The resulting assemblage of recommended measures is comprised of currently implemented measures, modifications of currently implemented measures, and newly proposed measures. Details on the assessment methods are provided in Section 5.2.3 (Assessment Method). The rationale for recommending, modifying, adding, or discontinuing each measure is provided in Section 5.3 (Mitigation Assessment).

#### 5.2.2.2 Protective Measures Assessment Protocol

The Protective Measures Assessment Protocol is a decision support and situational awareness software tool that the Navy uses to facilitate compliance with mitigation measures during the conduct of certain training and testing activities at sea. The Navy runs the Protective Measures Assessment Protocol program during the event planning process to ensure that personnel involved in the activity are aware of the mitigation requirements and to help ensure that all mitigations are implemented appropriately. In addition to providing notification of the required mitigation, the tool also provides a visual display of the exercise area, unit's position in relation to the target area, and any relevant environmental data. The final suite of mitigation measures contained in the ROD will be integrated into the Protective Measures Assessment Protocol.

Section 5.3.1.1.1.1 (United States Navy Afloat Environmental Compliance Training Series) contains information about the newly developed Protective Measures Assessment Protocol training module.

### 5.2.3 Assessment Method

As shown in Figure 5-1, the Navy undertook an effectiveness assessment and operational assessment for each potential mitigation measure to ensure its compatibility with Section 5.2.2 (Overview of Mitigation Approach). The Navy used information from published and readily available sources, as well as Navy after-action and monitoring reports. When available, these data were used when they represented the best available science and if they were generally accepted by the scientific community, to ensure that they were applicable and contributed to the analysis.

#### 5.2.3.1 Effectiveness Assessment

##### 5.2.3.1.1 Procedural Measures

Procedural measures could involve employing techniques or technology to modify an activity in order to avoid or reduce a potential impact on a particular resource. For the purposes of organization, procedural measures are discussed within two subcategories: Lookouts and mitigation zones.

A procedural measure was deemed effective if implementing the measure was likely to result in avoidance or reduction of an impact on a resource. The level of avoidance or reduction of the impact gained from implementing a procedural measure was weighed against the potential for a shift in impacts resulting from the activity modification. For example, if predictive modeling results indicate that the use of underwater explosives could cause unacceptable impacts on a particular resource, those impacts could possibly be reduced by substituting non-explosive activities for explosive activities.

However, if the increased use of non-explosive activities would consequently produce an unacceptable impact on habitats due to an associated physical disturbance or strike risk from military expended materials, the measure would not necessarily be justifiable.

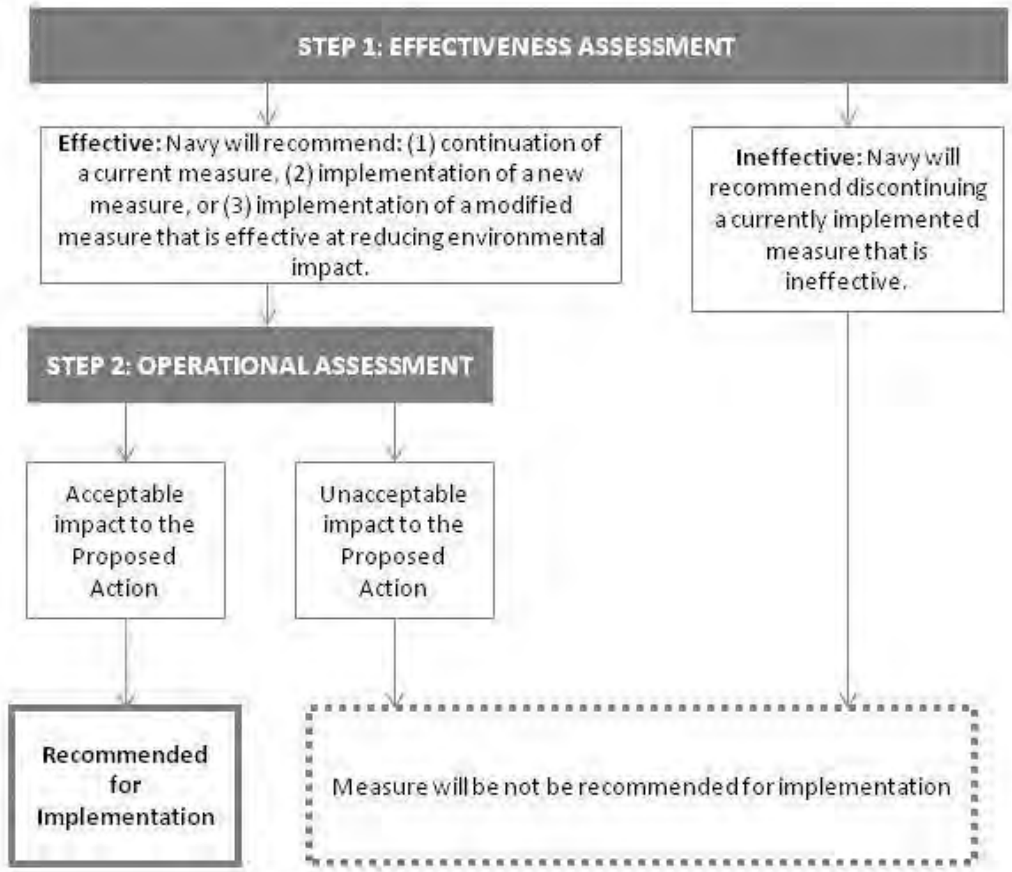


**Figure 5-1: Flowchart of Process for Determining Proposed Mitigation Measures**

A procedural measure was deemed ineffective if its implementation would not result in avoidance or reduction of an impact on a resource, or if an unacceptable impact will simply be shifted from one resource to another. For ineffective procedural measures that are currently being implemented, the rationale for terminating, modifying, or continuing to carry out the measure is included in the discussion.

#### 5.2.3.1.2 Proposed Mitigation Areas

In order to avoid or reduce a potential impact on a particular resource, the Navy would either limit the time of day or duration in which a particular activity could take place, or move or relocate a particular activity outside of a specific geographic area, yet still within the Study Area. Within mitigation areas, the measures would only apply to the specific activity that resulted in the requirement for mitigation, and would not prevent or restrict other activities from occurring during that time or in that area.

A proposed mitigation area was deemed effective if implementing the measure may be likely to result in avoidance or reduction of the impact on the resource. The specific season, time of day, or geographic area must be important to the resource. In determining importance, special consideration was given to time periods or geographic areas having characteristics such as especially high overall density or percent population use, seasonal bottlenecks for a migration corridor, and identifiable key foraging and reproduction areas.

Avoidance or reduction of the impact in the specific time period or geographic area was weighed against the potential for causing new impacts in alternative time periods or geographic areas. For example, if the proposed training or test event predicted to cause unacceptable impacts to a particular resource in a known foraging location, those impacts could possibly be reduced by relocating those activities to a new location. However, if the proposed training or test event at the new location would consequently produce an unacceptable impact to the same or a different resource at the new location, the measure would not necessarily be justifiable.

A proposed mitigation area was deemed ineffective if implementing the measure would not result in avoidance or reduction of an impact to a resource, or if an unacceptable impact would simply be shifted from one time period or location to another. For ineffective mitigation areas that are currently being implemented, the rationale for terminating, modifying, or continuing to carry out the measure is included in the discussion.

#### 5.2.3.2 Operational Assessment

The Navy conducted the operational assessment for procedural measures and proposed mitigation areas using the criteria described below. The Navy deemed procedural and mitigation area measures to have acceptable operational impacts to a particular proposed activity if the following conclusions were reached:

1. Implementation of the measure will not increase safety risks to Navy personnel and equipment.

2. Implementation of the measure is practical. Practicality was defined by the following factors:
    - The measure does not result in an unacceptable increase in resource requirements (e.g., wear and tear on equipment, additional fuel, additional personnel, increased training or testing requirements, or additional reporting requirements).
    - The measure does not result in an unacceptable increase in time away from homeport for Navy personnel.
    - The measure does not result in national security concerns. Should national security require conducting more than the designated number of activities, or a change in how the Navy conducts those activities, the Navy reserves the right to provide the regulatory federal agency with prior notification and include the information in any associated exercise or monitoring reports.
    - The measure is consistent with Navy policy.

3. Implementation of the measure will not result in an unacceptable impact on readiness. A primary factor that was considered for all mitigation measures is that the measure must not modify the activity in a way that no longer allows the activity to meet the intended objectives, and ultimately must not interfere with the Navy meeting all of its military readiness requirements. Specifically, for mitigation area measures, the following additional factors were considered:

- The activity is not dependent on a specific range or range support structure within the mitigation area, and there are alternate areas with the necessary environmental conditions (e.g., oceanographic conditions).
- The mitigation area does not hold any current or foreseeable future readiness value. This assessment will be revisited if Navy operations or national security interests conclude that training or testing needs to occur within the mitigation area.
- Implementation of the measure will not prohibit conducting shipboard maintenance, repair, and testing pierside prior to at-sea operations.

4. The Navy has legal authority to implement the measure.

If all four of the above conditions were not able to be reached, the Navy deemed the procedural or proposed mitigation area measure to have unacceptable impacts on the Proposed Action, and did not recommend those unacceptable measures for implementation.

## 5.3 Mitigation Assessment

The effectiveness and operational assessments resulted in potential mitigation measures being organized into the following four sections:

- Section 5.3.1 (Lookout Procedural Measures) includes recommended measures specific to the use of Lookouts or trained marine species observers.
- Section 5.3.2 (Mitigation Zone Procedural Measures) includes recommended measures specific to visual observations with a mitigation zone.
- Section 5.3.3 (Mitigation Areas) includes recommended measures specific to particular locations.
- Section 5.3.4 (Mitigation Measures Considered but Eliminated) includes measures that the Navy does not recommend for implementation due to the measure being ineffective at reducing environmental impacts, having an unacceptable operational impact, or being incompatible with Section 5.2.2 (Overview of Mitigation Approach).

A summary of the Navy recommended measures is provided in Table 5.4-1.

### 5.3.1 Lookout Procedural Measures

As described in Section 5.1 (Standard Operating Procedures), ships have personnel assigned to stand watch at all times while underway. Standard watch personnel may perform watch duties in conjunction with job responsibilities that extend beyond looking at the water or air (such as supervision of other personnel). This section will introduce Lookouts, who perform similar duties to standard personnel standing watch and whose duties satisfy safety of navigation and mitigation requirements.

The Navy will have two types of Lookouts for the purposes of conducting visual observations: those positioned on ships; and those positioned ashore, in aircraft, or on small boats. Lookouts positioned on ships will diligently observe the air and surface of the water. They will have multiple observation objectives, which include but are not limited to detecting the presence of biological resources and recreational or fishing boats, observing the mitigation zones described in Section 5.3.1.2 (Lookouts), and monitoring for vessel and personnel safety concerns.

Due to manning and space restrictions on aircraft, small boats, and some Navy ships, Lookouts for these platforms may be supplemented by the aircraft crew or pilot, boat crew, range site personnel, or shore-side personnel. Lookouts positioned in minimally manned platforms may be responsible for tasks in addition to observing the air or surface of the water (e.g., navigation of a helicopter or small boat). However, all Lookouts will, considering personnel safety, practicality of implementation, and impact on the effectiveness of the activity, comply with the observation objectives described above for Lookouts positioned on ships.

Some testing activities are conducted close enough to shore that observers located at shore sites have a clear view of the activities as they are conducted, and benefit from advanced systems (improved optics, acoustic detection) available for detection of animals. The procedural measures described below primarily consist of having Lookouts during specific training and testing activities.

#### 5.3.1.1 Specialized Training

##### 5.3.1.1.1 Training for Navy Personnel and Civilian Equivalents

###### 5.3.1.1.1.1 United States Navy Afloat Environmental Compliance Training Series

**Recommended Mitigation and Comparison to Current Mitigation**

The Navy is proposing to continue implementing the Marine Species Awareness Training for watch personnel and Lookouts, and to add the requirement for additional Navy personnel and civilian equivalents to complete one or more environmental training modules.

The Navy has developed the United States Navy Afloat Environmental Compliance Training Series to help ensure Navy-wide compliance with environmental requirements, and to help Navy personnel gain a better understanding of their personal roles and responsibilities. The training series contains four interactive multimedia training modules. Personnel will be required to complete all modules identified in their career path training plan.

The first module is the Introduction to the U.S. Navy Afloat Environmental Compliance Training Series. The introduction module provides information on environmental laws (e.g., ESA and MMPA) and responsibilities relevant to Navy training and testing activities. The material is put into context of why environmental compliance is important to the Navy, from the most junior sailor to Commanding Officers.

The second module is the U.S. Navy Marine Species Awareness Training. Consistent with current requirements, all personnel standing watch on the bridge, Commanding Officers, Executive Officers, maritime patrol aircraft aircrews, anti-submarine warfare helicopter crews, civilian equivalents, and Lookouts will successfully complete the Marine Species Awareness Training prior to standing watch or serving as a Lookout. The module contained within the U.S. Navy Environmental Compliance Training Series is an update to the current Marine Species Awareness Training version 3.1. The updated training is designed to improve the effectiveness of visual observations for marine resources, including marine mammals and sea turtles. The Marine Species Awareness Training provides information on sighting cues, visual observation tools and techniques, and sighting notification procedures.

The third module is on the U.S. Navy Protective Measures Assessment Protocol. Protective Measures Assessment Protocol is a decision support and situational awareness software tool that the Navy uses to facilitate compliance with worldwide mitigation measures during the conduct of training and testing activities at sea. The module provides instruction for generating and reviewing Protective Measures

Assessment Protocol reports. Section 5.2.2.2 (Protective Measures Assessment Protocol) contains additional information on the benefits of the software tool.

The fourth module is on the U.S. Navy Sonar Positional Reporting System and marine mammal incident reporting. The Navy developed the Sonar Positional Reporting System as its official record of underwater sound sources used under its MMPA permits. Marine mammal incidents include vessel strikes and animal strandings. The module provides instruction on the reporting requirements and procedures.

**Effectiveness and Operational Assessment**

Navy personnel undergo extensive training in order to stand watch on the bridge. Standard training includes on-the-job instruction under the supervision of experienced personnel, followed by completion of the Personal Qualification Standard program. The Personal Qualification Standard program certifies that personnel have demonstrated the skills needed to stand watch, such as detecting and reporting floating or partially submerged objects.

The United States Navy Afloat Environmental Compliance Training Series, including the updated Marine Species Awareness Training, is a specialized multimedia training program designed to help Navy operational and test communities best avoid potentially harmful interactions with marine species. The program provides training on how to sight marine species, focusing on marine mammals. The training also includes instruction for visually identifying sea turtles, concentrations of floating vegetation (kelp paddies), jellyfish aggregations, and flocks of seabirds, which are often indicators of marine mammal or sea turtle presence. The Marine Species Awareness Training also addresses the role that watchstanders and Lookouts play in helping the Navy maintain compliance with environmental protection requirements, as well as supporting Navy stewardship commitments.

In summary, the Navy believes that the U.S. Navy Afloat Environmental Compliance Training Series, including the updated Marine Species Awareness Training, is the best and most appropriate forum for teaching watch personnel and Lookouts about their responsibilities for helping reduce impacts on the marine environment. The Marine Species Awareness Training provides the Navy with invaluable training for a relatively large number of personnel. Constantly shifting personnel assignments presents a real challenge; however, the format and structure of the U.S. Navy Afloat Environmental Compliance Training Series will help the Navy reduce costs during fiscally constrained periods and provide constant access to training. Overall, the Marine Species Awareness Training is an effective tool for improving the potential for Lookouts to detect marine species while on duty.

Implementation of the Marine Species Awareness Training is considered to be an acceptable program with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

### 5.3.1.2 Lookouts

The Navy proposes to use one or more Lookouts during the training and testing activities described below, which are organized by stressor category. A comparison of the currently implemented mitigation measures and recommended mitigation measures are provided where applicable. The effectiveness and operational assessments are discussed for all Lookout measures collectively in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts) and Section 5.3.1.2.6 (Operational Assessment for Lookouts).

#### 5.3.1.2.1 Acoustic Stressors – Non-Impulse Sound

##### 5.3.1.2.1.1 Low-Frequency and Hull-Mounted Mid-Frequency Active Sonar

Under the Proposed Action, low-frequency active sonar would be used only during testing activities conducted in the Offshore Area and in the Inland Waters of the Study Area, and not during any proposed training activities. Therefore, mitigation measures for low-frequency active sonar sources currently exist only for these testing activities.

**Training**

The Navy's current Lookout mitigation measures during training activities involving hull-mounted mid-frequency active sonar include requirements such as the number of personnel on watch and the manner in which personnel are to visually search the area in the vicinity of the ongoing activity.

The Navy is proposing to maintain the number of Lookouts currently implemented for ships using hull-mounted mid-frequency active sonar. Ships using hull-mounted mid-frequency active sonar sources associated with ASW and mine warfare activities at sea (with the exception of ships less than 65 ft. [20 m] in length, which are minimally manned) will have two Lookouts at the forward position. For the purposes of this document, low-frequency active sonar does not include surface towed array surveillance system low frequency active sonar, which is not a part of this Proposed Action.

While using hull-mounted mid-frequency active sonar sources underway, vessels less than 65 ft. in length, and ships that are minimally manned will have one Lookout at the forward position due to space and manning restrictions.

Ships conducting active sonar activities while moored or at anchor (including pierside testing or maintenance) will maintain one Lookout.

**Testing**

There are no current mitigation measures for hull-mounted mid-frequency sonar testing activities in the Study Area. The Navy's current Lookout mitigation measures during low-frequency sonar testing activities are:

- Vessels on a range shall use Lookouts during all hours of range activities. Lookout duties include looking for marine mammals. All sightings of marine mammals shall be reported to the Range Officer in charge of overseeing the activity.
- Visual surveillance shall be conducted just prior to all in-water exercises. Surveillance shall include, as a minimum, monitoring from all participating surface craft and, where available, adjacent shore sites.
- When cetaceans have been sighted in the vicinity of the operation, all range participants increase vigilance and take reasonable and practicable actions to avoid collisions and activities that may result in close interaction of naval assets and marine mammals. Actions may include changing speed and/or direction, subject to environmental and other conditions (e.g., safety, weather).

The Navy's Proposed Action includes newly assessed hull-mounted mid-frequency active sonar testing activities as well as low-frequency active sonar testing. The Navy proposes to apply the existing testing mitigation measures to both low-frequency and hull-mounted mid-frequency testing. Any appropriately trained member of the test support staff may serve as a Lookout at any time during an event so long as the observation and reporting is carried out as identified in existing measures. Testing conducted at sea on a maximally manned vessel over 65 ft. will employ two Lookouts. Testing conducted pierside or shore-based testing will employ one Lookout. Testing conducted from small boats, minimally manned vessels, or aircraft will employ one Lookout.

##### 5.3.1.2.1.2 High-Frequency and Non-Hull-Mounted Mid-Frequency Active Sonar

**Training**

The Navy currently conducts high-frequency and non-hull-mounted mid-frequency active sonar training in the Study Area. Non-hull-mounted mid-frequency active sonar training activities include the use of aircraft deployed sonobuoys and helicopter dipping sonar. During those activities, the Navy employs the following mitigation measure regarding Lookout procedures:

- Navy aircraft participating in exercises at sea shall conduct and maintain, when operationally feasible and safe, surveillance for marine species of concern as long as it does not violate safety constraints or interfere with the accomplishment of primary operational duties.
- Helicopters shall observe/survey the vicinity of an ASW training event for 10 minutes before the first deployment of active (dipping) sonar in the water.

The Navy is proposing to continue using the number of Lookouts currently implemented for aircraft conducting non-hull-mounted mid-frequency active sonar activities.

Mitigation measures do not currently exist for other high-frequency active sonar activities associated with ASW and mine warfare training, or for new platforms; therefore, the Navy is proposing to add a new Lookout and other measures for these activities and on these platforms when conducted in the Study Area. The recommended measure is provided below.

The Navy will have one Lookout on ships conducting high-frequency or non-hull-mounted mid-frequency active sonar activities associated with ASW and mine warfare activities at sea.

Prior to Maritime Homeland Defense/Security Mine Countermeasure Integrated Exercises, the Navy will conduct pre-event planning and training to ensure environmental awareness of all exercise participants. When this event is proposed to be conducted in Puget Sound, Navy event planners will consult with Navy biologists who will contact NMFS during the planning process in order to determine likelihood of gray whale or southern resident killer whale presence in the proposed exercise area as planners consider specifics of the event.

**Testing**

The Navy currently conducts high-frequency and non-hull-mounted mid-frequency active sonar testing activities in the Study Area. These activities include the use of aircraft deployed sonobuoys, countermeasure testing, unmanned vehicle testing, system and component testing, and non-explosive torpedo testing. Mitigation measures for high-frequency active sonar sources currently exist only for some NAVSEA testing activities conducted in the Offshore Area and Inland Waters of the Study Area. These mitigation measures are the same as described above for testing in Section 5.3.1.2.1.1 (Low-Frequency and Hull-Mounted Mid-Frequency Active Sonar). The Navy is proposing to apply the same Lookout requirements to all NAVSEA testing activities in the Proposed Action.

The Navy's proposed mitigation measures for Naval Air Systems Command testing activities are consistent with Navy training mitigation measures described above.

##### 5.3.1.2.2 Acoustic Stressors – Explosives and Impulse Sound

###### 5.3.1.2.2.1 Improved Extended Echo Ranging Sonobuoys

**Training**

The Navy has historically conducted Improved Extended Echo Ranging (IEER) training in the Study Area and has completed environmental planning documents analyzing this training in the past. Mitigation applied to this event includes the following procedures:

- Crews shall conduct visual reconnaissance of the drop area prior to laying their intended sonobuoy pattern. This search shall be conducted at an altitude below 1,500 ft. (457 m) at a slow speed, if operationally feasible and weather conditions permit. In dual aircraft operations, crews are allowed to conduct area clearances utilizing more than one aircraft.
- Crews shall conduct a minimum of 30 minutes of visual and passive acoustic monitoring of the search area prior to commanding the first post detonation. This 30-minute observation period may include pattern deployment time.
- When operationally feasible, Navy crews shall conduct continuous visual and passive acoustic monitoring of marine mammal activity. This shall include monitoring of aircraft sensors from the time of the first sensor placement until the aircraft have left the area and are out of range of these sensors.
- Passive Acoustic Detection – If the presence of marine mammals is detected aurally, then that shall cue the Navy aircrew to increase the vigilance of their visual surveillance. Subsequently, if no marine mammals are visually detected, then the crew may continue multi-static active search.
- Mammal monitoring shall continue until out of own-aircraft sensor range.

IEER sonobuoy training is included under the No Action Alternative, as part of the Navy's baseline of activities. However, the Navy is transitioning from the IEER sonobuoy to the multistatic active coherent (MAC) sonobuoy. Sonobuoy technology is evolving, and the IEER sonobuoys are being phased out due to improved capabilities in the MAC sonobuoys. Therefore, the IEER sonobuoys are no longer proposed for training activities under Alternative 1 or Alternative 2.

**Testing**

The Navy will have one Lookout in aircraft conducting improved extended echo ranging sonobuoy activities. The Navy is proposing to continue the Lookout procedural measures currently implemented for this activity, as described below:

- Crews shall conduct visual reconnaissance of the drop area prior to laying their intended sonobuoy pattern. This search shall be conducted at an altitude below 1,500 ft. (457 m) at a slow speed, if operationally feasible and weather conditions permit. In dual aircraft operations, crews are allowed to conduct area clearances utilizing more than one aircraft.
- Crews shall conduct a minimum of 30 minutes of visual and passive acoustic monitoring of the search area prior to commanding the first post detonation. This 30-minute observation period may include pattern deployment time.
- When operationally feasible, Navy crews shall conduct continuous visual and passive acoustic monitoring of marine mammal activity. This shall include monitoring of aircraft sensors from the time of the first sensor placement until the aircraft have left the area and are out of range of these sensors.

- Passive Acoustic Detection – If the presence of marine mammals is detected aurally, then that shall cue the Navy aircrew to increase the vigilance of their visual surveillance. Subsequently, if no marine mammals are visually detected, then the crew may continue multi-static active search.
- Mammal monitoring shall continue until out of own-aircraft sensor range.

###### 5.3.1.2.2.2 Explosive Signal Underwater Sound Buoys Using >0.5–2.5 Pound Net Explosive Weight

Lookout measures do not currently exist for explosive Signal Underwater Sound (SUS) buoy exercises using >0.5–2.5 pound (lb.) net explosive weight.

**Training**

The Navy is proposing to add this measure. Aircraft conducting explosive sonobuoy exercises using >0.5–2.5 lb. net explosive weight will have one Lookout.

**Testing**

The Navy's proposed mitigation measures for testing activities are consistent with Navy training mitigation measures described above.

###### 5.3.1.2.2.3 Mine Countermeasure and Neutralization Activities Using Positive Control Firing Devices

**Training**

Mine countermeasure and neutralization activities in the Study Area involve the use of diver-placed charges that typically occur close to shore. When these activities are conducted using a positive control firing device, the detonation is controlled by the personnel conducting the activity and is not authorized until the area is clear at the time of detonation.

Currently, the Navy employs the following Lookout procedures during mine countermeasure and neutralization activities using positive control firing devices:

- Two survey boats will be used to conduct seabird and marine mammal surveys within a 700 yd. (640 m) radius of 2.5 lb. (1.1 kilograms [kg]) net explosive weight training activities, within a 330 yd. (300 m) radius for the 1.5 lb. (0.7 kg) net explosive weight training charge, and within a 110 yd. (100 m) radius for a 1-ounce (31-gram) net explosive weight charge.
- Transect lines will be no more than 110 yd. (100 m) apart and beginning at the outside radius.
- Pre-exercise surveys shall be conducted within 30 minutes prior to commencement of the scheduled explosive event.
- The two survey boats will approach from the opposite direction and move toward the center (or explosive charge placement area) and work their way to the outside of the radius.
- Survey boats will maintain speed equal to or less than 10 knots.
- Each boat will have a minimum of two surveyors using aid of binoculars.
- In case of fog or reduced visibility, the surveyors must be able to see a minimum of 55 yd. (50 m) or the training event cannot be conducted.

A combination of factors has led to a change in the proposed procedures. For example, marine mammal and fish effects criteria have changed, resulting in the area required to be surveyed being smaller than previously assessed. By reducing the area, the Lookout effectiveness is improved. The Navy, along with the regulatory agencies, believes this is the appropriate zone for protection of species and minimize impacts. The Navy is proposing to change the Lookout procedural measures for explosive charges of >0.5-2.5 lb. net explosive weight:

- Two survey boats will be used to conduct marbled murrelet and marine mammal surveys.
- Each survey boat will have two Lookouts onboard, one dedicated Lookout and one boat operator.

The above protocol will be reduced to one boat for the 1-ounce (31-gram) net explosive weight charge.

The divers and Lookouts will report all marine mammal, sea turtle, and marbled murrelet sightings to their dive support vessel.

**Testing**

The Navy's Proposed Action does not include mine countermeasure and neutralization testing activities.

##### 5.3.1.2.2.4 Gunnery Exercises – Small-, Medium-, and Large-Caliber Using a Surface Target

**Training**

Currently, the Navy employs the following Lookout procedures during gunnery exercises:

- From the intended firing position, trained Lookouts shall survey the mitigation zone for marine mammals prior to commencement and during the exercise as long as practicable.
- If applicable, target towing vessels shall maintain a Lookout. If a marine mammal is sighted in the vicinity of the exercise, the tow vessel shall immediately notify the firing vessel in order to secure gunnery firing until the area is clear.

The Navy is proposing to continue using the Lookout procedures currently implemented for this activity. The Navy will have one Lookout on the vessel or aircraft conducting small-, medium-, or large-caliber gunnery exercises against a surface target. Towing vessels, if applicable, shall also maintain one Lookout.

One gunnery exercise, Small Boat Attack, involves only blank rounds and no targets. However, because of the exercise location in Puget Sound, prior to Small Boat Attack training, the Navy will conduct pre-event planning and training to ensure environmental awareness of all exercise participants. When this event is proposed to be conducted in and around Naval Station Everett, Naval Base Kitsap Bangor, or Naval Base Kitsap Bremerton in Puget Sound, Navy event planners will consult with Navy biologists who will contact NMFS early in the planning process in order to determine the extent marine mammals may be present in the immediate vicinity of proposed exercise area as planners consider the specifics of the event.

**Testing**

The Navy's Proposed Action does not include gunnery testing activities.

##### 5.3.1.2.2.5 Missile Exercises Using a Surface Target

**Training**

Currently, the Navy employs the following Lookout procedures during missile exercises:

- Aircraft shall visually survey the target area for marine mammals. Visual inspection of the target area shall be made by flying at 1,500 ft. (457 m) or lower, if safe to do so, and at slowest safe speed.

- Firing or range clearance aircraft must be able to actually see ordnance impact areas.

The Navy is proposing to continue using the Lookout procedures currently implemented for this activity. When aircraft are conducting missile exercises against a surface target, the Navy will have one Lookout positioned in an aircraft.

Historically, Navy missile exercises are very infrequent and have occurred greater than 50 nm from shore in order to avoid other users of the area and for marine safety purposes. Conducting these exercises greater than 50 nm from shore has the practical effect of affording environmental protections to certain species such as southern resident killer whale, salmonids, and harbor porpoise. For various reasons, therefore, the Navy proposes to conduct no missile exercises utilizing high explosives within 50 nm of the shore in the NWTT Offshore Area.

**Testing**

The Navy's Proposed Action does not include missile testing activities.

#### 5.3.1.2.2.6 Bombing Exercises (Explosive)

**Training**

Currently, the Navy employs the following Lookout procedures during bombing exercises:

- If surface vessels are involved, Lookouts shall survey for floating kelp and marine mammals.
- Aircraft shall visually survey the target and buffer zone for marine mammals prior to and during the exercise. The survey of the impact area shall be made by flying at 1,500 ft. (457 m) or lower, if safe to do so, and at the slowest safe speed. Release of ordnance through cloud cover is prohibited: aircraft must be able to actually see ordnance impact areas. Survey aircraft should employ most effective search tactics and capabilities.

The Navy is proposing to (1) continue implementing the current measures for bombing exercises, and (2) clarify the number of Lookouts currently implemented for this activity. The Navy will have one Lookout positioned in an aircraft conducting bombing exercises.

Historically, Navy bombing exercises are very infrequent and have occurred greater than 50 nm from shore in order to avoid other users of the area and for marine safety purposes. Conducting these exercises greater than 50 nm from shore has the practical effect of affording environmental protections to certain species such as southern resident killer whale, salmonids, and harbor porpoise. For various reasons, therefore, the Navy proposes to conduct no bombing exercises utilizing high explosives within 50 nm of the shore in the NWTT Offshore Area.

**Testing**

The Navy's Proposed Action does not include bomb testing activities.

#### 5.3.1.2.2.7 Torpedo Testing (Explosive)

The Navy currently has no Lookout procedures for this activity in the Study Area.

**Training**

The Navy does not include training with explosive torpedoes in the Proposed Action.

#### Testing

For explosive torpedoes tested from a surface ship, the Navy is proposing to use the Lookout procedures currently implemented for hull-mounted mid-frequency active sonar activities. For explosive torpedo tests with low-altitude aircraft present, the Navy will have one Lookout positioned in an aircraft. There will be safety spotters for all explosive torpedo testing, on a submarine or on a high-altitude aircraft. There will also be a low-altitude non-participant aircraft checking that the target zone is clear during all explosive torpedo testing activities.

### 5.3.1.2.2.8 Weapons Firing Noise During Gunnery Exercises

#### Training

The Navy is proposing to continue using the number of Lookouts currently implemented for gunnery exercises. The Navy will have one Lookout on the ship conducting explosive and non-explosive large-caliber gunnery exercises. This may be the same Lookout described in Section 5.3.1.2.2.4 (Gunnery Exercises – Small-, Medium-, and Large-Caliber Using a Surface Target) when that activity is conducted from a ship against a surface target.

#### Testing

The Navy's Proposed Action does not include gun testing activities.

### 5.3.1.2.2.9 Sinking Exercises

The Navy has historically conducted sinking exercises in the Study Area, and has completed environmental planning documents analyzing up to two sinking exercises per year. During sinking exercises, the Navy will have two lookouts (one positioned in an aircraft and one on a surface vessel).

Because of this prior analysis, sinking exercises are included under the No Action Alternative, as part of the Navy's baseline of activities. However, sinking exercises are not proposed under Alternative 1 or Alternative 2.

### 5.3.1.2.3 Physical Disturbance and Strike

### 5.3.1.2.3.1 Vessels

#### Training

Currently, the Navy employs the following Lookout procedures to avoid physical disturbance and strike of marine mammals during at-sea training:

- While underway, surface vessels shall have at least two Lookouts with binoculars; surfaced submarines shall have at least one Lookout with binoculars. Lookouts already posted for safety of navigation and man-overboard precautions may be used to fill this requirement. As part of their regular duties, Lookouts will watch for and report to the Officer of the Deck the presence of marine mammals.

The Navy is proposing to revise the mitigation measures for this activity as follows: while underway, vessels will have a minimum of one Lookout.

#### Testing

The Navy's current mitigation measures for testing activities are consistent with Navy training mitigation measures described for avoiding physical disturbance and strike of marine mammals during at-sea training (Section 5.3.1.2.3.1, Vessels – Training) above.

#### 5.3.1.2.3.2 Towed In-Water Devices

The Navy currently has no Lookout procedures for this activity in the Study Area.

**Training**

The Navy is proposing to have one Lookout during activities using towed in-water devices when towed from a manned platform.

**Testing**

The Navy's proposed mitigation measures for testing activities from manned platforms are consistent with Navy training mitigation measures described above. During testing in which in-water devices are towed by unmanned platforms, a manned escort vessel will be included and one Lookout will be employed.

### 5.3.1.2.4 Non-Explosive Practice Munitions

#### 5.3.1.2.4.1 Gunnery Exercises – Small-, Medium-, and Large-Caliber Using a Surface Target

Currently, the Navy employs the same mitigation measures for non-explosive gunnery exercises as described above in Section 5.3.1.2.2.4 (Gunnery Exercises – Small-, Medium-, and Large-Caliber Using a Surface Target).

**Training**

The Navy is proposing to continue using the number of Lookouts currently implemented for these activities. The Navy will have one Lookout during activities involving non-explosive practice munitions (e.g., small-, medium-, and large-caliber gunnery exercises) against a surface target.

**Testing**

The Navy's Proposed Action does not include gunnery testing activities.

#### 5.3.1.2.4.2 Bombing Exercises

Currently, the Navy employs the same mitigation measures for non-explosive bombing exercises as described above in Section 5.3.1.2.2.6 (Bombing Exercises [Explosive]).

**Training**

The Navy is proposing to continue using the same Lookout procedures currently implemented for these activities. The Navy will have one Lookout positioned in an aircraft during non-explosive bombing exercises.

BOMBEX events using non-explosive practice munitions may occur in areas greater than 20 nm from shore, but will not occur within the Olympic Coast National Marine Sanctuary (OCNMS).

**Testing**

The Navy's Proposed Action does not include bomb testing activities.

### 5.3.1.2.5 Effectiveness Assessment for Lookouts

Personnel standing watch in accordance with Navy standard operating procedures have multiple job responsibilities. While on duty, these standard personnel standing watch often conduct marine species observation in addition to their primary job duties (e.g., aiding in the navigation of the vessel). By having one or more Lookouts observing the air and surface of the water during certain training and testing activities, the Navy increases the likelihood that marine species will be detected. It is also important to note that a number of training and testing activities involve multiple vessels and aircraft, thereby increasing the cumulative number of Lookouts or watch personnel that could be present during a given activity.

Although using Lookouts is expected to increase the likelihood that marine species will be detected at the surface of the water, it is unlikely that using Lookouts will be able to help avoid impacts to all species entirely due to the inherent limitations of visually detecting marine mammals. The probability of visually detecting a marine animal is dependent upon two things. An animal must be present in an area to be seen (known as the availability bias), and an animal that is present in the area of observation must be positioned or behaving in a way that will allow for a visual detection. For example, an animal may not be visually detectable if it is swimming entirely under the water at a relatively far distance from a boat. Second, the observer must perceive the animal when the animal is in a position to be detected (Marsh and Sinclair 1989).

Pursuant to Phase I (e.g., Northwest Training Range Complex EIS/OEIS) and in cooperation with NMFS, the Navy has undertaken monitoring efforts to track compliance with take authorizations, help evaluate the effectiveness of implemented mitigation measures, and gain a better understanding of the impacts of the Navy activities on marine resources. In 2010, the Navy initiated a study designed to evaluate the effectiveness of the Navy Lookout team. The University of St. Andrews, Scotland, under contract to the U.S. Navy, developed an initial data collection protocol for use during the study. Between 2010 and 2012, trained Navy marine mammal observers collected data during nine field trials as part of a "proof of concept" phase. The goal of the proof of concept phase was to develop a statistically valid protocol for quantitatively analyzing the effectiveness of Lookouts during Navy training exercises. Field trials were conducted in the Hawaii Range Complex, Southern California Range Complex, and Jacksonville Range Complex onboard one frigate, one cruiser, and seven destroyers. After final assessment of the proof of concept and necessary revisions to the methodology were completed, the data collection phase began in 2012. Eight embarks have been conducted from 2012 through March 2015. Data collection is ongoing, and analysis will be conducted when the data set is large enough to produce statistically significant results. The Navy plans to conduct four embarks per year until the data set is sufficient, which is currently estimated to take 4–8 more years of effort[1].

#### 5.3.1.2.5.1 Detection Probabilities of Marine Mammals in the Study Area

Until the results of the Navy's Lookout effectiveness study are available, the Navy must rely on the best available science to determine detection probabilities of marine mammals by Navy Lookouts. To do so, the Navy has compiled the results of available literature on line-transect analyses, which are typically used to estimate cetacean abundance. In line-transect analyses, the factors affecting the detection of an animal or group of animals directly on the transect line may be probabilistically quantified as g(0). As a reference, a g(0) value of 1 indicates that animals on the transect line are always detected. Table 5.3-1 provides detection probabilities for cetacean species based largely on g(0) values derived from shipboard and aerial surveys in the Study Area, which vary widely based on g(0) derivation factors (e.g., species, sighting platforms, group size, and sea state conditions). Refer to Section 3.4.3.1.16 (Implementing Mitigation to Reduce Sound Exposures) for additional background on g(0) and a discussion of how the Navy used g(0) to quantitatively assess the effectiveness of Lookouts during sound-producing activities.

[1] Collection of a large enough data set to be statistical significant will partially be a function of the number of marine mammals in a given area available for sighting at the time of any embark. Therefore, the length of time needed to complete this study cannot be more precisely determined.

Several variables that play into how easily a marine mammal may be detected by a dedicated observer are directly related to the animal, including its external appearance and size; surface, diving and social behavior; and life history. The following is a generalized discussion of the behavior and external appearance of the marine mammals with the potential to occur in the Study Area as these characters relate to the detectability of each species. The species are grouped loosely based on either taxonomic relatedness or commonalities in size and behavior, and include large whales, cryptic species delphinids, beluga whales, and pinnipeds. Not all statements may hold true for all species in a grouping and exceptions are mentioned where applicable. The information presented in this section may be found in Jefferson et al. (2008) and sources within unless otherwise noted.

**Table 5.3-1: Sightability Based on g(0) Values for Marine Mammal Species in the Study Area**

| Species/Stocks | Family | Vessel Sightability | Aircraft Sightability |
|---|---|---|---|
| Baird's Beaked Whale | Ziphiidae | 0.96 | 0.18 |
| Blue Whale, Fin Whale, Sei Whale | Balaenopteridae | 0.921 | 0.407 |
| Bottlenose Dolphin | Delphinidae | 0.76 | 0.67 |
| California Sea Lion | Otariidae | 0.299 | 0.299 |
| Cuvier's Beaked Whale | Ziphiidae | 0.23 | 0.074 |
| Dall’s Porpoise | Phocoenidae | 0.822 | 0.221 |
| Dwarf Sperm Whale, Pygmy Sperm Whale, *Kogia* spp. | Kogiidae | 0.35 | 0.074 |
| Gray Whale | Eschrichtiidae | 0.921 | 0.482 |
| Harbor Porpoise | Phocoenidae | 0.769 | 0.292 |
| Harbor Seal | Phocidae | 0.281 | 0.281 |
| Humpback Whale | Balaenopteridae | 0.921 | 0.495 |
| Killer Whale | Delphinidae | 0.921 | 0.95 |
| *Mesoplodon* spp. | Ziphiidae | 0.45 | 0.11 |
| Minke Whale | Balaenopteridae | 0.856 | 0.386 |
| North Pacific Right Whale | Balaenidae | 0.645 | 0.41 |
| Northern Elephant Seal | Phocidae | 0.105 | 0.105 |
| Northern Fur Seal | Otariidae | 0.299 | 0.299 |
| Northern Right Whale Dolphin, Pacific White-Sided Dolphin | Delphinidae | 0.856 | 0.67 |
| Risso’s Dolphin, Striped Dolphin | Delphinidae | 0.76 | 0.67 |
| Short-Beaked Common Dolphin | Delphinidae | 0.856 | 0.67 |
| Short-finned Pilot Whale | Delphinidae | 0.76 | 0.67 |
| Sperm Whale | Physeteridae | 0.87 | 0.32 |
| Steller Sea Lion | Otariidae | 0.299 | 0.299 |

Note: For species having no data, the g(0) for Cuvier’s aircraft value (where g(0)=0.074) was used; or in cases where there was no value for vessels, the g(0) for aircraft was used as a conservative underestimate of sightability following the assumption that the availability bias from a slower moving vessel should result in a higher g(0).
Sources: Barlow 2006; Barlow et al. 2006; Barlow and Forney 2007; Carretta et al. 2000; Forney and Barlow 1998; Laake et al. 1997; Palka 2005. The published California Sea Lion aircraft g(0) is used for Steller Sea Lion, Guadalupe Fur Seal, and Northern Fur Seal since all are in the otariidae family and there is no g(0) data for these other species. Pinniped g(0) are not available for vessels so the aircraft value has been used as a conservative under estimate of sightability.

**Large Whales**

Species of large whales found in the Study Area include all the baleen whales and the sperm whale. Baleen whales are generally large, with adults ranging in size from 30 to 89 ft. (9 to 27 m), often making them immediately detectable. Many species of baleen whales have a prominent blow ranging from 10 ft. (3 m) to as much as 39 ft. (12 m) above the surface. However, at least one species (common minke whale) often have no visible blow. Baleen whales tend to travel singly or in small groups ranging from pairs to groups of five. The exception to this is the fin whale, which is known to travel in pods of seven or more individuals. All species of baleen whales are known to form larger-scale aggregations in areas of high localized productivity or on breeding grounds. Baleen whales may or may not fluke at the surface before they dive; some species fluke regularly (humpback whale), some fluke variably (blue whale, fin whale) and some rarely fluke (sei whale and common minke whale). Baleen whales may remain at the surface for extended periods of time as they forage or socialize. Humpback whales are known to corral prey at the surface. Dive behavior varies amongst species, as well. Many species will dive and remain at depth for as long as 30 minutes. Some will adjust their diving behavior according to the presence of vessels (humpback whale, fin whale). Sei whales are known to sink just below the surface and remain there between breaths. Baleen whale g(0) values are shown in Table 5.3-1.

Adult gray whales, included among the large whales, range in size from 38 to 46 ft. (11 to 14 m). When viewed in windless conditions, their blow is heart-shaped, up to 15 ft. (5 m) in height. They typically breathe 3–5 times in a row, about 10–20 seconds apart, then dive for 3–7 minutes. Gray whales occur within a narrow coastal band and their populations are generally assessed using focused (single-species) count data made from shore stations; g(0) values from vessels are not available for this species and thus estimates from other large baleen whales were used.

Sperm whales are also considered large whales, with adult males reaching as much as 50 ft. (18 m) in total length. Sperm whales at the surface would likely be easy to detect. They are large, have a prominent, 16 ft. (5 m) blow, and may remain at the surface for long periods of time. They are known to raft (i.e., loll at the surface) and to form surface-active groups when socializing. Sperm whales may travel or congregate in large groups of as many as 50 individuals. Although sperm whales engage in conspicuous surface behavior such as fluking, breaching and tail-slapping, they are long, deep divers and may remain submerged for over 1 hour. Sperm whale g(0) values are shown in Table 5.3-1.

**Cryptic Species**

Cryptic and deep-diving species are those that do not surface for long periods of time and are often difficult to see when they surface, which ultimately limits the ability of Lookouts to detect them even in good sighting conditions (Barlow et al. 2006). Cryptic species include beaked whales (family Ziphiidae), dwarf and pygmy sperm whales (*Kogia* species), and harbor porpoises. Beaked whales are notoriously difficult to detect at sea. In the Study Area, beaked whales may occur in a variety of group sizes, ranging from single individuals to groups of as many as 22 individuals (MacLeod and D'Amico 2006). Beaked whale diving behavior in general consists of long, deep dives that may last for nearly 90 minutes followed by a series of shallower dives and intermittent surfacings (Tyack et al. 2006, Baird et al. 2007). Some individuals remain at the surface for an extended period of time (perhaps 1 hour or more) or make shorter dives (MacLeod and D’Amico 2006). Beaked whale detection is further complicated because they often dive and surface in a synchronous pattern and often travel below the surface of the water (MacLeod and D'Amico 2006). Cryptic beaked whale g(0) values are shown in Table 5.3-1. (Baird’s beaked whale is not considered a cryptic species as it is large and relatively easy to detect in comparison to other beaked whale species.)

Dwarf and pygmy sperm whales (referred to broadly as *Kogia* species) are small cetaceans (10–13 ft. [3–4 m] adult length) that are not seen commonly at sea. *Kogia* species g(0) values are shown in Table 5.3-1. *Kogia* species are some of the most commonly stranded species in some areas, which suggests that sightings are not indicative of their overall abundance. This supports the idea that they are cryptic, perhaps engaging in inconspicuous surface behavior or actively avoiding vessels. When *Kogia* species are sighted, they are seen in groups of no more than five to six individuals. They have no visible blow, do not fluke when they dive, and are known to log (i.e., lie motionless) at the surface. When they do dive, they often will sink out of sight with no prominent behavioral display.

Harbor porpoises are difficult to detect in all but the best of conditions (i.e., no swell, no whitecaps). Harbor porpoise g(0) are shown in Table 5.3-1. Harbor porpoises travel singly or in small groups of less than six individuals, but may aggregate into groups of several hundred. They are inconspicuous at the surface, rarely lifting their heads above the surface and often lying motionless. They are small and may actively avoid vessels.

**Delphinids**

Delphinids are some of the most likely species to be detected at sea by observers. Delphinid g(0) values are shown in Table 5.3-1. Many species having very high g(0) values, such as the killer whale with values ranging from 0.921 to 0.95 (see Table 5.3-1). Many species of delphinids engage in very conspicuous surface behavior, including leaping, spinning, bow riding, and traveling along the surface in large groups. Delphinid group sizes may range from 10 to 10,000 individuals, depending upon the species and the geographic region. Species such as Pacific white-sided dolphins, bottlenose dolphins, and common dolphins are known to either actively approach and investigate vessels, or bow ride along moving vessels. The physical profile of a killer whale is unmistakable and while at the surface they are easily detected. Common dolphins form huge groups that travel quickly along the surface, churning up the water and making them visible from a great distance. Delphinids may dive for as little as 1 minute to more than 30 minutes, depending upon the species.

**Pinnipeds**

Pinnipeds (seals and sea lions) are more difficult to detect at sea, but are plentiful in inland waters as compared to cetaceans. There is not a lot of information regarding pinniped behavior at sea, but pinnipeds have been described at length for inland waters. Pinnipeds are much smaller, are often solitary at sea, and they generally do not engage in conspicuous surface behavior. In inland waters they may congregate in large groups and engage in observable behaviors. Pinnipeds have a low profile, no dorsal appendage, and small body size in comparison with most cetaceans, limiting accurate visual detection to sea states of less than 2 on the Beaufort scale (Carretta et al. 2000) at sea. Some species, such as harbor seals, are known to approach and observe human activities in inland waterways, on land, or on stationary vessels.

#### 5.3.1.2.5.2 Detection Probabilities of Sea Turtles in the Study Area

Sea turtles spend a majority of their time below the surface and are difficult to sight from a vessel until the animal is at close range (Hazel et al. 2007). Sea turtles often spend over 90 percent of their time underwater and are not visible more than 6.5 ft. (2 m) below the surface (Mansfield 2006). Sea turtles are generally much smaller than cetaceans, so while shipboard surveys designed for sighting marine mammals are adequate for detecting large sea turtles (e.g., adult leatherbacks), they are usually not adequate for detecting the smaller-sized turtles (e.g., juveniles). Juvenile sea turtles may be especially difficult to detect. Aerial detection may be more effective in spotting sea turtles on the surface, particularly in calm seas and clear water, but it is possible that the smallest age classes are not detected even in good conditions (Marsh and Saalfeld 1989). Visual detection of sea turtles, especially small turtles, is further complicated by their startle behavior in the presence of ships. Turtles on the surface may dive below the surface of the water in the presence of a vessel before it is detected by shipboard or aerial observers (Kenney 2005). The detection probability of sea turtles is generally lower than that of cetaceans; however, there is no information available on specific g(0) values for turtles. The use of Lookouts for visual detection of sea turtles is likely effective only at close range, and is thought to be less effective for small individuals than large individuals.

##### 5.3.1.2.5.3 Summary of Lookout Effectiveness

Due to the various detection probabilities, levels of experience, and dependence on sighting conditions, Lookouts will not always be effective at avoiding impacts to all species. However, Lookouts are expected to increase the overall likelihood that certain marine mammal species will be detected at the surface of the water, when compared to the likelihood that these same species would be detected if Lookouts are not used. The Navy believes the continued use of Lookouts contributes to helping reduce potential impacts to these marine mammal species from training and testing activities.

#### 5.3.1.2.6 Operational Assessment for Lookouts

As written, implementation of the mitigation measures recommended in Section 5.3.1.2 (Lookouts) is considered an acceptable program with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activities, and Navy policy. The number of Lookouts recommended for each measure often represents the maximum Lookout capacity based on limited resources (e.g., space and manning restrictions).

### 5.3.2 Mitigation Zone Procedural Measures

Safety zones described in Section 5.1 (Standard Operating Procedures) are zones designed for human safety, whereas this section will introduce mitigation zones. A mitigation zone is designed solely for the purpose of reducing potential impacts on marine mammals and sea turtles from training and testing activities. Mitigation zones are measured as the radius from a source. Unique to each activity category, each radius represents a distance that the Navy will visually observe to help reduce injury to marine species. Visual detections of applicable marine species will be communicated immediately to the appropriate watch station for information dissemination and appropriate action. If the presence of marine mammals is detected acoustically, Lookouts posted in aircraft and on surface vessels will increase the vigilance of their visual surveillance. As a reference, aerial surveys are typically made by flying at 1,500 ft. (457 m) altitude or lower at the slowest safe speed.

Many of the proposed activities have mitigation measures that are currently being implemented, as required by previous environmental documents or consultations. Most of the current Phase I (e.g., Northwest Training Range Complex EIS/OEIS) mitigation zones for activities that involve the use of impulse and non-impulse sources were originally designed to reduce the potential for onset of temporary threshold shift (TTS). For the NWTT EIS/OEIS, the Navy updated the acoustic propagation modeling to incorporate updated hearing threshold metrics (i.e., upper and lower frequency limits), updated density data for marine mammals, and factors such as an animal's likely presence at various depths. An explanation of the acoustic propagation modeling process can be found in the *Determination of Acoustic Effects on Marine Mammals and Sea Turtles for the Northwest Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement* technical report (Marine Species Modeling Team 2013).

As a result of the updates to the acoustic propagation modeling, in some cases the ranges to onset of TTS effects are much larger than those output by previous Phase I models. Due to the ineffectiveness and unacceptable operational impacts associated with mitigating these large areas, the Navy is unable to mitigate for onset of TTS for every activity. In this NWTT analysis, the Navy developed each recommended mitigation zone to avoid or reduce the potential for onset of the lowest level of injury, permanent threshold shift (PTS), out to the predicted maximum range. In some cases where the ranges to effects are smaller than previous models estimated, the mitigation zones were adjusted accordingly to provide consistency across the measures. Mitigating to the predicted maximum range to PTS consequently also mitigates to the predicted maximum range to onset mortality (1 percent mortality), onset slight lung injury, and onset slight gastrointestinal tract injury, since the maximum range to effects for these criteria are shorter than for PTS. Furthermore, in most cases, the predicted maximum range to PTS also consequently covers the predicted average range to TTS. Table 5.3-2 summarizes the predicted average range to TTS, average range to PTS, maximum range to PTS, and recommended mitigation zone for each activity category, based on the Navy's acoustic propagation modeling results. The predicted ranges are based on local environmental conditions and are unique to the NWTT Study Area.

The activity-specific mitigation zones are based on the longest range for all the functional hearing groups (based on the hearing threshold metrics described in Section 3.4, Marine Mammals, and Section 3.5, Sea Turtles). The mitigation zone for a majority of activities is driven by either the high-frequency cetaceans or the sea turtles functional hearing groups. Therefore, the mitigation zones are even more protective for the remaining functional hearing groups (i.e., low-frequency cetaceans, mid-frequency cetaceans, and pinnipeds), and likely cover a larger portion of the potential range to onset of TTS.

The range to effects for activities using sonar and other active acoustic sources used in the Inland Waters differ from the ranges used in Table 5.3-2 based on Offshore Area activities. For pierside maintenance and testing of hull-mounted mid-frequency sources in the Inland Waters, modeling provides an overestimate of the range to effects because it cannot adequately account for the complex interactions of the sound energy into very shallow water and associated shorelines, the loss into dampening structures (i.e., such as adjacent pilings, jetties, or seawalls), or occasions when a ship or submarine is moored bow in so that the sonar is transmitted toward the nearby shoreline. Therefore, the ranges in Table 5.3-2 are even more protective for activities in the Inland Waters.

In addition to evaluating mitigation zones based on marine mammals and sea turtles, the Navy also evaluated ranges for specific effects to the marbled murrelet. This evaluation included explosive ranges to TTS and the onset of auditory injury, non-auditory injury, slight lung injury, and mortality. For every source proposed for use by the Navy, the recommended mitigation zones included in Table 5.3-2 exceed each of these ranges.

In some instances, the Navy recommends mitigation zones that are larger or smaller than the predicted maximum range to PTS based on the effectiveness and operational assessments. The recommended mitigation zones and their associated assessments are provided throughout the remainder of this section. The recommended measures are either currently implemented, are modifications of current measures, or are new measures.

For some activities specified throughout the remainder of this section, Lookouts may be required to observe for concentrations of detached floating vegetation (i.e., kelp paddies), which are indicators of potential marine mammal and sea turtle presence within the mitigation zone. Those specified activities will not commence if floating vegetation (i.e., kelp paddies) is observed within the mitigation zone prior to the initial start of the activity. If floating vegetation is observed prior to the initial start of the activity, the activity will be relocated to an area where no floating vegetation is observed. Training and testing will not cease as a result of indicators entering the mitigation zone after activities have commenced. This measure is intended only for floating vegetation detached from the seafloor.

**Table 5.3-2: Predicted Range to Effects and Recommended Mitigation Zones for Marine Mammals and Sea Turtles**

| Activity Category | Representative Source (Bin)[1] | Predicted Average Range to TTS | Predicted Average Range to PTS | Predicted Maximum Range to PTS | Recommended Mitigation Zone |
|---|---|---|---|---|---|
| **Sonar and Other Active Acoustic Sources** | | | | | |
| Low-Frequency and Hull-Mounted Mid-Frequency Active Sonar | SQS-53 ASW hull-mounted sonar (MF1) | 4,251 yd. (3,887 m) for one ping | 100 yd. (91 m) for one ping | Not applicable | Training: 1,000 yd. (914 m) and 500 yd. (457 m) power downs and 200 yd. (183 m) shutdown for cetaceans and sea turtles, 100 yd. (91 m) mitigation zone for pinnipeds (excludes haulout areas)<br>Testing: 1,000 yd. (914 m) and 500 yd. (457 m) power downs for sources that can be powered down, 200 yd. (183 m) shutdown for cetaceans, and 100 yd. (91 m) for pinnipeds (excludes haulout areas) |
| High-Frequency and Non-Hull-Mounted Mid-Frequency Active Sonar[2] | AQS-22 ASW dipping sonar (MF4) | 226 yd. (207 m) for one ping | 20 yd. (18 m) for one ping | Not applicable | Training: 200 yd. (183 m)<br>Testing: 200 yd. (183 m) for cetaceans, 100 yd. (91 m) for pinnipeds (excludes haulout areas) |
| **Explosive and Impulse Sound** | | | | | |
| Improved Extended Echo Ranging Sonobuoys | Explosive sonobuoy (E4) | 237 yd. (217 m) | 133 yd. (122 m) | 235 yd. (215 m) | Training: 600 yd. (549 m)<br>Testing: 600 yd. (549 m) |
| Signal Underwater Sound (SUS) buoys using > 0.5–2.5 lb. NEW | Explosive sonobuoy (E3) | 178 yd. (163 m) | 92 yd. (84 m) | 214 yd. (196 m) | Training: 350 yd. (320 m)<br>Testing: 350 yd. (320 m) |
| Mine Countermeasure and Neutralization Activities (Positive control) | >0.5-2.5 lb. NEW (E3) | 495 yd. (453 m) | 145 yd. (133 m) | 373 yd. (341 m) | Training: 400 yd. (366 m)<br>Testing: n/a |
| Gunnery Exercises – Small- and Medium-Caliber (Surface Target) | 25 mm projectile (E1) | 72 yd. (66 m) | 48 yd. (44 m) | 73 yd. (67 m) | Training: 200 yd. (183 m)<br>Testing: n/a |
| Gunnery Exercises – Large-Caliber (Surface Target) | 5 in. projectiles (E5 at the surface)[3] | 210 yd. (192 m) | 110 yd. (101 m) | 177 yd. (162 m) | Training: 600 yd. (549 m)<br>Testing: n/a |
| Missile Exercises up to 500 lb. NEW (Surface Target) | Harpoon missile (E10) | 1,164 yd. (1,065 m) | 502 yd. (459 m) | 955 yd. (873 m) | Training: 2,000 yd. (1.8 km)<br>Testing: n/a |
| Bombing Exercises | MK-84 2,000 lb. bomb (E12) | 1,374 yd. (1,256 m) | 591 yd. (540 m) | 1,368 yd. (1,251 m) | Training: 2,500 yd. (2.3 km)<br>Testing: n/a |

**Table 5.3-2: Predicted Range to Effects and Recommended Mitigation Zones for Marine Mammals and Sea Turtles (continued)**

| Activity Category | Representative Source (Bin)[1] | Predicted Average Range to TTS | Predicted Average Range to PTS | Predicted Maximum Range to PTS | Recommended Mitigation Zone |
|---|---|---|---|---|---|
| Lightweight Torpedo (Explosive) Testing | MK-46 torpedo (E8) | 497 yd. (454 m) | 245 yd. (224 m) | 465 yd. (425 m) | Training: n/a<br>Testing: 2,100 yd. (1.9 km) |
| Heavyweight Torpedo (Explosive) Testing | MK-48 torpedo (E11) | 1,012 yd. (926 m) | 472 yd. (432 m) | 885 yd. (809 m) | Training: n/a<br>Testing: 2,100 yd. (1.9 km) |
| Sinking Exercises [4] | Various up to MK-84 2,000 lb. bomb (E12) | 1,374 yd. (1,256 m) | 591 yd. (540 m) | 1,368 yd. (1,251 m) | Training: 2.5 $nm^2$<br>Testing: n/a |

[1] This table does not provide an inclusive list of source bins; bins presented here represent the source bin with the largest range to effects within the given activity category.
[2] High-frequency and non-hull-mounted mid-frequency active sonar category includes unmanned underwater vehicle and torpedo testing activities.
[3] The representative source bin E5 has different range to effects depending on the depth of activity occurrence (at the surface or at various depths).
[4] Although included under the No Action Alternative, sinking exercises will no longer be conducted in the NWTT Study Area.
Notes: ASW = anti-submarine warfare, m = meter, n/a = Not Applicable, NEW = net explosive weight, PTS = permanent threshold shift, TTS = temporary threshold shift, yd. = yard

#### 5.3.2.1 Acoustic Stressors

##### 5.3.2.1.1 Non-Impulse Sound

###### 5.3.2.1.1.1 Low-Frequency and Hull-Mounted Mid-Frequency Active Sonar

**Recommended Mitigation and Comparison to Current Mitigation**

Under the Proposed Action, low-frequency active sonar would be used only during a few testing activities conducted in the Offshore Area, the Inland Waters, and the Western Behm Canal, and not during any proposed training activities. Therefore, mitigation measures for low-frequency active sonar sources currently exist only for these testing activities conducted in the Study Area.

**Training**

The Navy is proposing to (1) continue implementing the current measures for mid-frequency active sonar, (2) clarify the conditions needed to recommence an activity after a sighting, and (3) implement mitigation measures for pinnipeds and for pierside sonar testing in the vicinity of hauled out pinnipeds.

For training activities, the recommended measures are provided below.

Activities that involve the use of hull-mounted mid-frequency active sonar (including pierside) will use Lookouts for visual observation from a ship immediately before and during the activity. Mitigation zones for these activities involve powering down the sonar by 6 dB when a marine mammal is sighted within 1,000 yd. (914 m) of the sonar dome, and by an additional 4 dB when sighted within 500 yd. (457 m) from the source, for a total reduction of 10 dB. Active transmissions will cease if a marine mammal or sea turtle is sighted within 200 yd. (183 m). Active transmission will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes, (4) the ship has transited more than 2,000 yd. (1.8 kilometers [km]) beyond the location of the last sighting, or (5) the ship concludes that dolphins are deliberately closing in on the ship to ride the ship's bow wave (and there are no other marine mammal sightings within the mitigation zone). Active transmission may resume when dolphins are bow riding because they are out of the main transmission axis of the active sonar while in the shallow-wave area of the ship bow.

For pinnipeds, the Navy proposes a 100 yd. mitigation zone; active transmissions will cease if a pinniped is sighted within 100 yd. (91 m). The pinniped mitigation zone does not apply for pierside sonar maintenance in the vicinity of pinnipeds hauled out on or in the water near man-made structures and vessels. Within Puget Sound there are several locations where pinnipeds use Navy structures (e.g., submarines, security barriers) for haulouts in spite of the degree of activity surrounding these sites (Figure 5-2). Given that animals continue to choose these areas for their resting behavior, it would appear there are no long-term effects or consequences to those animals, whether in the water or hauled out, as a result of ongoing and routine Navy activities. The mitigation of removing them from a submarine and/or port security barrier is not considered viable as that action could be perceived as a greater harassment and would be difficult to implement because of the number of animals typically involved.

**Testing**

There are no current hull-mounted mid-frequency active sonar testing activities in the Study Area, and no mitigation procedures. However, the Navy's Proposed Action includes newly assessed hull-mounted mid frequency active sonar testing activities.

**Figure 5-2: Sea Lions Hauled Out on: Naval Station Everett Port Security Barrier (Top), on Naval Base Kitsap, Bangor Port Security Barrier (Center), and on a Submarine at Naval Base Kitsap, Bangor (Bottom)**

For testing with low-frequency or hull-mounted mid-frequency source activities, the recommended measures are provided below.

Activities that involve the use of low-frequency active sonar (including pierside) will use Lookouts for visual observation immediately before and during the event. If a cetacean or sea turtle (pinniped measures are described below) is sighted within 200 yd. (183 m) of the sound source, active transmissions will cease. Active transmission will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes, or (4) the sound source has transited more than 2,000 yd. (1.8 km) beyond the location of the last sighting.

Activities that involve the use of hull-mounted mid-frequency active sonar (including pierside and shore-based testing) will follow the mitigation measures described above for hull-mounted mid-frequency active sonar training.

For pinnipeds, the Navy proposes a 100 yd. mitigation zone. The pinniped mitigation zone does not apply for pierside sonar maintenance in the vicinity of pinnipeds hauled out on or in the water near man-made structures and vessels.

**Effectiveness and Operational Assessments**

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce. As shown in Table 5.3-2, the predicted maximum range to onset of PTS for low-frequency and hull-mounted mid-frequency active sonar sources is approximately 292 yd. (267 m) for one ping. This range was determined by the high-frequency cetacean functional hearing group. The distance for all other marine mammal functional hearing groups is less than 104 yd. (95 m) for one ping, so the mitigation zone will provide further protection from injury (PTS) for these species. Therefore, implementation of the 200 yd. (183 m) shutdown zone will reduce the potential for exposure to higher levels of energy that would result in injury (PTS) and large threshold shifts that are recoverable (i.e., TTS) when individuals are sighted. Implementation of the 500 yd. (457 m) and 1,000 yd. (914 m) sonar power reductions will further reduce the potential for injury (PTS) and larger threshold shifts that would result in recovery (i.e., TTS) to occur when individual marine mammals are sighted within these zones, especially in cases where the ship and animal are approaching each other.

The mitigation zones the Navy has developed are within a range for which Lookouts can reasonably be expected to maintain situational awareness and visually observe during most conditions. Since the average range to onset of TTS is 4,251 yd. (3,887 m), the entire range to TTS is not reasonably observable. By establishing mitigation zones that can be realistically maintained from ships, Lookouts will be more effective at sighting individual animals. By keeping Lookouts focused within the ranges where exposure to higher levels of energy is possible, the effectiveness at reducing potential impacts to marine mammals and sea turtles will increase. As discussed in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), the likelihood of sighting individual animals, particularly sea turtles and some species of small or cryptic marine mammals, decreases at long distances.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. A 30-minute wait period more than covers the average dive times of most marine mammal species but may not be sufficient for some deep-diving marine mammal species or for sea turtles. However, the analysis in Section 3.4.3.1 (Acoustic Stressors) shows that injury to deep-diving marine mammals (e.g., sperm whales and beaked whales) is not expected to occur. Furthermore, any wait period greater than 30 minutes would result in an unacceptable operational impact on readiness. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to marine mammals and sea turtles; and (2) implementation is considered to be acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

#### 5.3.2.1.1.2 High-Frequency and Non-Hull-Mounted Mid-Frequency Active Sonar

**Recommended Mitigation and Comparison to Current Mitigation**

**Training**

Non-hull-mounted mid-frequency active sonar training activities include the use of aircraft deployed sonobuoys and helicopter dipping sonar. The Navy is proposing to: (1) continue implementing the current mitigation measures for activities currently being executed, such as dipping sonar activities; (2) extend the implementation of its current mitigation to all other activities in this category; and (3) clarify the conditions needed to recommence an activity after a sighting. The recommended measures are provided below.

Mitigation will include visual observation from a vessel or aircraft (with the exception of platforms operating at high altitudes) immediately before and during active transmission within a mitigation zone of 200 yd. (183 m) from the active sonar source. For activities involving helicopter deployed dipping sonar, visual observation will commence 10 minutes before the first deployment of active dipping sonar. Helicopter dipping and sonobuoy deployment will not begin if concentrations of floating vegetation (kelp paddies), are observed in the mitigation zone. If the source can be turned off during the activity, active transmission will cease if a marine mammal is sighted within the mitigation zone. Active transmission will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes for an aircraft-deployed source, (4) the mitigation zone has been clear from any additional sightings for a period of 30 minutes for a vessel-deployed source, (5) the vessel or aircraft has repositioned itself more than 400 yd. (370 m) away from the location of the last sighting, or (6) the vessel concludes that dolphins are deliberately closing in to ride the vessel's bow wave (and there are no other marine mammal sightings within the mitigation zone).

**Testing**

Mitigation measures for high-frequency active sonar sources currently exist only for testing activities conducted in the Inland Waters of Puget Sound. These activities include the use of unmanned vehicles, non-explosive torpedoes, and similar systems. The current mitigation measures used for these testing activities are the same as described above in Section 5.3.2.1.1.1 (Low-Frequency and Hull-Mounted Mid-Frequency Active Sonar).

For all high-frequency and non-hull-mounted mid-frequency active sonar testing activities in the Proposed Action, the Navy proposes to employ the mitigation measures described above for training. For pinnipeds, the Navy proposes a 100 yd. (91 m) mitigation zone during testing. The pinniped mitigation zone does not apply for pierside sonar testing in the vicinity of pinnipeds hauled out on or in the water near man-made structures and vessels.

**Effectiveness and Operational Assessments**

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce. As shown in Table 5.3-2, the predicted maximum range to onset of PTS for high-frequency and non-hull-mounted mid-frequency active sonar sources is less than 55 yd. (50 m) for one ping. This range was the same for all functional hearing groups. The average range to onset of TTS across all functional hearing groups is 226 yd. (207 m) for one ping. Implementation of the 200 yd. (183 m) mitigation zone will reduce the potential for exposure to higher levels of energy that would result in injury (PTS) and larger threshold shifts that would result in recovery (i.e., TTS) when individuals are sighted. Lookouts often visually observe either close aboard a vessel or from directly above the source by aircraft (i.e., helicopters). Exceptions include when sonobuoys are deployed and when sources are deployed from high altitude aircraft. When sonobuoys are used, the sonobuoy field may be dispersed over a large distance. As discussed in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), the likelihood of sighting individual animals, particularly small or cryptic marine mammals, decreases at long distances. This measure should be effective at reducing risks to all marine mammals that are available to be observed within the mitigation zone.

The post-sighting wait periods are designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. The 30-minute wait period for vessel-deployed sources more than covers the average dive times of most marine mammal species but may not be sufficient for some deep-diving species. However, the analysis in Section 3.4.3.1 (Acoustic Stressors) shows that injury to deep-diving marine mammals (e.g., sperm whales and beaked whales) is not expected to occur, with the exception of *Kogia* species. Furthermore, any wait period greater than 30 minutes for vessel-deployed sources would result in an unacceptable operational impact on readiness. The 10-minute wait period for aircraft-deployed sources is based on fuel restrictions. Any wait period greater than 10 minutes for an aircraft-deployed source would result in an unacceptable operational impact on readiness and safety of personnel. The 10-minute wait period covers a portion of the average marine mammal dive times but may not be sufficient to cover the average dive times of all species. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to marine mammals; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

#### 5.3.2.1.2 Explosives and Impulse Sound

##### 5.3.2.1.2.1 Improved Extended Echo Ranging Sonobuoys

**Recommended Mitigation and Comparison to Current Mitigation**

**Training**

The Navy has historically conducted IEER training in the Study Area, and has completed environmental planning documents analyzing this training in the past. Mitigation applied to this event includes the following procedures:

The Navy is proposing to (1) modify the mitigation measures currently implemented for this activity by reducing the marine mammal and sea turtle mitigation zone from 1,000 yd. (914 m) to 600 yd. (549 m), (2) clarify the conditions needed to recommence an activity after a sighting, and (3) adopt the marine mammal and sea turtle mitigation zone size for floating vegetation for ease of implementation. The recommended measures are provided below.

Mitigation will include pre-exercise aerial observation and passive acoustic monitoring, which will begin 30 minutes before the first source/receiver pair detonation and continue throughout the duration of the exercise. The pre-exercise aerial observation will include the time it takes to deploy the sonobuoy pattern (deployment is conducted by aircraft dropping sonobuoys in the water). Improved Extended Echo Ranging sonobuoys will not be deployed if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone around the intended deployment location. Explosive detonations will cease if a marine mammal or sea turtle is sighted within the mitigation zone. Detonations will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes.

Passive acoustic monitoring would be conducted with Navy assets, such as sonobuoys, already participating in the activity. These assets would only detect vocalizing marine mammals within the frequency bands monitored by Navy personnel. Passive acoustic detections would provide only limited range and bearing to detected animals, and therefore cannot provide locations of these animals. Passive acoustic detections would be reported to Lookouts posted in aircraft and on vessels in order to increase vigilance of their visual surveillance.

#### Testing

The Navy's proposed mitigation measures for testing activities are consistent with Navy training mitigation measures described above.

#### Effectiveness and Operational Assessments

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce. As shown in Table 5.3-2, the predicted maximum range to onset of PTS for Improved Extended Echo Ranging sonobuoys is approximately 235 yd. (215 m). This range was determined by the high-frequency cetacean functional hearing group. The remaining functional hearing groups had a shorter range to onset of PTS, so the mitigation zone will provide further protection for these species. The average range to onset of TTS across all functional hearing groups is 237 yd. (217 m). Implementation of the 600 yd. (549 m) mitigation zone will reduce the potential for exposure to higher levels of energy that would result in injury and larger threshold shifts that would result in recovery (i.e., TTS) when individuals are sighted. The sonobuoy field may be dispersed over a large distance. As discussed in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), the likelihood of sighting individual animals, particularly sea turtles and some species of small or cryptic marine mammals, decreases at long distances.

The decrease in mitigation zone size will result in no mitigation for exposure to lower levels of potential onset of TTS; however, it will allow for a more focused survey effort over a smaller survey distance, and will consequently increase the likelihood of avoidance of injury and larger threshold shifts that would result in recovery (i.e., TTS) to marine mammals and sea turtles.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. A 30-minute wait period more than covers the average dive times of most marine mammal species but may not be sufficient for some deep-diving marine mammal species or for sea turtles. However, the analysis in Section 3.4.3.1 (Acoustic Stressors) shows that injury to deep-diving marine mammals (e.g., sperm whales and beaked whales) is not expected to occur. Furthermore, any wait period greater than 30 minutes would result in an unacceptable operational impact on readiness. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to marine mammals and sea turtles; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

##### 5.3.2.1.2.2 Explosive Signal Underwater Sound Buoys Using > 0.5–2.5 Pound Net Explosive Weight

**Recommended Mitigation and Comparison to Current Mitigation**

Mitigation measures do not currently exist for activities using SUS buoys.

**Training**

The Navy is proposing to add the following recommended measures. Mitigation will include pre-exercise aerial monitoring during deployment within a mitigation zone of 350 yd. (320 m) around an explosive SUS buoy. Explosive SUS buoys will not be deployed if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone (around the intended deployment location). SUS deployment will cease if a marine mammal or sea turtle is sighted within the mitigation zone. Deployment will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes.

Passive acoustic monitoring will also be conducted with Navy assets, such as sonobuoys, already participating in the activity. These assets would only detect vocalizing marine mammals within the frequency bands monitored by Navy personnel. Passive acoustic detections would not provide range or bearing to detected animals, and therefore cannot provide locations of these animals. Passive acoustic detections would be reported to Lookouts posted in aircraft in order to increase vigilance of their visual surveillance.

**Testing**

The Navy's proposed mitigation measures for testing activities are consistent with Navy training mitigation measures described above.

**Effectiveness and Operational Assessments**

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce. As shown in Table 5.3-2, the predicted maximum range to onset of PTS for explosive SUS buoys using > 0.5–2.5 lb. net explosive weight is approximately 214 yd. (196 m). This range was determined by the high-frequency cetacean functional hearing group. The remaining functional hearing groups had a shorter range to onset of PTS, so the mitigation zone will provide further protection for these species. The average range to onset of TTS across all functional hearing groups is 178 yd. (163 m). Implementation of the 350 yd. (320 m) mitigation zone will reduce the potential for exposure to higher levels of energy that would result in injury and large threshold shifts that are recoverable (i.e., TTS) when individuals are sighted. As discussed in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), the likelihood of sighting individual animals, particularly sea turtles and some species of small or cryptic marine mammals, decreases at long distances.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. The 10-minute wait period for this activity, which involves aircraft-deployed sources, is based on fuel restrictions. Any wait period greater than 10 minutes for an aircraft-deployed source would result in an unacceptable operational impact on readiness and safety of personnel. The 10-minute wait period covers a portion of the average marine mammal and sea turtle dive times but may not be sufficient to cover the average dive times of all species. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

The Navy proposes implementing the recommended measure described above because (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to marine mammals and sea turtles; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

##### 5.3.2.1.2.3 Mine Countermeasure and Neutralization Activities Using Positive Control Firing Devices

**<u>Recommended Mitigation and Comparison to Current Mitigation</u>**

**Training**

Mine countermeasure and neutralization activities in the Study Area involve the use of diver-placed charges that typically occur close to shore. When these activities are conducted using a positive control firing device, the detonation is controlled by the personnel conducting the activity and is not authorized until the area is clear at the time of detonation.

Currently, the Navy employs the following mitigation zone procedures during mine countermeasure and neutralization activities using positive control firing devices:

- Mitigation Zone – All Mine Warfare and Mine Countermeasures Operations involving the use of explosive charges must include mitigation zones for marine mammals and marbled murrelets to prevent physical and/or acoustic effects to those species.
    - The exclusion zone for marine mammals shall extend in a 700 yd. (640 m) arc radius around the detonation site for all charges sizes from > 0.5-2.5 lb. net explosive weight.
    - The exclusion zone for marbled murrelets shall extend in a 700 yd. (640 m) arc radius around the detonation site for 2.5 lb. net explosive weight training activities; 330 yd. (300 m) radius for a 1.5 lb. charge and 110 yd. (100 m) radius for a 1-ounce charge.
- Pre-Exercise Surveys – For Demolition and Mine Countermeasures Operations, pre-exercise surveys shall be conducted within 30 minutes prior to the commencement of the scheduled explosive event. The survey may be conducted from the surface, by divers, and/or from the air, and personnel shall be alert to the presence of any marine mammal or seabird. Should such an animal be present within the survey area, the explosive event shall not be started until the

animal voluntarily leaves the area. The Navy will ensure the area is clear of marine mammals and seabirds for a full 30 minutes prior to initiating the explosive event. Personnel will record any marine mammal and seabird observations during the exercise as well as measures taken if species are detected within the exclusion zone.

- Post-Exercise Surveys – Surveys within the same radius shall also be conducted within 30 minutes after the completion of the explosive event.

For activities involving positive control diver-placed charges, the Navy is proposing to (1) modify the currently implemented mitigation measures for activities involving > 0.5-2.5 lb. net explosive weight by changing the mitigation zone from 700 yds. (640 m) to 400 yd. (366 m) for marine mammals, (2) clarify the conditions needed to recommence an activity after a sighting, (3) add a requirement to observe for floating vegetation, and (4) defer the determination of a mitigation zone and monitoring procedure for marbled murrelet until consultation with USFWS is complete. The recommended measures for activities involving positive control diver-placed activities are provided below.

The Navy is proposing to use the 400 yd. (366 m) mitigation zones for marine mammals described above during activities involving positive control diver-placed charges. The mitigation zone for the marbled murrelet will be determined in consultation with USFWS. Visual observation will be conducted by two small boats, each with a minimum of one surveyor.

Explosive detonations will cease if a marine mammal is sighted in the water portion of the mitigation zone (i.e., not on shore). Detonations will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes.

Although the mitigation zone and monitoring procedure for the marbled murrelet are being determined in consultation with USFWS, the Navy proposes to continue visual monitoring for the marbled murrelet within the mitigation zone. The Navy will report all injured marbled murrelets sighted during the post-detonation observations to the appropriate Navy Region Environmental Director, Navy Pacific Fleet Environmental Office, and local base wildlife biologist.

#### Testing

The Navy's Proposed Action does not include mine countermeasure and neutralization testing activities.

#### <u>Effectiveness and Operational Assessments</u>

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce. In determining the range to effects shown in Table 5.3-2 for general mine countermeasure and neutralization activities, the high-frequency cetacean functional hearing group, sea turtles, and marbled murrelets were considered. The remaining functional hearing groups had shorter ranges to onset of PTS, so the mitigation zones will provide further protection for these species. Implementing the mitigation zones outlined in Table 5.3-2 will reduce the potential for exposure to higher levels of energy that would result in injury and larger threshold shifts that would result in recovery (i.e., TTS) when individuals are sighted.

As described in Section 5.3.1 (Lookout Procedural Measures), Lookouts positioned in aircraft or small boats may be responsible for tasks in addition to observing the air or surface of the water. For example, a Lookout for this activity may also be responsible for navigation or assistance with mine countermeasure and neutralization deployment. The decrease in mitigation zone size for activities using diver-placed charges will result in no mitigation for exposure to lower levels of potential onset of TTS; however, it will allow for a more focused survey effort over a smaller area, and will consequently increase the likelihood of avoidance of injury and larger threshold shifts that would result in recovery (i.e., TTS) to marine mammals. Having a Lookout observe a mitigation zone that is too large could potentially increase the safety risk due to an increased level of distraction from normal job duties. Observation of an area beyond what the Navy is proposing to implement would not be likely to result in avoidance or reduction of injury to marine mammals or sea turtles because the effort spent observing those more distant areas would inevitably be minimal.

As described in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), the ability of a Lookout to detect an animal can vary greatly based on what observing platform is being used. For large ranges, aerial observation is more effective. In addition, when observing from a small boat, sea turtle and cryptic marine mammal species can be very difficult to detect beyond a few meters. However, this measure should be effective at reducing potential impacts for individuals that are sighted.

Mine neutralization activities involving diver-placed charges occur only in the Inland Waters, primarily close to shore and in shallow water. The range to effects shown in Table 5.3-2 for mine neutralization activities involving diver placed charges were determined by the sea turtle functional hearing group, since this species has the longest range to effects for this activity. All other hearing groups had shorter ranges to onset of PTS, so the mitigation zones will provide further protection for these species. However, mitigation would be implemented for any species observed within the mitigation zone. Implementation of the mitigation zones outlined in Table 5.3-2 will reduce the potential for exposure to higher levels of energy that would result in injury and larger threshold shifts that would result in recovery (i.e., TTS) when individuals are sighted. The decrease in mitigation zone size for activities using diver placed charges will result in no mitigation for exposure to lower levels of potential onset of TTS; however, it will allow for a more focused survey effort over a smaller area, and will consequently increase the likelihood of avoidance of injury and larger threshold shifts that would result in recovery (i.e., TTS) to marine mammals.

During activities using diver placed charges, Lookouts are visually observing from small boats (rigid hull inflatable boats) or helicopters. As discussed above, aerial observation is more effective than observation from a small boat. Since small boats do not have a very elevating observing platform, the distance over which animals can be observed is much shorter. Sea turtles and cryptic marine mammal species would be very difficult to detect further than a few meters away from the boat.

#### 5.3.2.1.2.4 Gunnery Exercises – Small- and Medium-Caliber Using a Surface Target

**<u>Recommended Mitigation and Comparison to Current Mitigation</u>**

**Training**

The Navy is proposing to (1) continue implementing the current mitigation measures for this activity, (2) clarify the conditions needed to recommence an activity after a sighting, and (3) add a requirement to visually observe for kelp paddies.

Mitigation will include visual observation from a vessel or aircraft immediately before and during the exercise within a mitigation zone of 200 yd. (183 m) around the intended impact location. Vessels will observe the mitigation zone from the firing position. When aircraft are firing, the aircrew will maintain visual watch of the mitigation zone during the activity. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing will cease if a marine mammal or sea turtle is sighted within the mitigation zone. Firing will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes for a firing aircraft, (4) the mitigation zone has been clear from any additional sightings for a period of 30 minutes for a firing ship, or (5) the intended target location has been repositioned more than 400 yd. (370 m) away from the location of the last sighting.

**Testing**

The Navy's Proposed Action does not include gunnery testing activities.

**Effectiveness and Operational Assessments**

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce. As shown in Table 5.3-2, the predicted maximum range to onset of PTS for small and medium caliber gunnery is approximately 73 yd. (67 m). This range was determined by the high-frequency cetacean functional hearing group. The remaining functional hearing groups had a shorter range to onset of PTS, so the mitigation zone will provide further protection for these species. The average range to onset of TTS across all functional hearing groups is 72 yd. (66 m). Implementation of the 200 yd. (183 m) mitigation zone will reduce the potential for exposure to higher levels of energy that would result in injury and larger threshold shifts that would result in recovery (i.e., TTS) when individuals are sighted.

Small-, and medium-caliber gunnery exercises involve the participating vessel or aircraft firing munitions at a target location that may be up to 4,000 yd. (3.7 km) away, although typically much closer than this. Therefore, it is necessary for the Lookout to be able to visually observe the mitigation zone from this distance. Large vessel or aircraft platforms would provide a more effective observation platform for Lookouts than small boats. However, as discussed in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), it is highly unlikely that anything but a whale blow or large pod of dolphins will be seen at distances closer to 4,000 yd. (3.7 km). However, this measure is likely effective at reducing the risk of injury to marine mammals that may be observed from the typical target distances. This measure may be ineffective at reducing the risk of injury to sea turtles at large target distances; however, it does reduce the risk for those individuals that may be observed at closer distances. In addition, it is more likely that sea turtles will be observed when exercises involve aircraft versus vessels.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. A 30-minute wait period more than covers the average dive times of most marine mammal species but may not be sufficient for some deep-diving marine mammal species or for sea turtles. However, the analysis in Section 3.4.3.1 (Acoustic Stressors) shows that injury to deep-diving marine mammals (e.g., sperm whales and beaked whales) is not expected to occur. Furthermore, any wait period greater than 30 minutes when vessels are firing would result in an unacceptable operational impact on readiness. The 10-minute wait period when aircraft are firing is based on fuel restrictions. Any wait period greater than 10 minutes when aircraft are firing would result in an unacceptable operational impact on readiness and safety of personnel. The 10-minute wait period covers a portion of the average marine mammal dive times but may not be sufficient to cover the average dive times of all species. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to some marine mammal species, and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

#### 5.3.2.1.2.5 Gunnery Exercises – Large-Caliber Explosive Rounds Using a Surface Target Training

There are currently no existing mitigation measures unique to large-caliber explosive gunnery exercises in the Study Area. The Navy is proposing to adopt mitigation measures in place at other Navy training ranges outside of the Study Area.

#### Testing

The Navy's Proposed Action does not include gunnery testing activities.

**Recommended Mitigation and Comparison to Current Mitigation**

The Navy is proposing to (1) implement new mitigation zone measures for this activity, (2) describe conditions needed to recommence an activity after a sighting, and (3) implement a requirement to visually observe for kelp paddies. The recommended measures are provided below.

Mitigation will include visual observation from a ship immediately before and during the exercise within a mitigation zone of 600 yd. (549 m) around the intended impact location. Ships will observe the mitigation zone from the firing position. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing will cease if a marine mammal or sea turtle is sighted within the mitigation zone. Firing will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes.

**Effectiveness and Operational Assessments**

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce. As shown in Table 5.3-2, the predicted maximum range to onset of PTS for large caliber gunnery is approximately 177 yd. (162 m). This range was determined by the high-frequency cetacean functional hearing group. The remaining functional hearing groups had a shorter range to onset of PTS, so the mitigation zone will provide further protection for these species. The average range to onset of TTS across all functional hearing groups is 210 yd. (192 m). Implementation of the 600 yd. (549 m) mitigation zone will reduce the potential for exposure to higher levels of energy that would result in injury and larger threshold shifts that would result in recovery (i.e., TTS) when individuals are sighted. Per the Navy's current reporting requirements, any injured or dead marine mammals or sea turtles will be reported as appropriate.

Large caliber gunnery exercises involve the participating ship firing munitions at a target location from ranges up to 6 nm away. Therefore, it is necessary for the Lookout to be able to visually observe the mitigation zone from this distance. Although the Lookout will observe for all marine mammals or sea turtles in the area, as discussed in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), it is highly unlikely that anything but a whale blow or large pod of dolphins will be seen. Although this measure is likely ineffective at reducing the risk of injury to sea turtles and some species of marine mammals, it does reduce the risk for those individuals that may be observed. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. A 30-minute wait period more than covers the average dive times of most marine mammal species but may not be sufficient for some deep-diving marine mammal species or for sea turtles. However, the analysis in Section 3.4.3.1 (Acoustic Stressors) shows that injury to deep-diving marine mammals (e.g., sperm whales and beaked whales) is not expected to occur. Requiring additional delay beyond 30 minutes would modify the activity in a way that it would no longer meet its intended objective. Any additional delay would reduce the gun crews' abilities to engage surface targets and practice defensive marksmanship as would be required in a real world combat situation, and would therefore have an unacceptable impact on the realism and effectiveness of the exercise.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to some marine mammal species; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

#### 5.3.2.1.2.6 Missile Exercises up to 250 Pound Net Explosive Weight Using a Surface Target

**Recommended Mitigation and Comparison to Current Mitigation**

**Training**

Currently, the Navy employs a mitigation zone of 1,800 yd. (1.6 km) for all missile exercises. Because the Navy is not proposing to use missiles with less than a 251 lb. net explosive weight warhead in the Study Area, separate mitigation procedures for this exercise have not been developed. Should the need arise to conduct training using missiles in this category, the Navy proposes that mitigation procedures be followed as described below for the larger category of missiles (Section 5.3.2.1.2.7, Missile Exercises 251–500 Pound Net Explosive Weight).

#### 5.3.2.1.2.7 Missile Exercises 251–500 Pound Net Explosive Weight (Surface Target)

**Recommended Mitigation and Comparison to Current Mitigation**

**Training**

Current mitigation measures apply to all missile exercises, regardless of the warhead size. The Navy proposes to add a mitigation zone that applies only to missiles with a net explosive weight of 251–500 lb. The recommended measures are provided below.

When aircraft are involved in the missile firing, mitigation will include visual observation by the aircrew prior to commencement of the activity within a mitigation zone of 2,000 yd. (1.8 km) around the intended impact location. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing will cease if a marine mammal or sea turtle is sighted within the mitigation zone. Firing will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes or 30 minutes (depending on aircraft type).

**Testing**

The Navy's Proposed Action does not include missile testing activities.

**Effectiveness and Operational Assessments**

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce. As shown in Table 5.3-2, the predicted maximum range to onset of PTS for a missile exercise (up to 500 lb. net explosive weight [bin E10]) is approximately 955 yd. (873 m). This range was determined by the sea turtle functional hearing group. The marine mammal functional hearing groups had a shorter range to onset of PTS, so the mitigation zone will provide further protection for these species. The average range to onset of TTS across all functional hearing groups is 1,164 yd. (1,065 m). Implementing the 2,000 yd. (1.8 km) mitigation zone will reduce the potential for exposure to higher levels of energy that would result in injury and larger threshold shifts that would result in recovery (i.e., TTS) when individuals are sighted.

Missile exercises involve the aircraft firing munitions at a target location typically up to 15 nm away and infrequently include ranges up to 75 nm away. When an aircraft is firing, the aircraft can travel close to the intended impact area so that it can be visually observed. There is a chance that animals could enter the impact area after the visual observations have been complete and the activity has commenced. Therefore, this measure is not effective at reducing the risk of injury to animals once the activity has begun, but it does reduce the risk for those individuals that may be observed prior to commencement of the activity when aircraft are firing. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. The 10-minute wait period is for aircraft that have fuel restrictions (e.g., helicopters). Any wait period greater than 10 minutes for these types of aircraft would result in an unacceptable operational impact on readiness and safety of personnel. The 10-minute wait period covers a portion of the average marine mammal dive times but may not be sufficient to cover the average dive times of all species. The 30-minute wait period is for aircraft that are less restricted by fuel capacities (e.g., maritime patrol aircraft). The 30-minute wait period more than covers the average dive times of most marine mammal species but may not be sufficient for some deep-diving marine mammal species or for sea turtles. Any wait period greater than 30 minutes would result in an unacceptable operational impact on readiness for this type of aircraft.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to marine mammals and sea turtles; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

#### 5.3.2.1.2.8 Bombing Exercises

**Recommended Mitigation and Comparison to Current Mitigation**

**Training**

Currently, the Navy employs the following mitigation zone procedures during bombing exercises:

- Ordnance shall not be targeted to impact within 1,000 yd. (914 m) of known or observed floating kelp or marine mammals.
- A 1,000 yd. (914 m) radius mitigation zone shall be established around the intended target.

- The exercise will be conducted only if marine mammals are not visible within the mitigation zone.

The Navy is proposing to (1) maintain the existing mitigation zone to be used for non-explosive bombing activities, (2) revise the mitigation zone procedures to account for predicted ranges to impacts to marine species when high explosive bombs are used, (3) clarify the conditions needed to recommence an activity after a sighting, and (4) add a requirement to visually observe for kelp paddies.

Mitigation will include visual observation from the aircraft immediately before the exercise and during target approach within a mitigation zone of 2,500 yd. (2.3 km) around the intended impact location for explosive bombs and 1,000 yd. (914 m) for non-explosive bombs. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Bombing will cease if a marine mammal or sea turtle is sighted within the mitigation zone. Bombing will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes.

**Testing**

The Navy's Proposed Action does not include bomb testing activities.

**Effectiveness and Operational Assessments**

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce. As shown in Table 5.3-2, the predicted maximum range to onset of PTS for bombing exercises is approximately 1,368 yd. (1,251 m). This range was determined by the sea turtle functional hearing group. The marine mammal functional hearing groups had a shorter range to onset of PTS, so the mitigation zone will provide further protection for these species. For example, the maximum range to onset of PTS to mid-frequency of cetaceans is less than 500 yd. (457 m). The average range to onset of TTS across all functional hearing groups is 1,374 yd. (1,256 m). Implementation of the 2,500 yd. (2.3 km) mitigation zone will reduce the potential for exposure to higher levels of energy that would result in injury and larger threshold shifts that would result in recovery (i.e., TTS) when individuals are sighted.

The maximum range to effects on mortality across all functional hearing groups is less than 250 yd. (229 m). Therefore, this measure will be effective at reducing potential mortality to all marine mammals and sea turtles when individuals are sighted. As discussed in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), it is highly unlikely that anything but a whale blow or large pod of dolphins will be seen at distances closer to 2,500 yd. (2.3 km) near the perimeter of the mitigation zone. However, this measure is likely effective at reducing the risk of injury to marine mammals and sea turtles that may be observed from the smaller distances within the mitigation zone. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

As described in Section 5.3.1 (Lookout Procedural Measures), Lookouts positioned in aircraft or vessels may be responsible for tasks in addition to observing the air or surface of the water. For example, a Lookout for this activity may also be responsible for navigation of the aircraft. Having a Lookout observe a mitigation zone that is too large could potentially increase the safety risk due to an increased level of distraction from normal job duties. Similarly, Lookouts posted in aircraft during bombing activities will, by necessity, focus their attention on the water surface below and surrounding the location of bomb deployment. Due to the nature of this activity (e.g., aircraft maintaining a relatively steady altitude of approximately 1,500 ft. [457 m] and approaching the intended impact location), Lookouts will be able to observe a larger area during bombing activities than other proposed activities that involve the use of Lookouts positioned in aircraft (e.g., Improved Extended Echo Ranging sonobuoy activities). However, observation of an area beyond what the Navy is proposing to implement for bombing activities is not practical and would not likely result in avoidance or reduction of injury to marine mammals or sea turtles because the effort spent observing those more distant areas would inevitably be minimal.

The decrease in mitigation zone size will result in no mitigation for exposure to lower levels of potential onset of TTS; however, it will allow for a more focused survey effort over a smaller survey distance, and will likely consequently increase the likelihood of avoidance of injury and larger threshold shifts that would result in recovery (i.e., TTS) to marine mammals and sea turtles.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. The 10-minute wait period for this activity, which involves aircraft-deployed sources, is based on fuel restrictions. Any wait period greater than 10 minutes for an aircraft-deployed source would result in an unacceptable operational impact on readiness and safety of personnel. The 10-minute wait period covers a portion of the average marine mammal and sea turtle dive times but may not be sufficient to cover the average dive times of all species.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to marine mammals and sea turtles; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

#### 5.3.2.1.2.9 Torpedo (Explosive) Testing

**Recommended Mitigation and Comparison to Current Mitigation**

The Navy currently has no mitigation zone procedures for torpedo (explosive) testing in the Study Area.

**Training**

The Navy does not include training with explosive torpedoes in the Proposed Action.

**Testing**

The Navy is proposing to (1) establish mitigation measures for this activity that include a mitigation zone of 2,100 yd. (1.9 km), (2) establish the conditions needed to recommence an activity after a sighting, and (3) establish a requirement to visually observe for kelp paddies. The recommended measures are provided below.

Mitigation will include visual observation by aircraft immediately before, during, and after the event within a mitigation zone of 2,100 yd. (1.9 km) around the intended impact location. The event will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing will cease if a marine mammal, sea turtle, or aggregation of jellyfish is sighted within the mitigation zone. Firing will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes or 30 minutes (depending on aircraft type).

In addition to visual observation, passive acoustic monitoring will be conducted with Navy assets, such as passive ships sonar systems or sonobuoys, already participating in the activity. Passive acoustic observation would be accomplished through the use of remote acoustic sensors or expendable sonobuoys, or via passive acoustic sensors on submarines when they participate in the Proposed Action. These assets would only detect vocalizing marine mammals within the frequency bands monitored by Navy personnel. Passive acoustic detections would not provide range or bearing to detected animals, and therefore cannot provide locations of these animals. Passive acoustic detections would be reported to the Lookout posted in the aircraft in order to increase vigilance of the visual surveillance; and to the person in control of the activity for their consideration in determining when the mitigation zone is determined free of visible marine mammals.

**Effectiveness and Operational Assessments**

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, how they are implemented, and the potential effects they are designed to reduce. As shown in Table 5.3-2, the predicted maximum range to onset of PTS for explosive torpedoes is approximately 885 yd. (809 m). This range was determined by the sea turtle functional hearing group. The marine mammal functional hearing groups had a shorter range to onset of PTS, so the mitigation zone will provide further protection for these species. The average range to onset of TTS across all functional hearing groups is 1,012 yd. (926 m). Implementation of the 2,100 yd. (1.9 km) mitigation zone will reduce the potential for exposure to higher levels of energy that would result in injury and larger threshold shifts that would result in recovery (i.e., TTS) when individuals are sighted.

The maximum range to effects on mortality across all functional hearing groups is less than 670 yd. (610 m). Therefore, this measure will be effective at reducing potential mortality to all marine mammals and sea turtles when individuals are sighted. As discussed in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), it is highly unlikely that anything but a whale blow or large pod of dolphins will be seen at distances closer to 2,100 yd. (1.9 km) near the perimeter of the mitigation zone. However, this measure is likely effective at reducing the risk of injury to marine mammals and sea turtles that may be observed from the smaller distances within the mitigation zone.

As described in Section 5.3.1 (Lookout Procedural Measures), Lookouts positioned in aircraft may be responsible for tasks in addition to observing the air or surface of the water. For example, a Lookout for this activity may also be responsible for navigation of the aircraft. Having a Lookout observe a mitigation zone that is too large could potentially increase the safety risk due to an increased level of distraction from normal job duties. Observation of an area beyond what the Navy is proposing to implement for torpedo (explosive) testing activities is not practical and would not likely result in avoidance or reduction of injury to marine mammals or sea turtles because the effort spent observing those more distant areas would inevitably be minimal. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) and jellyfish aggregations will further help avoid impacts to marine mammals and sea turtles.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. The 10-minute wait period is for aircraft that have fuel restrictions (e.g., helicopters). Any wait period greater than 10 minutes for these types of aircraft would result in an unacceptable operational impact on readiness and safety of personnel. The 10-minute wait period covers a portion of the average marine mammal dive times but may not be sufficient to cover the average dive times of all species. The 30-minute wait period is for aircraft that are less restricted by fuel capacities (e.g., maritime patrol aircraft). The 30-minute wait period more than covers the average dive times of most marine mammal species but may not be sufficient for some deep-diving marine mammal species or for sea turtles. Any wait period greater than 30 minutes would result in an unacceptable operational impact on readiness for this type of aircraft.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to marine mammals and sea turtles; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

#### 5.3.2.1.2.10 Sinking Exercises

The Navy has historically conducted sinking exercises in the Study Area and has completed environmental planning documents analyzing up to two sinking exercises per year. Because of this prior analysis, sinking exercises are included under the No Action Alternative, as part of the Navy's baseline of activities. However, sinking exercises are not proposed under Alternative 1 or Alternative 2. Mitigation applied to this activity under the No Action Alternative is described below.

**<u>Recommended Mitigation and Comparison to Current Mitigation</u>**

The Navy is proposing to (1) modify the mitigation measures currently implemented for this activity by increasing the mitigation zone from 2.0 nm to 2.5 nm, (2) clarify the conditions needed to recommence an activity after a sighting, (3) add a requirement to visually observe for kelp paddies, and (4) adopt the marine mammal and sea turtle mitigation zone size for concentrations of floating vegetation and aggregation of jellyfish for ease of implementation. The recommended measures are provided below.

Mitigation will include visual observation within a mitigation zone of 2.5 nm around the target ship hulk. Sinking exercises will include aerial observation beginning 90 minutes before the first firing, visual observations from vessels throughout the duration of the exercise, and both aerial and vessel observation immediately after any planned or unplanned breaks in weapons firing of longer than 2 hours. Prior to conducting the exercise, the Navy will review remotely sensed sea surface temperature and sea surface height maps to aid in deciding where to release the target ship hulk.

The Navy will also monitor using passive acoustics during the exercise. Passive acoustic monitoring would be conducted with Navy assets, such as passive ships' sonar systems or sonobuoys, already participating in the activity. These assets would only detect vocalizing marine mammals within the frequency bands monitored by Navy personnel. Passive acoustic detections would not provide range or bearing to detected animals and therefore cannot provide locations of these animals. Passive acoustic detections would be reported to Lookouts posted in aircraft and on vessels in order to increase vigilance of their visual surveillance. Lookouts will also increase observation vigilance before the use of torpedoes or unguided ordnance with a net explosive weight of 500 lb. or greater, or if the Beaufort sea state is a 4 or above.

The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. The exercise will cease if a marine mammal, sea turtle, or aggregation of jellyfish is sighted within the mitigation zone. The exercise will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on a determination of its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes. Upon sinking the vessel, the Navy will conduct post-exercise visual surveillance of the mitigation zone for 2 hours (or until sunset, whichever comes first).

**Effectiveness and Operational Assessments**

See the introduction of Section 5.3.2 (Mitigation Zone Procedural Measures) for a general discussion of mitigation zones, their implementation, and the potential impacts they are designed to reduce. During a sinking exercise, multiple weapons sources may be used (e.g., projectiles, missiles, bombs, torpedoes), the largest of which is the 2,000 lb. bomb. The recommended mitigation zone is significantly greater than the predicted maximum range to onset of PTS of the largest weapon source and is designed to account for multiple detonations during the activity. As shown in Table 5.3-2, the predicted maximum range to onset of PTS for a bombing exercise is 1,368 yd. (1,251 m). This range was determined by the sea turtle functional hearing group. The marine mammal functional hearing groups had a shorter predicted range to onset of PTS, so the mitigation zone will provide further protection for these species. For example, the maximum range to onset of PTS for mid-frequency cetaceans is less than 500 yd. (457 m). The average range to onset of TTS across all functional hearing groups is 1,374 yd. (1,256 m). Implementation of the 2.5 nm mitigation zone will reduce the potential for exposure to higher levels of energy that would result in injury and larger threshold shifts that would result in recovery (i.e., TTS) when individuals are sighted.

The predicted maximum range to onset mortality across all functional hearing groups is less than 250 yd. (229 m). Therefore, this measure will be effective at reducing potential mortality to all marine mammals and sea turtles when individuals are sighted. As discussed in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), it is highly unlikely that anything but a whale blow or large pod of dolphins will be seen at distances closer to 2.5 nm near the perimeter of the mitigation zone. However, this measure is likely effective at reducing the risk of injury to marine mammals and sea turtles that may be observed from the smaller distances within the mitigation zone. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

As described in Section 5.3.1 (Lookout Procedural Measures), Lookouts positioned in aircraft or vessels may be responsible for tasks in addition to observing the air or the surface of the water. For example, a Lookout for this activity may also be responsible for navigation of the aircraft. Having a Lookout observe a mitigation zone that is too large could potentially increase the safety risk due to an increased level of distraction from normal job duties. Observation of an area beyond what the Navy is proposing to implement for sinking exercises is not practical and would not likely result in avoidance or reduction of injury to marine mammals or sea turtles because the effort spent observing those more distant areas would inevitably be minimal. The decrease in mitigation zone size will result in no mitigation for exposure to lower levels of potential onset of TTS; however, it will allow for a more focused survey effort over a smaller survey distance, and will consequently increase the likelihood of avoidance of injury and larger threshold shifts that would result in recovery (i.e., TTS) to marine mammals and sea turtles. The amount of time it takes for an aircraft to conduct line transects around a detonation point within the currently implemented 2 nm mitigation zone could result in animals entering the mitigation zone at one end while the aircraft completes the survey at the other end of the mitigation zone. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) and jellyfish aggregations will further help avoid impacts on marine mammals and sea turtles.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. A 30-minute wait period more than covers the average dive times of most marine mammal species but may not be sufficient for some deep-diving marine mammal species or for sea turtles. However, the analysis in Section 3.4.3.2.2 (Impacts from Explosives) shows that injury to deep-diving marine mammals (e.g., sperm whales and beaked whales) is not expected to occur. Requiring additional delay beyond 30 minute would modify the activity such that it would no longer meet its intended objective. Any additional delay would reduce the ship and aircrews' abilities to coordinate attack tactics on a seaborne target as would be required in a real world combat situation, and would therefore have an unacceptable impact on the realism and effectiveness of the exercise. Although activities involving certain types of aircraft (e.g., helicopters) typically employ a 10-minute wait period due to fuel restrictions, the Navy is able to make an exception for this particular activity due to the large variation and rotation of assets that could participate in this type of exercise.

The Navy proposes implementing the recommended measure described above because (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to marine mammals and sea turtles; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

#### 5.3.2.1.2.11 Weapons Firing Noise During Gunnery Exercises – Large-Caliber

**Recommended Mitigation and Comparison to Current Mitigation**

The Navy currently has no mitigation zone procedures for this activity in the Study Area.

**Training**

The Navy is proposing to adopt measures currently used during Navy gunnery exercises in other ranges outside of the Study Area. For all explosive and non-explosive large-caliber gunnery exercises conducted from a ship, mitigation will include visual observation immediately before and during the exercise within a mitigation zone of 70 yd. (46 m) within 30 degrees on either side of the gun target line on the firing side. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing will cease if a marine mammal or sea turtle is sighted within the mitigation zone. Firing will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes, or (4) the vessel has repositioned itself more than 140 yd. (128 m) away from the location of the last sighting.

**Testing**

The Navy's Proposed Action does not include gun testing activities.

**Effectiveness Assessment**

The mitigation zone is designed to reduce the potential for injury from weapons firing noise during large-caliber gunnery exercises conducted from a ship. The majority of the energy that an animal could be exposed to would occur on the firing side of the vessel and would follow in the direction of fire. It is not operationally feasible to have Lookouts stationed on all sides of the vessel to visually observe for marine mammals and sea turtles due to limited resources (e.g., manning restrictions). Since the Lookout is positioned aboard the firing ship and is visually observing nearby the ship (70 yd. [64 m]), this measure should be effective at reducing the risk to all marine mammals and sea turtles that are available to be observed.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. A 30-minute wait period more than covers the average dive times of most marine mammal species but may not be sufficient for some deep-diving marine mammal species or for sea turtles. However, the analysis in Section 3.4.3.1 (Acoustic Stressors) shows that injury to deep-diving marine mammals (e.g., sperm whales and beaked whales) is not expected to occur. Furthermore, any wait period greater than 30 minutes would result in an unacceptable operational impact on readiness.

The Navy proposes implementing the recommended measure described above because (1) it is likely to result in avoidance or reduction of exposure to high levels of energy to marine mammals and sea turtles; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

### 5.3.2.2 Physical Disturbance and Strike

#### 5.3.2.2.1 Vessels and In-Water Devices

##### 5.3.2.2.1.1 Vessels

**<u>Recommended Mitigation and Comparison to Current Mitigation</u>**

**Training**

The Navy’s current measures to mitigate potential impacts to marine mammals from vessel and in-water device strikes during training activities are provided below:

- Naval vessels shall maneuver to keep at least 500 yd. (457 m) away from any observed whale in the vessel's path and avoid approaching whales head-on. These requirements do not apply if a vessel's safety is threatened, such as when change of course will create an imminent and serious threat to a person, vessel, or aircraft, and to the extent vessels are restricted in their ability to maneuver. Restricted maneuverability includes, but is not limited to, situations when vessels are engaged in dredging, submerged activities, launching and recovering aircraft or landing craft, minesweeping activities, replenishment while underway and towing activities that severely restrict a vessel's ability to deviate course.
- Vessels will take reasonable steps to alert other vessels in the vicinity of the whale. Given rapid swimming speeds and maneuverability of many dolphin species, naval vessels would maintain normal course and speed on sighting dolphins unless some condition indicated a need for the vessel to maneuver.

The Navy is proposing to continue to use the 500 yd. (457 m) mitigation zone currently established for whales, and to implement a 200 yd. (183 m) mitigation zone for all other marine mammals. Vessels will avoid approaching marine mammals head on and will maneuver to maintain a mitigation zone of 500 yd. (457 m) around observed whales and 200 yd. (183 m) around all other marine mammals (except bow-riding dolphins), providing it is safe to do so. The Navy is clarifying its existing speed protocol: while in transit, Navy vessels shall be alert at all times, use extreme caution, and proceed at a "safe speed" so that the vessel can take proper and effective action to avoid a collision with any sighted object or disturbance, including any marine mammal or sea turtle and can be stopped within a distance appropriate to the prevailing circumstances and conditions.

Mitigation zones include marine mammals hauled-out on islands, rocks, and other non-man made sites. However, it excludes pinnipeds hauled out on man-made navigational and port structures (e.g., piers and security barriers) and vessels (Figure 5-2).

#### Testing

The Navy's current measures to mitigate potential impacts to marine mammals from vessel and in-water device strikes during testing activities are provided below:

- Range activities shall be conducted in such a way as to ensure marine mammals are not harassed or harmed by human-caused events.
- Visual surveillance shall be accomplished just prior to all in-water exercises. This surveillance shall ensure that no marine mammals are visible within the boundaries of the area within which the test unit is expected to be operating. Surveillance shall include, as a minimum, monitoring from all participating surface craft and, where available, adjacent shore sites.
- The Navy shall postpone activities until cetaceans (whales, dolphins, and porpoises) leave the activity area. When cetaceans have been sighted in an area, all range participants increase vigilance and take reasonable and practicable actions to avoid collisions and activities that may result in close interaction of naval assets and marine mammals. Actions may include changing speed and/or direction and are dictated by environmental and other conditions (e.g., safety, weather).
- Range craft shall not approach within 100 yd. (91 m) of marine mammals and shall be followed to the extent practicable considering human and vessel safety priorities. All participant vessels and aircraft, including helicopters, are expected to comply with this directive.
- Mitigation zones include marine mammals hauled-out on islands, rocks, and other non-man made sites. However, it excludes pinnipeds hauled out on man-made navigational and port structures (e.g., piers and security barriers) and vessels.

The Navy is proposing to incorporate the training mitigation measures described above during testing activities involving surface ships, and for all other testing activities to continue using the mitigation measures currently implemented, revised to exclude pinnipeds during test body retrieval and to include the exception for bow-riding dolphins as described above under Training. During test body retrieval, the activity cannot be relocated away from marine mammals active in the area, or significantly delayed without risking loss of the test body, so the activity must proceed even if pinnipeds are present in the immediate vicinity. However, the retrieval vessel is a range craft and risks to marine mammals are very low.

#### <u>Effectiveness and Operational Assessments</u>

Since the Lookout is visually observing within a reasonable distance of the vessel (within 100 yd. [91 m] for testing activities and within 500 yd. [457 m] for training activities), this measure should be effective at reducing the risk to marine mammals that are available to be observed. However, as discussed above in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), large whales and pods of dolphins are more likely to be seen than other more cryptic species, such as beaked whales.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of injury to marine mammals; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

#### 5.3.2.2.1.2 Towed In-Water Devices

**Recommended Mitigation and Comparison to Current Mitigation**

The Navy currently has no mitigation zone procedures for this activity in the Study Area.

**Training**

The Navy is proposing to adopt measures currently used in other ranges outside of the Study Area during activities involving towed in-water devices. The Navy will ensure that towed in-water devices being towed from manned platforms avoid coming within a mitigation zone of 250 yd. (230 m) around any observed marine mammal, providing it is safe to do so.

**Testing**

The Navy's proposed mitigation measures for testing activities from manned platforms are consistent with Navy training mitigation measures described above. During testing in which in-water devices are towed by unmanned platforms, a manned escort vessel will be included and one Lookout will be employed.

**Effectiveness and Operational Assessments**

Since the Lookout is visually observing within a reasonable distance of the vessel (within 100 yd. [91 m] for testing activities and 250 yd. [230 m] for training activities), this measure should be effective at reducing the risk to marine mammals that are available to be observed. However, as discussed above in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), large whales and pods of dolphins are more likely to be seen than other more cryptic species such as beaked whales.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of injury to marine mammals; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

### 5.3.2.2.2 Non-Explosive Practice Munitions

#### 5.3.2.2.2.1 Gunnery Exercises – Small, Medium-, and Large-Caliber Using a Surface Target

**Recommended Mitigation and Comparison to Current Mitigation**

**Training**

Currently, the Navy employs the same mitigation measures for non-explosive gunnery exercises as described above in 5.3.2.1.2.5 (Gunnery Exercises – Small-, Medium-, and Large-Caliber Using a Surface Target).

The Navy is proposing to (1) continue using the mitigation measures currently implemented for this activity, and (2) clarify the conditions needed to recommence an activity after a sighting. The recommended measures are provided below.

Mitigation will include visual observation from a vessel or aircraft immediately before and during the exercise within a mitigation zone of 200 yd. (183 m) around the intended impact location. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Firing will cease if a marine mammal or sea turtle is sighted within the mitigation zone. Firing will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes for a firing aircraft, (4) the mitigation zone has been clear from any additional sightings for a period of

30 minutes for a firing ship, or (5) the intended target location has been repositioned more than 400 yd. (370 m) away from the location of the last sighting.

**Testing**

The Navy's Proposed Action does not include gunnery testing activities.

**Effectiveness and Operational Assessments**

The mitigation zone is designed to reduce the potential for direct strike from a non-explosive projectile. Large-caliber gunnery exercises involve the participating ship or aircraft firing munitions at a target location from ranges up to 6 nm away. Small- and medium-caliber gunnery exercises involve the participating vessel or aircraft firing munitions at a target location from up to 2 nm away, although typically closer. Therefore, it is necessary for the Lookout to be able to visually observe the mitigation zone from these distances. Although the Lookout will observe for all marine mammals or sea turtles in the area, as discussed in Section 5.3.1.2.5 (Effectiveness Assessment for Lookouts), it is highly unlikely that anything but a whale blow or large pod of dolphins will be seen. Although this measure is likely ineffective at reducing the risk of injury to sea turtles and some species of marine mammals, it does reduce the risk for those individuals that may be observed.

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. A 30-minute wait period more than covers the average dive times of most marine mammal species but may not be sufficient for some deep-diving marine mammal species or for sea turtles. However, the analysis in Section 3.4.3.1 (Acoustic Stressors) shows that injury to deep-diving marine mammals (e.g., sperm whales and beaked whales) is not expected to occur. Furthermore, any wait period greater than 30 minutes would result in an unacceptable operational impact on readiness. The 10-minute wait period when aircraft are firing is based on fuel restrictions. Any wait period greater than 10 minutes when aircraft are firing would result in an unacceptable operational impact on readiness and safety of personnel. The 10-minute wait period covers a portion of the average marine mammal dive times but may not be sufficient to cover the average dive times of all species. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of injury to some species of marine mammals; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

#### 5.3.2.2.2.2 Bombing Exercises

**Recommended Mitigation and Comparison to Current Mitigation**

**Training**

The Navy is proposing to continue using the mitigation measures currently implemented for this activity. The recommended measure includes clarification of a post-sighting activity recommencement criterion.

Mitigation will include visual observation from the aircraft immediately before the exercise and during target approach within a mitigation zone of 1,000 yd. (914 m) around the intended impact location. The exercise will not commence if concentrations of floating vegetation (kelp paddies) are observed in the mitigation zone. Bombing will cease if a marine mammal or sea turtle is sighted within the mitigation zone. Bombing will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 10 minutes.

**Testing**

The Navy's Proposed Action does not include bomb testing activities.

**Effectiveness and Operational Assessments**

The post-sighting wait period is designed to give any animals that are sighted an opportunity to leave the area before the exercise recommences but will only be employed if one of the other conditions has not already been met. The 10-minute wait period for this activity, which involves aircraft-deployed sources, is based on fuel restrictions. Any wait period greater than 10 minutes for an aircraft-deployed source would result in an unacceptable operational impact on readiness and safety of personnel. The 10-minute wait period covers a portion of the average marine mammal and sea turtle dive times but may not be sufficient to cover the average dive times of all species. Observation for indicators of marine mammal and sea turtle presence (e.g., concentrations of floating vegetation [kelp paddies]) will further help avoid impacts to marine mammals and sea turtles.

The mitigation zone is designed to reduce the potential for direct strike from a non-explosive bomb. The Navy proposes implementing the recommended measure described above because: (1) it is likely to result in avoidance or reduction of injury to marine mammals or sea turtles; and (2) implementation has been analyzed as acceptable with regard to personnel safety, practicality of implementation, impact on effectiveness of the military readiness activity, and Navy policy.

## 5.3.3 MITIGATION AREAS

The Navy has considered measures to limit activity that might affect special use areas. The Navy currently applies area-specific mitigation measures for the following two areas:

### 5.3.3.1 Olympic Coast National Marine Sanctuary

While active sonar and ASW activities are authorized within the OCNMS, the Navy uses its Protective Measures Assessment Protocol (PMAP) program to inform all users of active sonar that the OCNMS is within the NWTT Study Area. PMAP informs users that no high explosives are authorized in the OCNMS. The Navy proposes to continue use of PMAP in this manner for awareness and notification.

### 5.3.3.2 Puget Sound and the Strait of Juan de Fuca

#### 5.3.3.2.1 Mid-Frequency Active Sonar Training

Currently, the Navy is not conducting nor is it proposing to conduct training with mid-frequency active hull-mounted sonar on vessels while underway in Puget Sound and the Strait of Juan de Fuca. The Navy's process since 2003 requires approval prior to operating mid-frequency active hull-mounted sonar in Puget Sound and the Strait of Juan de Fuca.

The Navy will continue the permission and approval process, in place since 2003, through U.S. Pacific Fleet's designated authority for all mid-frequency active hull-mounted sonar on vessels while training underway in Puget Sound and Strait of Juan de Fuca.

Pierside maintenance/testing of sonar systems within Puget Sound and the Strait of Juan de Fuca will also require approval by U.S. Pacific Fleet's designated authority or Systems Command designated authority as applicable, and must be conducted in accordance with PMAP for ship and submarine active sonar use, to include the use of Lookouts.

Use of active sonar for anti-terrorism/force protection or for safe navigation within the Puget Sound or Strait of Juan de Fuca is always permitted for safety of ship/national security reasons.

##### 5.3.3.2.2 Mine Neutralization Explosive Ordnance Disposal

The Navy conducts Explosive Ordnance Disposal (EOD) Mine Neutralization events in only two designated locations within the Inland Waters of the NWTT Study Area. A process has been in place requiring approval from U.S. Third Fleet prior to conducting EOD underwater detonations. The Navy will continue the permission and approval process through U.S. Third Fleet for in-water explosives training conducted at Hood Canal or Crescent Harbor. This process ensures marine safety and environmental protection.

##### 5.3.3.2.3 Marbled Murrelet Mitigation

The following marbled murrelet mitigation procedural measures exist for testing activities conducted in the Inland Waters:

- During the marbled murrelet nesting season (1 April–15 September) avoid sonar testing, where feasible, during the period from 2 hours before sunrise to 2 hours after sunrise.
- Where practicable (as determined by the Navy) during the summer, conduct long duration (exceeding 30 minutes) countermeasures tests in the Keyport Range Site instead of the Dabob Bay Range Complex Site.
- Where practicable (as determined by the Navy), conduct countermeasure testing activities during the summer rather than the winter.

The Navy is proposing to eliminate the marbled murrelet mitigation measures described above. There is no evidence to support that marbled murrelet hearing is within the frequency ranges of the sound sources used (e.g., sonar and countermeasures) in these tests. Therefore, these mitigation measures would provide no added benefit. The Navy is currently in consultation with USFWS on this and other issues related to potential impacts on the marbled murrelet.

### 5.3.4 MITIGATION MEASURES CONSIDERED BUT ELIMINATED

A number of mitigation measures were suggested during the public comment periods of previous Navy environmental documents. As a result of the assessment process identified in Section 5.2 (Introduction to Mitigation), the Navy determined that some of the suggested measures would likely be ineffective at reducing environmental impacts, have an unacceptable operational impact based on the effectiveness assessment, or be incompatible with Section 5.2.2 (Overview of Mitigation Approach). The measures that the Navy does not recommend for implementation are discussed in Section 5.3.4.1 (Previously Considered but Eliminated) and Section 5.3.4.2 (Previously Accepted but Now Eliminated).

There is a distinction between effective and feasible observation procedures for data collection and measures employed to prevent impacts or otherwise serve as mitigation. The discussion below is in reference to those procedures meant to serve as mitigation measures.

#### 5.3.4.1 Previously Considered but Eliminated

##### 5.3.4.1.1 Reducing Amount of Training and Testing Activities

Reducing training and testing for the purpose of mitigation would result in an unacceptable impact on readiness for the following reasons:

The requirements to train are designed to provide the experience needed to ensure Sailors are properly prepared for operational success. Training requirements have been developed through many years of iteration and are designed to ensure Sailors achieve the levels of readiness needed to properly respond to the many contingencies that may occur during an actual mission. The Proposed Action does not include training beyond levels required for maintaining satisfactory levels of readiness due to the need to efficiently use limited resources (e.g., fuel, personnel, and time). Therefore, any reduction of training would not allow Sailors to achieve satisfactory levels of readiness needed to accomplish their mission.

The requirements to test systems prior to their implementation in military activities are identified in DoD Directive 5000.1. This directive states that test and evaluation support is to be integrated throughout the defense acquisition process. The Navy rigorously collected data during the developmental stages of this EIS/OEIS to accurately quantify test activities necessary to meet requirements of DoD Directive 5000.1. These testing requirements are designed to determine whether systems perform as expected and are operationally effective, suitable, survivable, and safe for their intended use. Any reduction of testing activities would not allow the Navy to meet its purpose and need to achieve requirements set forth in DoD Directive 5000.1.

##### 5.3.4.1.2 Replacing Training and Testing with Simulated Activities

Replacing training and testing activities with simulated activities for the purpose of mitigation would result in an unacceptable impact on readiness for the following reasons:

As described in Section 2.5.1.4 (Simulated Training and Testing), the Navy currently uses computer simulation for training and testing whenever possible. Computer simulation can provide familiarity and complement live training; however, it cannot provide the fidelity and level of training necessary to prepare naval forces for deployment.

The Navy is required by law to operationally test major platforms, systems, and components of these platforms and systems in realistic combat conditions before full-scale production can occur. Substituting simulation for live training and testing fails to meet the purpose of and need for the Proposed Action and therefore was eliminated from consideration as a mitigation measure.

##### 5.3.4.1.3 Reducing Sonar Source Levels and Total Number of Hours

Active sonar is only used when required by the mission since it has the potential to alert opposing forces to the sonar platform’s presence. Passive sonar and all other sensors are used in concert with active sonar to the maximum extent practicable when available and when required by the mission. Reducing active sonar source levels and the total number of active sonar hours used during training and testing activities for the purpose of mitigation would adversely impact the effectiveness of military readiness activities and increase safety risks to personnel for the following reasons:

Sonar operators need to train as they would operate during real combat situations. Operators of sonar equipment are always cognizant of the environmental variables affecting sound propagation. In this regard, sonar equipment power levels are always set consistent with mission requirements. Reducing sonar source levels for the purpose of mitigation precludes sonar operators from learning to operate the sonar systems with their entire range of capabilities throughout the extremely diverse range of environmental conditions they may encounter. Failure to train with the entire range of capabilities will reduce the effectiveness of the sonar operators should their skills be required during real world events. Not only would they not develop the skills necessary to identify and track submarines at the maximum distances of their systems capabilities, they would not learn how to use their systems' capabilities during the entire range of environmental conditions they may encounter. Likewise, they would not develop the knowledge of how to fully integrate multiple ASW capabilities, including other ships and aircraft into an integrated ASW team.

Failure to train with the entire range of capabilities also compromises training by reducing the ability for a sonar operator to detect, track, and hold an enemy target, mine, or other object, and by reducing the realism of other training scenarios (e.g., navigation training). Particularly during a strike group exercise, sonar operators need to learn to handle real world combat situations (e.g., the ability to manage sonar operations during periods of mutual interference, which can occur when more than one sonar system is operating simultaneously). Training with reduced sonar source levels would ultimately condition Sailors to expect conditions that they would not experience in a real world combat situation, thereby resulting in an unacceptable increased risk to personnel safety and the strike group's ability to achieve mission success. The Navy must test its systems in the same way they would be used for military readiness activities. Reducing sonar source levels during testing would impact the ability to determine whether systems are operationally effective, suitable, survivable, and safe. Ultimately, reducing sonar source levels would reduce training and testing realism. Reducing the total number of sonar hours used during training and testing would prevent the Navy from meeting its military readiness qualification standards.

#### 5.3.4.1.4 Implementing Active Sonar Ramp-Up Procedures during Training

Implementing active sonar ramp-up procedures (slowly increasing the sound in the water to necessary levels) in an attempt to clear the range prior to conduct of activities for the purpose of mitigation during training activities would result in an unacceptable impact on readiness and would not necessarily be effective at reducing potential impacts on marine species for the following reason:

Ramp-up procedures would alert opponents to the participants' presence. This would consequently negatively affect the realism of training because the target submarine could detect the searching unit before the searching unit could detect the target submarine, enabling the target submarine to take evasive measures. This is not representative of a real-world situation and thereby would impact training realism and effectiveness. Training with reduced realism would alter Sailors' abilities to effectively operate in a real world combat situation, thereby resulting in an unacceptable increased risk to personnel safety and the sonar operator's ability to achieve mission success.

Although ramp-up procedures have been used for some testing activities, effectiveness at avoiding or reducing impacts on marine mammals has not been demonstrated. Until evidence suggests that ramp-up procedures are an effective means of avoiding or reducing potential impacts on marine mammals, the Navy is proposing to eliminate the implementation of this measure for testing activities as part of the Proposed Action.

#### 5.3.4.1.5 Reducing Vessel Speed

As a standard operating procedure, Navy personnel are required to use extreme caution and operate at a slow, safe speed consistent with mission and safety. These standard operating procedures are designed to allow a vessel to take proper and effective action to avoid a collision with any sighted object or disturbance (which may include a marine mammal) and to stop within a distance appropriate to the prevailing circumstances and conditions. Implementing widespread reductions in vessel speed throughout the Study Area for the purpose of mitigation would be impractical with regard to military readiness activities, and result in an unacceptable impact on readiness for the following reasons:

Vessel operators need to be able to react to changing tactical situations and evaluate system capabilities in training and testing as they would in actual combat. Widespread speed restrictions would not allow the Navy to properly test vessel capabilities or train to react to these situations. Training with reduced realism would alter Sailors' abilities to effectively operate in a real world combat situation, thereby resulting in an unacceptable increased risk to personnel safety and the vessel operator's ability to achieve mission success.

#### 5.3.4.1.6 Limiting Access to Training and Testing Locations

Limiting training and testing activities to specific locations for the purpose of mitigation would be impractical with regard to implementation, would adversely impact the effectiveness of military readiness activities, and would increase safety risks to personnel for the following reasons:

As described in Section 2.5.1.1 (Alternative Locations), the ability to use the diverse and multidimensional capabilities of each range complex and testing range results in the Navy's ability to develop and maintain high levels of readiness. Major exercises using integrated warfare components require large areas of the littorals, open ocean, and certain nearshore areas for realistic and safe training. Limiting training and testing (including the use of sonar and other active acoustic sources or explosives) to specific locations (e.g., abyssal waters and surveyed offshore waters), avoiding areas (e.g., embayments or large areas of the littorals and open ocean), or avoiding overflying areas (e.g., the Olympic National Park) would be impractical to implement with regard to the need to conduct activities in proximity to certain facilities and range complexes. These restrictions would also adversely impact the safety of the training and testing activities by requiring activities to take place in more remote areas where safety support may be limited.

Training and testing activities require continuous access to large areas consisting potentially of thousands of square miles of ocean and air space to provide naval personnel the ability to train with and develop competence and confidence in their capabilities and their entire suite of weapons and sensors. Exercises may change mid-stream based on evaluators' assessments of performance and other conditions including weather or mechanical issues. These may preclude use of a permission scheme for access to water space. Threats to national security are constantly evolving and the Navy requires the ability to adapt training to meet these emerging threats as well as develop and test systems to effectively operate in these environments. Restricting access to limited locations would impact the ability of Navy training and testing to evolve as the threat evolves. Operational units already incorporate requirements for safety of personnel including air space and shipping routes. Safety restrictions may include limits on distance from military air fields during carrier flight operations and air traffic corridors for safety of military and civilian aviation. These types of limitations shape how exercise planners develop and implement training scenarios including those involving defense of aircraft carriers from submarines.

Therefore, limiting access to training and testing locations would reduce realism of activities by restricting access to important real world combat situations, such as bathymetric features and varying oceanographic features. As described in Section 5.3.4.1.7 (Avoiding Locations Based on Bathymetry and Environmental Conditions), Sailors must be trained to handle bottom bounce, sound passing through changing currents, eddies, or across changes in ocean temperature, pressure, or salinity. Training in a few specific locations would alter Sailors' abilities to effectively operate in varying real world combat situations, thereby resulting in an unacceptable increased risk to personnel safety and the ability to achieve mission success.

#### 5.3.4.1.7 Avoiding Locations Based on Bathymetry and Environmental Conditions

Avoiding locations for training and testing activities based on bathymetry (e.g., areas between 500 and 2,000 meters depth) and environmental conditions for the purpose of mitigation would increase safety risks to personnel and result in an unacceptable impact on readiness for the following reasons:

Areas where training and testing activities are scheduled to occur are carefully chosen to provide safety and allow realism of events. As described in Section 2.5.1.1 (Alternative Locations), the varying environmental conditions of the Study Area (e.g., bathymetry and topography) maximize the training realism and testing effectiveness. Limiting training and testing (including the use of sonar and other active acoustic sources or explosives) to avoid steep or complex bathymetric features (e.g., the "Prairie," Juan de Fuca Canyon, Swiftsure Bank, Barkley and Nitinat Canyons, and Heceta Bank) and oceanographic features (e.g., surface fronts and variations in sea surface temperatures) would reduce the realism of the military readiness activity. Systems must be tested in a variety of bathymetric and environmental conditions to ensure functionality and accuracy in a variety of environments. Sonar operators need to train as they would operate during real world combat situations. Because real world combat situations include diverse bathymetric and environmental conditions, Sailors must be trained to handle bottom bounce, sound passing through changing currents, eddies, or across changes in ocean temperature, pressure, or salinity. Training with reduced realism would alter Sailors' abilities to effectively operate in a real world combat situation, thereby resulting in an unacceptable increased risk to personnel safety and the sonar operator's ability to achieve mission success.

#### 5.3.4.1.8 Avoiding or Reducing Active Sonar at Night and During Periods of Low Visibility

Avoiding or reducing active sonar at night and during periods of low visibility for the purpose of mitigation would result in an unacceptable impact on readiness for the following reasons:

The Navy must train in the same manner as it will fight. Anti-submarine warfare can require a significant amount of time to develop the "tactical picture," or an understanding of the battle space (e.g., area searched or unsearched, identifying false contacts, and understanding the water conditions). Reducing or securing power in low-visibility conditions would affect a commander's ability to develop this tactical picture and would not provide the needed training realism. Training differently from what would be needed in an actual combat scenario would decrease training effectiveness, reduce the crew's abilities, and introduce an increased safety risk to personnel.

Mid-frequency active sonar training is required year-round in all environments, including night and low-visibility conditions. Training occurs over many hours or days, which requires large teams of personnel working together in shifts around the clock to work through a scenario. Training at night is vital because environmental differences between day and night affect the detection capabilities of sonar. Temperature layers that move up and down in the water column and ambient noise levels can vary significantly between night and day, which affects sound propagation and could affect how sonar systems are operated. Consequently, personnel must train during all hours of the day to ensure they identify and respond to changing environmental conditions, and not doing so would unacceptably decrease training effectiveness and reduce the crews' abilities. Therefore, the Navy cannot operate only in daylight hours or wait for the weather to clear before training.

The Navy must test its systems in the same way they would be used for military readiness activities. Reducing or securing power in adverse weather conditions or at night would impact the ability to determine whether systems are operationally effective, suitable, survivable, and safe. Additionally, some systems have a nighttime testing requirement. Therefore, Navy personnel cannot operate only in daylight hours or wait for the weather to clear before or during all test events.

#### 5.3.4.1.9 Avoiding or Reducing Active Sonar during Strong Surface Ducts

Avoiding or reducing active sonar during strong surface ducts for the purpose of mitigation would increase safety risks to personnel, be impractical with regard to implementation of military readiness activities, and result in an unacceptable impact on readiness for the following reasons:

The Navy must train in the same manner as it will fight. Anti-submarine warfare can require a significant amount of time to develop the "tactical picture," or an understanding of the battle space such as area searched or unsearched, identifying false contacts, understanding the water conditions, etc. Surface ducting is a condition when water conditions (e.g., temperature layers, lack of wave action) result in little sound energy penetrating beyond a narrow layer near the surface of the water. Submarines have long been known to exploit the phenomena associated with surface ducting. Therefore, training in surface ducting conditions is a critical component to military readiness because sonar operators need to learn how sonar transmissions are altered due to surface ducting, how submarines may take advantage of them, and how to operate sonar effectively in this environment. Avoiding or reducing active sonar during surface ducting conditions would affect a commander's ability to develop this tactical picture and would not provide the needed training realism. Diminished realism would reduce a sonar operator's ability to effectively operate in a real world combat situation, thereby resulting in an unacceptable increased risk to personnel safety and the ability to achieve mission success.

Furthermore, avoiding surface ducting would be impractical to implement because ocean conditions contributing to surface ducting change frequently, and surface ducts can be of varying duration. Surface ducting can also lack uniformity and may or may not extend over a large geographic area, making it difficult to determine where to reduce power and for what periods.

#### 5.3.4.1.10 Avoiding Locations Based on Distances from Isobaths or Shorelines

Avoiding locations for training and testing activities within the Study Area based on wide-scale distances from isobaths or the shoreline for the purpose of mitigation (e.g., avoiding sound exposure levels within the 100-meter isobath) would be impractical with regard to implementation of military readiness activities, result in unacceptable impact on readiness, would not be an effective means of mitigation, and would increase safety risks to personnel for the following reasons:

A measure requiring avoidance of mid-frequency active sonar within 13 nm of the 656 ft. (200 m) isobaths was part of the Rim of the Pacific exercise 2006 authorization by NMFS. This measure, as well as similar measures of like distances, lacks any scientific basis when applied to the context of the Study Area (e.g., bathymetry, sound propagation, and width of channels). There is no scientific analysis indicating this measure is protective and no known basis for these specific metrics. The Rim of the Pacific 2006 exercise mitigation measure precluded active anti-submarine training in the littoral region, which significantly impacted realism and training effectiveness (e.g., protecting ships from submarine threats during amphibious landings). This mitigation procedure had no observable effect on the protection of marine mammals during Rim of the Pacific 2006 exercises, and its value is unclear; however, its adverse effect on realistic training, as with all arbitrary distance from land restrictions, is significant.

Training in shallower water is an essential component to maintaining military readiness. Sound propagates differently in shallower water and operators must learn to train in this environment. Additionally, submarines have become quieter through the use of improved technology and have learned to hide in the higher ambient noise levels of the shallow waters of coastal environments. In real world events, it is highly likely Sailors would be working in, and therefore must train in, these types of areas.

Areas where training and testing activities are scheduled to occur are carefully chosen to provide safety and allow realism of events. The proximity to facilities, range complexes, and testing ranges is essential to the training and testing realism and effectiveness required to train and certify naval forces ready for combat operations. Limiting access to coastal areas would restrict access to certain training and testing locations and would increase transit time for these activities, which would result in an increased risk to personnel safety, particularly for platforms with fuel restrictions (e.g., aircraft) or for certain activities such as mine countermeasures and neutralization activities using diver-placed mines.

The ability to use the diverse and multi-dimensional capabilities of each range complex and testing range results in the Navy's ability to develop and maintain high levels of readiness. Otherwise limiting training and testing (including the use of sonar and other active acoustic sources or explosives) to avoid arbitrary distances from isobaths or the shoreline would adversely impact the effectiveness of the training and testing. This includes avoiding conducting activities within 12 nm from shore, 25 nm from shore, between shore and the 20 m isobath, and 13 nm out from the 656 ft. (200 m) isobath. Operating in shallow water is essential in order to provide realistic training in real world combat conditions with regard to shallow water sound propagation.

However, since the NWTT Offshore Area is 12 nm from shore, which roughly aligns with the 100 m isobath, activities proposed for this area do avoid most of these locations.

#### 5.3.4.1.11 Avoiding Marine Species Habitats and Biologically Important Areas

In general, the Navy considered mitigation measures for marine species habitats and identified areas of biological importance on a case-by-case basis through consultation with NMFS and the USFWS. The Navy deems avoidance of an area potentially effective mitigation and practicable only if (1) the area has been well-documented as important habitat for particular species based on the best available science; (2) the potential impacts of Navy activities spatially and temporally overlap with the areas to be avoided; (3) that overlap is likely to have biologically meaningful effects in the identified area; and (4) avoidance of the area would not result in unacceptable impacts on military readiness.

As described in Section 5.3.4.1.6 (Limiting Access to Training and Testing Locations) and Section 5.3.4.1.7 (Avoiding Locations Based on Bathymetry and Environmental Conditions), the Navy carefully identified areas where proposed training and testing activities would occur by evaluating the extent to which these areas provide for personnel safety and replicate real-world conditions, including varying environmental conditions, to maximize training realism and testing effectiveness. The locations in which the Navy is proposing to continue training and testing activities have all been in use for many decades, and the same types of training and testing events have occurred in these locations over the years. These locations continue to be used because they provide unique environmental training conditions that replicate real-world environments, allow the Navy to avoid interaction with established commercial air traffic routes and commercial vessel shipping lanes, are in proximity to aircraft emergency divert landing fields, and are in proximity to homeports and home bases to minimize fuel use and minimize the time personnel are away from home. Some Navy training and testing activities require coordination with, or use of, existing fixed support facilities such as instrumented ranges, and therefore cannot be conducted in alternate locations without adversely affecting the ability to meet mission requirements.

Locations in which Navy training and testing activities would occur inevitably overlap with a wide array of marine species habitats, including foraging habitats, reproductive areas, and migration corridors. Limiting activities to avoid all of these habitats would adversely impact the effectiveness of the training or testing activity, create a risk to non-participating aircraft and vessels, result in an unacceptable increased risk to personnel safety, and result in greater fuel expenditure as a result of transiting to locations at greater distances from homeports and home bases, thereby impacting the ability to achieve mission success.

Through the Cetacean Density and Distribution Mapping (CetMap) process, NMFS has recently identified specific areas where certain marine mammal species tend to be found concentrated at particular times of the year while engaging in important behavioral activities (Aquatic Mammals 2015; Calambokidis et al. 2015; Ferguson et al. 2015a, 2015b; Van Parijs 2015). The areas currently identified are not intended to reflect a complete list of areas of biological importance, are not equivalent to habitat or range, and likely represent only a fraction of a species' overall range (Ferguson et al. 2015a). Additionally, the delineation of a mapped boundary does not reflect the day-to-day dynamic nature of marine mammal distributions or of the ocean environment, both of which are subject to perturbation along with other key variables such as prey availability and other environmental factors (e.g., sea surface temperature). Therefore, the Navy has determined that it is most effective to implement mitigation measures whenever and wherever a marine mammal is detected, regardless of the probability that a marine mammal may be in a certain location.

In response to public comments and as part of ongoing discussions with NMFS, the Navy has considered if additional mitigation is warranted, including avoiding training and testing activities in each of the areas that have been identified as biologically important within the NWTT Study Area. These areas include gray whale migration and presence areas as well as humpback and gray whale feeding areas.

Commenters have also suggested that the Navy should not train or test in seasonal blue and humpback whale migration areas. However, no seasonal blue and humpback whale migration areas of importance have been identified in the NWTT Study Area. The Navy conducted an assessment of NWTT training and testing activities in relation to the humpback and gray whale feeding areas that overlap the NWTT Study Area. Based on approximate historically used locations for training and testing in the NWTT Study Area, the Navy anticipates that training proposed in this EIS/OEIS would have very limited spatial overlap with any designated feeding areas for humpback whales in the Offshore portion of the NWTT Study Area. Sound from training activities in the Northern Washington humpback whale feeding area would mostly result from hull-mounted sonar maintenance or systems checks as vessels are transiting to other areas within and outside of the NWTT Study Area. With regard to testing activities, it is possible, though not likely, that acoustic emissions from countermeasure testing could propagate into the Northern Washington humpback whale feeding area. However, all acoustic emissions, whether resulting from training or testing, would be infrequent, transitory, and would occur with a high degree of temporal variability. Given the area's location at the entrance of Strait of San Juan de Fuca, the vast majority of sound and disturbance in the area will be the result of non-Navy vessel activity (see detailed discussion in Section 3.4.3.2.4 [Impacts from Vessel Noise]). It is unlikely that the limited Navy training and testing events would have any biologically meaningful effect on humpback whale feeding behavior in this area. Avoidance of this area by transiting Navy ships is not warranted when balanced against the fact that it would force ships into higher traffic density waters based on commercial shipping density data in that area. Avoidance could also create safety concerns by forcing the Navy to delay maintenance and systems checks until ships are farther from shore and homeport infrastructure that could have assisted in addressing potential technical issues. Therefore, in light of the unlikely biologically benefit to the species and the anticipated adverse impacts on military readiness, the Navy concludes that avoidance of this area is not warranted.

There would be no direct overlap of any Navy active sonar or explosive training activity in the Stonewall and Heceta Bank humpback whale feeding area offshore of Oregon, although occasional shallow water testing with sonobuoys would overlap with this location. The shallower water features in the area affect bottom reflecting, scattering, and absorption of the sound and typically it creates a more challenging environment to test sonobuoys due to other surface sound sources (commercial/recreational boats). These conditions allow aircrews to gain understanding of how noise from other sources will impact underwater signal detection. However, these sonobuoy testing events are infrequent (fewer than 50 per year) and of short-duration (less than a day). It is unlikely that this limited testing of sonobuoys would have any biologically meaningful effect on humpback whale feeding behavior in this area. Therefore, in light of the unlikely biologically benefit to the species and the anticipated adverse impacts on military readiness, the Navy concludes that avoidance of this area is not warranted.

The Northern Puget Sound gray whale feeding area includes waters associated within the nearshore confines of the piers of Naval Station Everett, Washington. Infrequent (no more than 13 per year) hull mounted sonar training maintenance and lifecycle testing must occur periodically based on ship availability and logistics while pierside in Everett. Related acoustic emissions would propagate into the Northern Puget Sound gray whale feeding area. A Maritime Homeland Defense/Security Mine Countermeasure exercise could occur once every other year (3 out of 5 years) near or around Naval Station Everett which could have non-hull mounted acoustic emissions that would propagate into the feeding area as well. However, these acoustic emissions would be very infrequent, transitory, and happen with a high degree of temporal variability. Given this area's location in Puget Sound, the vast majority of sound and disturbance in the area will be the result of non-Navy vessel traffic. As such, precluding Navy activity at Naval Station Everett and in Northern Puget Sound would be of little to no biological benefit to the gray whales. Furthermore, given pending overseas deployment needs and individual ship readiness cycles to support those deployments, the time of year when maintenance or testing occurs cannot be proscribed. As for the homeland defense exercise, the location in which it would occur provides realistic conditions necessary to effectively train personnel to protect a major port and the vital assets (ships, cargo) and shipping channels near those ports. This pierside activity cannot be relocated given the ships are homeported in that location. The Navy concludes that seasonal avoidance of the use of acoustic sources within this feeding area would be of little biological benefit to the gray whales and would negatively impact readiness.

Both humpback feeding areas are within densely trafficked and highly established shipping channels and traffic separation zones used by civilian and Navy vessels, which suggests that humpback feeding is somewhat compatible with the heavy ship traffic. Navy vessel movement associated with transit through the southern portion of the Northern Puget Sound gray whale feeding (near Naval Station Everett) and Northern Washington humpback whale feeding area (offshore of Washington) is likely to occur as ships routinely leave and arrive from homeports at Naval Station Everett or Naval Base Kitsap-Bremerton or Naval Base Kitsap-Bangor, and it would be impracticable, if not impossible, for the Navy to avoid transiting this area. There would be limited if any Navy ship transit through the Stonewall and Heceta Bank humpback whale feeding area, as this area is well outside of normal north-south shipping lanes often utilized by Navy vessels, and as such, there would be little to no biological benefit from adopting avoidance measures for Navy vessels while not restricting other commercial or recreational vessels in this area.

The area of potential gray whale occurrence that extends along the entire U.S. West Coast continental shelf as well as throughout Puget Sound, is impractical to avoid. Neither the Navy nor any other user of the waters in the Study Area could completely avoid these areas. In addition, the separately identified Northern Puget Sound gray whale feeding area includes the waters around the piers of Naval Station Everett. This pierside acoustic activity cannot be relocated given the ships are homeported in that location and the Maritime Homeland Defense/Security Mine Countermeasure exercise that could occur once every other year (3 out of 5 years) near or around Naval Station Everett must be conducted in an area that provides realistic conditions necessary to train personnel to protect ships and cargo and piers to maneuver around. The Navy concludes that avoidance would be of little biological benefit to the gray whales and would negatively impact operational readiness.

In addition to the above analysis, based on the best available science, analyses of Navy's proposed training and testing activities in these areas was presented in Section 3.4.3 (Environmental Consequences) for each of the stressors. The analysis demonstrates that the proposed training and testing activities would not significantly affect the particular behavioral activity for which the areas were identified.

In addition to avoiding biologically important areas, some commenters suggested that the Navy avoid areas where the Navy model predicted high numbers of exposures. As described in the *Determination of Acoustic Effects on Marine Mammals and Sea Turtles for the Northwest Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement* technical report (Marine Species Modeling Team 2013), modeling locations were developed based on historical data and anticipated future needs. The model does not provide information detailed enough to analyze or compare locations based on potential take levels for each activity; therefore, applying the modeling results to inform development of mitigation areas would not be feasible.

The Navy does not find avoidance of the areas reasonably practicable or necessary at this time. The Navy proposes to monitor use of active sonar within these feeding areas and report that use to NMFS in classified annual reports to inform future adaptive management of activities within the NWTT Study Area. Reporting of active sonar use in the gray whale migration potential presence area within Puget Sound and Inland Waters and the coastal migration areas is not practical because the areas are not limited in size enough to warrant any adaptive management assistance to NMFS. The Navy already provides all sonar use to NMFS in annual reports. As explained in Section 5.3.3.2 (Puget Sound and the Strait of Juan de Fuca), Navy plans to continue the permission scheme for use of active sonar that has been in place since 2003. There has been limited use in this Puget Sound area for testing or maintenance. No training use has occurred and limited training use of mid-frequency active sonar is still anticipated, with the Maritime Homeland Defense/Security Mine Countermeasure Integrated Exercise as the only likely training activity that could use sonar in approximately three events over the course of a 5-year period. Additionally, Navy vessels already adhere to measures as identified in Section 5.3.2.2.1.1 while in transit to avoid marine mammals.

#### 5.3.4.1.12 Avoiding Marine Protected Areas

Avoiding marine protected areas for the purpose of mitigation would increase safety risks to personnel, be impractical with regard to implementation, and would not be warranted based on the discussions presented in the Chapter 3 (Affected Environment and Environmental Consequences) environmental analyses for biological resources and Section 6.1.2 (Marine Protected Areas).

Areas where training and testing activities are scheduled to occur are carefully chosen to provide safety and allow realism of events. The proximity to facilities, range complexes, and testing ranges is essential to the training and testing realism and effectiveness required to train and certify naval forces ready for combat operations. Limiting access to marine protected areas would restrict access to training and testing locations and would increase transit time, which would result in an increased risk to personnel safety, particularly for platforms with fuel restrictions (e.g., aircraft).

As described in Section 6.1.2 (Marine Protected Areas), due to the nature of many training and testing activities (e.g., requiring deep water), proposed activities are unlikely to occur in the extremely shallow nearshore waters typical of most marine protected areas. Within most marine protected areas, the only activity likely to occur is an aircraft overflight during transit from an airfield to an offshore training or testing location. Exposure of marine protected area resources to aircraft overflights would be brief and is expected to cause only a minor and temporary behavioral reaction due to noise for marine mammals, sea turtles, birds, or fish that may be present in the area. There is potential for birds to be struck by aircraft; however, the Navy implements standard operating procedures that require pilots of Navy aircraft to make every attempt to avoid large flocks of birds in order to reduce the safety risk involved with a potential bird strike. Additional mitigation or avoidance of these marine protection areas would be unnecessary, and limiting passage through the areas would restrict direct access to training and testing locations. Such avoidance would ultimately increase transit time and for platforms with fuel restrictions (e.g., aircraft) would therefore result in an unacceptable increased risk to personnel safety.

For marine protected areas (e.g., gear restricted areas) located further offshore, activities in addition to aircraft overflights may occur. Refer to Section 6.1.2 (Marine Protected Areas) for a more detailed discussion on the activities that are expected to occur within marine protected areas in the Study Area. Ultimately, limiting access to training and testing locations that overlap, are contained within, or are adjacent to marine protected areas would reduce realism of training by restricting access to important real world combat situations, such as bathymetric features and varying oceanographic features. As described in Section 2.5.1.1 (Alternative Locations), the ability to use the diverse and multidimensional capabilities of each range complex and testing range results in the Navy's ability to develop and maintain high levels of readiness. Major exercises using integrated warfare components require large areas of the littorals, Open Ocean, and certain nearshore areas for realistic and safe training. Limiting training and testing to specific locations and avoiding all marine protected areas would be impractical to implement with regard to the need to conduct activities in proximity to certain facilities, range complexes, and testing ranges. The Navy typically conducts activities in proximity to certain facilities, range complexes, and testing ranges in order to reduce travel time and funding required to conduct training away from a unit's home base. Activities involving the use of helicopters typically occur in proximity to shore or refueling stations due to fuel restrictions and personnel safety. Training and testing location limitations would also adversely impact the safety of the training and testing activities by requiring activities to take place in more remote areas where safety support may be limited. Refer to Section 5.3.4.1.6 (Limiting Access to Training and Testing Locations) for further discussion on the impacts of limiting access to training and testing locations on the Navy's ability to maintain military readiness.

#### 5.3.4.1.13 Avoiding the Olympic Coast National Marine Sanctuary

Navy activities have occurred for decades in this area both before and after the OCNMS was designated, and are currently authorized in accordance with Sanctuary regulations. Avoiding the OCNMS for the purpose of mitigation would be incompatible with the purpose and need because it would require closure of the Quinault Range site and loss of access to diverse environmental conditions that are needed to support testing requirements. Also, as stated in Section 6.1.2.1 (Olympic Coast National Marine Sanctuary) of the Final EIS/OEIS, the Navy is in ongoing consultation with the OCNMS regarding the effects of the Proposed Action on Sanctuary resources, but has concluded its activities are not likely to result in the loss, destruction, or adverse changes to the viability of Sanctuary resources.

Areas where training and testing activities are scheduled to occur are carefully chosen to provide safety and allow realism of events. The proximity to facilities, range complexes, and testing ranges is essential to the training and testing realism and effectiveness required to train and certify naval forces ready for combat operations. Avoiding training and testing in the OCNMS would restrict access to training and testing locations and could increase transit time, which would result in an increased risk to personnel safety, particularly for platforms with fuel restrictions (e.g., aircraft).

Ultimately, limiting access to training and testing locations that overlap, are contained within, or are adjacent to the OCNMS would reduce realism of training by restricting access to important real world combat situations, such as bathymetric features and varying oceanographic features. As described in Section 2.5.1.1 (Alternative Locations), the ability to use the diverse and multidimensional capabilities of each range complex and testing range results in the Navy's ability to develop and maintain high levels of readiness. Limiting training and testing to specific locations and avoiding all marine-protected areas would be impractical to implement with regard to the need to conduct activities in proximity to certain facilities, range complexes, and testing ranges. The Navy typically conducts activities in proximity to certain facilities, range complexes, and testing ranges in order to reduce travel time and funding required to conduct training away from a unit's home base. Activities involving the use of helicopters typically occur in proximity to shore or refueling stations due to fuel restrictions and personnel safety. Training and testing location limitations would also adversely impact the safety of the training and testing activities by requiring activities to take place in more remote areas where safety support may be limited. Refer to Section 5.3.4.1.6 (Limiting Access to Training and Testing Locations) for further discussion on the impacts of limiting access to training and testing locations on the Navy's ability to maintain military readiness.

Complete avoidance of the OCNMS for sonar activities is not practical; however, while active sonar and ASW activities are authorized within the OCNMS, the Navy uses its PMAP program to inform all users of active sonar that the OCNMS is within the NWTT Study Area. PMAP informs users that no high explosives are authorized in the OCNMS. The Navy proposes to continue use of PMAP in this manner for awareness and notification.

#### 5.3.4.1.14 Increasing Visual and Passive Acoustic Observations

Increasing visual and passive acoustic observations, including modification of sonobuoys for passive acoustic detection of vocalizing species, for the purpose of mitigation would be impractical with regard to implementation of military readiness activities and result in unacceptable impact on readiness for the following reasons:

The Navy recommended mitigation measures already represent the maximum level of effort (e.g., numbers of Lookouts and passive sonobuoys) that the Navy can commit to observing mitigation zones given the number of personnel that will be involved and the number and type of assets and resources available. The number of Lookouts that the Navy recommends for each measure often represents the maximum capacity based on limited resources (e.g., space and manning restrictions). For example, some vessels are minimally manned and are therefore physically unable to accommodate more than one Lookout. Furthermore, training and testing activities are carefully planned with regard to personnel duties. Requiring additional Lookouts would require either adding personnel, for which there would be no additional space, or reassigning duties, which would divert Navy personnel from essential tasks required to meet mission objectives.

The Navy will conduct passive acoustic monitoring during several activities with Navy assets, such as sonobuoys, already participating in the activity (e.g., torpedo [explosive] testing and improved extended echo ranging sonobuoys). Refer to Section 5.3.2 (Mitigation Zone Procedural Measures) for additional information on the use of passive acoustics during training and testing activities. The Navy does not have the resources to construct and maintain additional passive acoustic monitoring systems (e.g., modified passive sonobuoys) for each training and testing activity.

#### 5.3.4.1.15 Increasing the Size of Observed Mitigation Zones

Increasing the size of observed mitigation zones for the purpose of mitigation would be impractical with regard to implementation of military readiness activities and result in unacceptable impact on readiness for the following reasons:

The Navy developed activity-specific mitigation zones based on the Navy's acoustic propagation model. In this NWTT analysis, the Navy developed each recommended mitigation zone to avoid or reduce the potential for onset of the lowest level of injury, PTS, out to the predicted maximum range. Mitigating to the predicted maximum range to PTS consequently also mitigates to the predicted maximum range to onset mortality (1 percent mortality), onset slight lung injury, and onset slight gastrointestinal tract injury, since the maximum range to effects for these criteria are shorter than for PTS. Furthermore, in most cases, the predicted maximum range to PTS also covers the predicted average range to TTS. In some instances, the Navy recommends mitigation zones that are larger or smaller than the predicted maximum range to PTS based on the associated effectiveness and operational assessments presented in Section 5.3.2 (Mitigation Zone Procedural Measures).

The Navy recommended mitigation zones represent the maximum area the Navy can effectively observe based on the platform of observation, number of personnel that will be involved, and the number and type of assets and resources available. As mitigation zone sizes increase, the potential for reducing impacts decreases. For instance, if a mitigation zone increases from 1,000 to 4,000 yd. (914 to 3,660 m), the area that must be observed increases sixteen-fold. The Navy recommended mitigation measures balance the need to reduce potential impacts with the ability to provide effective observations throughout a given mitigation zone. Implementation of mitigation zones is most effective when the zone is appropriately sized to be realistically observed. The Navy does not have the resources to maintain additional Lookouts or observer platforms that would be needed to effectively observe mitigation zones of increased size. Further, as explained above, the number of Lookouts that the Navy recommends for each measure often represents the maximum capacity based on limited resources (e.g., space and manning restrictions). For example, some vessels are minimally manned and are therefore physically unable to accommodate more than one Lookout. Training and testing activities are carefully planned with regard to personnel duties. Requiring observation of mitigation zones of increased size would either require adding personnel, for which there would be no additional space or resources, or reassigning duties, which would divert Navy personnel from essential tasks required to meet mission objectives. For most activities, Lookouts are required to observe for concentrations of detached floating vegetation (*Sargassum* or kelp paddies), which are indicators of potential marine mammal and sea turtle presence, within the mitigation zone to further help reduce the potential for injury to occur.

##### 5.3.4.1.16 Conducting Visual Observations Using Third-Party Observers

With limited exceptions, use of third-party observers (e.g., trained marine species observers) in air or on surface platforms in addition to existing Navy Lookouts for the purposes of mitigation would be impractical with regard to implementation of military readiness activities and result in unacceptable impact on readiness for the following reasons:

Use of third-party observers is not necessary because Navy personnel are extensively trained in spotting items on or near the water surface. Use of Navy Lookouts ensures immediate implementation of mitigation if marine species are sighted. A critical skill set of effective Navy training is communication. Navy Lookouts are trained to act swiftly and decisively to ensure that appropriate actions are taken. Additionally, multiple training and testing events can occur simultaneously and in various regions throughout the Study Area, and can last for days or weeks at a time. The Navy does not have the resources to maintain third-party personnel to accomplish the task for every event.

The use of third-party observers would compromise security for some activities involving active sonar due to the requirement to provide advance notification of specific times and locations of Navy platforms. Reliance on the availability of third-party personnel would impact training and testing flexibility. The presence of other aircraft in the vicinity of naval activities would raise safety concerns for both the commercial observers and naval aircraft. Furthermore, vessels have limited passenger capacity. Training and testing event planning includes careful consideration of this limited capacity in the placement of personnel on ships involved in the event. Inclusion of non-Navy observers onboard these vessels would require that in some cases there would be no additional space for essential Navy personnel required to meet the exercise objectives.

The areas where training events will most likely occur in the Study Area cover more than 120,000 square nautical miles. Contiguous ASW events may cover many hundreds or even thousands of square miles. The number of civilian ships or aircraft required to monitor the area of these events would be considerable. It is, thus, not feasible to survey or monitor the large exercise areas in the time required. In addition, marine mammals may move into or out of an area, if surveyed before an event, or an animal could move into an area after an event took place. Given that there are no adequate controls to account for these or other possibilities, there is little utility to performing extensive before or after event surveys of large exercise areas as a mitigation measure.

Surveying during an event raises safety issues with multiple, slow civilian aircraft operating in the same airspace as military aircraft engaged in combat training activities. In addition, many of the training and testing events take place far from land, limiting both the time available for civilian aircraft to be in the event area and presenting a concern should aircraft mechanical problems arise. Scheduling civilian vessels or aircraft to coincide with training events would impact training effectiveness, since exercise event timetables cannot be precisely fixed and are instead based on the free-flow development of tactical situations. Waiting for civilian aircraft or vessels to complete surveys, refuel, or be on station would slow the progress of the exercise and impact the effectiveness of the military readiness activity.

#### 5.3.4.1.17 Adopting Mitigation Measures of Foreign Navies

Adopting mitigation measures of foreign navies generally for the purpose of mitigation, such as expanding the mitigation zones to match those used by a particular foreign navy, would be impractical with regard to implementation of military readiness activities and result in unacceptable impact on readiness for the following reasons:

Mitigation measures are carefully customized for and agreed upon by each individual navy based on potential impacts of the activities on marine species and the impacts of the mitigation measures on military readiness. The mitigation measures developed for one navy would not necessarily be effective at reducing potential impacts on marine species by all navies. Similarly, mitigation measures that do not cause an unacceptable impact on one navy may cause an unacceptable impact on another. For example, most other navies do not possess an integrated strike group and do not have integrated training requirements. The Navy's training is built around the integrated warfare concept and is based on the Navy's capabilities, the threats faced, the operating environment, and the overall mission. Implementing other navies' mitigation would be incompatible with U.S. Navy requirements. The U.S. Navy's recommended mitigation measures have been carefully designed to reduce potential impacts on marine species while not causing an unacceptable impact on readiness.

#### 5.3.4.1.18 Increasing Reporting Requirements

The Navy has extensive reporting requirements, including exercise, testing, and monitoring reporting designed to verify implementation of mitigation, comply with current permits, and improve future environmental assessments (Section 5.5.3, Reporting). Increasing the requirement to report marine species sightings to augment scientific data collection and to further verify the implementation of mitigation measures is unnecessary and would increase safety risks to personnel, be impractical with regard to implementation of military readiness activities, and result in unacceptable impact on readiness for the following reasons:

Vessels, aircraft, and personnel engaged in training and testing events are intensively employed throughout the duration of training and testing activities. Any additional workload assigned that is unrelated to their primary duty would adversely impact personnel safety and the effectiveness of the military readiness activity they are undertaking. Lookouts are not trained to make accurate species-specific identification and would not be able to provide the detailed information that the scientific community would use. Alternatively, the Navy has an integrated comprehensive monitoring program (Section 5.5, Monitoring and Reporting) that does provide information that is available and useful to the scientific community in annual monitoring reports.

### 5.3.4.2 Previously Accepted but Now Eliminated

#### 5.3.4.2.1 Implementing Active Sonar Ramp-Up Procedures During Testing

Although some testing activities are not capable of ramping up power levels, some have implemented active sonar ramp-up procedures (slowly increasing the sound in the water to necessary levels) in an attempt to clear the range prior to conduct of activities for the purpose of mitigation. Although ramp-up procedures have been used for some testing activities, the effectiveness at avoiding or reducing impacts on marine mammals has not been demonstrated. Until evidence suggests that ramp-up procedures are an effective means of avoiding or reducing potential impacts on marine mammals, and for reasons discussed in Section 5.3.4.1.4 (Implementing Active Sonar Ramp-Up Procedures during Training), the Navy would not implement this measure for testing activities as part of the Proposed Action.

#### 5.3.4.2.2 Implementing a Mitigation Zone for Missile Exercises with Airborne Targets

Per current mitigation, a mitigation zone of 1,000 yd. (914 m) is observed around the expected expended material field. The Navy is proposing to eliminate the need for a Lookout to maintain a mitigation zone for missile exercises involving airborne targets. Most airborne targets are recoverable aerial drones, and missile impact with the target does not typically occur. Most anti-air missiles used in training are telemetry configured (i.e., they do not have an actual warhead). Impact of a target is unlikely because missiles are designed to detonate (simulated detonation for telemetry missiles) in the vicinity of the target and not as a result of a direct strike on the target. Given the speed of the missile and the target, the high altitudes involved, and the long ranges of missile travel possible, it is not possible to definitively predict or to effectively observe where the missile fragments will fall. The potential expended material fall zone can only be predicted within tens of miles for long range events, which can be in excess of 80 nm from the firing location, and thousands of yards for shorter events, which can occur within several thousand yards from the firing location. Establishment of a mitigation zone for activities involving airborne targets would be ineffective at reducing potential impacts.

Furthermore, the potential risk to any marine mammal or sea turtle from a missile exercise with an airborne target is a direct strike from falling expended material. Based on the extremely low potential for a target strike and associated expended material field to co-occur in space and time with a marine species at or near the surface of the water, the potential for a direct strike is negligible.

#### 5.3.4.2.3 Implementing a Mitigation Zone for Medium- and Large-Caliber Gunnery Exercises with Airborne Targets

Per current mitigation, a mitigation zone is observed in the vicinity of the expected military expended material field. The Navy is proposing to eliminate the need for a Lookout to observe the vicinity of the expected military expended material for medium- and large-caliber gunnery exercises involving airborne targets. The potential expended material fall zone can only be predicted within thousands of yards, which can be up to 7 nm from the firing location. Establishment of a mitigation zone for activities involving airborne targets would be ineffective at reducing potential impacts.

Furthermore, the potential risk to any marine mammal or sea turtle from a gunnery exercise with an airborne target is a direct strike from falling military expended materials. Based on the extremely low potential for an expended material field to co-occur in space and time with a marine species at or near the surface of the water, the potential for a direct strike is negligible.

## 5.4 MITIGATION SUMMARY

Table 5.4-1 provides a summary of the Navy's proposed mitigation measures. For reference, currently implemented mitigation measures for each activity category are also summarized in the table. The process for developing each of these measures is detailed in Section 5.2.3 (Assessment Method) and involved: (1) an effectiveness assessment to determine if implementation of the measure will likely result in avoidance or reduction of an impact on a resource; and (2) an operational assessment to determine if implementation of the measures will have acceptable operational impacts on the Proposed Action with regard to personnel safety, practicality of implementation, readiness, and Navy policy. Measures are intended to meet applicable regulatory compliance requirements for NEPA, Executive Order 12114, and CEQ guidance. The proposed mitigation measures were also developed consistent with resource-specific environmental requirements, as follows:

- Measures specifying marine mammals, floating vegetation (kelp paddies), large schools of fish, or birds as the protection focus are intended to meet MMPA requirements.
- Measures specifying marine mammals, sea turtles, birds, floating vegetation (kelp paddies), or jellyfish aggregations as the protection focus are intended to meet ESA requirements.
- Measures specifying live hardbottom, artificial reefs, or shipwrecks as the protection focus are intended to meet Essential Fish Habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act.
- Measures specifying shipwrecks is an additional protection focus intended to meet Abandoned Shipwreck Act and National Historic Preservation Act requirements.

The measures presented in Table 5.4-1 are discussed in greater detail in Section 5.3.1 (Lookout Procedural Measures), Section 5.3.2 (Mitigation Zone Procedural Measures), and Section 5.3.3 (Mitigation Areas). As discussed in Section 5.2.2.2 (Protective Measures Assessment Protocol), the final suite of mitigations resulting from the ongoing planning for this EIS/OEIS, as well as the regulatory consultation and permitting processes will be integrated into the Protective Measures Assessment Protocol for implementation purposes. Section 5.5 (Monitoring and Reporting) describes the monitoring and reporting efforts the Navy will undertake to investigate the effectiveness of implemented mitigation measures and to better understand the impacts of the Proposed Action on marine resources.

Table 5.4-2 compares the current and recommended (proposed) mitigations measures for acoustic (non-impulse and impulse) stressors and for physical disturbance and strike stressors.

**Table 5.4-1: Summary of Recommended Mitigation Measures**

| Activity Category or Mitigation Area | Recommended Lookout Procedural Measure | Recommended Mitigation Zone and Protection Focus | Current Measure and Protection Focus |
|---|---|---|---|
| **Specialized Training** | | | |
| Marine Species Awareness Training (Modules 1 through 4) | Training: Applicable personnel will complete the United States Navy Marine Species Awareness Training prior to standing watch or serving as a Lookout.<br>Testing: Same as Training | Training: The mitigation zones observed by Lookouts are specified for each Mitigation Zone Procedural Measure below.<br>Testing: Same as Training | Training: Applicable personnel will complete the United States Navy Marine Species Awareness Training prior to standing watch or serving as a Lookout.<br>Testing: Same as Training |
| **Acoustic Stressors – Sonar and Other Active Acoustic Sources** | | | |
| Low-Frequency and Hull-Mounted Mid-Frequency Active Sonar during Anti-Submarine Warfare and Mine Warfare | Training: 2 Lookouts (general), 1 Lookout (minimally manned, moored, or anchored)<br>Testing: 2 Lookouts (general), 1 Lookout (small boats, minimally manned, moored, anchored, pierside, or shore-based) | Training: 1,000 yd. (914 m) and 500 yd. (457 m) power downs and 200 yd. (183 m) shutdown for cetaceans and sea turtles (excludes bow-riding dolphins), 100 yd. (91 m) mitigation zone for pinnipeds (excludes haulout areas).<br>Testing: 1,000 yd. (914 m) and 500 yd. (457 m) power downs for sources that can be powered down, 200 yd. (183 m) shutdown for cetaceans, and 100 yd. (91 m) for pinnipeds. (excludes haulout areas) | Training: 1,000 yd. (914 m) and 500 yd. (457 m) power downs and 200 yd. (183 m) shutdown for marine mammals and sea turtles.<br>Testing: Observation conducted from all participating surface craft and, where available, adjacent shore sites, with a cetacean mitigation zone 1,000 yd. (914 m), 100 yd. (91 m) for pinnipeds from intended track of the test unit. |
| High-Frequency and Non-Hull-Mounted Mid-Frequency Active Sonar | Training: 2 Lookouts (general), 1 Lookout (minimally manned, moored, or anchored)<br>Testing: 2 Lookouts (general), 1 Lookout (minimally manned, moored, anchored, and aircraft systems testing). | Training: 200 yd. (183 m) for marine mammals and concentrations of floating vegetation.<br>Testing: 200 yd. (183 m) for marine mammals and (100 yd. [91 m] for pinnipeds from intended track of the test unit (excludes haulout areas). | Training: Non-hull-mounted mid-frequency: 200 yd. (183 m) for marine mammals, floating vegetation and kelp paddies.<br>High-frequency: None<br>All Other Testing: Observation conducted from all participating surface craft and, where available, adjacent shore sites, with a cetacean mitigation zone 1,000 yd. (914 m), 100 yd. (91 m) for pinnipeds from intended track of the test unit. |

**Table 5.4-1: Summary of Recommended Mitigation Measures (continued)**

| Activity Category or Mitigation Area | Recommended Lookout Procedural Measure | Recommended Mitigation Zone and Protection Focus | Current Measure and Protection Focus |
|---|---|---|---|
| **Explosive and Impulse Sound** | | | |
| Improved Extended Echo Ranging Sonobuoys | Training: 1 Lookout<br>Testing: 1 Lookout | Training: 600 yd. (549 m) for marine mammals, sea turtles, and concentrations of floating vegetation.<br>Testing: Same as Training | Training: 1,000 yd. (914 m) for marine mammals and sea turtles.<br>Testing: Same as Training |
| Explosive Signal Underwater Sound buoys using >0.5–2.5 lb. NEW | Training: 1 Lookout<br>Testing: 1 Lookout | Training: 350 yd. (320 m) for marine mammals, sea turtles, and concentrations of floating vegetation.<br>Testing: Same as Training | None |
| Mine Countermeasures and Mine Neutralization using Positive Control Firing Devices | Training: 2 Lookouts (1 each on 2 survey boats)<br>Testing: n/a | Training: 400 yd. (366 m) for > 0.5–2.5 lb. charge for marine mammals. Mitigation zone for marbled murrelet will be determined through the consultation process with USFWS.<br>Testing: n/a | Training: 700 yd. (640 m) for >0.5-2.5 lb. charge for marine mammals, turtles, and marbled murrelet.<br>330 yd. (300 m) for up to 1.5 lb. charge for marbled murrelet.<br>110 yd. (100 m) for 1 ounce charge marbled murrelet.<br>Testing: n/a |
| Gunnery Exercises – Small- or Medium-Caliber using a Surface Target | Training: 1 Lookout<br>Testing: n/a | Training: 200 yd. (183 m) for marine mammals, sea turtles, and concentrations of floating vegetation.<br>Testing: n/a | Training: 200 yd. (183 m) for marine mammals, sea turtles, and floating vegetation.<br>Testing: n/a |
| Gunnery Exercises – Large-Caliber Explosive Rounds using a Surface Target | Training: 1 Lookout<br>Testing: n/a | Training: 600 yd. (549 m) around target for marine mammals, sea turtles, and concentrations of floating vegetation.<br>Testing: n/a | Training: None. (Current mitigation measures were for all gunnery exercises and included only a 200 yd. [183 m] mitigation zone, which the Navy feels is too small for high explosive gunnery.)<br>Testing: n/a |

**Table 5.4-1: Summary of Recommended Mitigation Measures (continued)**

| Activity Category or Mitigation Area | Recommended Lookout Procedural Measure | Recommended Mitigation Zone and Protection Focus | Current Measure and Protection Focus |
|---|---|---|---|
| Missile Exercises (Including Rockets) Up to 250 lb. NEW using a Surface Target[1] | Training: See Missile Exercises up to 500 lb. NEW using a Surface Target.<br>Testing: n/a | Training: See Missile Exercises up to 500 lb. NEW using a Surface Target.<br>Testing: n/a | Training: 1,800 yd. (1.7 km) for marine mammals, sea turtles, floating vegetation and kelp paddies.<br>Testing: n/a |
| Missile Exercises up to 500 lb. NEW using a Surface Target[1] | Training: 1 Lookout<br>Testing: n/a | Training: 2,000 yd. (1.8 km) for marine mammals, sea turtles, and concentrations of floating vegetation.<br>Testing: n/a | Training: 1,800 yd. (1.7 km) for marine mammals, sea turtles, floating vegetation and kelp paddies.<br>Testing: n/a |
| Explosive and Non-Explosive Bombing Exercises[1] | Training: 1 Lookout<br>Testing: n/a | Training: Explosive: 2,500 yd. (2.3 km) for marine mammals, sea turtles, and concentrations of floating vegetation.<br>Non-Explosive: 1,000 yd. (914 m) for marine mammals, sea turtles, and concentrations of floating vegetation.<br>Testing: n/a | Training: 1,000 yd. (914 m) for marine mammals, sea turtles, floating vegetation and kelp paddies.<br>Testing: n/a |
| Torpedo Testing (Explosive)[1] | Training: n/a<br>Testing: Surface ship – 2 Lookouts<br>Aircraft – 1 Lookout | Training: n/a<br>Testing: 2,100 yd. (1.9 km) for marine mammals, sea turtles, and concentrations of floating vegetation. | Training: n/a<br>Testing: None |
| Sinking Exercises | Training: 2 Lookouts (1 each on an aircraft and a surface vessel)<br>Testing: n/a | Training: 2.5 nm (4.6 km)<br>Testing: n/a | 4.5 nm for marine mammals, sea turtles, floating vegetation and jellyfish aggregations. |
| Weapons Firing Noise During Gunnery Exercises – Large-Caliber | Training: 1 Lookout<br>Testing: n/a | Training: 70 yd. (60 m) within 30 degrees on either side of the gun target line on the firing side for marine mammals, sea turtles, and concentrations of floating vegetation. | Training: None<br>Testing: n/a |

Note 1: When high explosives are used, this activity is conducted at least 50 nm from shore and outside OCNMS. Conducting these exercises greater than 50 nm from shore also has the practical effect of affording environmental protections to certain species such as southern resident killer whale, salmonids, and harbor porpoise.

**Table 5.4-1: Summary of Recommended Mitigation Measures (continued)**

| Activity Category or Mitigation Area | Recommended Lookout Procedural Measure | Recommended Mitigation Zone and Protection Focus | Current Measure and Protection Focus |
|---|---|---|---|
| **Physical Disturbance and Strike** | | | |
| Vessel Movements | Training: 1 Lookout<br>Testing: 1 Lookout | Training: 500 yd. (457 m) for whales.<br>200 yd. (183 m) for all other marine mammals (except bow-riding dolphins).<br>Testing: Range craft shall not approach within 100 yd. (91 m) of cetaceans (bow-riding dolphins excluded, and pinnipeds excluded during test body retrieval). | Training: 500 yd. (457 m) for whales.<br>Testing: Range craft shall not approach within 100 yd. (91 m) of marine mammals. |
| Towed In-Water Device Use | Training: 1 Lookout<br>Testing: 1 Lookout | Training: 250 yd. (229 m) for marine mammals<br>Testing: Range craft shall not approach within 100 yd. (91 m) of marine mammals. | Training: 250 yd. (229 m) for marine mammals.<br>Testing: Range craft shall not approach within 100 yd. (91 m) of marine mammals. |

Notes: ft. = feet, km = kilometer, lb.= pound, m = meter, n/a = not applicable, NEW = net explosive weight, nm = nautical mile, yd.= yard

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**Table 5.4-2: Mitigation Identification and Implementation**

<table>
<tr><th>Mitigation Measure</th><th>Benefit</th><th>Evaluation Criteria</th><th>Implementation</th><th>Responsible Command</th><th>Date Implemented</th></tr>
<tr><td>Marine Species Awareness Training<br><br>All personnel standing watch on the bridge and Lookouts will successfully complete the training before standing watch or serving as a Lookout.</td><td>To learn the procedures for searching for and recognizing the presence of marine species, including detection cues (e.g., congregating seabirds) so that potentially harmful interactions can be avoided.</td><td>Successful completion of training by all personnel standing watch and all personnel serving as Lookouts.<br><br>Personnel successfully applying skills learned during training.</td><td>The multimedia training program has been made available to personnel required to take the training.<br><br>Personnel have been and will continue to be required to take the training prior to standing watch and serving as Lookouts.</td><td>Officer Conducting the Exercise or Test or civilian equivalent</td><td>Ongoing</td></tr>
<tr><td colspan="6">Lookouts</td></tr>
<tr><td>Use of Four Lookouts for Underwater Detonations<br><br>Mine countermeasure and neutralization activities using positive control firing devices will include the use of two Lookouts. If applicable, aircrew and divers will report sightings of marine mammals or sea turtles.</td><td>Lookouts can visually detect marine species so that potentially harmful impacts to marine mammals and sea turtles from explosives use can be avoided.<br><br>Lookouts can more quickly and effectively relay sighting information so that corrective action can be taken. Support from aircrew and divers, if they are involved in the activity, will increase the probability of sightings, reducing the potential for impacts.</td><td rowspan="3">Annual report documenting NAVSEA testing and marine mammal observation data.<br><br>Timely reporting of underwater detonations and monitoring results related to bull trout and marbled murrelets.</td><td rowspan="3">All Lookouts will receive marine species awareness training and will be positioned on vessels, boats, and aircraft as described in Section 5.3.1.1.1 (Training for Navy Personnel and Civilian Equivalents).</td><td rowspan="3">Officer Conducting the Exercise or Test</td><td rowspan="3">Ongoing</td></tr>
<tr><td>Use of One or Two Lookouts<br><br>Vessels using low-frequency active sonar or hull-mounted mid-frequency active sonar associated with ASW activities will have either one or two Lookouts, depending on the activity and size of the vessel.<br><br>Mine countermeasure and neutralization activities with positive control will use two Lookouts, with one on each support vessel. If applicable, aircrew and divers will also report the presence of marine mammals or sea turtles. One Lookout may be used under certain circumstances specific in Section 5.3.1.2 (Lookouts).</td><td>Lookouts can visually detect marine species so that potentially harmful impacts to marine mammals and sea turtles from Navy sonar and explosives use can be avoided.<br><br>Lookouts can more quickly and effectively relay sighting information so that corrective action can be taken. Support from aircrew and divers, if they are involved in the activity, will increase the probability of sightings, reducing the potential for impacts.</td></tr>
<tr><td>Use of One Lookout<br><br>Surface ships and aircraft conducting ASW, ASUW, or MIW activities using HFAS, non-hull-mounted mid-frequency active sonar, helicopter dipping mid-frequency active sonar, anti-swimmer grenades, explosive buoys, surface gunnery activities, surface missile activities, bombing activities, explosive torpedo testing, and activities using non-explosive practice munitions, will have one Lookout.</td><td>Lookouts can visually detect marine species so that potentially harmful impacts to marine mammals and sea turtles from Navy sonar, explosives, sonobuoys, gunnery rounds, missiles, explosive torpedoes, pile driving, towed systems, surface vessel propulsion, and non-explosive munitions can be avoided.<br><br>Lookouts will quickly and effectively relay sighting information so that corrective action(s) can be taken.</td></tr>
</table>

**Table 5.4-2: Mitigation Identification and Implementation (continued)**

| Mitigation Measure | Benefit | Evaluation Criteria | Implementation | Responsible Command | Date Implemented |
|---|---|---|---|---|---|
| **Mitigation Zones** | | | | | |
| **Use of a Mitigation Zone**<br><br>A mitigation zone is an area defined by a radius and centered on the location of a sound source or activity. The size of each mitigation zone is specific to a particular training or testing activity (e.g., sonar use or explosive use). | A mitigation zone defines the area in which Lookouts survey for marine mammals and sea turtles.<br><br>Mitigation zones reduce the potential for injury to marine species. | For those activities where monitoring is required, record observations of marine mammals and sea turtles located outside of the mitigation zone and note any apparent reactions to on-going Navy activities. Observation of acute reactions may be used as an indicator that the radius of the mitigation zone needs to be increased. | Mitigation zones have been and will continue to be implemented as described in Section 5.3.2 (Mitigation Zone Procedural Measures).<br><br>Lookouts are trained to conduct observations within mitigation zones of different sizes. | Officer Conducting the Exercise or Test | Ongoing |
| **Recognize the Importance of Marine Protected Areas**<br><br>In general, most Armed Forces activities are exempt from the prohibitions of marine protected areas Nevertheless, the Navy would carry out its training and testing activities in a manner that will avoid, to the maximum extent practical and consistent with training and testing requirements, adverse impacts to National Marine Sanctuary resources. | Avoiding or minimizing impacts while operating in or near marine protected areas could result in improved health of the resources in the areas. | The Navy shall submit an annual report to the National Marine Fisheries Service. | The Navy includes charts in the Protective Measures Assessment Protocol to define marine protected areas.<br><br>To the greatest extent practical, adverse impacts to these areas will be avoided. | Officer Conducting the Exercise or Test | Ongoing |

Notes: ASW = Anti-submarine Warfare, ASUW = Anti-surface Warfare, HFAS = High-Frequency Active Sonar, IEER = Improved Extended Echo Ranging, MIW = Mine Warfare, NAVSEA = Naval Sea Systems Command

## 5.5 Monitoring and Reporting

### 5.5.1 Approach to Monitoring

The Navy is committed to demonstrating environmental stewardship while executing its National Defense Mission and complying with the suite of Federal environmental laws and regulations. As a complement to the Navy's commitment to avoiding and reducing impacts of the Proposed Action through mitigation, the Navy will undertake monitoring efforts to track compliance with take authorizations, help evaluate the effectiveness of implemented mitigation measures, and gain a better understanding of the effects of the Proposed Action on marine resources. Taken together, mitigation and monitoring comprise the Navy's integrated approach for reducing environmental impacts from the Proposed Action. The Navy's overall monitoring approach will seek to leverage and build on existing research efforts whenever possible.

Consistent with the cooperating agency agreement with NMFS, mitigation and monitoring measures presented in this EIS/OEIS focus on the requirements for protection and management of marine resources. A well-designed monitoring program can provide important feedback for validating assumptions made in analyses and allow for adaptive management of marine resources. Since monitoring will be required for compliance with the final rule issued for the Proposed Action under the MMPA, details of the monitoring program will be developed in coordination with NMFS through the regulatory process. Discussions with resource agencies during the consultation and permitting processes may result in changes to the mitigation as described in this document. Such changes will be reflected in the Final EIS/OEIS, ROD, and consultation documents such as the ESA Biological Opinion.

#### 5.5.1.1 Integrated Comprehensive Monitoring Plan Top-Level Goals

The Integrated Comprehensive Monitoring Program is intended to coordinate monitoring efforts across all regions where the Navy trains and tests and to allocate the most appropriate level and type of effort for each range complex (U.S. Department of the Navy 2010). The current Navy monitoring program is composed of a collection of "range-specific" monitoring plans, each developed individually as part of MMPA and ESA compliance processes as environmental documentation was completed. These individual plans establish specific monitoring requirements for each range complex and are collectively intended to address the Integrated Comprehensive Monitoring Program top-level goals.

A 2010 Navy-sponsored monitoring meeting in Arlington, Virginia, initiated a process to critically evaluate the current Navy monitoring plans and begin development of revisions and updates to both existing region-specific plans as well as the Integrated Comprehensive Monitoring Plan. Discussions at that meeting as well as the following Navy and NMFS annual adaptive management meeting established a way ahead for continued refinement of the Navy's monitoring program. This process included establishing a Scientific Advisory Group of leading marine mammal scientists with the initial task of developing recommendations that would serve as the basis for a Strategic Plan for Navy monitoring. The Strategic Plan is intended to be a primary component of the Integrated Comprehensive Monitoring Program, provide a "vision" for Navy monitoring across geographic regions—serving as guidance for determining how to most efficiently and effectively invest the marine species monitoring resources to address Integrated Comprehensive Monitoring Program top-level goals, and satisfy MMPA Letter of Authorization regulatory requirements.

The objective of the Strategic Plan is to continue the evolution of Navy marine species monitoring towards a single integrated program, incorporating Scientific Advisory Group recommendations, and establishing a more transparent framework for soliciting, evaluation, and implementing monitoring work across the range complexes. The Strategic Plan must consider a range of factors in addition to the scientific recommendations including logistic, operational, and funding considerations and will be revised regularly as part of the annual adaptive management process.

The Integrated Comprehensive Monitoring Plan establishes top-level goals that have been developed in coordination with NMFS (U.S. Department of the Navy 2010). The following top-level goals will become more specific with regard to identifying potential projects and monitoring field work through the Strategic Plan process as projects are evaluated and initiated in the Study Area.

- An increase in our understanding of the likely occurrence of marine mammals or ESA-listed marine species in the vicinity of the action (i.e., presence, abundance, distribution, and density of species);
- An increase in our understanding of the nature, scope, or context of the likely exposure of marine mammals and ESA-listed species to any of the potential stressor(s) associated with the action (e.g., tonal and impulse sound), through better understanding of one or more of the following: (1) the action and the environment in which it occurs (e.g., sound source characterization, propagation, and ambient noise levels), (2) the affected species (e.g., life history or dive patterns), (3) the likely co-occurrence of marine mammals and ESA-listed marine species with the action (in whole or part) associated with specific adverse effects, or (4) the likely biological or behavioral context of exposure to the stressor for the marine mammal and ESA-listed marine species (e.g., age class of exposed animals or known pupping, calving or feeding areas);
- An increase in our understanding of how individual marine mammals or ESA-listed marine species respond (behaviorally or physiologically) to the specific stressors associated with the action (in specific contexts, where possible, e.g., at what distance or received level);
- An increase in our understanding of how anticipated individual responses, to individual stressors or anticipated combinations of stressors, may impact either: (1) the long-term fitness and survival of an individual; or (2) the population, species, or stock (e.g., through effects on annual rates of recruitment or survival);
- An increase in our understanding of the effectiveness of mitigation and monitoring measures;
- A better understanding and record of the manner in which the authorized entity complies with the Incidental Take Authorization and Incidental Take Statement;
- An increase in the probability of detecting marine mammals (through improved technology or methods), both specifically within the mitigation zone (thus allowing for more effective implementation of the mitigation) and in general, to better achieve the above goals; and
- A reduction in the adverse impact of activities to the least practicable level, as defined in the MMPA.

#### 5.5.1.2 Scientific Advisory Group Recommendations

Navy established the Scientific Advisory Group in 2011 with the initial task of evaluating current Navy monitoring approaches under the Integrated Comprehensive Monitoring Plan and existing MMPA Letters of Authorization and developing objective scientific recommendations that would form the basis for this Strategic Plan. While recommendations were fairly broad and not prescriptive from a range complex perspective, the Scientific Advisory Group did provide specific programmatic recommendations that serve as guiding principles for the continued evolution of the Navy Marine Species Monitoring Program and provide a direction for the Strategic Plan to move this development. Key recommendations include:

- Working within a conceptual framework of knowledge, from basic information on the occurrence of species within each range complex, to more specific matters of exposure, response, and consequences.
- Facilitating collaboration among researchers in each region, with the intent to develop a coherent and synergistic regional monitoring and research effort.
- Striving to move away from a “box-checking” mentality. Monitoring studies should be designed and conducted according to scientific objectives, rather than on merely cataloging effort expended.
- Approach the monitoring program holistically and select projects that offer the best opportunity to advance understanding of the issues, as opposed to establishing range-specific requirements.

## 5.5.2 Activity Specific Monitoring

**Mine Countermeasures and Neutralization Training Activities**

Following consultation with USFWS, the Navy has implemented the monitoring measures necessary to minimize the impact of the taking on both bull trout and marbled murrelets during Mine Countermeasures and Neutralization Activities.

**Bull Trout**

In October 2012, in cooperation with USFWS, the Navy completed a post-detonation fish-monitoring plan to be implemented after each EOD detonation in Crescent Harbor. The monitoring plan ensures that mortality of bull trout that may occur from EOD detonations does not exceed the amount anticipated in this incidental take statement (10 adult or subadult bull trout over 5 years).

**Marbled Murrelet**

In October 2012, the Navy completed a monitoring plan it developed in cooperation with USFWS. The monitoring plan addresses the following objectives:

- Ensures the sound pressure level for each detonation associated with EOD exercises is less than 41 pascal seconds (pa Sec) at 210 m for 2.5 lb charges and 150 m for 1.5 lb charges.
- Measure transmission loss (decay) of underwater sound beyond 210 m and 150 m distances on a mutually agreeable number of detonations.
- Monitor murrelet (or an appropriate surrogate) response to exposure to underwater sound beyond 210 m and 150 m distances.

## 5.5.3 Reporting

The Navy is committed to documenting and reporting relevant aspects of training and testing activities in order to document species sightings, reduce environmental impact, and improve future environmental assessments, including the reporting initiatives described below.

### 5.5.3.1 Exercise and Monitoring Reporting

The Navy will submit annual exercise and monitoring reports to the Office of Protected Resources at NMFS. The exercise report will describe the level of training and testing conducted during the reporting period, and the monitoring report will describe both the nature of the monitoring that has been conducted and the actual results of the monitoring. All of the details regarding the content of the annual reports will be coordinated with NMFS through the permitting process. All unclassified reports submitted to date can be found on the NMFS Office of Protected Resources webpage.

The Navy proposes special reporting within the Navy annual NWTT classified exercise report provided to NMFS. These reports will include:

- The total hours of active sonar used during training and testing occurring in the Humpback Whale Northern Washington feeding area and the Stonewall and Heceta Bank feeding area between May and November.
- The total hours of active sonar used during training and testing occurring in the Gray Whale Northern Puget Sound Feeding Area between March and May.

The Navy proposes this reporting in its annual reports to inform future adaptive management of activities within the NWTT Study Area.

#### 5.5.3.2 Additional Reporting Requirements

##### 5.5.3.2.1 Marine Mammal or Sea Turtle

If there is evidence that a marine mammal or sea turtle may have been stranded, injured or killed by the action, Navy training and testing activities will be immediately suspended and the situation immediately reported by the participating unit to the Officer in Charge of the Exercise, who will follow Navy procedures for reporting the incident to Commander, Pacific Fleet, Commander, Navy Region Northwest, Environmental Director, and the chain-of-command. The situation will also be reported to NMFS.

Navy personnel shall ensure that NMFS is notified immediately (or as soon as clearance procedures allow) if an injured, stranded, or dead marine mammal is found during or shortly after, and in the vicinity of, any Navy training exercise utilizing mid-frequency active sonar, high-frequency active sonar, or underwater explosive detonations. The Navy will provide NMFS with the name of species or description of the animal(s), the condition of the animal(s) (including carcass condition if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available). In the event that an injured, stranded, or dead marine mammal is found by the Navy that is not in the vicinity of, or during or shortly after, mid-frequency active sonar, high-frequency active sonar, or underwater explosive detonations, the Navy will report the same information as listed above as soon as operationally feasible and clearance procedures allow.

**General Notification of Ship Strike**

In the event of a ship strike by any Navy vessel, at any time or place, the Navy shall do the following:

- Immediately report to NMFS the species identification (if known), location (lat/long) of the animal (or the strike if the animal has disappeared), and whether the animal is alive or dead (or unknown).
- Report to NMFS as soon as operationally feasible the size and length of animal, an estimate of the injury status (e.g., dead, injured but alive, injured and moving, unknown, etc.), vessel class/type and operational status.
- Report to NMFS the vessel length, speed, and heading as soon as feasible.
- Provide NMFS a photo or video, if equipment is available.

##### 5.5.3.2.2 Other ESA-Listed Species

The Navy is in consultation with NMFS and USFWS to determine future monitoring and reporting requirements for other ESA-listed species.

#### 5.5.3.3 Stranding Response Plan

In coordination with NMFS, the Navy will have a stranding response plan. All of the details regarding the content of the stranding response plan will be coordinated with NMFS through the permitting process.

#### 5.5.3.4 Bird Strikes

The Navy will report all damaging and non-damaging bird strikes to the Naval Safety Center through the chain of command.

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# 6 Additional Regulatory Considerations

# TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES

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# 6 ADDITIONAL REGULATORY CONSIDERATIONS

In accordance with the Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA), federal agencies shall, to the fullest extent possible, integrate the requirements of NEPA with other planning and environmental review procedures required by law or by agency practice so that all such procedures run concurrently rather than consecutively. This chapter summarizes environmental compliance for the Proposed Action; consistency with other federal, state, and local plans, policies, and regulations; the relationship between short-term use of the environment and maintenance and enhancement of long-term productivity in the affected environment; irreversible or irretrievable commitments of resources; and energy requirements and conservation.

## 6.1 CONSISTENCY WITH OTHER APPLICABLE FEDERAL, STATE, AND LOCAL PLANS, POLICIES, AND REGULATIONS

Implementation of the Proposed Action addressed in the Northwest Training and Testing (NWTT) Environmental Impact Statement (EIS)/Overseas EIS (OEIS) would comply with applicable federal laws, regulations, and executive orders (EOs), and comply, to the extent practicable, with state and local laws. The United States (U.S.) Department of the Navy (Navy) is consulting with and will continue to consult with regulatory agencies, as appropriate, during the NEPA process and prior to implementation of the Proposed Action to ensure that requirements are met. Table 6.1-1 summarizes environmental compliance requirements that were considered in preparing this EIS/OEIS (including those that may be secondary considerations in the resource evaluations). Section 3.0.1 (Regulatory Framework) provides brief excerpts of the primary federal statutes, EOs, international standards, and guidance that form the regulatory framework for the resource evaluations. Documentation of consultation and coordination with regulatory agencies is provided in Appendix C (Agency Correspondence). Formal consultation under the Endangered Species Act (ESA) started following the release of the Draft EIS/OEIS. However, the Navy began coordinating with regulatory offices prior to initiating the formal consultation. Likewise, the Navy submitted applications to the National Marine Fisheries Service (NMFS) for Marine Mammal Protection Act (MMPA) authorizations supported by this EIS/OEIS. Consultation with NMFS is currently underway. Consultation documentation is included in Appendix C (Agency Correspondence) or on the website (https://nwtteis.com/).

**Table 6.1-1: Summary of Environmental Compliance for the Proposed Action**

| Laws, Executive Orders, International Standards, and Guidance | Status of Compliance |
|---|---|
| **Laws** | |
| Abandoned Shipwreck Act<br>(43 U.S.C. §§ 2101–2106) | The 1987 Abandoned Shipwreck Act establishes requirements for educational and recreational access to abandoned shipwrecks, the protection of such resources through the establishment of underwater parks and protected areas, the development of specific guidelines for management and protection in consultation with various stakeholders, defines the jurisdiction and responsibility of federal and state agencies, and explicitly states that the law of salvage and the law of finds do not apply. Under the Act, the Department of the Interior and National Park Service issued guidelines in 2007 to help states manage shipwrecks in their waters. The Act defines the federal government's title to any abandoned shipwreck that meets criteria for inclusion in the National Register of Historic Places within state submerged lands, with the stipulation that title to these shipwrecks will be transferred to the appropriate state. For abandoned shipwrecks in U.S. Territorial Waters, the federal government asserts title to the resource. See Section 3.10 (Cultural Resources) for assessment and conclusion that the Proposed Action is consistent with the Act. |
| Act to Prevent Pollution from Ships (33 U.S.C. § 1901 et seq.) | Requirements associated with the Act to Prevent Pollution from Ships are implemented by the Navy Environmental Readiness Program Manual and related Navy guidance documents governing waste management, pollution prevention, and recycling. At sea, the Navy complies with these regulations and operates in a manner that minimizes or eliminates any adverse effects on the marine environment (U.S. Department of the Navy 2014). See Section 3.1 (Sediments and Water Quality) for the assessment. |
| Antiquities Act<br>(16 U.S.C. § 431) | The Antiquities Act states that any person who shall appropriate, excavate, injure, or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States, without the permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated, shall, upon conviction, be fined or be imprisoned for a period of not more than 90 days, or shall suffer both fine and imprisonment. The Proposed Action is consistent with the Act's objectives for protection of archaeological and historical sites and objects, preservation of cultural resources, and the public's access to them. See Section 3.10 (Cultural Resources) for the assessment. |
| Bald and Golden Eagle Protection Act<br>(16 U.S.C. 668–668c) | This Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. Implementation of the Proposed Action would not result in an adverse effect on Bald or Golden Eagles as their protection is defined in the Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act is discussed in detail in regards to the Proposed Action in Section 3.6 (Birds). |
| Clean Air Act (CAA) (42 U.S.C. §§ 7401 et seq.)<br>CAA General Conformity Rule (40 C.F.R. § 93[B])<br>State Implementation Plan (SIP) | The CAA is the comprehensive federal law that regulates air emissions from stationary and mobile sources. The Proposed Action would not conflict with attainment and maintenance goals established in SIPs. A CAA conformity determination will not be required because emissions attributable to the alternatives including the Proposed Action would be below *de minimis* thresholds. Representative air pollutant emissions calculations and a Record of Non-Applicability are provided in Appendix D. |

**Table 6.1-1: Summary of Environmental Compliance for the Proposed Action (continued)**

| Laws, Executive Orders, International Standards, and Guidance | Status of Compliance |
|---|---|
| **Laws (continued)** | |
| Clean Water Act (CWA) (33 U.S.C. 1251 et seq.) | The CWA is an act to provide for water pollution control activities in the Public Health Service of the Federal Security Agency and in the Federal Works Agency, and for other purposes. The Act's objective is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The Proposed Action would not conflict with goals established in SIPs. No permits are required under the CWA Sections 401, 402, or 404 (b) (1). |
| Coastal Zone Management Act (16 C.F.R. § 1451 et seq.) | This Act established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans. The Navy evaluated the Proposed Action to determine whether it would affect the coastal uses or resources of any of the four states in the Study Area. See Section 6.1.1, below, for discussion of Navy activities and compliance with the Coastal Zone Management Act. |
| Endangered Species Act (ESA) (16 U.S.C. §§ 1531 et seq.) | The ESA established protection over and conservation of threatened and endangered species and the ecosystems upon which they depend. The EIS/OEIS analyzes potential effects to species listed under the ESA. In accordance with ESA requirements, The Navy is still in ongoing consultation under Section 7 of the ESA with NMFS and U.S. Fish and Wildlife Service on the potential that implementation of the Proposed Action may affect listed species. Completion of consultations will be documented in the Record of Decision. |
| Historic Sites Act (16 U.S.C. §§ 461–467) | The Historic Sites Act established a national policy to preserve for public use historic sites, buildings, and objects of national significance for the inspiration and benefit of the people of the United States. The Proposed Action is consistent with the national policy for the preservation of historic sites, buildings, and objects of national significance. See Section 3.10 (Cultural Resources) for the complete assessment. |
| Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801–1802) | The Magnuson-Stevens Fishery Conservation and Management Act was established to conserve and manage U.S. fishery resources. The Proposed Action has the potential to adversely affect essential fish habitat and managed species. The Navy prepared an Essential Fish Habitat Assessment and completed consultation with NMFS on affected species and their habitats. |
| Marine Mammal Protection Act (MMPA) (16 U.S.C. §§ 1431 et seq.) | The MMPA governs activities with the potential to harm, disturb, or otherwise "harass" marine mammals. As a result of acoustic effects associated with active sonar use, acoustic sources, and underwater detonations of explosives, implementation of the alternatives including the Proposed Action may result in potential Level A (harm or mortality) or Level B (disturbance) harassment to marine mammals. The Navy submitted an application for Letters of Authorization as well as conducted the analysis in Chapter 3 to support the determination of whether takes of marine mammals are likely. The Navy will obtain Letters of Authorization from NMFS for the proposed activities. |

**Table 6.1-1: Summary of Environmental Compliance for the Proposed Action (continued)**

| Laws, Executive Orders, International Standards, and Guidance | Status of Compliance |
|---|---|
| **Laws (continued)** | |
| Migratory Bird Treaty Act (16 U.S.C. §§ 703–712) | The Migratory Bird Treaty Act prohibits the taking, killing, or possessing of migratory birds or the parts, nests, or eggs of such birds, unless permitted by regulation. The 2003 National Defense Authorization Act provides that the Armed Forces may take migratory birds incidental to military readiness activities provided that, for those ongoing or proposed activities that the Armed Forces determine may result in a significant adverse effect on a population of a migratory bird species, the Armed Forces confer and cooperate with the Service to develop and implement appropriate conservation measures to minimize or mitigate such significant adverse effects. Implementation of the Proposed Action would cause no significant adverse effect on a population of migratory bird species. See Section 3.6 (Birds) for the assessment. |
| Resource Conservation and Recovery Act (42 U.S.C. § 6901 et seq.) | Under the Resource Conservation and Recovery Act, the Military Munitions Rule identifies when conventional and chemical military munitions are considered solid waste. Military munitions are not considered solid waste if they are (1) used for their intended purpose, which includes training military personnel and testing of munitions, weapons, or weapon systems; or (2) subjected to materials recovery activities (40 Code of Federal Regulations [C.F.R.] § 266.202(a)(1) and (2)). These two conditions cover the uses of munitions included in the Proposed Action; therefore, the Resource Conservation and Recovery Act does not apply. |
| National Fishery Enhancement Act (33 U.S.C. § 2101 et seq.) | The purpose of this act is to promote and facilitate responsible and effective efforts to establish artificial reefs in the navigable waters of the United States and the waters superjacent to the Outer Continental Shelf. The Proposed Action is consistent with regulations administered by NMFS and U.S. Army Corps of Engineers concerning artificial reefs because the Proposed Action does not include the establishment of artificial reefs. |
| National Historic Preservation Act (16 U.S.C. §§ 470 et seq.) | The National Historic Preservation Act is intended to preserve historical and archaeological sites in the United States. Under Section 106 of the Act, Federal agencies also consult with any tribal governments on unlisted properties. The alternatives, including the Proposed Action, will be implemented and a letter of notification will be sent to the State Historic Preservation Office and to applicable Tribal governments. The Navy invited the Tribes to initiate government-to-government consultation or hold staff level consultations. Consultations with the Tribes are ongoing and a summary is provided in Appendix C (Agency Correspondence). The Navy initiated Section 106 consultation with the Washington State Historic Preservation Office (SHPO) and the Alaska SHPO. The Navy submitted the Determination of Effect and request for concurrence with a finding of No Adverse Effect on Historic Properties by letter to both SHPOs. The Alaska SHPO concurred with the Navy's finding of no adverse effect on historic properties. The Navy is continuing consultation with the Washington SHPO. |

**Table 6.1-1: Summary of Environmental Compliance for the Proposed Action (continued)**

| Laws, Executive Orders, International Standards, and Guidance | Status of Compliance |
|---|---|
| **Laws (continued)** | |
| National Marine Sanctuaries Act (16 U.S.C. § 1431 et seq.) | This Act authorizes the Secretary of Commerce to designate and protect areas of the marine environment with special national significance due to their conservation, recreational, ecological, historical, scientific, cultural, archeological, educational, or esthetic qualities as National Marine Sanctuaries. One National Marine Sanctuary, the Olympic Coast National Marine Sanctuary (OCNMS), is administered by the National Oceanic and Atmospheric Administration Office of National Marine Sanctuaries, and lies within the Study Area. Because a small subset of the Navy's activities occur within the OCNMS, the Navy initiated consultation with the Sanctuary. The Navy and NMFS submitted a joint Sanctuary Resource Statement to OCNMS. OCNMS has 45 days to respond with conservation recommendations for the agencies to consider. This consultation is still ongoing. |
| Rivers and Harbors Act (33 U.S.C. § 401 et seq.) | The Rivers and Harbors Act addresses projects and activities in navigable waters and harbor and river improvements. In accordance with U.S. Army Corps of Engineers regulations, no permit is required under the Rivers and Harbors Act because no construction in navigable waterways is proposed. |
| Submerged Lands Act of 1953 (43 U.S.C. §§ 1301–1315) | The Submerged Lands Act returns the title to submerged lands to the states and promotes the exploration and development of petroleum deposits in coastal waters. The Proposed Action is consistent with regulations concerning the Submerged Lands Act. |
| Sunken Military Craft Act (Public Law 108-375, 10 U.S.C. § 113 Note and 118 Stat. 2094-2098) | Under this Act, no person shall engage in or attempt to engage in any activity directed at a sunken military craft that disturbs, removes, or injures any sunken military craft. Although the Sunken Military Craft Act does not apply to actions taken by or at the direction of the United States, the Navy's Proposed Action would have no adverse effects on sunken U.S. military ships or aircraft within the Study Area. See Section 3.10 (Cultural Resources) for the assessment. |
| California Marine Life Protection Act and Marine Managed Areas Improvement Act (California Fish and Game Code §§ 2850–2863) | California Marine Life Protection Act requires California Department of Fish and Game to confer with the Navy regarding issues related to Navy activities that may affect Marine Managed Areas. Because the portion of the Study Area near California is 12 nm off the coast, activities will occur outside of the State's jurisdiction, and therefore, no impacts are expected to marine managed areas nor is consultation required. |
| **Executive Orders** | |
| Executive Order (EO) 11990*, Protection of Wetlands* | This EO was issued to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands. There are no wetlands within the Study Area; therefore, the EO does not apply to the Proposed Action. |

**Table 6.1-1: Summary of Environmental Compliance for the Proposed Action (continued)**

| Laws, Executive Orders, International Standards, and Guidance | Status of Compliance |
|---|---|
| **Executive Orders (continued)** | |
| Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* | This EO is responsible for identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands. The proposed activities occurring in the Inland Waters of Washington and Alaska, and open ocean would not have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. See Section 3.12 (Socioeconomic Resources) and Section 3.13 (Public Health and Safety) for the assessment. |
| Executive Order 12962*, Recreational Fisheries* | This EO orders Federal agencies, to the extent permitted by law and where practicable, and in cooperation with States and Tribes, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing. The Proposed Action would not affect federal agencies' ability to fulfill certain duties with regard to promoting the health and access of the public to recreational fishing areas. See Section 3.12 (Socioeconomics) for the assessment. |
| Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* | This EO considers the risks that arise because children eat more food, drink more fluids, and breathe more air in proportion to their body weight than adults; children's size and weight may diminish their protection from standard safety features; and children's behavior patterns may make them more susceptible to accidents because they are less able to protect themselves. Although children could be present in vessels on the water, there are no sensitive receptors as defined by the EO present in the Study Area and, therefore, the Proposed Action would not result in disproportionate environmental health risks or safety risks to children. See Section 3.13 (Public Health and Safety) for the assessment. |
| Executive Order 13089*, Coral Reef Protection* | EO 13089 was enacted to preserve and protect the biodiversity, health, heritage, and social and economic value of U.S. coral reef ecosystems and the marine environment. The Navy has prepared this EIS/OEIS in accordance with requirements that federal agencies whose actions affect U.S. coral reef ecosystems shall provide for implementation of measures needed to research, monitor, manage, and restore them, including reducing impacts from pollution and sedimentation. See Section 3.3 (Marine Habitats) and Section 3.8 (Marine Invertebrates) for assessment. |
| Executive Order 13112*, Invasive Species* | This EO is to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. The Proposed Action would not increase the number of or introduce new invasive species nor require the Navy to take measures to avoid introduction and spread of those species. Naval vessels are exempt from 33 C.F.R. 151 Subpart D, Ballast Water Management for Control of Nonindigenous Species in Waters of the United States. While the standards do not apply directly to Navy ships, the Navy has chosen to adopt the intent of the U.S. Coast Guard standards. |

**Table 6.1-1: Summary of Environmental Compliance for the Proposed Action (continued)**

| Laws, Executive Orders, International Standards, and Guidance | Status of Compliance |
|---|---|
| **Executive Orders (continued)** | |
| Executive Order 13158, *Marine Protected Areas* | This EO is intended to provide for the protection of significant natural and cultural resources within the marine environment for the benefit of present and future generations by strengthening and expanding the Nation's system of MPAs. The Navy has prepared this EIS/OEIS in accordance with the requirements to avoid harm to the natural and cultural resources of existing national system marine protected areas. See Section 6.1.2 for more information. |
| Executive Order 13175, *Consultation and Coordination With Indian Tribal Governments* | This order is to establish a regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes. The Proposed Action is consistent with the comprehensive national policy for the Consultation and Coordination with Indian Tribal Governments. The Navy invited the Tribes to initiate government-to-government consultation or hold staff level consultations. Consultations with the Tribes are ongoing and a summary is provided in Appendix C (Agency Correspondence). |
| Executive Order 13547, *Stewardship of the Ocean, Our Coasts, and the Great Lakes* | This order establishes a national policy to ensure the protection, maintenance, and restoration of the health of ocean, coastal, and Great Lakes ecosystems and resources, enhance the sustainability of ocean and coastal economies, preserve our maritime heritage, support sustainable uses and access, provide for adaptive management to enhance our understanding of and capacity to respond to climate change and ocean acidification, and coordinate with our national security and foreign policy interests. The Proposed Action is consistent with the comprehensive national policy for the Stewardship of the Ocean, Our Coasts, and the Great Lakes. |
| Executive Order 13693, *Planning for Federal Sustainability in the Next Decade* | This order, which was issued in March 2015 and revoked EO 13423 and EO 13514, looks to cut the Federal Government’s greenhouse gas (GHG) emissions 40 percent over the next decade, relative to 2008 levels by increasing efficiency and improving environmental performance. The Proposed Action is consistent with the federal government's GHG emissions reductions and sustainability goals of this EO. |
| **International Standards** | |
| International Convention for the Prevention of Pollution from Ships | This standard prohibits certain discharges of oil, garbage, and other substances from vessels. The convention and its annexes are implemented by national legislation, including the Act to Prevent Pollution from Ships (33 U.S.C. §§ 1901–1915) and the Federal Water Pollution Control Act (33 U.S.C. §§ 1321–1322). The Navy vessels operating in the Study Area would comply with the discharge requirements established in this program, minimizing or eliminating potential impacts from discharges from ships. |

Notes: BO = Biological Opinion, CAA = Clean Air Act, C.F.R. = Code of Federal Regulations, CZMA = Coastal Zone Management Act, EIS/OEIS = Environmental Impact Statement/Overseas Environmental Impact Statement, EO = Executive Order, MPA = Marine Protected Area, Navy = United States Department of the Navy, nm = nautical mile, NMFS = National Marine Fisheries Service, NWTRC = Northwest Training Range Complex, U.S. = United States, U.S.C. = United States Code

### 6.1.1 Coastal Zone Management Act Compliance

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S. Code [U.S.C.] § 1451, et seq.) encourages coastal states to be proactive in managing coastal zone uses and resources. The Act established a voluntary coastal planning program under which participating states submit a Coastal Management Plan (CMP) to the National Oceanic and Atmospheric Administration (NOAA) for approval. Under the Act, federal actions that have an effect on a coastal use or resource are required to be consistent, to the maximum extent practicable, with the enforceable policies of federally approved CMPs.

The Act defines the coastal zone as extending “to the outer limit of State title and ownership under the Submerged Lands Act” (i.e., 3 nautical miles [nm]). The extent of the coastal zone inland varies from state to state, but the shoreward extent is not relevant to this Proposed Action. The CZMA federal consistency determination process includes a review of the Proposed Action to determine whether it has reasonably foreseeable effects on coastal zone resources or uses, an in-depth examination of any such effects, and a determination on whether those effects are consistent to the maximum extent practicable with the State's enforceable policies. Under the CZMA, the states must provide an opportunity for public comment and involvement in the federal coastal consistency determination process.

A Consistency Determination, or a Negative Determination, may be submitted for review of federal agency activities. A federal agency submits a consistency determination when it determines that its activity may have either a direct or an indirect effect on a state coastal use or resource. In accordance with 15 Code of Federal Regulations (C.F.R.) § 930.39, the consistency determination will include a brief statement indicating whether the proposed activity will be undertaken in a manner consistent to the maximum extent practicable with the enforceable policies of the management program. The consistency determination should be based on evaluation of the relevant enforceable policies of the management program. In accordance with 15 C.F.R. § 930.35, “if a Federal agency determines that there will not be coastal effects, then the Federal agency shall provide the State agencies with a negative determination for a Federal agency activity: (1) Identified by a State agency on its list, as described in § 930.34(b), or through case-by-case monitoring of unlisted activities; or (2) Which is the same as or is similar to activities for which consistency determinations have been prepared in the past; or (3) For which the Federal agency undertook a thorough consistency assessment and developed initial findings on the coastal effects of the activity.” Thus, a negative determination must be submitted to a state if the agency determines no coastal effects and one or more of the triggers above is met.

#### 6.1.1.1 Washington Coastal Zone Management Program

The state of Washington’s Coastal Zone Management Program (CZMP) was the first to be approved in 1976. The Washington CZMP is implemented by Washington Department of Ecology (DOE) and approved by NOAA. Washington’s CZMP is primarily based on their Shoreline Management Act of 1971, as well as other state land use and resource management laws. Any public federal project carried out with a federal agency, or private project licensed or permitted by a federal agency, or carried out with a federal grant, must be determined to have “Federal Consistency,” which means the project is consistent with Washington’s CZMP.

The coastal zone includes all lands and waters from the coastline seaward to 3 nm. The coastline along the inland marine waters is located at the seaward limit of rivers, bays, estuaries, or sound. The inland political boundaries of the counties are used as the Coastal Zone limit because they generally follow drainage divides. The Act specifically excludes from the coastal zone those lands that are subject solely by law to the discretion of or held in trust by the federal government (i.e., military reservations and other defense installations, all lands within National Parks, the Olympic Coast National Marine Sanctuary, Indian lands held in trust by the federal government, and National Forest lands and National

Recreation Areas owned or leased by the federal government) (National Oceanic and Atmospheric Administration 2001).

The federal CZMA also gives special funding to assist in making improvements to the state CZMP. Washington State participates in these voluntary Improvement Grants, otherwise known as the Section 309 Program, in order to update and amend the Shoreline Master Program Guidelines under Washington's Shoreline Management Act.

The Navy submitted a Coastal Consistency Determination to the Washington Department of Ecology and received a conditional concurrence with the determination (see Appendix C – Agency Correspondence). The Navy is continuing to work with the Washington Department of Ecology on the terms of the conditional concurrence.

#### 6.1.1.2 Oregon Coastal Management Program

The state of Oregon has an approved CMP, administered by the Department of Land Conservation and Development. The Oregon Coastal Management Program (OCMP) knits together various state statutes for managing coastal lands and waters into a single, coordinated package. There are three basic parts of the program: the 19 Statewide Planning Goals, City and County Comprehensive Land Use Plans, and State Agencies and Natural Resource Laws. The Program coordinates and integrates programs of local, state, and federal agencies to support local planning and to protect and restore coastal natural resources. The Oregon Coastal Zone extends from the Washington border on the north to the California border on the south, seaward to 3 nm offshore, and inland to the crest of the coastal mountain range (except to the downstream end of Puget Island on the Columbia River), to Scottsburg on the Umpqua River, and to Agness on the Rogue River.

Under the CZMA, the OCMP provides guidelines and financial and technical assistance for coastal grants, public notices, shoreland processes, water quality, ocean resources, territorial sea plans, coastal access, coastal planners network meetings, public involvement, and local government partners.

As a component of the Proposed Action, the Navy completed a federal consistency process under the CZMA with the Oregon Department of Land Conservation and Development (DLCD). Previously, the Navy submitted a negative determination to the Oregon DLCD for the Northwest Training Range Complex (NWTRC) EIS/OEIS. The proposed actions for the NWTT EIS/OEIS and the NWTRC EIS/OEIS are similar within the Oregon coastal zone, the only difference being that the NWTRC Study Area overlapped with the coastal zone and the NWTT Study Area does not. Therefore, the Navy submitted a negative determination (see Appendix C – Agency Correspondence), as the NWTT Study Area stops 12 nm short of the coastline and is well outside of the 3 nm coastal zone limit, and the proposed activities will have no effect on the coastal zone. The Navy received concurrence with the negative determination from Oregon completing the CZMA process.

#### 6.1.1.3 California Coastal Management Program

The state of California has an approved CMP, administered by the California Coastal Commission (CCC). The California Coastal Act of 1976 (California Public Resources Code, § 30000 et seq.) implements California's CMP. The California Coastal Act includes policies to protect and expand public access to shorelines, and to protect, enhance, and restore environmentally sensitive habitats, including intertidal and nearshore waters, wetlands, bays and estuaries, riparian habitat, certain woods and grasslands, streams, lakes, and habitat for rare and endangered plants and animals. The Coastal Act defines "coastal zone" as an area, extending 3 miles (mi.) seaward and inland generally 1,000 yards (yd.) (914.4 meters

[m]). In significant coastal estuarine, habitat, and recreational areas, it extends inland to a maximum of 5 mi. (8.1 kilometers [km]); in developed urban areas it generally extends inland less than 1,000 yd. (914.4 m).

As a component of the Proposed Action, the Navy completed a Federal consistency process under the CZMA with the CCC. Previously, the Navy submitted a negative determination to the CCC for the NWTRC EIS/OEIS. The proposed actions for the NWTT EIS/OEIS and the NWTRC EIS/OEIS within the California coastal zone are essentially the same, but there is a difference in the impacts assessed on species that use the California coastal zone based on advancements in science and information available for analysis, including different thresholds for hearing in marine species. Another difference between the NWTT and NWTRC studies is that the NWTRC Study Area overlapped with the coastal zone and the NWTT Study Area does not. The NWTT EIS/OEIS Study Area is 12 nm off the California coast. Therefore, the Navy submitted a negative determination (see Appendix C – Agency Correspondence), as the NWTT Study Area stops 12 nm short of the coastline and is well outside of the 3 nm coastal zone limit, and therefore activities in the Study Area will not affect the coastal zone. The Navy received concurrence with the negative determination from California, completing the CZMA process.

#### 6.1.1.4 Alaska Coastal Management Program

The Alaska Coastal Management Program (ACMP) ended at 12:01 a.m., Alaska Standard Time on 1 July 2011 per state legislative action (AS 44.66.030). The Legislature adjourned the special legislative session 14 May 2011 without passing legislation required to extend the ACMP. Therefore, Alaska currently does not have an approved CMP, and the Navy has no requirements to prepare and submit a consistency determination.

### 6.1.2 Marine Protected Areas

Many areas of the marine environment have some level of federal, state, or local management or protection. Marine protected areas (MPAs) have conservation or management purposes, defined boundaries, and some legal authority to protect resources. Marine protected areas vary widely in purpose, managing agency, management approaches, level of protection, and restrictions on human uses. They have been designated to achieve objectives ranging from conservation of biodiversity, to preservation of sunken historic vessels, to protection of spawning habitats important to commercial and recreational fisheries. Executive Order 13158*, Marine Protected Areas,* was created to “strengthen the management, protection, and conservation of existing marine protected areas and establish new or expanded marine protected areas; develop a scientifically based, comprehensive national system of marine protected areas representing diverse U.S. marine ecosystems, and the nation’s natural and cultural resources; and avoid causing harm to marine protected areas through federally conducted, approved, or funded activities.”

Executive Order 13158 requires each Federal agency whose actions affect the natural or cultural resources that are protected by a national system of MPAs to identify such actions, and in taking such actions, avoid harm to those natural and cultural resources. Pursuant to Section 5 of EO 13158, agency requirements apply only to the natural or cultural resources specifically afforded protection by the site as described by the List of National System Marine Protected Areas. For sites that have both a terrestrial and marine area, only the marine portion and its associated protected resources are included on the List of National System Marine Protected Areas and subject to Section 5 of EO 13158. A full list and map of areas accepted in the National System of Marine Protected Areas is available from the National Marine Protected Areas Center.

The National Marine Protected Areas Center, which is federally managed through the NOAA, is tasked with implementing EO 13158. In order to meet the qualifications for the various terms within EO 13158, the National Marine Protected Areas Center developed a Marine Protected Areas Classification system. This system uses six criteria to describe the key features of most MPAs, as follows:

1) Primary conservation focus, such as natural heritage, cultural heritage, or sustainable production
2) Level of protection (e.g., no access, no impact, no take, zoned with no-take areas, zoned multiple use, or uniform multiple use)
3) Permanence of protection
4) Constancy of protection
5) Ecological scale of protection
6) Restrictions on extraction

The National Marine Protected Areas Center utilizes these criteria to evaluate MPAs for inclusion in the National System of MPAs. Implementation of the National System of MPAs is managed by the Department of Commerce (DOC) and the Department of the Interior (DOI). Executive Order 13158 requires the DOC and the DOI to consult with other federal agencies about the inclusion of sites into the National System of MPAs, including the Department of Defense (DoD). The National System of MPAs includes MPAs managed under the following six systems:

**National Marine Sanctuary System.** Under the National Marine Sanctuaries Act (NMSA), the NOAA establishes national marine sanctuaries for marine areas with special conservation, recreational, ecological, historical, cultural, archaeological, scientific, educational, or aesthetic qualities. Within the NWTT Study Area (Study Area) there is one National Marine Sanctuary System site, the Olympic Coast National Marine Sanctuary (OCNMS), which is included in the National System of Marine Protected Areas (Figure 6.1-1).

**Marine National Monuments.** Marine national monuments are designated through Presidential Proclamation under the authority of the Antiquities Act of 1906 (16 U.S.C. § 431). Marine national monuments are often co-managed by state, federal, and local governments, in order to preserve diverse habitats and ecosystem functions. There are no Marine National Monuments within the Study Area.

**National Wildlife Refuge System.** The U.S. Fish and Wildlife Service manages ocean and Great Lakes refuges for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats. There are nine National Wildlife Refuge areas near the Study Area: Bandon Marsh National Wildlife Refuge, Dungeness National Wildlife Refuge, Grays Harbor National Wildlife Refuge, Lewis and Clark National Wildlife Refuge, Nestucca Bay National Wildlife Refuge, Nisqually National Wildlife Refuge, Protection Island National Wildlife Refuge, Siletz Bay National Wildlife Refuge, and Willapa National Wildlife Refuge, all of which are included in the National System of MPAs (Figure 6.1-1[not discussed in Table 6.1-2 as they are not within the boundaries of the NWTT Study Area]).

**State and Local Marine Protected Areas.** State and local governments have established MPAs for the management of fisheries, nursery grounds, shellfish beds, recreation, tourism, and other uses; these areas have a diverse array of conservation focuses, from protecting ecological functions, to preserving shipwrecks, to maintaining traditional or cultural interaction with the marine environment. In Washington there are seven state or local MPAs that are not included in the National System of Marine Protected Areas. In Oregon there is one state or local MPA that is not included in the National System of MPAs. California has four state or local MPAs that are not included in the National System of MPAs. There are three state or local eligible MPAs within the Western Behm Canal portion of the Study Area, but they are not included in the National System of Marine Protected Areas. In Washington, Oregon, and California combined, there are 26 state or local MPAs that are included in the National System of Marine Protected Areas (Table 6.1-2 [for those located within the NWTT Study Area] and Figure 6.1-1).

**National Parks System.** The National Park System contains ocean and Great Lakes parks, including some national monuments, administered by the U.S. Department of the Interior National Park Service to conserve the scenery and the natural and historic objects and wildlife contained within. There is one National Parks System site, the Olympic National Park, within the Study Area. Because the Olympic National Park has a marine component—a band of area along the Washington Coast—it is included in the National System of Marine Protected Areas (Table 6.1-2 [for those located within the NWTT Study Area] and Figure 6.1-1).

**National Estuarine Research Reserve System.** National Estuarine Research Reserve System sites protect estuarine land and water and provide essential habitat for wildlife, educational opportunities for student, teachers, and the public and living laboratories for scientists. There are no National Estuarine Research Reserve System sites within the Study Area.

This EIS/OEIS has been prepared in accordance with requirements for natural or cultural resources protected under the National System of MPAs. While several MPAs are located within the Study Area and are included in the National System of MPAs, it is important to note that through standard operating procedures, the Navy takes every precaution to train or test in these areas sparingly. Navy activities within these MPAs abide by the regulations of the individual MPA. Table 6.1-2 provides information on the individual MPA regulations and the Navy activities that occur in these areas. Additionally, the OCNMS within the Study Area receives protection under both EO 13158 and the NMSA, and is described in more detail below.

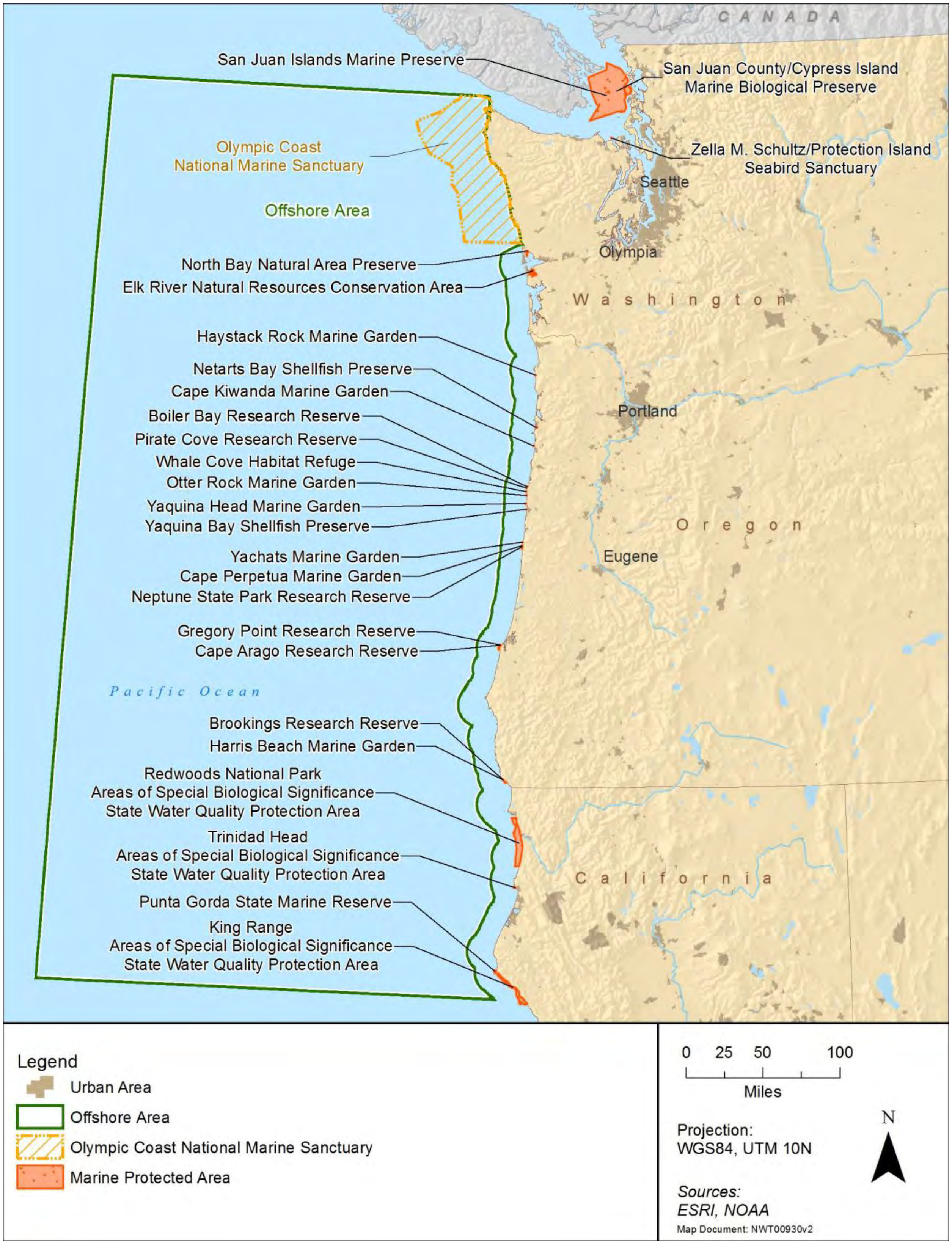


**Figure 6.1-1: Map of Marine Protected Areas in and near the Study Area**

**Table 6.1-2: Marine Protected Areas located within the Northwest Training and Testing Study Area**

| Marine Protected Area | Location Within the Study Area | Protection Focus | Regulations Applicable to Navy Activities | Navy Proposed Activities and Potential Impacts |
|---|---|---|---|---|
| Admiralty Head Marine Preserve | Washington (Puget Sound) | Focal Resource | The recreational and commercial taking of fish, wildlife, and shellfish, except sea cucumbers and sea urchins, is prohibited. | The Navy's proposed activities in the Inland Waters portion of the Study Area, would not involve the taking of fish, wildlife, or shellfish for recreational or commercial use. The Navy's proposed activities would not occur in the Marine Preserve, and should not affect the Marine Protected Area resources in the Preserve. |
| Blake Island Underwater Park | Washington (Puget Sound) | Ecosystem | No applicable regulations to the Navy. | There are no applicable regulations to the Navy in this Park. |
| Brackett's Landing Shoreline Sanctuary Conservation | Washington (Puget Sound) | Ecosystem | Prohibits recreational and commercial fishing and the taking of all species of invertebrates and fishes. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Sanctuary, and would not involve the taking of invertebrates and fishes. |
| Cherry Point Aquatic Reserve | Washington (Puget Sound) | Focal Resource | Prohibits the creation of new "hard" structured shoreline armoring on State-owned aquatic lands, underwater cable or pipeline structures, or new saltwater intakes. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Reserve, and would not involve the creation of new "hard" structured shoreline. |
| Cypress Island Aquatic Reserve | Washington (Puget Sound) | Ecosystem | Prohibits mooring of boats more than 60 feet in length. Unless written permission is obtained from the Director of Friday Harbor Laboratories, the collection of any marine biological materials other than those taken for food, and also excepting kelp, is prohibited. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Reserve, and would not involve boat mooring or the taking of biological materials. |
| Deception Pass Underwater Park | Washington (Puget Sound) | Ecosystem | No applicable regulations to the Navy. | The Navy's proposed activities in the Inland waters portion of the Study Area would not occur within the limits of the Park, nor would they affect the resources of the Park. There are no applicable regulations to the Navy in this Park. |
| Dungeness National Wildlife Refuge | Washington (Puget Sound) | Ecosystem | Prohibits access according with spatial boundaries and seasonal closures in the refuge. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Refuge, and therefore would not violate the spatial boundaries or seasonal closures of the refuge. |

**Table 6.1-2: Marine Protected Areas within the Northwest Training and Testing Study Area (continued)**

| Marine Protected Area | Location Within the Study Area | Protection Focus | Regulations Applicable to Navy Activities | Navy Proposed Activities and Potential Impacts |
|---|---|---|---|---|
| Fidalgo Bay Aquatic Reserve | Washington (Puget Sound) | Ecosystem | Uses that conflict with the purpose of the reserve designation and with its habitat and species identified for conservation are prohibited. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Reserve, and would not involve uses that conflict with the purpose of the reserve. |
| Grays Harbor National Wildlife Refuge | Washington | Ecosystem | No applicable regulations to the Navy. | The Navy conducts no activities in or near this area. |
| Haro Strait Special Management Fishery Area | Washington (Puget Sound) | Focal Resource | Prohibits non-tribal commercial fishers from harvesting sea urchins and sea cucumbers. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Management Fishery Area, and would not involve the taking of sea urchins or sea cucumbers. |
| Maury Island Aquatic Reserve | Washington (Puget Sound) | Focal Resource | Prohibits shellfish harvesting as a consequence of polluted waters and paralytic shellfish poisoning. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Reserve, and would not involve the taking of shellfish. |
| Nisqually National Wildlife Refuge | Washington (Puget Sound) | Ecosystem | Prohibits consumptive uses at all times, and prohibits boating from 1 October to 31 March. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Refuge, and would not involve consumptive uses, or boating from 1 October to 31 March. |
| Nisqually Reach Aquatic Reserve | Washington (Puget Sound) | Ecosystem | Shellfish harvest is prohibited in shellfish beds. | The Navy conducts no activities in this area, but does conduct infrequent testing activities in the Carr Inlet Operations Area, just north of McNeil Island (see Figure 2.1-7 in Chapter 2 of this EIS/OEIS). These testing activities would not affect shellfish beds. |

**Table 6.1-2: Marine Protected Areas within the Northwest Training and Testing Study Area (continued)**

| Marine Protected Area | Location Within the Study Area | Protection Focus | Regulations Applicable to Navy Activities | Navy Proposed Activities and Potential Impacts |
|---|---|---|---|---|
| Olympic Coast National Marine Sanctuary | Washington | Ecosystem | The regulations state that "all DoD activities must be carried out in a manner that avoids to the maximum extent practicable any adverse impacts on sanctuary resources and qualities." If a DoD activity causes any destruction, loss, or injury to a Sanctuary resource then the "DoD, in coordination with the Director, must promptly prevent and mitigate further damage and must restore or replace the Sanctuary resource or quality in a manner approved by the Director." | The Navy and NMFS are consulting under the National Marine Sanctuaries Act with the OCNMS as to (1) any potential for injury from Navy activities to Sanctuary resources when within the Sanctuary, and (2) NMFS authorization of marine mammal takes. The OCNMS may recommend reasonable and prudent alternatives. The Navy proposes to continue to conduct a number of activities in the Sanctuary that have not been prohibited by regulation since establishment, including transit, live firing of guns, torpedoes, chaff, and anti-submarine warfare activities and testing. However, no bombing is permitted in the Sanctuary. Regulations require all DoD military activities shall be carried out in a manner that avoids to the maximum extent practicable any adverse impacts on Sanctuary resources and qualities (see Section 6.1.2.1 [Olympic Coast National Marine Sanctuary]). As indicated in Chapter 5, the Navy is agreeing to not conduct Bombing and Missile exercises within 50 nm and thus well outside the OCNMS. And while activities with non-explosive practice munitions may occur in waters greater than 20 nm of shore, none would occur within the OCNMS. The Navy is also proposing other requirements as indicated in Section 5.3.3. |

**Table 6.1-2: Marine Protected Areas within the Northwest Training and Testing Study Area (continued)**

| Marine Protected Area | Location Within the Study Area | Protection Focus | Regulations Applicable to Navy Activities | Navy Proposed Activities and Potential Impacts |
|---|---|---|---|---|
| Olympic National Park | Washington | Ecosystem | It is prohibited for vessels to create a wake or exceed 5 miles per hour, 100 yards from shoreline in undeveloped areas. Permits are required for Aircraft and air delivery, delivery/retrieval of a person/object by parachute, helicopter or other airborne means, removal of a downed aircraft.<br>As a designated World Heritage Site, the Olympic National Park is analyzed in Appendix K (World Heritage Site Analysis). | The Navy does not conduct ship or submarine activities in Olympic National Park, but does conduct flight activities in the Olympic Military Operations Areas in national airspace above the Park. The environmental analysis for placement of mobile emitters on U.S. Forest Lands outside the Olympic National Park supporting these activities was included in the Navy's Electronic Warfare Range Environmental Assessment. The Navy is applying for special use permits from the U.S. Forest Service for placement of these emitters. Analysis of flight activities over the Olympic National Park within the MOA airspace is included in this Proposed Action. Navy completed a noise study in Appendix J (Airspace Noise Analysis for the Olympic Military Operations Areas) to support determinations made in Section 3.12 (Socioeconomic Resources) that noise impacts on the Park and its resources would be negligible. |
| Protection Island Aquatic Reserve | Washington (Puget Sound) | Ecosystem | Commercial trawling for finfish is prohibited. | The Navy conducts no activities in or near this area, but Navy ships may transit near or through the reserve. |
| Protection Island National Wildlife Refuge | Washington (Puget Sound) | Focal Resource | No regulations are applicable to the Navy. | There are no applicable regulations to the Navy in this Refuge. |
| San Juan Channel and Upright Channel Special Management Fishery Area | Washington (Puget Sound) | Focal Resource | Regulations for the commercial non-Indian sea urchin and sea cucumber fisheries prohibit harvest of sea urchins and sea cucumbers within the closure areas. The closure areas are also identified within sea urchin and sea cucumber harvest management plans between the State and Treaty Tribes. | The Navy’s proposed activities in the Inland Waters would not occur within the limits of the Management Fishery Area, and would not involve the taking of sea urchins or sea cucumbers. |

**Table 6.1-2: Marine Protected Areas within the Northwest Training and Testing Study Area (continued)**

| Marine Protected Area | Location Within the Study Area | Protection Focus | Regulations Applicable to Navy Activities | Navy Proposed Activities and Potential Impacts |
|---|---|---|---|---|
| San Juan County/Cypress Island Marine Biological Preserve | Washington (Puget Sound) | Ecosystem | No person shall gather marine biological materials useful for scientific purposes, except when gathered as human food (or kelp); from the area of preserve except under permission first granted by the director of the Friday Harbor Laboratories of the University of Washington. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Preserve, and would not involve the taking of biological materials. |
| San Juan Islands Marine Preserve (Argyle Lagoon) | Washington (Puget Sound) | Ecosystem | Prohibits commercial and recreational fishing for bottomfish and classified shellfish. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Preserve, and would not involve the taking of fish, or shellfish. |
| San Juan Islands Marine Preserve (False Bay) | Washington (Puget Sound) | Ecosystem | Commercial and recreational fishing for bottomfish and classified shellfish is prohibited. Recreational and commercial fishing may occur for the harvesting of salmon, trout, and forage fishes except commercial fishing for Pacific herring. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Preserve, and would not involve the taking of fish, or shellfish. |
| San Juan Islands Marine Preserve (Friday Harbor) | Washington (Puget Sound) | Ecosystem | Commercial and recreational fishing for bottomfish and classified shellfish is prohibited. Recreational and commercial fishing may occur for the harvesting of salmon, trout, and forage fishes except commercial fishing for Pacific herring. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Preserve, and would not involve the taking of fish, or shellfish. |
| San Juan Islands Marine Preserve (Shaw Island) | Washington (Puget Sound) | Ecosystem | Commercial and recreational fishing for bottomfish and most classified shellfish is prohibited. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Preserve, and would not involve the taking of fish, or shellfish. |
| San Juan Islands Marine Preserve (Yellow and Low Islands) | Washington (Puget Sound) | Ecosystem | Commercial and recreational fishing for bottomfish and most classified shellfish is prohibited. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Preserve, and would not involve the taking of fish, wildlife, or shellfish. |
| Smith and Minor Island Aquatic Reserve | Washington (Puget Sound) | Ecosystem | Prohibits commercial trawling of finfish. A 200-yard (183-meter) buffer surrounding Smith and Minor Islands prohibits boating activity in that zone. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Reserve, and would not involve the taking of fish. |

**Table 6.1-2: Marine Protected Areas within the Northwest Training and Testing Study Area (continued)**

| Marine Protected Area | Location Within the Study Area | Protection Focus | Regulations Applicable to Navy Activities | Navy Proposed Activities and Potential Impacts |
|---|---|---|---|---|
| South Puget Sound Wildlife Area | Washington (Puget Sound) | Ecosystem | No regulations are applicable to the Navy. | The Navy conducts infrequent testing activities in the Carr Inlet Operations Area, just north of McNeil Island (see Figure 2.1-7 in Chapter 2 of this EIS/OEIS). There are no regulations applicable to the Navy in this Wildlife Area. |
| Sund Rock Conservation Area | Washington (Puget Sound) | Focal Resource | Prohibits commercial and recreational fishing, and taking of all species of invertebrates and fishes. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Conservation Area, and would not involve the taking of fish, wildlife, or shellfish. |
| Zella M. Schultz/Protection Island Seabird Sanctuary | Washington (Puget Sound) | Focal Resource | Access by the public is prohibited. | The Navy's proposed activities in the Inland Waters would not occur within the limits of the Seabird Sanctuary, and would not violate the Sanctuary's regulation that restricts access to the public. |

Notes: ASBS = Area of Special Biological Significance, C.F.R. = Code of Federal Regulations, DoD = Department of Defense, EIS/OEIS = Environmental Impact Statement/Overseas Environmental Impact Statement, Navy = United States Department of the Navy, nm = nautical miles, NMFS = National Marine Fisheries Service, OCNMS = Olympic Coast National Marine Sanctuary, U.S. = United States, U.S.C. = United States Code, USFS = U.S. Forest Service

#### 6.1.2.1 Olympic Coast National Marine Sanctuary

The OCNMS consists of an area of 2,408 square nautical miles of marine waters and the submerged lands there off the Olympic Peninsula Coastline of Washington State (see Figure 6.1-1). The sanctuary extends 25–50 mi. (40.2–80.5 km) seaward, covering much of the continental shelf and several major submarine canyons. The boundaries of the sanctuary as defined in the OCNMS regulations (15 C.F.R. 922[O]) extend from Koitlah Point, due north to the United States/Canada international boundary, and seaward to the 100-fathom isobath (approximately 180 m in depth). The seaward boundary of the sanctuary follows the 100-fathom isobath south to a point due west of Copalis River, and cuts across the tops of Nitinat, Juan de Fuca, and the Quinault Canyons. The shoreward boundary of the sanctuary is at the mean lower low-water line when adjacent to American Indian lands and state lands, and includes the intertidal areas to the mean higher high-water line when adjacent to federally managed lands. When adjacent to rivers and streams, the sanctuary boundary cuts across the mouths but does not extend up river or up stream. The offshore portion of the NWTT Study Area encompasses the OCNMS. All DoD military activities currently are and would continue to be carried out in a manner that avoids to the maximum extent practicable any adverse impacts on Sanctuary resources and qualities.

Key habitats within the sanctuary include kelp forest, surfgrass, seafloor (sand and silt, gravel and cobbles), deep-sea coral and sponge gardens, rocky reefs, intertidal zone, nearshore subtidal, deepwater benthic, and water column habitat. The diversity of habitats, and the nutrient-rich upwelling zone (which exhibits the greatest volume of upwelling in North America) that drives high primary productivity in this province, contribute to the high species diversity in the OCNMS, with 309 species of fish, more than 56 species of seabirds and 24 species of shorebirds, occurring in the sanctuary (Office of National Marine Sanctuaries 2008). Twenty-nine species of marine mammals reside in or migrate through the OCNMS, including toothed and baleen whales, seals and sea lions, and sea otters (Office of National Marine Sanctuaries 2008).

Due to the Juan de Fuca Eddy ecosystem created from localized currents at the entrance to the Strait of Juan de Fuca, and the diversity of bottom habitats, the OCNMS supports a variety of marine life. Decimation of razor clam populations, due to pathogen infestations and other natural calamities in the early 1980s, has significantly impacted commercial harvests; however, the Pacific oyster, ocean pink shrimp, and Dungeness crab are all large fisheries supported by the sanctuary's ecosystem. See Section 3.4 (Marine Mammals), Section 3.5 (Sea Turtles), Section 3.6 (Birds), Section 3.7 (Marine Vegetation), Section 3.8 (Marine Invertebrates), and Section 3.9 (Fish) for additional information on these species.

Regulations for the OCNMS prohibit the following (15 C.F.R. § 922.152):

(a) Except as specified in paragraphs (b) through (g) of this section, the following activities are prohibited and thus are unlawful for any person to conduct or to cause to be conducted:

> (1) Exploring for, developing or producing oil, gas or minerals within the Sanctuary.
>
> (2) (i) Discharging or depositing, from within or into the Sanctuary, other than from a cruise ship, any material or other matter except:
>
> > (A) Fish, fish parts, chumming materials or bait used in or resulting from lawful fishing operations in the Sanctuary;

(B) Biodegradable effluent incidental to vessel use and generated by marine sanitation devices approved in accordance with section 312 of the Federal Water Pollution Control Act, as amended, (FWPCA), 33 U.S.C. 1322 *et seq.;*

(C) Water generated by routine vessel operations (e.g., cooling water, deck wash down, and graywater as defined by section 312 of the FWPCA) excluding oily wastes from bilge pumping;

(D) Engine exhaust; or

(E) Dredge spoil in connection with beach nourishment projects related to the Quillayute River Navigation Project.

(ii) Discharging or depositing, from beyond the boundary of the Sanctuary, any material or other matter, except those listed in paragraphs (a)(2)(i)(A) through (E) of this section, that subsequently enters the Sanctuary and injures a Sanctuary resource or quality.

(3) Discharging or depositing, from within or into the Sanctuary, any materials or other matter from a cruise ship except clean vessel engine cooling water, clean vessel generator cooling water, clean bilge water, engine exhaust, or anchor wash.

(4) Moving, removing or injuring, or attempting to move, remove or injure, a Sanctuary historical resource. This prohibition does not apply to moving, removing or injury resulting incidentally from lawful fishing operations.

(5) Drilling into, dredging or otherwise altering the submerged lands of the Sanctuary; or constructing, placing or abandoning any structure, material or other matter on the submerged lands of the Sanctuary, except as an incidental result of:

(i) Anchoring vessels;

(ii) Lawful fishing operations;

(iii) Installation of navigation aids;

(iv) Harbor maintenance in the areas necessarily associated with the Quillayute River Navigation Project, including dredging of entrance channels and repair, replacement or rehabilitation of breakwaters and jetties, and related beach nourishment;

(v) Construction, repair, replacement or rehabilitation of boat launches, docks or piers, and associated breakwaters and jetties; or

(vi) Beach nourishment projects related to harbor maintenance activities.

(6) Taking any marine mammal, sea turtle or seabird in or above the Sanctuary, except as authorized by the MMPA, as amended, 16 U.S.C. 1361 *et seq.,* the Endangered Species Act, as amended, (ESA), 16 U.S.C. 1531 *et seq.,* and the Migratory Bird Treaty Act, as amended, (MBTA), 16 U.S.C. 703 *et seq.,* or pursuant to any Indian treaty with an Indian tribe to which the

United States is a party, provided that the Indian treaty right is exercised in accordance with the MMPA, ESA, and MBTA, to the extent that they apply.

(7) Flying motorized aircraft at less than 2,000 ft. (609.6 m) both above the Sanctuary within 1 nm of the Flattery Rocks, Quillayute Needles, or Copalis National Wildlife Refuge, or within one nm seaward from the coastal boundary of the Sanctuary, except for activities related to tribal timber operations conducted on reservation lands, or to transport persons or supplies to or from reservation lands as authorized by a governing body of an Indian tribe.

(8) Possessing within the Sanctuary (regardless of where taken, moved or removed from) any historical resource, or any marine mammal, sea turtle, or seabird taken in violation of the MMPA, ESA, or MBTA, to the extent that they apply.

(9) Interfering with, obstructing, delaying or preventing an investigation, search, seizure or disposition of seized property in connection with enforcement of the Act or any regulation or permit issued under the Act.

(b) The prohibitions in paragraph (a)(2) through (5), (7), and (8) of this section do not apply to activities necessary to respond to emergencies threatening life, property, or the environment.

(c) The prohibitions in paragraphs (a)(2) through (5), (7), and (8) of this section do not apply to activities necessary for valid law enforcement purposes.

(d) (1) All Department of Defense military activities shall be carried out in a manner that avoids to the maximum extent practicable any adverse impacts on Sanctuary resources and qualities.

(i) Except as provided in paragraph (d)(2) of this section, the prohibitions in paragraphs (a)(2) through (8) of this section do not apply to the following military activities performed by the Department of Defense in W-237A, W-237B, and Military Operating Areas Olympic A and B in the Sanctuary:

(A) Hull integrity tests and other deep water tests;

(B) Live firing of guns, missiles, torpedoes, and chaff;

(C) Activities associated with the Quinault Range including the in-water testing of non-explosive torpedoes; and

(D) Anti-submarine warfare operations.

(ii) New activities may be exempted from the prohibitions in paragraphs (a)(2) through (8) of this section by the Director after consultation between the Director and the Department of Defense. If it is determined that an activity may be carried out such activity shall be carried out in a manner that avoids to the maximum extent practicable any adverse impact on Sanctuary resources and qualities. Civil engineering and other civil works projects conducted by the U.S. Army Corps of Engineers are excluded from the scope of this paragraph (d).

(2) The Department of Defense is prohibited from conducting bombing activities within the Sanctuary.

(3) In the event of threatened or actual destruction of, loss of, or injury to a Sanctuary resource or quality resulting from an untoward incident, including but not limited to spills and groundings caused by the Department of Defense, the Department of Defense shall promptly coordinate with the Director for the purpose of taking appropriate actions to respond to and mitigate the harm and, if possible, restore or replace the Sanctuary resource or quality.

(e) The prohibitions in paragraphs (a)(2) through (8) of this section do not apply to any activity executed in accordance with the scope, purpose, terms and conditions of a National Marine Sanctuary permit issued pursuant to §§ 922.48 and 922.153 or a Special Use permit issued pursuant to section 310 of the Act.

(f) Members of a federally recognized Indian tribe may exercise aboriginal and treaty-secured rights, subject to the requirements of other applicable law, without regard to the requirements of this part. The Director may consult with the governing body of a tribe regarding ways the tribe may exercise such rights consistent with the purposes of the Sanctuary.

(g) The prohibitions in paragraphs (a)(2) through (8) of this section do not apply to any activity authorized by any lease, permit, license, or other authorization issued after July 22, 1994, and issued by any Federal, State or local authority of competent jurisdiction, provided that the applicant complies with § 922.49, the Director notifies the applicant and authorizing agency that he or she does not object to issuance of the authorization, and the applicant complies with any terms and conditions the Director deems necessary to protect Sanctuary resources and qualities. Amendments, renewals and extensions of authorizations in existence on the effective date of designation constitute authorizations issued after the effective date.

(h) Notwithstanding paragraphs (e) and (g) of this section, in no event may the Director issue a National Marine Sanctuary permit under §§ 922.48 and 922.153 or a Special Use permit under section 310 of the Act authorizing, or otherwise approve: The exploration for, development or production of oil, gas or minerals within the Sanctuary; the discharge of primary-treated sewage within the Sanctuary; the disposal of dredged material within the Sanctuary other than in connection with beach nourishment projects related to the Quillayute River Navigation Project; or bombing activities within the Sanctuary. Any purported authorizations issued by other authorities after July 22, 1994 for any of these activities within the Sanctuary shall be invalid.

According to the National Marine Sanctuary Program Regulations for the OCNMS (15 C.F.R. § 922.152), the prohibitions "…in paragraphs (a)(2) through (8) of this section do not apply to the following military activities performed by the Department of Defense in W-237A, W-237B, and Military Operating Areas Olympic A and B in the Sanctuary: (A) Hull integrity tests and other deep water tests; (B) Live firing of guns, missiles, torpedoes, and chaff; (C) Activities associated with the Quinault Range including the in-water testing of non-explosive torpedoes; and (D) Anti-submarine warfare operations." However, "New activities may be exempted from the prohibitions in paragraphs (a)(2) through (8) of this section by the Director after consultation between the Director and the Department of Defense. If it is determined that an activity may be carried out such activity shall be carried out in a manner that avoids to the maximum extent practicable any adverse impact on Sanctuary resources and qualities." If a DoD activity causes any destruction, loss, or injury to a sanctuary resource, then they "shall promptly coordinate with the

Director for the purpose of taking appropriate actions to respond to and mitigate the harm and, if possible, restore or replace the Sanctuary resource or quality."

In general, most Armed Forces activities are exempt from the OCNMS requirement to obtain an Olympic National Marine Sanctuary permit. However, bombing is explicitly prohibited in the OCNMS. If the Navy conducts new activities affected by the prohibitions, those activities may be exempted from the prohibitions within the OCNMS after consultation with the Sanctuary. In addition, the Navy is required to consult with the OCNMS pursuant to the National Marine Sanctuary Act section 304(d), for activities within or outside the Sanctuary that may be likely to destroy, cause loss of, or injure any sanctuary resource. Nevertheless, all DoD military activities shall be carried out in a manner that avoids to the maximum extent practicable any adverse impacts on Sanctuary resources and qualities.

The Navy and NMFS jointly are still in ongoing consultation with the OCNMS regarding the effects of the Proposed Action on Sanctuary resources. The Navy concludes its activities are not likely to result in the loss, destruction, or adverse changes to the viability of Sanctuary resources. Several points support this determination:

- Less than two percent of proposed training and 15 percent of proposed testing activities would occur within or immediately adjacent to the OCNMS.
- The NWTT Final EIS/OEIS shows that training and testing activities have minimal temporary impacts on the quantity or quality of the Study Area's physical environment, and minor to no impacts on marine or shore birds, fish, sea turtles, or invertebrate marine life.
- Although explosives have the potential to affect physical and biological resources, the Navy does not use explosives within the OCNMS, and bombing and missile exercises with high explosives occur 50 nm from shore, well outside the OCNMS.
- OCNMS resources with the most potential to be affected by the Proposed Action are marine mammals, from underwater sound propagation associated with the Navy's very infrequent use of active sonar which could cause temporary behavioral impacts. However, the Navy concludes any marine mammal behavioral reactions to NWTT training and testing activities would be transitory, infrequent, and non-cumulative. Impacts are not expected to decrease overall individual fitness, or result in long-term population-level impacts on any given population, and consequently will not result in any adverse changes to the sanctuary.

Therefore, proposed activities are consistent with those described in the sanctuary's designation document and in Section 6.4.5 (Department of Defense Activities) of the *Olympic Coast National Marine Sanctuary Final Management Plan and Environmental Assessment* (2011), authored and published by the NOAA, and would continue to be exempt from the prohibitions identified in the Sanctuary's regulations. The extensive mitigation developed for MMPA/ESA impacts (see Chapter 5, Standard Operating Procedures, Mitigation, and Monitoring) would be applied to all activities occurring near or within the Sanctuary. Further, the Navy would continue to regulate which activities occur within the Sanctuary based on existing requirements, as discussed below.

To ensure compliance with the National Marine Sanctuary Program Regulations and the interagency consultation requirements of National Marine Sanctuaries Act section 304(d), the Navy considered all proposed training and testing activities to determine whether they have the potential to destroy, cause the loss of, or injure sanctuary resources, or result in adverse impacts on sanctuary resources or qualities. As consultation with OCNMS is still ongoing, OCNMS may provide reasonable and prudent alternatives for Navy and NMFS consideration. The Navy has also already considered some additional mitigations as indicated in Chapter 5.

## 6.2 Relationship Between Short-Term Use of the Environment and Maintenance and Enhancement of Long-Term Productivity

In accordance with the CEQ regulations (Part 1502), this EIS/OEIS analyzes of the relationship between the short-term impacts on the environment and the effects those impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This means that choosing one option may reduce future flexibility in pursuing other options, or that committing a resource to a certain use may often eliminate the possibility for other uses of that resource. The Navy, in partnership with NMFS, is committed to furthering the understanding of marine resources and developing ways to lessen or eliminate the impacts Navy training and testing activities may have on these resources. For example, the Navy and NMFS collaborate on the Integrated Comprehensive Monitoring Program for marine species to assess the impacts of Navy activities on marine species and investigate population-level trends in marine species distribution, abundance, and habitat use in various range complexes and geographic locations where Navy training and testing occurs. Another example, the Navy is a member of the OCNMS Advisory Council whose members are federal, state, local governments, non-governmental entities, and American Indian Tribes and Nations. The Sanctuary and members of the council conduct cooperative reviews of all activities in the Sanctuary to minimize short- and long-term impacts.

The Proposed Action could result in both short- and long-term environmental impacts. However, these are not expected to result in any impacts that would reduce environmental productivity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to health, safety, or general welfare of the public. The Navy is committed to sustainable military range management, including co-use of the Study Area with tribal, the general public, and commercial and recreational interests. This commitment to co-use of the Study Area will maintain long-term accessibility of the NWTT EIS/OEIS training and testing areas. Sustainable range management practices are specified in range complex management plans under the Navy’s Tactical Training Theater Assessment and Planning Program. Among other benefits, these practices protect and conserve natural and cultural resources and preserve access to training areas for current and future training requirements while addressing potential encroachments that threaten to impact range and training area capabilities.

## 6.3 Irreversible or Irretrievable Commitment of Resources

The NEPA requires that environmental analysis include identification of “any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented” (42 U.S.C. § 4332). Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy or minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., the disturbance of a cultural site).

For the Proposed Action, most resource commitments would be neither irreversible nor irretrievable. Most impacts would be short term and temporary, or long lasting but within historical or desired conditions. Because there would be no building or facility construction, the consumption of material typically associated with such construction (e.g., concrete, metal, sand, fuel) would not occur. Energy typically associated with construction activities would not be expended and irretrievably lost.

Implementation of the Proposed Action would require fuels used by aircraft and vessels, and would be the only irreversible and irretrievable resource commitment. Since fixed- and rotary-wing aircraft and ship activities could increase relative to the baseline, total fuel use would increase. Therefore, total fuel consumption would increase under the Proposed Action (Section 6.4), and this nonrenewable resource would be considered irretrievably lost (see Chapter 4, Cumulative Impacts, and the following discussion on the Navy's Climate Change Roadmap).

## 6.4 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL OF ALTERNATIVES AND MITIGATION MEASURES

The federal government consumes 2 percent of the total U.S. energy share (Jean 2010). Of that 2 percent, the DoD consumes 93 percent. The Navy consumes one-fourth of the total DoD share. The Navy consumes 1.2 billion to 1.6 billion gallons of fuel each year. The Navy expects an overall 25 percent increase in fuel consumption for the entire U.S. fleet, in the future because of new ships coming into the fleet and the growth in mission areas including, but not limited to, the NWTT Study Area (Jean 2010).

Increased training and testing activities within the Study Area would result in an increase in energy demand over the No Action Alternative. The increased energy demand would arise from an increase in fuel consumption, mainly from aircraft and vessels participating in training and testing. Details of fuel consumption by training and testing activities on an annual basis are set forth in the air quality emissions calculation spreadsheets available on the project website. This EIS/OEIS assesses the impacts of an additional 5.0 million gallons per year of fuel consumption beyond what the Navy has previously assessed. Conservative assumptions were made in developing the estimates, and therefore the actual amount of fuel consumed during training and testing events may be less than estimated. Nevertheless, the demand for fuel consumption would increase from baseline levels, given the proposed increases in training and testing activities.

Energy requirements would be subject to any established energy conservation practices. By policy, the Navy minimizes the use of energy sources wherever possible without compromising safety, training, or testing activities. No additional conservation measures related to direct energy consumption by the proposed activities are identified.

The Navy is committed to improving energy security and environmental stewardship by reducing its reliance on fossil fuels. The Navy is actively developing and participating in energy, environmental, and climate change initiatives that will increase use of alternative energy and help conserve the world's resources for future generations. The Navy Climate Change Roadmap identifies actions the Environmental Readiness Division is taking to implement the directives in EO 13653, *Preparing the United States for the Impacts of Climate Change*. The Navy's Task Force Energy is responding to the Secretary of the Navy's Energy Goals through energy security initiatives that reduce the Navy's carbon footprint.

Two Navy programs—the Incentivized Energy Conservation (i-ENCON) Program and the Naval Sea Systems Command's (NAVSEA's) Fleet Readiness, Research and Development Program (FRR&DP)—are helping the fleet conserve fuel via improved operating procedures and long-term initiatives. The i-ENCON Program encourages the operation of ships in the most efficient manner while conducting their mission and supporting the Secretary of the Navy's efforts to reduce total energy consumption on naval ships. The NAVSEA's FRR&DP includes the High-Efficiency Heating, Ventilating, and Air Conditioning and the Hybrid Electric Drive for DDG-51 class ships, which are improvements to existing shipboard technologies that will both help with fleet readiness and decrease the ships' energy consumption and greenhouse gas emissions. These initiatives are expected to greatly reduce the consumption of fossil fuels (see Section 3.2, Air Quality). Furthermore, to offset the impact of its expected near-term increased fuel demands and achieve its goals to reduce fossil fuel consumption and greenhouse gas emissions, the Navy plans to deploy, throughout the U.S. OPAREAs, by 2016 a green strike group (a "great green fleet") composed of nuclear vessels and ships powered by biofuel in local operations and with aircraft flying only with biofuels (Jean 2010).

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# 7 List of Preparers

## TABLE OF CONTENTS



## LIST OF TABLES

There are no tables in this section.

## LIST OF FIGURES

There are no figures in this section.

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# 7 LIST OF PREPARERS

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# Appendix A: Navy Activities Descriptions

# TABLE OF CONTENTS

**LIST OF TABLES**

There are no tables in this section.

**LIST OF FIGURES**

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# APPENDIX A NAVY ACTIVITIES DESCRIPTIONS

The United States (U.S.) Department of the Navy's (Navy's) activities can generally be categorized as either training or testing. Training activities involve Navy service members employing tactics and established weapons systems in a realistic manner to prepare for combat or similar situations. Testing activities, which include research, development, test, and evaluation (RDT&E), are performed to ensure that U.S. military forces have the latest technologies with which to engage in hostile or hazardous situations.

The descriptions that follow are intended to provide a better understanding of each training and testing activity commonly conducted by naval forces.

The Navy's training activities are organized generally into eight primary mission areas and a miscellaneous category (other training) that includes those activities that don't fall within one of the eight primary mission areas, but are an essential part of Navy training. Many of the activities described here may have a land component, occurring both at sea and on or over land. In this Environmental Impact Statement (EIS)/Overseas EIS (OEIS), only the at-sea component is analyzed, except for activities occurring in the Olympic Military Operations Area (MOA) that have a shoreline component.

## A.1 TRAINING ACTIVITIES

The Navy's training activities are organized generally into eight primary mission areas (two of which are not conducted in the Northwest; Amphibious Warfare and Strike Warfare) and a miscellaneous category (Other Training) that includes those activities that do not fall within a primary mission area, but are an essential part of Navy training.

### A.1.1 ANTI-AIR WARFARE TRAINING

Anti-air warfare is the primary mission area that addresses combat operations by air and surface forces against hostile aircraft. Navy ships contain an array of modern anti-aircraft weapon systems, including naval guns linked to radar-directed fire-control systems, surface-to-air missile systems, and radar controlled cannons for close-in point defense. Strike/fighter aircraft carry anti-aircraft weapons, including air-to-air missiles and aircraft cannons. Anti-air warfare training encompasses events and exercises to train ship and aircraft crews in employment of these weapons systems against simulated threat aircraft or targets. Anti-air warfare training includes surface-to-air gunnery, surface-to-air and air-to-air missile exercises, and aircraft force-on-force combat maneuvers.

### A.1.1.1 Air Combat Maneuver

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Anti-Air Warfare</td></tr>
<tr><td>Air Combat Maneuver</td><td colspan="2">Short Description:<br>Aircrews engage in flight maneuvers designed to gain a tactical advantage during combat.</td></tr>
<tr><td>Long Description</td><td colspan="2">Basic flight maneuvers where aircrew engage in offensive and defensive maneuvering against each other. During an air combat maneuver engagement, no ordnance is fired, countermeasures such as chaff and flares may be used. These maneuvers typically involve two aircraft; however, based upon the training requirement, air combat maneuver exercises may involve up to four aircraft.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Fixed-wing aircraft (e.g., EA-18G)<br>Systems: None<br>Ordnance/Munitions: None<br>Targets: None<br>Duration: 1–2 hours</td><td>Location:<br>Offshore Area</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Aircraft noise<br>Energy: None<br>Physical Disturbance and Strike: Aircraft and aerial target strikes<br>Entanglement: None<br>Ingestion: Military expended materials</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">Chaff and flares</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">No munitions fired. Flare and chaff may be used. All flare and chaff analyzed under flare exercise and chaff exercise events.</td></tr>
</table>

### A.1.1.2 Missile Exercise (Air-to-Air)

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Air Warfare** | | |
| **Missile Exercise (Air-to-Air)** | **Short Description:**<br>Aircrews defend against threat aircraft with missiles. | |
| *Long Description* | An event involves two or more jet aircraft and a target. Missiles are non-explosive practice munitions or high explosive warheads. The target is an unmanned aerial target drone (e.g., BQM-34, BQM-74), a Tactical Air-Launched Decoy, or a parachute suspended illumination flare. Target drones deploy parachutes and are recovered by boat or helicopter; Tactical Air-Launched Decoys and illumination flares are expended and not recovered. These events typically occur at high altitudes.<br>Anti-air missiles may also be employed when training against threat missiles. | |
| *Information Typical to the Event* | **Platform:** Fixed-wing aircraft (e.g., FA-18C, EA-18G, F-35)<br>**Systems:** None<br>**Ordnance/Munitions:** Anti-air missiles (e.g., AIM-7, AIM-9, AIM-120 [non-explosive and high explosive])<br>**Targets:** BQM-34, BQM-74, Tactical Air-Launched Decoy, illumination flare (e.g., LUU-2)<br>**Duration:** 1–2 hours | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** In-air explosions, aircraft noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Aircraft and aerial target strikes, military expended materials strike (target and missile fragment)<br>**Entanglement:** Decelerator/parachutes<br>**Ingestion:** Military expended materials (missile fragments, decelerator/parachute, flare casing, target fragments) | |
| *Detailed Military Expended Materials Information* | Decelerator/parachutes, flare casings, missile body, target fragments, missile fragments | |
| *Assumptions Used for Analysis* | 1.25 missiles per event. Half of all missiles have explosive warheads, half are non-explosive.<br>Assume 1.5 flares per Missile Exercise event | |

### A.1.1.3 Gunnery Exercise (Surface-to-Air)

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Air Warfare** | | |
| **Gunnery Exercise (Surface-to-Air)** | **Short Description:**<br>Surface vessel crews defend against threat aircraft or missiles with large/medium-caliber guns. | |
| *Long Description* | Surface vessel personnel defend against threat aircraft or missile targets with guns to disable or destroy the threat.<br>An event involves one vessel and a simulated threat aircraft or anti-vessel missile that is detected by the vessel's radar. Medium-caliber guns fire projectiles, typically non-explosive, to disable or destroy the threat before it reaches the vessel. The target is towed by a commercial air services jet. | |
| *Information Typical to the Event* | **Platform:** Surface vessel (all)<br>**Systems:** None<br>**Ordnance/Munitions:** Large/medium-caliber munitions (non-explosive)<br>**Targets:** Towed banners behind aircraft<br>**Duration:** 1–2 hours | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** In-air explosions, aircraft noise, vessel noise, weapons firing noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Military expended materials strike (projectiles), vessel strike, aircraft strike (seabirds only)<br>**Entanglement:** None<br>**Ingestion:** Military expended materials (projectiles, casings) | |
| *Detailed Military Expended Materials Information* | Projectiles<br>Casings | |
| *Assumptions Used for Analysis* | All projectiles are non-explosive. Close In Weapon System employed in all events. Routine Close In Weapon System maintenance related firing can occur throughout study area, as long as a clear range is established. This is conducted at altitudes as low as 3,000 ft. | |

### A.1.1.4 Missile Exercise (Surface-to-Air)

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Air Warfare** | | |
| **Missile Exercise (Surface-to-Air)** | **Short Description:**<br>Surface vessel crews engage threat missiles and aircraft with missiles. | |
| *Long Description* | Surface vessel crews defend against threat missiles and aircraft with vessel launched missiles.<br>The event involves a simulated threat aircraft or anti-ship missile, which is detected by the vessel's radar. Vessel launched anti-air missiles are fired (high explosive) to disable or destroy the threat. The target typically is a remote controlled drone. Anti-air missiles may also be used to train against land attack missiles. | |
| *Information Typical to the Event* | **Platform:** Surface vessels (all)<br>**Systems:** None<br>**Ordnance/Munitions:** Anti-air missiles (e.g., Sea Sparrow, Standard Missile SM-2, Rolling Airframe Missile [high explosive])<br>**Targets:** Unmanned drones (e.g., BQM-34, BQM-74)<br>**Duration:** 1–2 hours | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** In-air explosions, aircraft noise, vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Military expended materials strike (missile fragments), vessel strike, aircraft strike (seabirds only)<br>**Entanglement:** None<br>**Ingestion:** Military expended materials (missile fragments) | |
| *Detailed Military Expended Materials Information* | Missile fragments | |
| *Assumptions Used for Analysis* | Two missiles per event. All anti-air missiles are high explosive. Missile explodes well above the ocean surface. All explosive and propellant consumed. Target typically not destroyed, unmanned drones are recovered. | |

### A.1.2 ANTI-SURFACE WARFARE TRAINING

Anti-surface warfare is a type of naval warfare in which aircraft, surface ships, and submarines employ weapons and sensors in operations directed against enemy surface ships or boats. Air-to-surface exercises are conducted by long-range attacks using simulated air-launched cruise missiles or other precision guided munitions, bombs, or aircraft cannon. Anti-surface warfare is also conducted by warships employing torpedoes, naval guns, and surface-to-surface missiles. In the Northwest Training and Testing (NWTT) Study Area, warships will use only naval guns during exercises; use of torpedoes and missiles by surface ships will be simulated within the Study Area. Submarines will also simulate attacks on surface ships using torpedoes or submarine-launched, anti-ship cruise missiles. Gunnery training generally involves expenditure of ordnance (normally non-explosive practice munitions) against a towed or floating target. A sinking exercise is a specialized training event that provides an opportunity for ship, submarine, and aircraft crews to use multiple weapons systems to deliver high explosive ordnance on a deactivated vessel, which is deliberately sunk. Sinking exercises are no longer conducted in the NWTT Study Area. Anti-surface warfare also encompasses maritime security, that is, the interception of a suspect surface ship by a Navy ship for the purpose of boarding-party inspection or the seizure of the suspect ship. Training in these tasks is conducted in visit, board, search and seizure exercises.

### A.1.2.1 Gunnery Exercise Surface-to-Surface (Ship)

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Anti-Surface Warfare</td></tr>
<tr><td>Gunnery Exercise Surface-to-Surface (Ship)</td><td colspan="2">Short Description:<br>Vessel crews engage surface targets with vessel's small-, medium-, and large-caliber guns designed to provide close range defense against patrol boats, smaller boats, swimmers, and floating mines.</td></tr>
<tr><td>Long Description</td><td colspan="2">This exercise involves vessel crews engaging surface targets at sea with small-, medium-, and large-caliber weapons.<br>Vessels use small caliber weapons to practice defensive marksmanship, typically against stationary floating targets. The target may be a 10-foot diameter red balloon (Killer Tomato), a 50-gallon steel drum, or other available target, such as a cardboard box. Some targets are expended during the exercise and are not recovered.<br>Vessel crew qualifications conducted at sea employ stationary targets on deck. Small-, medium-, and large-caliber projectiles fired during these events will be expended in the water.<br>Shipboard protection systems utilizing small caliber projectiles will train against high speed mobile targets.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Surface vessels<br>Systems: None<br>Ordnance/Munitions: Small-, medium-, and large-caliber (non-explosive)<br>Targets: Recoverable or expendable floating target (stationary or towed), remote controlled high speed targets<br>Duration: 2–3 hours</td><td>Location:<br>Offshore Area</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Vessel noise, weapons firing noise, underwater explosions (e.g., E1, E5)<br>Energy: None<br>Physical Disturbance and Strike: Vessel and in-water device strike, military expended materials strike (projectile), target strike<br>Entanglement: None<br>Ingestion: Military expended materials (small-caliber projectiles, casings, target fragments)</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">Small-, medium-, and large-caliber projectiles<br>Casings<br>Target fragments</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">Small-caliber rounds: 121,200 non-explosive practice munitions annually<br>Medium-caliber rounds: 33,492 non-explosive practice munitions, and 178 high explosive (HE) munitions annually<br>Large-caliber rounds: 2,720 non-explosive practice munitions and 160 HE munitions annually.</td></tr>
</table>

### A.1.2.2 Missile Exercise Air-to-Surface

| Activity Name | Activity Description |
|---|---|
| **Anti-Surface Warfare** | |
| **Missile Exercise (Air-to-Surface)** | **Short Description:**<br>Fixed-wing aircrews simulate firing precision-guided missiles, using captive air training missiles (CATMs) against surface targets. Some activities include firing a missile with a high explosive (HE) warhead. |
| *Long Description* | Fighter and maritime patrol aircraft simulate the firing of precision-guided missiles against surface targets.<br>The aircrew uses sensors, usually radar, to locate a surface target. The crew then simulates the firing of an actual missile by using a non-firing CATM that has been loaded on the aircraft.<br>Some activities include firing a missile with a HE warhead at a target. |
| *Information Typical to the Event* | **Platform:** Fixed-wing aircraft (e.g., EA-18G)<br>**Systems:** None<br>**Ordnance/Munitions:** Air-to-surface missile (HE)<br>**Targets:** Recoverable floating target (stationary or towed), Remotely operated target<br>**Duration:** 2 hours<br>**Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Aircraft noise, tow vessel noise, underwater explosions (e.g., E10)<br>**Energy:** None<br>**Physical Disturbance and Strike:** Military expended materials strike (missile), vessel strike, aircraft strike (seabirds only)<br>**Entanglement:** None<br>**Ingestion:** None |
| *Detailed Military Expended Materials Information* | Missile fragments |
| *Assumptions Used for Analysis* | Assume one target per event.<br>Most missiles are non-firing. Some missiles are live missiles with HE warhead (4 HE missiles per year). |

### A.1.2.3 High-speed Anti-Radiation Missile (HARM) Exercise (Non-firing)

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Surface Warfare** | | |
| **High-speed Anti-Radiation Missile (HARM) Exercise (Non-firing)** | **Short Description:**<br>Fixed-wing aircrews simulate firing HARM missiles, using captive air training missiles against surface targets. All missile firings are simulated; no actual missiles are fired. | |
| *Long Description* | A HARM Exercise is conducted to train aircrews to conduct electronic attack using the HARM missile, which is the primary weapon used against threat radars, including air defense systems. Only non-firing HARMs are used during HARM Exercises in the Offshore Area of the NWTT Study Area. During a typical HARM Exercise, an EA-18G flying at a high altitude (> 10,000 ft. above ground level) would simulate firing a HARM missile at an electronic signal. HARM Exercises are non-firing events that typically last 1–2 hours. | |
| *Information Typical to the Event* | **Platform:** Fixed-wing aircraft (e.g., EA-18G)<br>**Systems:** Radar, electronic surveillance, Captive Air Training Missile<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 2 hours | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Aircraft noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Aircraft strike (seabirds only)<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | All events are non-firing.<br>Aircraft remain above 10,000 ft. for the entire event. | |

### A.1.2.4 Bombing Exercise Air-to-Surface

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Anti-Surface Warfare</td></tr>
<tr><td>Bombing Exercise (Air-to-Surface)</td><td colspan="2">Short Description:<br>Fixed-wing aircrews deliver bombs against surface targets.</td></tr>
<tr><td>Long Description</td><td colspan="2">Fixed-wing aircrews deliver bombs against surface targets. Aircraft altitudes during delivery can be as low as 400 ft.<br>Fixed-wing aircraft conduct a bombing exercise against stationary floating targets (e.g.: MK-58 smoke buoy). An aircraft clears the area, deploys a smoke buoy or other floating target, and then delivers high explosive (HE) or non-explosive practice munitions (NEPM) bomb(s) on the target. A range boat may be used to deploy targets for an aircraft to attack. The majority of bombing exercises conducted within the Northwest Training and Testing Study Area utilize NEPM.<br>Exercises for strike fighters typically involve a flight of two aircraft delivering unguided or guided munitions that may be either HE or NEPM. The following munitions may be employed by strike fighter aircraft in the course of the bombing exercise: Unguided munitions: Non-explosive sub-scale NEPM bombs (MK-76 and Bomb Dummy Unit [BDU]-45), explosive and non-explosive general purpose bombs (MK-80 series). Precision-guided munitions: Laser-guided bombs (explosive, non-explosive), Laser-guided Training Rounds (non-explosive), Joint Direct Attack Munition (explosive, non-explosive).</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Fixed-wing (e.g., F/A-18, F-35, P-8, P-3)<br>Systems: None<br>Ordnance/Munitions: Bombs (e.g., MK-76, BDU-45, MK-80 series<br>Targets: Expendable floating target (e.g., smoke float)<br>Duration: 1 hour</td><td>Location:<br>Offshore Area</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Underwater explosions (e.g., E12), aircraft noise<br>Energy: None<br>Physical Disturbance and Strike: Military expended materials strike (non-explosive bomb), aircraft strike (seabirds only)<br>Entanglement: None<br>Ingestion: Military expended materials (bomb fragments, target fragments, smoke floats)</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">Bomb fragments<br>Inert Bombs<br>Target fragments<br>Smoke floats</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">Approximately 90 percent of non-explosive bombs are the sub-scale NEPM bombs such as the MK-76 and BDU-48.<br>110 NEPM and 10 HE bombs annually.</td></tr>
</table>

### A.1.2.5 Sinking Exercise

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Surface Warfare** | | |
| **Sinking Exercise** | **Short Description:**<br>Aircraft, vessel, and submarine crews deliver ordnance on a seaborne target, usually a deactivated ship, which is deliberately sunk using multiple weapon systems. Sinking exercises are included in the No Action Alternative for the purpose of analysis, but are not part of the Proposed Action. | |
| *Long Description* | Ship personnel and aircrew deliver high explosive ordnance on a seaborne target, (large deactivated vessel), which is deliberately sunk using multiple weapon systems. A sinking exercise is typically conducted by aircraft, surface vessels, and submarines in order to take advantage of the ability to fire high-explosive ordnance on a full-size ship target.<br>The target is typically a decommissioned ship made environmentally safe for sinking according to U.S. Environmental Protection Agency standards. The location is greater than 50 nautical miles (nm) from shore and in water depths greater than 6,000 ft..<br>Vessel, aircraft, and submarine crews attack with coordinated tactics and deliver live high explosive ordnance to sink the target. Non-explosive practice munitions may be used during the initial stages to extend target life. Typically, the exercise lasts for 4–8 hours and possibly over 1–2 days; however, it is unpredictable, and ultimately ends when the ship sinks. | |
| *Information Typical to the Event* | **Platform:** Vessels, Aircraft, Submarines<br>**Systems:** None<br>**Ordnance/Munitions:** Potentially all available (explosive and non-explosive)<br>**Targets:** Decommissioned ship made environmentally safe for sinking (according to U.S. Environmental Protection Agency standards)<br>**Duration:** 4–8 hours, possibly over 1–2 days (unpredictable and ultimately ends when the ship sinks) | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Underwater explosions (e.g., E5, E8, E11, E12), vessel noise, aircraft noise, weapons firing noise, heavyweight torpedo (e.g., TORP2)<br>**Energy:** None<br>**Physical Disturbance and Strike:** Military expended materials strike (non-explosive projectiles, projectile fragments), vessel strike, aircraft strike (seabirds only)<br>**Entanglement:** Guidance wires<br>**Ingestion:** Military expended materials (munitions fragments, small caliber projectiles, casings) | |
| *Detailed Military Expended Materials Information* | Munitions fragments, Non-explosive ordnance, Guidance wires, Munitions fragments, Casings<br>Ship hulk (decommissioned ship made environmentally safe for sinking according to U.S. Environmental Protection Agency standards) | |

| Activity Name | Activity Description |
|---|---|
| **Anti-Surface Warfare** | |
| *Assumptions Used for Analysis* | Greater than 50 nm from shore and in water depths greater than 6,000 ft.<br>The participants and assets could include:<br>• 1 full-size target ship hulk<br>• 1–5 cruiser, destroyer, or frigate ships<br>• 1–10 F/A-18, or maritime patrol aircraft<br>• 1 or 2 HH-60H, MH-60R/S, or SH-60B helicopters<br>• 1 E-2 aircraft for Command and Control<br>• 1 submarine<br>• 1–3 range clearance aircraft<br>• 2–4 Harpoon surface-to-surface or air-to-surface missiles<br>• 2–8 air-to-surface Maverick missiles<br>• 2–16 MK-82 general purpose bombs<br>• 2–4 Hellfire air-to-surface missiles<br>• 1 or 2 SLAM-ER air-to-surface missiles<br>• 50–500 rounds 5-inch and 76-millimeter (mm) gun<br>• 1 to 2 MK-48 heavyweight submarine-launched torpedo<br>• 2–10,000 rounds .50 caliber and 7.62 mm<br>• Assume 2 guidance wires expended per event |

### A.1.3 Anti-Submarine Warfare Training

Anti-submarine warfare involves helicopter and maritime patrol aircraft, ships, and submarines. These units operate alone or in combination, in operations to locate, track, and neutralize submarines. Controlling the undersea battle space is a unique naval capability and a vital aspect of sea control. Undersea battle space dominance requires proficiency in anti-submarine warfare. Every deploying strike group and individual surface combatant must possess this capability.

Various types of active and passive sonar are used by the Navy to determine water depth, locate mines, and identify, track, and target submarines. Passive sonar "listens" for sound waves by using underwater microphones, called hydrophones, which receive, amplify, and process underwater sounds. No sound is introduced into the water when using passive sonar. Passive sonar can indicate the presence, character, and movement of submarines; however, passive sonar, as a tool for detecting submarines, is increasingly ineffective as modern submarines become quieter. Active sonar is needed to locate objects because active sonar provides both bearing and range to the detected contact (such as an enemy submarine).

Active sonar transmits pulses of sound that travel through the water, reflect off objects and return to a receiver. By knowing the speed of sound in water and the time taken for the sound wave to travel to the object and back, active sonar systems can quickly calculate direction and distance from the sonar platform to the underwater object.

The Navy's anti-submarine warfare training plan, including the use of active sonar in at-sea training scenarios, includes multiple levels of training. Individual-level anti-submarine warfare training addresses basic skills such as detection and classification of contacts, distinguishing discrete acoustic signatures including those of ships, submarines, and marine life, and identifying the characteristics, functions, and effects of controlled jamming and evasion devices.

More advanced, integrated anti-submarine warfare training exercises involving active sonar are conducted in coordinated, at-sea operations during multi-dimensional training events involving submarines, ships, aircraft, and helicopters. This training integrates the full anti-submarine warfare continuum from detecting and tracking a submarine to attacking a target using either exercise torpedoes or simulated weapons. Training events include detection and tracking exercises against "enemy" submarine contacts; torpedo employment exercises against the target; and exercising command and control tasks in a multi-dimensional battle space.

### A.1.3.1 Tracking Exercise – Submarine

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Submarine Warfare** | | |
| **Tracking Exercise – Submarine** | **Short Description:**<br>Submarine crews search for, track, and detect submarines. | |
| *Long Description* | The anti-submarine warfare tracking exercise-submarine involves a submarine employing hull mounted and/or towed array sonar against an anti-submarine warfare target such as a MK-39 Expendable Mobile Anti-Submarine Warfare Training Target, a MK-30, or another submarine. During this event, passive sonar is used almost exclusively; active sonar use is restricted because it would reveal the tracking submarine's presence to the target submarine. The preferred type of range for this exercise is an instrumented underwater training range with the capability to track the locations of submarines and targets, to enhance the after-action learning component of the training. This exercise may involve a single submarine, or be undertaken in the context of a coordinated larger exercise involving multiple aircraft, ships, and submarines, including a major range event. | |
| *Information Typical to the Event* | **Platform:** Submarines<br>**Systems:** Mid-frequency (primarily passive) and high-frequency sonar<br>**Ordnance/Munitions:** None<br>**Targets:** Submarine MK-30, MK-39 Expendable Mobile Anti-Submarine Warfare Training Target<br>**Duration:** 8 hours | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Submarine high-frequency navigation and mine hunting sonar (e.g., HF1), Portable Underwater Tracking Range (e.g., HF6 and P2), submarine sonar (BQQ-10) (e.g., MF3), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strike<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | Expendable Mobile Anti-Submarine Warfare Training Target (MK-39); MK-30 targets are recovered | |
| *Assumptions Used for Analysis* | Each activity includes vessel noise stressor | |

### A.1.3.2 Tracking Exercise – Surface

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Submarine Warfare** | | |
| **Tracking Exercise – Surface** | **Short Description:**<br>Surface vessel crews search for, track, and detect submarines. | |
| *Long Description* | Surface ships search, detect, and track threat submarines to determine a firing position to launch a simulated torpedo and attack the submarine.<br>A surface vessel operates at slow speeds while employing hull mounted and/or towed array sonar. Passive or active sonar is employed depending on the type of threat submarine, the tactical situation, and environmental conditions. The target for this exercise is a MK-39 Expendable Mobile Anti-Submarine Warfare Training Target, MK-30 Recoverable Training Target, or a submarine.<br>Tracking exercise – surface could occur anywhere throughout the Offshore Area. This exercise may involve a single ship.<br>The preferred range for this exercise is an instrumented underwater range, but it may be conducted in any part of the Pacific Northwest Surface/Subsurface Operations Area depending on training requirements and available assets. | |
| *Information Typical to the Event* | **Platform:** Surface vessels<br>**Systems:** Mid-frequency sonar, Nixie (countermeasure system)<br>**Ordnance/Munitions:** None<br>**Targets:** Submarine MK-30 or MK-39 Expendable Mobile Anti-Submarine Warfare Training Target<br>**Duration:** 2–4 hours | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** SLQ-25A Nixie, Portable Undersea Tracking Range (e.g., HF6, P2), surface ship sonar (SQS-53C) (e.g., MF1), mid-frequency projector (e.g., MF11), surface ship sonar (SQS-56) (e.g., MF2), vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strike; military expended materials strike<br>**Entanglement:** None<br>**Ingestion:** Military expended materials (torpedo accessories, target fragments) | |
| *Detailed Military Expended Materials Information* | MK-39 Expendable Mobile Anti-Submarine Warfare Training Target<br>One Expendable Mobile Anti-Submarine Warfare Training Target (MK-39); MK-30 are recovered | |
| *Assumptions Used for Analysis* | Tracking exercise can occur in all locations in the Pacific Northwest Surface/Subsurface Operations Area. Submarines may provide service as the target. | |

### A.1.3.3 Tracking Exercise – Helicopter

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Submarine Warfare (ASW)** | | |
| **Tracking Exercise – Helicopter** | **Short Description:**<br>Helicopter crews search for, track, and detect submarines. | |
| *Long Description* | This exercise involves helicopters using sonobuoys and dipping sonar to search for, detect, classify, localize, and track a simulated threat submarine with the goal of determining a firing solution that could be used to launch a simulated torpedo and destroy the submarine.<br>Sonobuoys are typically employed by a helicopter operating at altitudes below 3,000 ft. (914 meters [m]). Sonobuoys are deployed in specific patterns based on the expected threat submarine and specific water conditions. These patterns will cover many different size areas, depending on these two factors. Both passive and active sonobuoys are employed. For certain sonobuoys, tactical parameters of use may be classified.<br>The dipping sonar is employed from an altitude of about 50 ft. (15 m) after the search area has been narrowed based on the sonobuoy search. Both passive and active sonar are employed. As the location of the submarine is further narrowed, a Magnetic Anomaly Detector may be used by the MH-60R to further confirm and localize the target's location.<br>The anti-submarine warfare target used for this exercise may be a MK-39 Expendable Mobile Anti-Submarine Warfare Training Target, a MK-30 target, or a submarine and may be either non-evading and assigned to a specified track, or fully evasive depending on the state of training of the helicopter. This exercise may involve a single aircraft.<br>The preferred range for this exercise is an instrumented underwater range, but it may be conducted in any part of the Pacific Northwest Surface/Subsurface Operations Area depending on training requirements and available assets. | |
| *Information Typical to the Event* | **Platform:** One or more helicopters, other aircraft, one or more surface ships<br>**Systems:** Mid-frequency helicopter dipping sonar, sonobuoys<br>**Ordnance/Munitions:** None<br>**Targets:** MK-30, MK-39, submarine<br>**Duration:** 1–2 hours | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br><br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Helicopter dipping sonar (AQS-22) (e.g., MF4), Active sonobuoy (SSQ-62 DICASS) (e.g., MF5), aircraft noise, vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** helicopter strike (birds), MK-30 strike, military expended materials bottom disturbance, vessel and in-water device strikes<br>**Entanglement:** parachutes/decelerators<br>**Ingestion:** Military expended materials (parachutes/decelerators) | |
| *Detailed Military Expended Materials Information* | MK-39 Expendable Mobile Anti-Submarine Warfare Training Target<br>Expended sonobuoys with decelerator/parachutes | |
| *Assumptions Used for Analysis* | None | |

### A.1.3.4 Tracking Exercise – Maritime Patrol Aircraft

| Activity Name | Activity Description |
|---|---|
| **Anti-Submarine Warfare** | |
| **Tracking Exercise – Maritime Patrol Aircraft** | **Short Description:**<br>Maritime patrol aircraft crews search for, detect, and track submarines. |
| *Long Description* | This exercise involves fixed-wing maritime patrol aircraft employing sonobuoys to search for, detect, classify, localize, and track a simulated threat submarine with the goal of determining a firing solution that could be used to launch a simulated torpedo and destroy the submarine.<br>Sonobuoys are typically employed by a maritime patrol aircraft operating at altitudes below 3,000 ft. (914 meters); however, sonobuoys may be released at higher altitudes. Sonobuoys are deployed in specific patterns based on the expected threat submarine and specific water conditions. Depending on these two factors, these patterns will cover many different size areas. Both passive and active sonobuoys are employed. For certain sonobuoys, tactical parameters of use may be classified. The anti-submarine warfare target used for this exercise may be a MK-39 Expendable Mobile Anti-Submarine Warfare Training Target, a MK-30 target, or a submarine. This exercise may involve a single aircraft.<br>The preferred range for this exercise is an instrumented underwater range, but it may be conducted in any part of the Pacific Northwest Surface/Subsurface Operations Area depending on training requirements and available assets. |
| *Information Typical to the Event* | **Platform:** Maritime Patrol Aircraft (e.g., P-3C Orion or P-8A Poseidon), manned or unmanned fixed-wing aircraft<br>**Systems:** Sonobuoys<br>**Ordnance/Munitions:** None<br>**Targets:** MK-39 Expendable Mobile Anti-Submarine Warfare Training Target, a MK-30 recoverable target, or a live submarine<br>**Duration:** 2–8 hours<br>**Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Active sonobuoy (e.g., SSQ-62 DICASS) (e.g., MF5), vessel noise, aircraft noise<br>**Energy:** Radar in periscope detection mode<br>**Physical Disturbance and Strike:** Aircraft strike (seabirds only), vessel and in-water device strike, Military expended materials strike<br>**Entanglement:** Decelerator/parachutes<br>**Ingestion:** Military expended materials (decelerator/parachutes) |
| *Detailed Military Expended Materials Information* | One Expendable Mobile Anti-Submarine Warfare Training Target (MK-39); MK-30 are recovered<br>Expended sonobuoys with decelerator/parachutes |
| *Assumptions Used for Analysis* | Tracking exercise can occur in all locations of the Pacific Northwest Surface/Subsurface Operations Area.<br>Submarine may provide service as the target.<br>If target is air-dropped, one parachute per target<br>Altitudes are below 3,000 ft.; can be 400 ft. or lower. |

### A.1.3.5 Tracking Exercise – Maritime Patrol Aircraft (Extended Echo Ranging Sonobuoys)

| Activity Name | Activity Description |
|---|---|
| **Anti-Submarine Warfare** | |
| **Tracking Exercise – Maritime Patrol (Extended Echo Ranging Sonobuoys)** | **Short Description:**<br>Maritime patrol aircraft crews search, detect and track submarines using extended echo ranging and multistatic active coherent sonobuoys. |
| *Long Description* | This exercise involves fixed-wing maritime patrol aircraft employing Improved Extended Echo Ranging and Multistatic Active Coherent sonobuoy systems to search for, detect, classify, localize, and track a simulated threat submarine with the goal of determining a firing solution that could be used to launch a simulated torpedo and destroy the submarine. The Improved Extended Echo Ranging events use the SSQ-110A sonobuoy as an impulse source, while the Multistatic Active Coherent events utilize the SSQ-125 sonobuoy as a tonal source. Each exercise would include the use of approximately 10 SSQ-110A or SSQ-125 sonobuoys. The anti-submarine warfare target used for this exercise may be a MK-39 Expendable Mobile Anti-Submarine Warfare Training Target, a MK-30 target, or a submarine. This exercise may involve single or multiple aircraft. |
| *Information Typical to the Event* | **Platform:** Maritime Patrol Aircraft<br>**Systems:** Improved Extended Echo Ranging and multistatic active coherent sonobuoy systems<br>**Ordnance/Munitions:** None<br>**Targets:** MK-39 Expendable Mobile Anti-Submarine Warfare Training Target, a MK-30 recoverable target, or a submarine<br>**Duration:** 2–8 hours<br><br>**Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** SSQ-125 Multistatic Acoustic Coherent (e.g., ASW2), underwater explosions, aircraft noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Aircraft strike (seabirds only), military expended materials strike<br>**Entanglement:** Decelerator/parachutes<br>**Ingestion:** Military expended materials (decelerator/parachutes) |
| *Detailed Military Expended Materials Information* | One Expendable Mobile Anti-Submarine Warfare Training Target (MK-39); MK-30 are recovered<br>Expended sonobuoys with decelerator/parachutes |
| *Assumptions Used for Analysis* | If target is air-dropped, one parachute per target<br>Altitudes for this activity can be as low as 400 ft. |

### A.1.4 Electronic Warfare Training

Electronic warfare is the mission area of naval warfare that aims to control use of the electromagnetic spectrum and to deny its use by an adversary. Typical electronic warfare activities include threat avoidance training, signals analysis for intelligence purposes, and use of airborne and surface electronic jamming devices to defeat tracking systems.

#### A.1.4.1 Electronic Warfare Operations

| Activity Name | Activity Description | |
|---|---|---|
| **Electronic Warfare** | | |
| **Electronic Warfare Operations** | **Short Description:**<br>Aircraft, surface vessel, and submarine personnel attempt to deny the enemy the ability to control the electromagnetic spectrum, which in turn degrades or denies the enemy the ability to take offensive or defensive actions. | |
| *Long Description* | Aircraft, surface ship, and submarine personnel attempt to control critical portions of the electromagnetic spectrum used by enemy systems to degrade or deny the enemy's ability to defend its forces from attack or recognize an emerging threat early enough to take defensive actions. Electronic Warfare Operations can be active or passive, offensive or defensive. Fixed-wing aircraft employ active jamming and deception against enemy search radars to mask the friendly inbound strike aircraft mission. Aircraft, surface vessels and submarines detect and evaluate enemy electronic signals from enemy aircraft or missile radars, evaluate courses of action concerning the use of passive or active countermeasures, then use vessel maneuvers and either chaff, flares, active electronic countermeasures, or a combination of them to defeat the threat. | |
| *Information Typical to the Event* | **Platform:** Fixed and rotary wing aircraft, surface combatant vessels, and submarines<br>**Systems:** None<br>**Ordnance/Munitions:** None<br>**Targets:** Land based fixed/mobile threat emitters<br>**Duration:** 1–2 hours | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Vessel noise, aircraft noise<br>**Energy:** Electromagnetic energy<br>**Physical Disturbance and Strike:** Vessel strike, aircraft strike (seabirds only)<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | Chaff and Flares | |
| *Assumptions Used for Analysis* | All chaff and flares involved in this event are covered under Chaff exercise and Flare exercises, respectively | |

### A.1.5 MINE WARFARE TRAINING

Mine warfare training is the naval warfare area involving the detection, avoidance, and neutralization of mines to protect Navy ships and submarines, and offensive mine laying in naval operations. Mine warfare training includes mine detection and neutralization exercises.

#### A.1.5.1 Mine Neutralization – Explosive Ordnance Disposal

| Activity Name | Activity Description | |
|---|---|---|
| **Mine Warfare** | | |
| **Mine Neutralization – Explosive Ordnance Disposal** | **Short Description:**<br>Personnel disable threat mines. Explosive charges are used. | |
| *Long Description* | Navy divers, typically explosive ordnance disposal personnel, disable threat mines with explosive charges to create a safe channel for friendly vessels to transit.<br>Personnel detect, identify, evaluate, and neutralize mines in the water with an explosive device and may involve detonation of one or more explosive charges from 15 gram explosive charge (Shock Wave Action Generator) to 2.5 pounds of trinitrotoluene (TNT) equivalent. These operations are normally conducted during daylight hours for safety reasons. | |
| *Information Typical to the Event* | **Platform:** Rotary wing aircraft, Small boats<br>**Systems:** None<br>**Ordnance/Munitions:** Underwater detonation charges<br>**Targets:** Mine shapes<br>**Duration:** Up to 4 hours | **Location:**<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Under water explosions (e.g., E3), aircraft noise, vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Seafloor, , vessel and in-water device strikes, military expended materials<br>**Entanglement:** None<br>**Ingestion:** Military expended materials (target fragments) | |
| *Detailed Military Expended Materials Information* | Target fragments | |
| *Assumptions Used for Analysis* | Charge placed anywhere in water column, including bottom<br>Mine shapes will be recovered | |

### A.1.5.2 Submarine Mine Exercise

| Activity Name | Activity Description | |
|---|---|---|
| **Mine Warfare** | | |
| **Submarine Mine Exercise** | **Short Description:**<br>Submarine crews practice detecting mines in a designated area. | |
| *Long Description* | Submarine crews use active sonar to detect and avoid mines or other underwater hazardous objects, while navigating restricted areas or channels, such as while entering or leaving port. This event trains submarine crews to detect and avoid mines. Training utilizes simulated minefields constructed of moored or bottom mine shapes, or instrumented mines that can record effectiveness of mine detection efforts.<br>In a typical training exercise, submarine crews will use submarine high-frequency active sonar to locate and avoid the mine shapes. Each mine avoidance exercise involves one submarine operating submarine high-frequency active sonar for 6 hours to navigate through the training minefield. During mine warfare exercises submarines will expend several submarine launched expendable bathythermographs to determine water conditions affecting sonar performance. | |
| *Information Typical to the Event* | **Platform:** Submarine<br>**Systems:** Submarine high-frequency active sonar<br>**Ordnance/Munitions:** None<br>**Targets:** Mine shapes<br>**Duration:** 6 hours | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Submarine high-frequency navigation and mine hunting sonar (e.g., HF1)<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strikes; seafloor device strike (bottom placed mine shapes), military expended materials<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | Bathythermograph buoys | |
| *Assumptions Used for Analysis* | Assume three bathythermograph buoys per event | |

### A.1.5.3 Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise

| Activity Name | Activity Description | |
|---|---|---|
| **Mine Warfare** | | |
| **Maritime Homeland Defense/Security Mine Countermeasures Integrated Exercise** | **Short Description:**<br>Maritime homeland defense/security mine countermeasures are naval mine warfare activities conducted at various ports and harbors, in support of maritime homeland defense/security. | |
| *Long Description* | Naval forces provide Mine Warfare capabilities to Department of Homeland Security led event. The three pillars of Mine Warfare, Airborne (helicopter), Surface (ships and unmanned vehicles), and Undersea (divers and unmanned vehicles) mine countermeasures will be brought to bear in order to ensure strategic U.S. ports remain free of mine threats. Various Mine Warfare sensors, which utilize active acoustics, will be employed in the detection, classification, and neutralization of mines. Along with traditional Mine Warfare techniques, such as helicopter towed mine countermeasures, new technologies (unmanned vehicles) will be utilized.<br>Event locations and scenarios will vary according to Department of Homeland Security strategic goals and evolving world events. | |
| *Information Typical to the Event* | **Platform:** Surface combatant vessels, Small boats, Rotary wing aircraft<br>**Systems:** Unmanned underwater and surface vehicles, various mine detection sensors (AN/AQS-20, AN/AQS-24)<br>**Ordnance/Munitions:** Shock Wave Action Generator<br>**Targets:** Temporary mine shapes<br>**Duration:** Multiple days | **Location:**<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Vessel noise; aircraft noise (e.g., AN/SQQ 32, Unmanned underwater vehicle, MK 18 Swordfish, AN/PQS 2A, Marine Mammal Systems bottlenose dolphin bio-sonar), high-frequency mine hunting sonar (e.g., HF4),<br>**Energy:** Magnetic influence mine sweeping<br>**Physical Disturbance and Strike:** Vessel and in-water device strikes; seafloor device strike (bottom placed mine shapes); aircraft strike (seabirds only)<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | Non-permanent mine shapes will be laid in various places on the bottom of Puget Sound.<br>Shapes are varied, from about 1 meter (m) circular to about 2.5 m long by 1 m wide. They will be recovered using normal assets, with diver involvement.<br>Programmatic analysis for acoustic effects only.<br>For Air Quality, assumed 24 hours of helicopter, 24 hours of small boat, and 24 hours of surface combatant (destroyer) Operation. | |

## A.1.6 NAVAL SPECIAL WARFARE TRAINING

Naval special warfare and other Navy forces train to conduct military operations in five Special Operations mission areas: unconventional warfare, direct action, special reconnaissance, foreign internal defense, and counterterrorism. Naval special warfare training involves specialized tactics, techniques, and procedures, employed in training events that include: insertion/extraction operations using parachutes rubber boats, or helicopters; boat-to-shore and boat-to-boat gunnery; underwater demolition training; reconnaissance; and small arms training.

### A.1.6.1 Personnel Insertion/Extraction – Submersible

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Naval Special Warfare</td></tr>
<tr><td>Personnel Insertion/Extraction – Submersible</td><td colspan="2">Short Description:<br>Military personnel train for clandestine insertion and extraction into target areas using submersibles.</td></tr>
<tr><td>Long Description</td><td colspan="2">Military personnel train for clandestine insertion and extraction into target areas using submersibles. Often, an undersea delivery vehicle, similar to a “mini-sub,” may be used to transfer the personnel to their objective near shore.<br>These operations will vary in length depending on the transportation method and systems being used.<br>Training may include navigation runs in Puget Sound that may be conducted in coordination with other training activities.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Sea, Air, Land Delivery Vehicle<br>Systems: None<br>Ordnance/Munitions: None<br>Targets: None<br>Duration: 2–8 hours</td><td>Location:<br>Inland Waters</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: None<br>Energy: None<br>Physical Disturbance and Strike: Vessel and in-water device strikes<br>Entanglement: None<br>Ingestion: None</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">None</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">None</td></tr>
</table>

### A.1.6.2 Personnel Insertion/Extraction – Non-Submersible

| Activity Name | Activity Description | |
|---|---|---|
| **Naval Special Warfare** | | |
| **Personnel Insertion/Extraction – Non-Submersible** | **Short Description:**<br>Military personnel train for clandestine insertion and extraction into target areas using rotary wing aircraft, fixed-wing aircraft (insertion only), or small boats. | |
| *Long Description* | Personnel train to approach or depart an objective area using various transportation methods and tactics. These operations train forces to insert and extract personnel and equipment day or night. Tactics and techniques employed include insertion from aircraft by parachute, by rope, or from low, slow-flying helicopters from which personnel jump into the water. Parachute training is required to be conducted on surveyed drop zones to enhance safety. Insertion and extraction methods also employ small inflatable boats. | |
| *Information Typical to the Event* | **Platform:** Fixed and rotary wing aircraft<br>**Systems:** None<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 2–8 hours | **Location:**<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Aircraft noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Aircraft and vessel strikes<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

## A.1.7 OTHER TRAINING

### A.1.7.1 Maritime Security Operations

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Other Training</td></tr>
<tr><td>Maritime Security Operations</td><td colspan="2">Short Description:<br>Surface ship and small boat crews conduct a suite of Maritime Security Operations (MSO) events, including maritime security escorts for Navy vessels such as submarines and aircraft carriers; Visit, Board, Search, and Seizure; Maritime Interdiction Operations; Force Protection; and Anti-Piracy Operations.</td></tr>
<tr><td>Long Description</td><td colspan="2">Maritime security operations in the Northwest Training and Testing (NWTT) study area are predominantly maritime security escort events, including the Transit Protection System (TPS) and training of other escort units.<br>The TPS includes up to 9 security vessels that protect SSBNs while moving within Puget Sound and the Strait of Juan de Fuca. U.S. Coast Guard (USCG) personnel and their ancillary equipment and weapons systems are involved in these events. Generally, the escorts establish a moving 1000-yard perimeter (security zone) around the vessel to prevent non-participants from entering that security zone. Non-participant vessels might be ordered to move. Every two years, a training event occurs which involves up to 16 vessels, transiting from Hood Canal to Admiralty Inlet. During this biennial event, boat crews train to engage surface targets by firing small-caliber (blank) weapons.<br>Similar maritime security escort training occurs with Coastal Riverine Group (CRG) boats that conduct force protection for designated vessels and movements. These CRG boat crews train to protect ships while entering and leaving ports. Other missions include ensuring compliance with vessel security zones for ships in port and at anchor, conducting patrols to counter waterborne threats, and conducting harbor approach defense.<br>The vessels used by TPS and CRG include: small unit riverine craft, combat rubber raiding craft, rigid-hull inflatable boats, patrol craft, reaction vessels, blocking vessels and many other versions of these types of boats. These boats use inboard or outboard, diesel or gasoline engines with either propeller or water jet propulsion. Boat crews may use high or low speeds to approach and engage targets simulating other boats, swimmers, floating mines, or nearshore land targets with small-caliber (blank) weapons.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Small boats (16–73 ft.), reaction vessels (87 ft.), blocking vessels (250 ft.), and patrol boats (34 to 85 ft.)<br>Systems: None<br>Ordnance/Munitions: Small-caliber side arms, 7.62 Caliber, 50 Caliber, and 25 millimeter weapons (all blanks).<br>Targets: High-performance small boats, recoverable or expendable floating target<br>Duration: For TPS, averaging 10 hours, up to approximately 12–18 hours; 2 hours for other MSO activities</td><td>Location:<br>Inland Waters, including Naval Base (NAVBASE) Kitsap Bangor, NAVBASE Kitsap Bremerton, Naval Station Everett, Hood Canal, Dabob Bay, Puget Sound, Strait of Juan de Fuca</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Airborne noise from small arms fire, in-water vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Vessel strike, in-water device strike, military expended material strike (casings)<br>Entanglement: None<br>Ingestion: Military expended materials (casings)</td></tr>
<tr><td>Detailed Military Expended Material Information</td><td colspan="2">None</td></tr>
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| | |
|---|---|
| *Assumptions Used for Analysis* | Maritime security operations is a broad term used to describe activities used to train naval forces in the skills necessary to protect naval vessels during transit and from small boat attack, perform counter piracy and drug operations (maritime interdiction operations and visit, board, search, and seizure), and protect key infrastructure. As a category, maritime security operations broadly covers training events naval forces need to be able to tailor to respond to emergent threats. Maritime security events conducted in inland waters do not involve live fire of weapons. All maritime security events involve vessel movement, sometimes at speeds necessary to overtake suspect vessel and/or small boats (targets).<br>Maritime security training events, particularly maritime security escorts, are conducted proximate to NAVBASEs Kitsap Bangor, Bremerton, and Everett, and within the Hood Canal, Dabob Bay, Puget Sound, and Strait of Juan de Fuca. Other maritime security operations events could occur in the Offshore Area.<br>**Maritime Security Escort (SSBN Transit Protection):** The Transit Protection System utilizes a mixture of 16 security vessels, up to 9 of which can be utilized at any time for escorting SSBNs transiting between the SSBN homeport of NAVBASE Bangor and the dive/surface point in the Strait of Juan de Fuca or Dabob Bay.<br>Transit Protection vessels are equipped with conventional weapons systems to provide protection during all SSBN transits. The Transit Protection System also utilizes USCG personnel and their ancillary equipment and weapons systems.<br>TPS vessels include 16 escort security boats home ported at NAVBASE Kitsap Bangor, consisting of 2 Blocking Vessels, 2 Reaction Vessels, and 12 Screening Vessels.<br>Specifics regarding how the escort activity would be performed, which boats would be used, how and when they would be deployed, type of armament, number of personnel assigned to each escort vessel, and specific capabilities of TPS are classified or fall under Department of Defense Controlled Nuclear Information guidelines and, thus, are not included here.<br>Generally, the escorts would establish and maintain a moving perimeter security zone perimeter around the SSBN to prevent other vessels and personnel from entering the security zone. Depending on the type of vessel escort being conducted and other conditions, the security zone could be from a 100-yard to a 1,000-yard radius around the escorted vessel. Recreational and commercial vessels might be ordered to move.<br>While the number and timing of TPS events would vary, it is estimated they would occur 225 times per year; 100 annual events with 9 escort vessels and 125 events with 7 escort vessels. Additionally there would be 1 biennial certification event with up to 16 vessels transiting from Hood Canal to Admiralty Inlet, firing blank rounds. To the extent practicable, all use of blank ammunition would be near the center of the waterway and no closer than 500 yards to the shoreline.<br>The TPS escorts help deter a terrorist threat to an SSBN, minimize the possibility of an accidental collision between recreational or commercial vessels and an SSBN, and fulfill mandated security directives and policies.<br>USCG crews on all TPS vessels would employ standard marine mammal strike avoidance protocols.<br>All shell casings associated with use of blank ammunition shall be captured, to the greatest extent feasible, using either cofferdams around guns, capture bins, or capture on the deck of vessels.<br>Radio broadcasts to mariners will be conducted during exercises to ensure the public is aware and clear of the area.<br>**Maritime Security Escort (Coastal Riverine Group):** Naval Coastal Riverine Units train to provide escort and force protection security to naval vessels.<br>These training events will be conducted within inland waterways in and around Naval Homeports such as Naval Base Kitsap Bangor, Naval Base Kitsap Bremerton, and Naval Station Everett, and within the Hood Canal, Dabob Bay, Puget Sound, and Strait of Juan de Fuca WA.<br>These training events would occur approximately 60 times per year, approximately 60–70% originating proximate to Bangor, 20–30% proximate to Bremerton, and the remainder (less than 10%) proximate to Everett. The average total transit distance associated with maritime security escort training events (Other) can vary between 50 and 180 nautical miles.<br>Maritime Security Escort (Other) is supported with 6 total vessels (i.e., 34' Sea Ark Patrol |

| | |
|---|---|
| | Craft and 85' Mk VI Riverine Craft), of which 2–4 vessels would be used for a single escort mission.<br><br>Naval Coastal Riverine Forces would also conduct certification maritime security escort training events once every 6–9 months. These certification events would include 8–10 days underway, operating in common escort areas (with 1–2 days of no-fire events/7 days of blank fire events in the vicinity of Whidbey Island). The typical training day would consist of two shifts, approximately 5 hours each. Nighttime training is not anticipated. Certification training would utilize up to 5 boats (3 as escorts, 1 simulating a Navy vessel to be protected, and 1 simulating Opposition Force [OPFOR]). The underway drills will focus on maritime security escorts, navigation, and basic seamanship evolutions to include mooring, towing, and anchoring. Some evolutions may require speed surges/short-term acceleration for proper force protection stationing. Training in weapons handling, firing of blank ammunition, and the use of pyrotechnics and non-lethal deterrents will also be conducted.<br><br>Routine Proficiency Training would occur 1–2 days a week, where the skills discussed above would be practiced as operational schedules allow to maintain readiness.<br><br>Special consideration will be given with regard to the presence of marine mammals during training events. Training will be paused until marine mammals have cleared the area, or the training area will be temporarily relocated. Expended Brass: Efforts will be made by crews to collect all expended brass captured on the deck; however, brass ejection may result in loss over the side. Use of Pyrotechnics limited to flash, flare, and sound devices, may be utilized for escalation of force training and/or execution in accordance with NTTP 3-20.6.29M governing tactical boat operations. Noise Levels: Loud hailers will be used for hailing contacts if no radio communication can be established. Use of sirens in support of mission or training will be minimized and period of use limited to late-morning through early evening. Water Depth: Patrol boats will not typically be operating in shoal water. Unless in an emergency and during launch and recovery, patrol boats will only operate in waters in which the charted depth is greater than 6 ft. Speed: Patrol boats are not expected to exceed 15 knots unless involved in a drill that requires them to quickly move from one zone to another to provide force protection. Anchoring: Crews will study the charts and Coast Guard notices to evaluate the bottom type and find an area to anchor that will not impact any type of marine life or plants. Refueling Operations: When refueling, pier side or on a trailer, crews will use the required checklist to refuel and will have the spill kit ready in case of any spills. When refueling an absorbing pad will be on the fuel tank inlet as well as the vent. |

### A.1.7.2 Precision Anchoring

| Activity Name | Activity Description |
|---|---|
| **Other Training** | |
| **Precision Anchoring** | **Short Description:**<br>Releasing of anchors in designated locations. |
| *Long Description* | Vessels navigate to a pre-planned position and deploy the anchor. The vessel uses all means available to determine its position when anchor is dropped to demonstrate calculating and plotting the anchor's position within 100 yards of center of planned anchorage. |
| *Information Typical to the Event* | **Platform:** All surface vessels<br>**Systems:** None<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** Up to 1 hour<br><br>**Location:**<br>Inland Waters (Naval Station Everett anchorage area, Indian Island anchorage area) |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike, seafloor device strike (anchor)<br>**Entanglement:** None<br>**Ingestion:** None |
| *Detailed Military Expended Material Information* | None |
| *Assumptions Used for Analysis* | None |

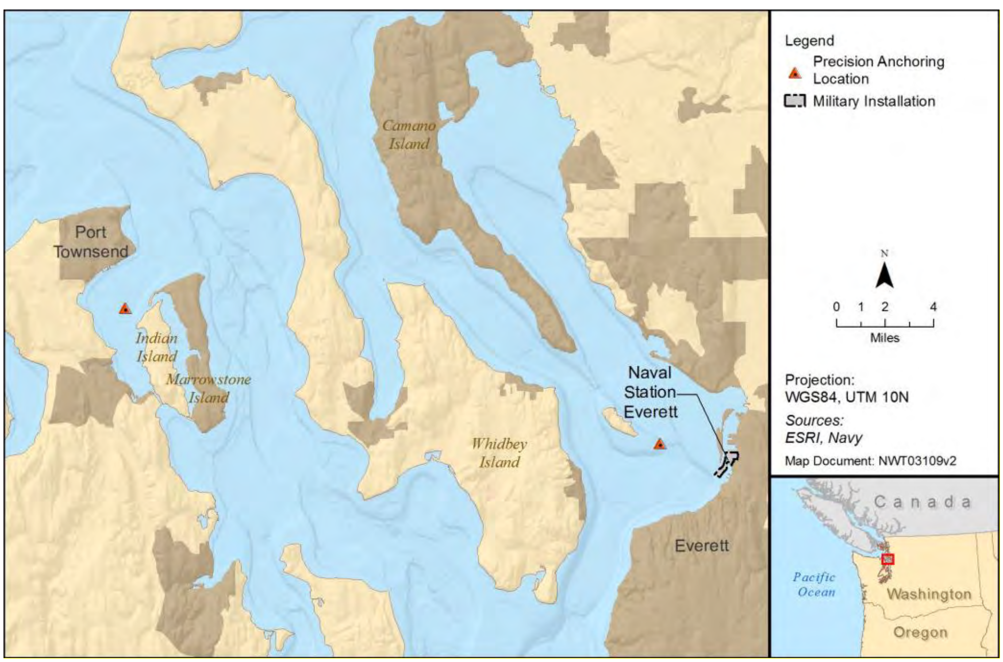


**Figure A-1: Precision Anchoring Locations in Puget Sound**

### A.1.7.3 Small Boat Attack

| Activity Name | Activity Description | |
|---|---|---|
| **Other** | | |
| **Small Boat Attack** | **Short Description:**<br>Small boat crews engage pierside surface targets with small-caliber weapons. Only blank rounds are fired. | |
| *Long Description* | A single activity consists of multiple days of training. For analysis in this EIS, a 3-day scenario is assumed. On the first day, blanks will be fired from a small-caliber machine gun, mounted on a high-speed boat used by Navy security forces. The second day will consist of test firing multiple crew-serve and hand-held small-caliber weapons, all with blank ammunition. Some rounds will be fired from both the high-speed boat and from a Navy surface ship moored at a Navy pier. The third day will be the full training exercise. This consists of a high-speed attack vessel running directly at the Navy pier where the simulated target surface ship is moored.<br>Duration of firing will be approximately 2 hours with a total of 1,000 rounds fired the first day, and a duration of 1.5 hours with a total of 1,000 rounds fired the second day. The final day will have a duration of approximately 30 minutes, with 1,000 rounds fired. Typical firing patterns are 3–30 round bursts, assess target, and then fire again. Multiple crew members will be given a chance to fire the weapons. | |
| *Information Typical to the Event* | **Platform:** Small boats or watercraft<br>**Systems:**<br>**Ordnance/Munitions:** Small-caliber (non-explosive)<br>**Targets:** High-performance small boats<br>**Duration:** Varies | **Location:**<br>Inland Waters (Naval Station Everett, Naval Base [NAVBASE] Kitsap Bangor, NAVBASE Kitsap Bremerton) |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Airborne noise from small arms fire, vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike, military expended material strike (casings)<br>**Entanglement:** None<br>**Ingestion:** Military expended materials (casings) | |
| *Detailed Military Expended Material Information* | Casings | |
| *Assumptions Used for Analysis* | At locations where a security barrier is present, and sea lions may be hauled out on the barrier, the security barrier will be pulled fully open to remove haul out opportunities. During Day 1 training, all firing will occur at least 250 ft. away from the security barrier. | |

### A.1.7.4 Intelligence, Surveillance, Reconnaissance

| Activity Name | Activity Description | |
|---|---|---|
| **Other Training Exercises** | | |
| **Intelligence, Surveillance, Reconnaissance (ISR)** | **Short Description:**<br>Maritime patrol aircraft (MPA) use all available sensors to collect data on threat vessels. | |
| *Long Description* | MPA use all available sensors to collect data on threat vessels. Passive sonobuoys are used to collect and analyze acoustic data, and photographic equipment is used to document the vessel with visual information. | |
| *Information Typical to the Event* | **Platform:** P-3, EP-3, P-8, EA-18G<br>**Systems:** Fixed-wing aircraft<br>**Ordnance/Munitions:** None<br>**Targets:** Targets of Opportunity<br>**Duration:** 2–8 hours | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Aircraft noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Aircraft strike (birds only)<br>**Entanglement:** Decelerator/parachutes<br>**Ingestion:** Decelerator/parachutes | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | ISR training is conducted by MPA in Warning Area 237 and the Pacific Northwest Operating Area. Activities typically last 6 hours. P-3 aircrews use a variety of intelligence gathering and surveillance methods, including visual, infrared, electronic, radar, and acoustic. EP-3 and EA-18G crews conduct ISR training as well, but to a lesser extent than P-3C crews. P-8 aircraft are the P-3 replacement MPA. | |

### A.1.7.5 Search and Rescue

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Other Training Exercises</td></tr>
<tr><td>Search and Rescue</td><td colspan="2">Short Description:<br>Helicopter crews rescue military personnel at sea.</td></tr>
<tr><td>Long Description</td><td colspan="2">Helicopter crews rescue military personnel at sea.<br>Helicopters fly below 3,000 ft. and locate personnel to be rescued. Flares are expended during training.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Helicopters (H-60); small boats<br>Systems: None<br>Ordnance/Munitions: Flares<br>Targets: None<br>Duration: 2–3 hours</td><td>Location:<br>Offshore Area<br>Inland Waters</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Vessel noise, aircraft noise<br>Energy: None<br>Physical Disturbance and Strike: Vessel strike, aircraft strike (birds only)<br>Entanglement: None<br>Ingestion: None</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">Expended flares</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">This activity involves a helicopter landing and simulated extraction of a survivor (typically one of the helicopter crewmembers). The search and rescue helicopter, an H-60, approaches the survivor, hovers, recovers the survivor, and then departs the area with the survivor onboard.</td></tr>
</table>

### A.1.7.6 Surface Ship Sonar Maintenance

| Activity Name | Activity Description | |
|---|---|---|
| **Other** | | |
| **Surface Ship Sonar Maintenance** | **Short Description:**<br>Pierside and at-sea maintenance of sonar systems. | |
| *Long Description* | This scenario consists of surface combatant vessels performing periodic maintenance to the AN/SQS-53 or AN/SQS-56 sonar while in port or at sea. This maintenance takes up to 4 hours. Surface vessels operate active sonar systems for maintenance while pierside however, sonar maintenance will occur pierside or at-sea in the open ocean. | |
| *Information Typical to the Event* | **Platform:** Surface combatant vessels<br>**Systems:** Hull mounted sonar systems (AN/SQS-53 or AN/SQS-56)<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** Up to 4 hours | **Location:**<br>Offshore Area<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Surface ship sonar (SQS-53C, SQS-56) (e.g., MF1, MF2), Vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

### A.1.7.7 Submarine Sonar Maintenance

| Activity Name | Activity Description | |
|---|---|---|
| **Other-Maintenance** | | |
| **Submarine Sonar Maintenance** | **Short Description:**<br>Pierside and at-sea maintenance of sonar systems. | |
| *Long Description* | A submarine performs periodic maintenance on the mid-frequency and high-frequency sonar systems while in port or at sea. Submarines conduct maintenance to their sonar systems in shallow water near their homeport however, sonar maintenance could occur anywhere as the system's performance may warrant | |
| *Information Typical to the Event* | **Platform:** Submarines<br>**Systems:** Mid- and high-frequency submarine sonar system<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 45 minutes–1 hour | **Location:**<br>Offshore Area<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Submarine sonar (e.g., MF3, HF1), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

## A.2 Naval Undersea Warfare Center Division, Keyport Testing Activities

Naval Undersea Warfare Center (NUWC) Division, Keyport testing activities are aligned with its mission of providing test and evaluation services and expertise to support the Navy's evolving manned and unmanned vehicle program activities. NUWC Division, Keyport has historically provided facilities and capabilities to support testing of torpedoes, other unmanned vehicles, submarine readiness, diver training, and similar activities that are critical to the success of undersea warfare. Each major category of NUWC Division, Keyport activities is described below.

## A.2.1 Torpedo Testing

### A.2.1.1 Torpedo Non-Explosive Testing

| Activity Name | Activity Description | |
|---|---|---|
| **Torpedo Testing** | | |
| **Torpedo Non-Explosive Testing** | **Short Description:**<br>Test of a non-explosive torpedo against a target. | |
| *Long Description* | Torpedoes are the primary undersea warfare weapons used by surface ships, aircraft, and submarines. The guidance systems of these weapons may be autonomous or controlled from the launch platform through a variety of "links" (e.g., electric, fiber optic, acoustic). The autonomous guidance systems use either "passive" acoustics, detecting the sound energy emitted from the target, or "active" acoustics, finding the target with sonar and using the received echoes for guidance. Torpedoes tested in this activity contain no explosives.<br>Propulsion Systems include thermal, electrical, or chemical propulsions systems.<br>Thermal propulsion systems are powered by motors that use different types of fuels (e.g., Otto Fuel II, rocket, diesel, jet fuels) that exhaust combustion products into the water column; other closed cycle thermal propulsion systems produce only heat emissions.<br>Electric propulsion systems are powered by closed cycle motors using batteries (e.g., lithium thionyl, lithium ion, lead acid, silver zinc, and nickel hydride); only heat emissions are produced.<br>Chemical propulsion systems are usually based on a lithium boiler that is a closed cycle system; only heat energy is transferred into the environment.<br>The torpedo test vehicle is deployed by a support craft or other means. The vehicle searches for its intended target, or runs a planned geometry. Each test, including set up and retrieval may last several hours. The vehicle run time may be 10 minutes. Following the test, the vehicle is retrieved for post-test analysis. Most targets are retrieved, while some may be expended. The objective is to retrieve all vehicles, targets and related materials. | |
| *Information Typical to the Event* | **Platform:** Support craft/other<br>**Systems:** Sonar, torpedoes, range tracking pingers, AUV/ROV/UUVs, submersible, concepts and prototypes (including experimental vehicles)<br>**Ordnance/Munitions:** Torpedoes (non-explosive)<br>**Targets:** EMATT, MK-30, submarine, or surface combatant<br>**Duration:** Assume 8 hours for all torpedo tests | **Location:**<br>Offshore Area<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Torpedo (e.g., TORP1, TORP2), Mid-frequency sonar (e.g., ASW3, ASW4, MF5, MF10), vessel noise (support craft)<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike, in-water device strike, military expended materials<br>**Entanglement:** Torpedo guidance wire, flex hose<br>**Ingestion:** Military expended materials | |
| *Detailed Military Expended Materials Information* | Torpedo guidance wire, flex hose, aluminum doors, lead dropper weights, fiber optic guidance wire, expendable targets, nose cap, release wire | |
| *Assumptions Used for Analysis* | All torpedo vehicles will be recovered.<br>Support craft are on site and usually stationary during the test, running for 30 percent of the entire 8-hour scenario including transit. | |

## A.2.2 AUTONOMOUS AND NON-AUTONOMOUS VEHICLES

### A.2.2.1 Unmanned Underwater Vehicle Testing

| Activity Name | Activity Description |
|---|---|
| **Autonomous and Non-Autonomous Vehicles** | |
| **Unmanned Underwater Vehicle (UUV) Testing** | **Short Description:**<br>Unmanned underwater vehicles are autonomous or remotely operated vehicles with a variety of different payloads used for various purposes. |
| *Long Description* | Autonomous underwater vehicle launch and retrieval methods are highly variable because of the differences in autonomous vehicle technology involved and of the variety of autonomous vehicle uses. Non-autonomous or remotely controlled vehicles are also used and tested. These may be tethered like remotely operated vehicles (ROVs) or remotely controlled vehicles that have radio links. Some vehicles may be used to transport personnel (whether inside or outside the vehicle). They may have both manual and autonomous control capabilities.<br>Many autonomous vehicles have multiple test objectives or payloads (such as cameras and side-scan or multibeam sonar) onboard so that numerous tests can be run during a single test activity. UUV sensors may be tested to ensure they can detect, classify, and localize non-explosive mine shapes among rocky outcrops or non-mine shapes. These sensors may also be associated with a vessel, or placed before a single non-explosive mine shape or mine field is put in place. The mine shapes themselves may be tested to ensure they deploy as required and fleet operators may be trained in mine field placement.<br>Propulsion Systems include thermal, electrical, or chemical propulsions systems as described above under A.2.1.1 (Torpedo Non-Explosive Testing). The UUV test vehicle is lowered into or onto the water from a support craft or from a pier. The vehicle will propel itself through the water or by crawling across the bottom to complete the test objectives, which could include deployment or recovery of a payload, sonar or other sensor use, or completion of a propulsion test. |
| *Information Typical to the Event* | **Platform:** Unmanned vehicles, support craft/other<br>**Systems:** Sonar, underwater communications<br>**Ordnance/Munitions:** none<br>**Targets:** Include but not limited to mobile, or Fleet vessel<br>**Duration:** Assume 8 hours for all UUV tests, though tests may continue for up to 40 hours, and infrequently some may operate continuously for multiple months<br>**Location:**<br>Offshore Area<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Synthetic aperture sonar (e.g., SAS2), acoustic modems (e.g., M3), vessel and simulated vessel noise<br>**Energy:** Electromagnetic and lasers<br>**Physical Disturbance and Strike:** In-water device strike, military expended materials, seafloor devices<br>**Entanglement:** Torpedo guidance wire<br>**Ingestion:** Military expended materials |
| *Detailed Military Expended Materials Information* | Torpedo guidance wire, flex hose, aluminum doors, lead dropper weights, fiber optic guidance wire, expendable targets, nose cap, release wire |
| *Assumptions Used for Analysis* | All test systems will be recovered.<br>Support craft include two rigid-hull inflatable boats, running at 50 percent power for the entire 8-hour scenario. |
| *Scenarios covered* | General and Experimental Test Vehicle, Low Frequency Broad Band Testing, UUV Operations (various), Mine Detections Operations |

### A.2.2.2 Unmanned Aircraft System

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Autonomous and Non-Autonomous Vehicles</td></tr>
<tr><td>Unmanned Aircraft System</td><td colspan="2">Short Description:<br>Unmanned aircraft systems (UASs) are remotely piloted or self-piloted (i.e., preprogrammed flight pattern) aircraft that include fixed-wing, rotary-wing, and other vertical takeoff vehicles. They can carry cameras, sensors, communications equipment, or other payloads.</td></tr>
<tr><td>Long Description</td><td colspan="2">UASs are remotely piloted or self-piloted (i.e., preprogrammed flight pattern) aircraft that include fixed-wing, rotary-wing, and other vertical takeoff vehicles. They can carry cameras, sensors, communications equipment, or other payloads. UASs can vary in size up to approximately 10 ft. (3 meters) in length, with gross vehicle weights of a couple hundred pounds.<br>Propulsion types can range from traditional turbofans, turboprops, and piston engine-driven propellers, to electric motor-driven propellers powered by rechargeable batteries (lead-acid, nickel-cadmium, and lithium ion), photovoltaic cells, and/or hydrogen fuel cells.<br>The UAS test vehicle is deployed by a support craft or other means from a ship or from shore, flying within the test area in accordance with Federal Aviation Administration (FAA) regulations over a duration of 2–8 hours. The UAS usually flies at altitudes less than 3,000 ft. in accordance with FAA regulations.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Unmanned aerial vehicles<br>Systems: None<br>Ordnance/Munitions: None<br>Targets: None<br>Duration: 2–8 hours</td><td>Location:<br>Offshore Area<br>Inland Waters</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Aircraft noise, vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Aircraft strike, vessel and in-water device strikes<br>Entanglement: None<br>Ingestion: None</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">None</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">The UAS may spend 25 percent of its flight time above 3,000 ft. and 25 percent of its time outside 3 nautical miles of the coastline.</td></tr>
</table>

### A.2.2.3 Unmanned Surface Vehicle Testing

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Autonomous and Non-Autonomous Vehicles</td></tr>
<tr><td>Unmanned Surface Vehicle Testing</td><td colspan="2">Short Description:<br>Unmanned surface vehicles are primarily autonomous systems designed to augment current and future platforms to help deter maritime threats. They employ a variety of sensors designed to extend the reach of manned ships.</td></tr>
<tr><td>Long Description</td><td colspan="2">Unmanned surface vehicles (USV) can include remotely operated craft (semi-submersible, plane hull, semi-plane hull, etc.) and test vehicles. During testing, they can operate autonomously, semi-autonomously, or non-autonomously. Non-autonomous or remotely controlled vehicles may be tethered like remotely operated vehicles (ROVs) or remotely controlled via radio link.<br>USVs may have multiple test objectives and/or payloads (such as cameras and sonar) onboard so that numerous tests can be executed during a single testing activity. USVs may be used in conjunction with UUVs and UAVs to meet test objectives.<br>USV launch and retrieval methods are highly variable because of the differences in vehicle type and size. USV test vehicle launch methods include, lowering onto the water from a support craft or pier, deploying from another craft, or launching from a boat ramp. The vehicle will propel itself through the water to complete the test objectives, which could include deployment and/or recovery of a payload, sonar or other sensor use, or completion of a propulsion test.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Unmanned vehicles, support craft/other<br>Systems: Sonar, electronic surveillance, infrared<br>Ordnance/Munitions: none<br>Targets: Include but not limited to mobile, or Fleet vessel<br>Duration: Assume 8 hours for all USV tests, though tests may continue for up to 40 hours, and infrequently some may operate continuously for multiple months</td><td>Location:<br>Offshore Area<br>Inland Waters</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Synthetic aperture sonar (e.g., SAS2), acoustic modems (e.g., M3), vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: In-water device strike, seafloor devices<br>Entanglement: None<br>Ingestion: None</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">None</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">All test systems will be recovered.<br>Support craft include two rigid-hull inflatable boats, running at 50 percent power for the entire 8-hour scenario.</td></tr>
<tr><td>Scenarios covered</td><td colspan="2">General and Experimental Test Vehicle, Low Frequency Broad Band Testing, USV Operations (various), Mine Detections Operations</td></tr>
</table>

### A.2.3 FLEET TRAINING/SUPPORT

#### A.2.3.1 Cold Water Training

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Fleet Training/Support</td></tr>
<tr><td>Cold Water Training</td><td colspan="2">Short Description:<br>Fleet training for divers in a cold water environment and other diver training related to Navy divers supporting range operations.</td></tr>
<tr><td>Long Description</td><td colspan="2">Fleet training for divers in a cold water environment and other diver training related to Navy divers supporting range operations. Acoustic systems may be used in diver training. These fleet activities in the Naval Sea Systems Command Naval Undersea Warfare Center Division, Keyport Range Complex are non-acoustic and do not include the use of submarine hull-mounted active sonar.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Support craft<br>Systems: None<br>Ordnance/Munitions: None<br>Targets: None<br>Duration: Assume 8 hours for all events, though they may continue for up to 40 hours, and infrequently some may operate intermittently for multiple consecutive months</td><td>Location:<br>Offshore Area<br>Inland Waters</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Other acoustic devices, vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Vessel strike<br>Entanglement: None<br>Ingestion: None</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">None</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">If used, support craft may run for 100 percent of an 8-hour event.</td></tr>
</table>

### A.2.3.2 Post-Refit Sea Trial

| Activity Name | Activity Description | |
|---|---|---|
| **Fleet Training/Support** | | |
| **Post-Refit Sea Trial** | **Short Description:**<br>Following periodic maintenance periods or repairs, sea trials are conducted to evaluate submarine propulsion, sonar systems, and other mechanical tests. | |
| *Long Description* | Testing activities are conducted throughout the life of a Navy submarine to verify performance and mission capabilities. Sea trials are conducted following periodic maintenance or repairs. A typical test may include a submarine operating at full power and subjected to high-speed runs, steering tests, and other mechanical tests. | |
| *Information Typical to the Event* | **Platform:** Submarine, support craft<br>**Systems:** All internal submarine systems<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** Typically 8 hours | **Location:**<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Mid-frequency active sources (e.g., MF10), acoustic modems (e.g., M3), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strikes<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | One submarine | |

### A.2.3.3 Anti-Submarine Warfare Testing

| Activity Name | Activity Description | |
|---|---|---|
| **Fleet Training/Support** | | |
| **Anti-Submarine Warfare (ASW) Testing** | **Short Description:**<br>Ships and their supporting platforms (e.g., helicopters, unmanned aerial vehicles) detect, localize, and prosecute submarines or other training targets. | |
| *Long Description* | Fleet activities that occur within the Range Complex may involve the use of ships. Such activities provide sailors the opportunity to train with actual Naval assets in a controlled range environment. Surface ships are outfitted with navigation tracking systems so that their location on the instrumented range can be very accurately determined. A typical activity involves surface ships and the range use of active acoustics to support navigation (tracking, depth sensors, etc.), detection, classification, and localization of underwater targets (submarines or submarine simulators) in a realistic environment. | |
| *Information Typical to the Event* | **Platform:** Surface combatants, submarines<br>**Systems:** Active sonar, tracking, underwater communications<br>**Ordnance/Munitions:** Sonobuoys<br>**Targets:** Include but not limited to stationary, mobile, or Fleet vessel<br>**Duration:** Assume 16 hours for all events, though they may continue for up to 48 hours, and infrequently some may operate intermittently for multiple consecutive weeks | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Mid-frequency sources (e.g., MF10), mid-frequency high duty-cycle sources (e.g., MF11), vessel and simulated vessel noise, aircraft noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strikes, aircraft strikes<br>**Entanglement:** Decelerator/parachutes<br>**Ingestion:** Military expended materials | |
| *Detailed Military Expended Materials Information* | Sonobuoys, EMATT | |
| *Assumptions Used for Analysis* | None | |

## A.2.4 Maintenance and Miscellaneous

### A.2.4.1 Side Scan/Multibeam

| Activity Name | Activity Description | |
|---|---|---|
| **Maintenance and Miscellaneous** | | |
| **Side Scan/ Multibeam Sonar** | **Short Description:**<br>Side Scan/Multibeam systems associated with a vessel or unmanned undersea vehicle (UUV) are tested to ensure they can detect, classify, and localize targets in a real world environment. | |
| *Long Description* | Side-scan and multibeam sonar can be used for mapping, as well as detection, classification, and localization of items on the sea floor such as cabling, shipwrecks, and mine shapes. It is typically very high frequency using multiple frequencies at one time with a very directional focus. Side-scan and multibeam sonar systems may be towed or mounted on a test vehicle or ship. Inert mines themselves may be tested to ensure they deploy as required and Fleet operators may be trained in mine field placement.<br>During inert mine detection, classification, and localization activities an inert mine shape may be temporarily deployed. This may include one shape or a field of shapes. All mine targets in the proposed range extension areas would be temporary; they would not be permanently mounted on the bottom and could be removed when they were no longer necessary for testing activities, which could be up to 2 years.<br>Several target shapes may be deployed in the surf-zone test area in water greater than 10 ft. (3 meters) deep; additional targets would be placed in depths of less than 10 ft. (3 m). Inert mine shapes may be made of many composite materials and are often put on the bottom or float in the water column above an anchor, often in groups. A series of inert mine fields can be laid to test the detection, classification, and localization capability of the system under test. | |
| *Information Typical to the Event* | **Platform:** UUV, surface vessel<br>**Systems:** Very high frequency sonar<br>**Ordnance/Munitions:** None<br>**Targets:** Including but not limited to bottom, moored, and floating targets.<br>**Duration:** Assume 8 hours for all events, though they may continue for up to 40 hours, and infrequently some may operate intermittently for multiple consecutive months | **Location:**<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Other acoustic devices, vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strikes, seafloor devices<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

### A.2.4.2 Non-Acoustic Tests

| Activity Name | Activity Description | |
|---|---|---|
| **Maintenance and Miscellaneous** | | |
| **Non-Acoustic Tests** | **Short Description:**<br>These tests involve non-acoustic sensors. Non-acoustic sensors may also gather other forms of environmental data. | |
| *Long Description* | These tests involve non-acoustic sensors. Non-acoustic sensors may also gather other forms of environmental data. An example of a non-acoustic sensor is an oxygen sensor that detects the level of dissolved oxygen in the water with respect to depth. Sensors for conductivity and temperature with respect to depth are used frequently to improve tracking with updated sound velocity profiles from raw data. Magnetic sensors are non-acoustic sensors that can be placed on the bottom to detect passing vessels. Non-acoustic sensors may also be put on an unmanned undersea vehicle as a payload. | |
| *Information Typical to the Event* | **Platform:** Various<br>**Systems:** Various non-acoustic systems<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** Assume 8 hours for all events, though they may continue for up to 40 hours, and infrequently some may operate intermittently for multiple consecutive months | **Location:**<br>Offshore Area<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strikes, seafloor devices<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

## A.2.5 ACOUSTIC COMPONENT TEST

### A.2.5.1 Countermeasures Testing

| Activity Name | Activity Description |
|---|---|
| **Acoustic Component Test** | |
| **Countermeasures Testing** | **Short Description:**<br>Includes testing of two types of countermeasures: those that emit active acoustic energy of varying frequencies into the water to mimic the characteristics of a target so that the actual threat or target remains undetected; and those that would detect, localize, track, and attack incoming weapons. |
| *Long Description* | Countermeasures, which may take many different forms and represent a range of tactics, attempt to disrupt an attack intended for a target. Underwater, a countermeasure may emit sound that is louder than the target or in a different location that is similar to the target, causing the attacker to detour away from the target. Additionally, it could be something that looks like a threat or mimics the magnetic characteristics of a target, so that the actual threat or target remains undetected. By design, countermeasures emit active acoustic energy of varying frequencies into the water. |
| *Information Typical to the Event* | **Platform:** Submarine<br>**Systems:** Acoustic countermeasures<br>**Ordnance/Munitions:** None<br>**Targets:** Various<br>**Duration:** Assume 8 hours for all events, though they may continue for up to 40 hours, and infrequently some may operate intermittently for multiple consecutive months<br>**Location:**<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Mid-frequency acoustic device countermeasures (ASW4), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strikes, military expended materials<br>**Entanglement:** None<br>**Ingestion:** None |
| *Detailed Military Expended Materials Information* | Expendable acoustic countermeasures |
| *Assumptions Used for Analysis* | None |

### A.2.5.2 Acoustic Test Facility

| Activity Name | Activity Description |
|---|---|
| **Acoustic Component Test** | |
| **Acoustic Test Facility** | **Short Description:**<br>Various acoustic component testing and calibration is conducted in a controlled experimental environment based on periodicity and is also conducted on modified, upgraded, and experimental devices. |
| *Long Description* | Acoustic Test Facility is used to calibrate and characterize transducers and hydrophones, and conduct performance testing of modified, upgraded, and experimental acoustic devices in a controlled yet realistic environment. Calibration and testing is also conducted for maintenance purposes based on periodicity. |
| *Information Typical to the Event* | **Platform:** Various<br>**Systems:** Various acoustic systems<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** Assume 8 hours for all tests; some may last 10 minutes, while others may continue intermittently for several days.<br>**Location:**<br>Inland Waters (Pierside Keyport Range Site) |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Low-frequency sources (LF4), mid-frequency sources (MF9), high-frequency sources (HF6), very high-frequency sources (VHF2)<br>**Energy:** None<br>**Physical Disturbance and Strike:** None<br>**Entanglement:** None<br>**Ingestion:** None |
| *Detailed Military Expended Materials Information* | None |
| *Assumptions Used for Analysis* | None |

### A.2.5.3 Pierside Integrated Swimmer Defense

| Activity Name | Activity Description | |
|---|---|---|
| **Acoustic Component Test** | | |
| **Pierside Integrated Swimmer Defense** | **Short Description:**<br>Swimmer defense testing ensures that systems can effectively detect, characterize, verify, and engage swimmer and diver threats in harbor environments. | |
| *Long Description* | Swimmer defense testing includes testing of systems to determine if they can effectively detect, characterize, verify, and engage swimmer/diver threats in harbor environments. Swimmer and diver threats are detected with high-frequency sonar. The threats are then warned to exit the water through the use of underwater voice communications. Under operational conditions, if the threat does not comply, non-lethal diver deterrent air guns are used against the threat; however, airguns would not be used under proposed testing conditions. Surface loudhailers are also used during the test.<br>Event duration is 14 days, with intermittent periods of use for each system during this time. | |
| *Information Typical to the Event* | **Platform:** None<br>**Systems:** High-frequency sonar; surface loudhailers<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 14 days | **Location:**<br>Inland Waters (Pierside Keyport Range Site) |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Low-frequency sonar (L4), mid-frequency sonar (MF8), swimmer detection sonar (SD1), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strikes<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | **Other Sensors:** Surface ship protection systems (e.g., communications systems, loudhailers, swimmer deterrents) | |

## A.3 NAVAL SURFACE WARFARE CENTER, CARDEROCK DIVISION DETACHMENT PUGET SOUND TESTING ACTIVITIES

The Naval Sea Systems Command, Naval Surface Warfare Center, Carderock Division (NSWCCD) Detachment Puget Sound testing activities are aligned with its mission to provide research, development, test and evaluation, analysis, acquisition support, in-service engineering, logistics and integration of surface and undersea vehicles and associated systems; develop and apply science and technology associated with naval architecture and marine engineering; and provide support to the maritime industry. Carderock is the Navy's center of excellence for ships and ship systems. Carderock is the full-spectrum research and development, test and evaluation, engineering, and Fleet support organization for the Navy's ships, submarine, military watercraft, and unmanned vehicles.

NSWCCD Detachment Puget Sound is located in the NAVBASE Kitsap Bangor. Its activities are conducted in the Hood Canal within the parameters of the Dabob Bay Range Complex Site and alternately as required in Carr Inlet. Activities and support include engineering, technical, operations, diving, and logistics required for the RDT&E associated with: Advanced Technology Concepts, Engineering and Proofing, Experimental Underwater Vehicles, Systems, Subsystems and Components Specialized Underwater Systems, Equipment, Tools and Hardware Acoustic Data Acquisition, Analysis and Measurement Systems (required to measure U.S. Navy Acoustic Signatures). These activities can be broken down into two major testing categories to include System, Subsystem and Component Acoustic Testing (with three variants) and Proof of Concept Testing. Typical RDT&E activity descriptions for each major category and variant are provided below.

### A.3.1 SYSTEM, SUBSYSTEM AND COMPONENT TESTING

#### A.3.1.1 Pierside Acoustic Testing

| Activity Name | Activity Description | |
|---|---|---|
| **System, Subsystem, and Component Testing** | | |
| **Pierside Acoustic Testing** | **Short Description:**<br>Operating autonomous underwater vehicle (AUV), remotely operated vehicle (ROV), unmanned undersea vehicle (UUV), submersibles/Concepts and Prototypes (including experimental vehicles, systems, equipment, tools and hardware) underwater in a static or dynamic condition within 500 yards (yd.) of an instrumented platform moored pierside. | |
| *Long Description* | Operating AUV, ROV, UUV, submersibles/Concepts and Prototypes (including experimental vehicles, systems, equipment, tools and hardware) underwater in a static or dynamic condition within 500 yd. of an instrumented platform moored pierside. The instrumented platform will have onboard acoustic measurement data acquisition and analysis systems, and onboard/over-the-side hydrophones (some sitting on the sea floor), and surface tracking vessels. Systems will be exercised to obtain static and short distance operational and acoustic measurements of all subsystems and components including motors, controllers, actuators, communication and devices, and forward, side and bottom looking sonar used for navigation and mission objectives. A separate tracking boat and multiple boats may be used as required for tracking, observation and safety. Diving services may be required. | |
| *Information Typical to the Event* | **Platform:** Support craft, barge, pierside (only at Naval Base Kitsap Bangor)<br>**Systems:** AUV, ROV, UUV, submersibles<br>**Ordnance/Munitions:** None<br>**Targets:** Targets will remain installed on the bottom until test period is completed and will be recovered.<br>**Duration:** Varies, dependent on test parameters. | **Location:**<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Mid-frequency projector (e.g., MF10), low-frequency projectors (e.g., LF5), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strikes, seafloor devices<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | Targets will remain installed on the bottom until test period is completed and will be recovered. | |
| *Assumptions Used for Analysis* | Varies, dependent on equipment tested. | |

### A.3.1.2 Performance Testing at Sea

| Activity Name | Activity Description | |
|---|---|---|
| **System, Subsystem and Component Testing** | | |
| **Performance Testing at Sea** | **Short Description:**<br>Operating autonomous underwater vehicle (AUV), remotely operated vehicle (ROV), unmanned undersea vehicle (UUV), submersibles/Concepts and Prototypes underwater at sea. Systems will be exercised to obtain operational performance measurements of all subsystems and components used for navigation and mission objectives. | |
| *Long Description* | Operating AUV, ROV, UUV, submersibles/Concepts and Prototypes (including experimental vehicles, systems, equipment, tools and hardware) underwater in a static or dynamic condition while underway in Puget Sound. The instrumented platform will have onboard acoustic measurement data acquisition and analysis systems, onboard/over-the-side hydrophones (some sitting on the sea floor), and surface tracking vessels. Systems will be exercised to obtain operational performance measurements of all subsystems and components including motors, controllers, actuators, communication and devices, and forward, side and bottom looking sonar used for navigation and mission objectives. A separate tracking boat and multiple boats may be used as required for tracking, observation and safety. Diving services may be required. | |
| *Information Typical to the Event* | **Platform:** Support craft, barge<br>**Systems:** AUV, ROV, UUV, submersibles<br>**Ordnance/Munitions:** None<br>**Targets:** Targets will remain installed on the bottom until test period is completed and will be recovered.<br>**Duration:** Varies, dependent on test parameters. | **Location:**<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Acoustic modems (e.g., M3), synthetic aperture sonar (e.g., SAS2), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strikes, seafloor devices<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | Targets will remain installed on the bottom until test period is completed and will be recovered. | |
| *Assumptions Used for Analysis* | Varies, dependent on equipment tested. | |

### A.3.1.3 Development Training and Testing

| Activity Name | Activity Description | |
|---|---|---|
| **System, Subsystem and Component Testing** | | |
| **Development Training and Testing** | **Short Description:**<br>Operating autonomous underwater vehicle (AUV), remotely operated vehicle (ROV), unmanned undersea vehicle (UUV), submersibles/Concepts and Prototypes underwater at sea. Systems will be exercised to validate development and to provide operator familiarization and training with all subsystems and components used for navigation and mission objectives. | |
| *Long Description* | Operating AUV, ROV, UUV, submersibles/Concepts and Prototypes (including experimental vehicles, systems, equipment, tools and hardware) underwater in a static or dynamic condition at-sea. The instrumented platform will have onboard acoustic measurement data acquisition and analysis systems, and onboard/over-the-side hydrophones (some sitting on the sea floor), and surface tracking vessels. Systems will be exercised to validate development and to provide operator familiarization and training with all subsystems and components including motors, controllers, actuators, communication and devices, and forward, side and bottom looking sonar used for navigation and mission objectives. A separate tracking boat and multiple boats may be used as required for tracking, observation and safety. Diving services may be required. | |
| *Information Typical to the Event* | **Platform:** Support craft, barge<br>**Systems:** AUV, ROV, UUV, submersibles<br>**Ordnance/Munitions:** None<br>**Targets:** Targets will remain installed on the bottom until test period is completed and will be recovered.<br>**Duration:** Varies, dependent on test parameters. | **Location:**<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** High-frequency projectors (e.g., HF6), acoustic modems (e.g., M3), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strikes, seafloor devices<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | Targets will remain installed on the bottom until test period is completed and will be recovered. | |
| *Assumptions Used for Analysis* | Varies, dependent on equipment tested. | |

## A.3.2 PROOF OF CONCEPT TESTING

### A.3.2.1 Proof-of-Concept Testing

| Activity Name | Activity Description | |
|---|---|---|
| **Proof-of-Concept Testing** | | |
| **Proof-of-Concept Testing** | **Short Description:**<br>Design, fabrication and installation of unique hardware and towing configurations in support of various surface and underwater demonstrations as proof-of-concept. | |
| *Long Description* | Design, fabrication and installation of unique hardware and towing configurations in support of various surface and underwater demonstrations as proof-of-concept. Example: Adapt a fixture to a test platform which will simulate a dry-deck shelter, at 40 ft. depth, and prove something can be safely deployed and recovered as it and the test platform moves through the water at slow speed. The instrumented platform may have a suite of Shipboard Deployed Equipment which will be used for monitoring, communication and control of the deployed systems. Can involve use of autonomous underwater vehicles (AUVs)/remotely operated vehicles (ROVs)/unmanned undersea vehicles (UUVs), submersibles, Concepts and Prototypes (including experimental vehicles, systems, equipment, tools and hardware). Systems will be exercised to prove concept(s) and integrate with all required subsystems and components including motors, controllers, actuators, communication and devices, and forward, side and bottom looking sonar used for navigation and mission objectives. A separate tracking boat and multiple boats will be used for tracking, observation and safety. Diving services may be required. | |
| *Information Typical to the Event* | **Platform:** Support craft (usually a tug boat), barges, and other support boats as required<br>**Systems:** Various such as AUV/ROV/UUVs, submersible, Concepts and Prototypes (including experimental vehicles, systems, equipment, tools and hardware.)<br>**Ordnance/Munitions:** None<br>**Targets:** Targets maybe required to be installed in the testing area<br>**Duration:** Varies | **Location:**<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** High-frequency projector (e.g., HF6), acoustic modem (e.g., M3), synthetic aperture sonar (e.g., SAS2), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike, seafloor devices<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | Targets will remain installed on the bottom until test period is completed (up to 36 months) and will be recovered. | |
| *Assumptions Used for Analysis* | Varies, dependent on equipment tested. | |

## A.4 Naval Surface Warfare Center, Carderock Division, Southeast Alaska Acoustic Measurement Facility Testing Activities

The Southeast Alaska Acoustic Measurement Facility (SEAFAC) is the Navy's only west coast asset for making high fidelity passive acoustic signature measurements. SEAFAC includes directive line arrays, data collection and processing systems for real-time data analysis and signature evaluation.

As the Navy's primary acoustic engineering measurement facility in the Pacific, SEAFAC provides the capability to perform RDT&E evaluations to determine the sources of radiated acoustic noise, to assess vulnerability, and to develop quieting measures.

The facility consists of a site to collect acoustic signatures of submerged submarines and surface vessels underway, and a unique static site to measure acoustic signatures of motionless (static) submerged submarines with various onboard machinery secured or under unloaded operation.

### A.4.1 Naval Surface Warfare Center, Carderock Division, Southeast Alaska Acoustic Facility

#### A.4.1.1 Surface Vessel Acoustic Measurement

| Activity Name | Activity Description | |
|---|---|---|
| **Research, Development, Test, and Evaluation** | | |
| **Surface Vessel Acoustic Measurement** | **Short Description:**<br>Conduct new construction acoustic trial measurements. | |
| *Long Description* | The assessment of surface ship acoustic signatures involves the measurement of radiated noise from surface ships within the Southeast Alaska Acoustic Measurement Facility's underway site.<br>During the acoustic trial, the surface ship traverses the underway site in alternate directions, passing above the measurement arrays under a variety of operating conditions and speeds.<br>Sensors on the arrays detect acoustic noise in the water and transmit it to shore facilities where the data is processed by computers. Scientists and engineers analyze the results, and the characteristics and the source of the noise emanating from the ship are determined. These operations typically run for 24 hours a day over the test period. | |
| *Information Typical to the Event* | **Platform:** Surface vessel<br>**Systems:** Various<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 3–4 days | **Location:**<br>Western Behm Canal, Alaska |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** High-frequency projectors (e.g., HF3), mid-frequency projectors (e.g., MF9, MF10), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

### A.4.1.2 Underwater Vessel Acoustic Measurement

| Activity Name | Activity Description | |
|---|---|---|
| **Research, Development, Test, and Evaluation** | | |
| **Underwater Vessel Acoustic Measurement** | **Short Description:**<br>Conduct acoustic trial measurements of underwater vessels. | |
| *Long Description* | Conduct new construction and post shakedown availability acoustic trial measurements. The primary purpose of the acoustic trial measurement is to identify any acoustic signals emanating from the vessel.<br>The assessment of underwater acoustic signatures involves the measurement of radiated noise from underwater vessels (typically submarines) within the Southeast Alaska Acoustic Measurement Facility's underway and/or static site.<br>During static tests, the submarine is positioned between two permanently moored barges and lowered on cables to the appropriate depth where acoustic measurements are taken during operation of various submarine systems.<br>During the underway portion of the acoustic trial, the submarine traverses the site in alternate directions, passing between the measurement arrays under a variety of operating conditions, speeds, and depths.<br>Sensors on the arrays detect acoustic noise in the water and transmit it to shore facilities where the data is processed by computers. Scientists and engineers analyze the results, and the characteristics and the source of the noise emanating from the submarine are determined. These operations typically run for 24 hours a day over the test period. | |
| *Information Typical to the Event* | **Platform:** Submarine<br>**Systems:** Various<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 1–2 weeks | **Location:**<br>Western Behm Canal, Alaska |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Mid-frequency projectors (e.g., MF9, MF10), high-frequency projectors (e.g., HF3), low-frequency projectors (e.g., LF5), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

### A.4.1.3 Underwater Vessel Hydrodynamic Performance Measurement

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Research, Development, Test, and Evaluation</td></tr>
<tr><td>Underwater Vessel Hydrodynamic Performance Measurement</td><td colspan="2">Short Description:<br>Conduct hydrodynamic performance trial measurements</td></tr>
<tr><td>Long Description</td><td colspan="2">The Southeast Alaska Acoustic Measurement Facility (SEAFAC) is used periodically to verify the accuracy of the navigational equipment used on subsurface vessels. The tracking features within SEAFAC's site are used to compare and calibrate on-vessel navigation systems. Typically, these operations occur once per year over a 2-day timeframe. In addition to calibration of navigation systems, the hydrodynamic performance of the submarine is tested and verified on the instrumented underway site.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Submarine<br>Systems: Various<br>Ordnance/Munitions: None<br>Targets: None<br>Duration: 2 days</td><td>Location:<br>Western Behm Canal, Alaska</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Vessel strike<br>Entanglement: None<br>Ingestion: None</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">None</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">None</td></tr>
</table>

### A.4.1.4 Cold Water Training

| Activity Name | Activity Description | |
|---|---|---|
| **Miscellaneous Tests** | | |
| **Cold Water Training** | **Short Description:**<br>Involves Navy personnel conducting insertion training in cold-water conditions. The training may include ingress and egress from subsurface vessels and small surface craft. | |
| *Long Description* | Fleet training for divers in a cold water environment and other diver training related to Navy divers supporting range operations. Acoustic systems may be used in diver training. The training may include ingress and egress from subsurface vessels positioned at the static site, and operations from small surface craft. | |
| *Information Typical to the Event* | **Platform:** Vessel, pierside, or shore<br>**Systems:** Various<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** TBD | **Location:**<br>Western Behm Canal, Alaska |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** High-frequency projector (e.g., HF6), mid-frequency projector (e.g., MF9, MF10), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel and in-water device strike<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

### A.4.1.5 Component System Testing

| Activity Name | Activity Description | |
|---|---|---|
| **Research, Development, Test, and Evaluation** | | |
| **Component System Testing** | **Short Description:**<br>Conduct testing on individual components of new defense acquisition systems | |
| *Long Description* | The Navy may develop or have developed new systems that require a measurement of the acoustic signature. The Southeast Alaska Acoustic Measurement Facility will create tests such that the component system can be properly evaluated either at the underway site or the static site, dependent upon the requirements.<br>Test varies depending on the specific system tested. Typical test involves acoustic measurement of system under operation. Duration of the testing is determined by the type of testing required and the complexity. | |
| *Information Typical to the Event* | **Platform:** Various<br>**Systems:** Various<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 1–2 weeks | **Location:**<br>Western Behm Canal, Alaska |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** High-frequency projectors (e.g., HF6), mid-frequency projectors (e.g., MF9, MF10), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

### A.4.1.6 Countermeasures Testing

| Activity Name | Activity Description | |
|---|---|---|
| **Research, Development, Test, and Evaluation** | | |
| **Countermeasures Testing** | **Short Description:**<br>Conduct engineering and acceptance testing of countermeasures. | |
| *Long Description* | Countermeasures, which may take many different forms and represent a range of tactics, attempt to disrupt an attack intended for a target. Underwater, a countermeasure may emit sound that is louder than the target or in a different location that is similar to the target, causing the attacker to detour away from the target. Additionally, it could be something that looks like a threat or mimics the acoustic characteristics of a target, so that the actual threat or target remains undetected. By design, countermeasures emit active acoustic energy of varying frequencies into the water. The Southeast Alaska Acoustic Measurement Facility will deploy these countermeasures to measure and validate performance for engineering tests or acceptance testing. | |
| *Information Typical to the Event* | **Platform:** Various<br>**Systems:** Various<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 3–4 days | **Location:**<br>Western Behm Canal, Alaska |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Various (e.g., ASW4), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

### A.4.1.7 Electromagnetic Measurement

| Activity Name | Activity Description | |
|---|---|---|
| **Research, Development, Test, and Evaluation** | | |
| **Electromagnetic Measurement** | **Short Description:**<br>Conduct new construction, post shakedown availability, and life cycle electromagnetic measurements. | |
| *Long Description* | Vessels require measurement to determine their electromagnetic characteristics on a regular basis. The measurements at the Southeast Alaska Acoustic Measurement Facility will provide this data to the Fleet. | |
| *Information Typical to the Event* | **Platform:** Various<br>**Systems:** Various<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 1–2 weeks | **Location:**<br>Western Behm Canal, Alaska |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Mid-frequency projectors (e.g., MF9, MF10), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Vessel strike<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

#### A.4.1.8 Measurement System Repair and Replacement

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Research, Development, Test, and Evaluation</td></tr>
<tr><td>Measurement System Repair and Replacement</td><td colspan="2">Short Description:<br>Conduct repairs, replacements, and calibration of acoustic measurement systems.</td></tr>
<tr><td>Long Description</td><td colspan="2">The Southeast Alaska Acoustic Measurement Facility (SEAFAC) has many in-water assets that are used to make measurements and track vessels. Occasionally, these assets require repair or replacement. The SEAFAC crew will recover, repair, and then re-install the assets. This event occurs as needed and of varying duration based upon complexity and scope.<br>Following the repairs, testing and validation of the equipment is needed to insure proper operation.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Various<br>Systems: Various<br>Ordnance/Munitions: None<br>Targets: None<br>Duration: 1–2 weeks</td><td>Location:<br>Western Behm Canal, Alaska</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Mid-frequency projectors (e.g., MF9, MF10), vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Vessel strike<br>Entanglement: None<br>Ingestion: None</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">None</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">None</td></tr>
</table>

### A.4.1.9 Project Operations

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Research, Development, Test, and Evaluation</td></tr>
<tr><td>Project Operations</td><td colspan="2">Short Description:<br>Support testing and training of fleet assets.</td></tr>
<tr><td>Long Description</td><td colspan="2">Prior to deployment overseas, every Navy ship conducts training and testing to prove they are ready for the deployment. The Southeast Alaska Acoustic Measurement Facility will be made available for this testing and training for submarines and possibly surface ships.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Various<br>Systems: Various<br>Ordnance/Munitions: None<br>Targets: None<br>Duration: 1–2 weeks</td><td>Location:<br>Western Behm Canal, Alaska</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: High-frequency projectors (e.g., HF6), mid-frequency projectors (e.g., MF9, MF10), vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Vessel strike<br>Entanglement: None<br>Ingestion: None</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">None</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">None</td></tr>
</table>

### A.4.1.10 Target Strength Trial

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Research, Development, Test, and Evaluation</td></tr>
<tr><td>Target Strength Trial</td><td colspan="2">Short Description:<br>Asset moored to static site. Acoustic projectors and receive arrays will be rotated around asset. Broadband waveforms will be transmitted. Underwater tracking system will be utilized to monitor relative positions.</td></tr>
<tr><td>Long Description</td><td colspan="2">Submarines require measurement to determine their target strength if subjected to active sonar. This testing procedure allows the Southeast Alaska Acoustic Measurement Facility to measure the target strength of a submarine while moored in the static site. A source is deployed and moved around the submarine to make this measurement.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Various<br>Systems: Various<br>Ordnance/Munitions: None<br>Targets: None<br>Duration: 3–4 days</td><td>Location:<br>Western Behm Canal, Alaska</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: High-frequency projectors (e.g., HF6), vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Vessel strike<br>Entanglement: None<br>Ingestion: None</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">None</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">None</td></tr>
</table>

## A.5 NAVAL SEA SYSTEMS COMMAND PROGRAM OFFICE SPONSORED TESTING ACTIVITIES

Naval Sea Systems Command also conducts tests that are sponsored by various program offices. Some of these activities are conducted in conjunction with fleet activities in the Offshore Area off the coast of Washington, Oregon, and northern California, and some occur in Puget Sound and at Navy piers at Naval Base (NAVBASE) Kitsap Bremerton, NAVBASE Kitsap Bangor, and Naval Station Everett. Tests within this category include, but are not limited to, anti-surface warfare, anti-submarine warfare, mine warfare, and force protection (maintaining security of Navy facilities, ships, submarines, and aircraft).

### A.5.1 LIFE CYCLE ACTIVITIES

#### A.5.1.1 Pierside Sonar Testing

| Activity Name | Activity Description | |
|---|---|---|
| **Life Cycle Activities** | | |
| **Pierside Sonar Testing** | **Short Description:**<br>Pierside testing of submarine and surface ship sonar systems occurs periodically following major maintenance periods and for routine maintenance. | |
| *Long Description* | Following major and routine maintenance periods and prior to deployment at-sea, pierside testing and maintenance of sonar systems is required. Multiple systems with active and passive acoustic sources such as tactical sonar, navigation systems, fathometers, underwater communications systems, underwater distress beacons, range finders, and other similar systems, would be tested. | |
| *Information Typical to the Event* | **Platform:** Submarines, surface ships<br>**Systems:** Surface ship and submarine sonar, fathometers, pingers, underwater communication<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** Event duration for each test can be up to 3 weeks, with intermittent use of active sonar. | **Location:**<br>Inland Waters:<br>Naval Base (NAVBASE) Kitsap Bangor<br>NAVBASE Kitsap Bremerton<br>Naval Station Everett |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Sources such as submarine and surface ship sonar (e.g., ASW3, MF3, MF9, HF1, HF3), underwater communications (e.g., M3)<br>**Energy:** None<br>**Physical Disturbance and Strike Potential:** None<br>**Entanglement Potential:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | Sonar would not be continuously active for the duration of the test | |

## A.5.2 Shipboard Protection Systems and Swimmer Defense Testing

### A.5.2.1 Pierside Integrated Swimmer Defense

| Activity Name | Activity Description | |
|---|---|---|
| **Shipboard Protection Systems and Swimmer Defense Testing** | | |
| **Pierside Integrated Swimmer Defense** | **Short Description:**<br>Swimmer defense testing ensures that systems can effectively detect, characterize, verify, and engage swimmer/diver threats in harbor environments. | |
| *Long Description* | Swimmer defense testing includes testing of systems to determine if they can effectively detect, characterize, verify, and engage swimmer/diver threats in harbor environments. Swimmer and diver threats are detected with high-frequency sonar. The threats are then warned to exit the water through the use of underwater voice communications. Under operational conditions, if the threat does not comply, non-lethal diver deterrent air guns are used against the threat; however, airguns would not be used under proposed testing conditions. Surface loudhailers are also used during the test.<br>Event duration is 14 days, with intermittent periods of use for each system during this time. | |
| *Information Typical to the Event* | **Platform:** None<br>**Systems:** High-frequency sonar; surface loudhailers<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 14 days | **Location:**<br>Inland Waters:<br>Naval Base Kitsap Bangor, Pierside Keyport Range Site |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Swimmer defense sonar (e.g., SD1, MF8, LF4)<br>**Energy:** None<br>**Physical Disturbance and Strike:** None<br>**Entanglement:** None<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | **Other Sensors:** Surface ship protection systems (e.g., communications systems, loudhailers, swimmer deterrents) | |

## A.5.3 UNMANNED VEHICLE TESTING

### A.5.3.1 Unmanned Vehicle Development and Payload Testing

| Activity Name | Activity Description | |
|---|---|---|
| **Unmanned Vehicle Testing** | | |
| **Unmanned Vehicle Development & Payload Testing** | **Short Description:**<br>Vehicle development involves the production and upgrade of new unmanned platforms on which to attach various payloads used for different purposes. | |
| *Long Description* | Vehicle development involves the production and upgrade of new unmanned underwater platforms on which to attach various payloads used for different purposes. Platforms can include unmanned underwater vehicles. Payload testing assesses various systems that can be incorporated onto unmanned platforms for mine warfare, bottom mapping, etc. Tests range from basic remote control and autonomous navigation tests to deployment and activation of onboard systems which may include hydrodynamic instruments, launchers, and recovery capabilities. These vehicles are capable of expanding the communication and surveillance capabilities of submarines, surface vessels, and terrestrial commands.<br>Event duration for unmanned vehicles with traditional propulsion typically lasts up to 40 hours. Some propulsion systems (e.g., gliders) could operate continuously for multiple months. | |
| *Information Typical to the Event* | **Platform:** Support craft, pierside or shore<br>**Systems:** Various<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** Tests may be from 10 minutes to 40 hours; some could operate for multiple days or months | **Location:**<br>Offshore Area<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Unmanned vehicle sonar systems (e.g., MF9), vessel and simulated vessel noise<br>**Energy:** Electromagnetic and lasers<br>**Physical Disturbance and Strike:** In-water device and vessel strike, bottom crawling vehicles<br>**Entanglement:** Cables and wires<br>**Ingestion:** None | |
| *Detailed Military Expended Materials Information* | None | |
| *Assumptions Used for Analysis* | None | |

## A.5.4 Anti-Surface Warfare/Anti-Submarine Warfare Testing

### A.5.4.1 Torpedo (Explosive) Testing

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Anti-Surface Warfare (ASUW)/Anti-Submarine Warfare (ASW) Testing</td></tr>
<tr><td>Torpedo (Explosive) Testing</td><td colspan="2">Short Description:<br>Air, surface, or submarine crews employ explosive torpedoes against artificial targets.</td></tr>
<tr><td>Long Description</td><td colspan="2">A target carrying a pinger would be suspended from a buoy to a depth between 200 and 700 ft. below the water's surface. One to two non-explosive exercise torpedoes would be fired at the target to ensure proper pinger functioning; those exercise torpedoes would be recovered by a surface vessel or helicopter. Once the exercise torpedo recovery is complete and the area has been cleared, the explosive torpedo (carrying a warhead) would be launched at the target. Torpedoes could be launched by a submarine, a fixed- or rotary-winged aircraft, or a surface combatant. The target would be placed by a support vessel.<br>Event duration is 1–2 days during daylight hours. Only one heavyweight torpedo test could occur in a day; two heavyweight torpedo tests could occur on consecutive days. Two lightweight torpedo tests could occur in a single day. Up to four exercise torpedoes could be used during each test day.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Submarine; surface ship; fixed- and rotary–wing aircraft; support vessels<br>Systems: None<br>Ordnance/Munitions: Torpedoes (heavyweight and lightweight) – high-explosive (HE) and non-explosive practice munitions (NEPM)<br>Targets: Stationary Artificial Targets (e.g., MK 28)<br>Duration: 1–2 days during daylight hours</td><td>Location:<br>Offshore Area</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Underwater explosion (e.g., E8, E11), torpedo sonar (e.g., TORP1, TORP2), other acoustic devices, aircraft noise, vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Vessel strike, In-water device strike, aircraft strikes, military expended materials<br>Entanglement: decelerator/parachutes (sonobuoy and torpedo), guidance wire<br>Ingestion: target and torpedo fragments, decelerator/parachutes (sonobuoy and torpedo), torpedo launch accessories</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">• 4 HE torpedoes and associated launch accessories/event<br>• 6 non-explosive torpedo accessories/event<br>• Torpedo launch accessories<br>  o Lightweight torpedo accessories (dependent upon launch platform/delivery):<br>    ▪ Air-launched: nose cap, suspension bands, air stabilizer, sway brace pad, arming wire, fahnstock clip<br>    ▪ High Altitude ASW Weapons Capability: all of above plus wing kit<br>    ▪ Vertical launch accessories: air-launched accessories plus rocket booster, airframe, parachute<br>    ▪ MK 46 exercise torpedo will drop two lead weights<br>• Heavyweight torpedo accessories: guidance wire, flex hose</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">One guidance wire and one flex hose for each heavyweight torpedo fired (HE or NEPM).<br>Two fahnstock clips, one of each other item per air-launched torpedo (HE or NEPM).<br>Lead weights are associated with the NEPM MK 46 torpedo only.</td></tr>
</table>

### A.5.4.2 Torpedo (Non-Explosive) Testing

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Surface Warfare (ASUW)/Anti-Submarine Warfare (ASW) Testing** | | |
| **Torpedo (Non-explosive) Testing** | **Short Description:**<br>Air, surface, or submarine crews employ non-explosive torpedoes against submarines or surface vessels. | |
| *Long Description* | Aerial, surface, and subsurface assets fire exercise torpedoes against surface or subsurface targets. Torpedo testing evaluates the performance and the effectiveness of hardware and software upgrades of heavyweight and/or lightweight torpedoes.<br>Event duration is dependent on number of torpedoes fired. Events can last up to 2 weeks. Typically, no more than 8 torpedoes are fired per day during daylight hours. | |
| *Information Typical to the Event* | **Platform:** Submarines, surface ships, fixed- and rotary–wing aircraft<br>**Systems:** Surface ship and submarine sonar, sonobuoys, dipping sonar<br>**Ordnance/Munitions:** Lightweight torpedoes, heavyweight torpedoes<br>**Targets:** Submarines, surface ships, Motorized Autonomous Targets (e.g., Expendable Mobile Anti-Submarine Warfare Training Target), Stationary Artificial Targets (e.g., Fleet Training Target)<br>**Duration:** Up to 2 weeks | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Submarine and surface ship sonar (e.g., ASW3), active sonobuoys (e.g., MF5), torpedo sonar (e.g., TORP1, TORP2), acoustic decoys, aircraft noise, vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** non-explosive practice munition strike, aircraft strike, vessel and in-water device strikes, military expended materials<br>**Entanglement:** decelerator/parachutes (sonobuoy and torpedo), guidance wire<br>**Ingestion:** decelerator/parachutes (sonobuoy and torpedo), torpedo launch accessories | |
| *Detailed Military Expended Material Information* | • Sonobuoys<br>• Expendable targets<br>• Acoustic countermeasures<br>• Torpedo launch accessories<br>  ○ Lightweight torpedo accessories (dependent upon launch platform/delivery):<br>    ▪ Air-launched: nose cap, suspension bands, air stabilizer, sway brace pad, arming wire, fahnstock clip<br>    ▪ High Altitude ASW Weapons Capability: all of above plus wing kit<br>    ▪ Vertical launch accessories: air-launched accessories plus rocket booster, airframe, parachute<br>    ▪ MK 46 torpedo will drop two lead weights<br>  ○ Heavyweight torpedo accessories: guidance wire, flex hose | |
| *Assumptions Used for Analysis* | All torpedoes are recovered<br>One guidance wire and one flex hose for each heavyweight torpedo fired.<br>Two fahnstock clips, one of each other item per air-launched torpedo. | |

### A.5.4.3 Countermeasure Testing

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Surface Warfare (ASUW)/Anti-Submarine Warfare (ASW) Testing** | | |
| **Countermeasure Testing** | **Short Description:**<br>Countermeasure testing involves the testing of systems that would detect, localize, track, and attack incoming weapons. | |
| *Long Description* | Countermeasure testing involves the testing of systems that would detect, localize, track, and sometimes attack incoming weapons. Countermeasure defense systems testing involves the launch of non-explosive torpedoes at incoming weapons. Acoustic systems testing includes towed arrays.<br>Event duration is up to 10 days with a maximum of 40 anti-torpedo torpedoes fired (up to 10 shots occurring per day), whereas towed array countermeasure tests can be as short as 4 hours. | |
| *Information Typical to the Event* | **Platform:** Surface ships<br>**Systems:** Anti-torpedo torpedo defense systems, towed arrays (e.g., NIXIE)<br>**Ordnance/Munitions:** Lightweight torpedoes (non-explosive practice munitions [NEPM])<br>**Targets:** Torpedo emulators<br>**Duration:** 4 hours–10 days | **Location:**<br>Offshore Area<br>Inland Waters |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Surface ship sonar (e.g., ASW3), high-frequency sources (e.g., HF5), torpedo sonar (e.g., TORP1), vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** NEPM strike, vessel and in-water device strikes<br>**Entanglement:** Cables and wires<br>**Ingestion:** Torpedo launch accessories | |
| *Detailed Military Expended Material Information* | Torpedo launch accessories | |
| *Assumptions Used for Analysis* | None | |

## A.5.5 New Ship Construction

### A.5.5.1 Anti-Submarine Warfare Mission Package Testing

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">New Ship Construction</td></tr>
<tr><td>Anti-Submarine Warfare (ASW) Mission Package Testing</td><td colspan="2">Short Description:<br>Ships and their supporting platforms (e.g., helicopters, unmanned aerial vehicles) detect, localize, and prosecute submarines.</td></tr>
<tr><td>Long Description</td><td colspan="2">Littoral combat ships conduct detect-to-engage operations against modern diesel-electric and nuclear submarines using airborne and surface assets (both manned and unmanned). Active and passive acoustic systems are used to detect and track submarine targets, culminating in the deployment of lightweight torpedoes to engage the threat.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Littoral Combat Ship; rotary wing aircraft<br>Systems: Surface ship sonar, helicopter-deployed sonar, active sonobuoys, torpedo sonar<br>Ordnance/Munitions: Non-explosive torpedoes<br>Targets: None<br>Duration: Event duration is approximately 1–2 weeks, with 4–8 hours of active sonar use with intervals of non-activity in between.</td><td>Location:<br>Offshore Area</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Surface ship sonar (e.g., ASW1, ASW3, MF12), helicopter-deployed sonar (e.g., MF4), active sonobuoys (e.g., MF5), torpedo sonar (e.g., TORP1), vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Vessel strike; towed device strike, military expended materials<br>Entanglement: Decelerator/parachutes<br>Ingestion: Decelerator/parachutes</td></tr>
<tr><td>Detailed Military Expended Material Information</td><td colspan="2">Torpedo launch accessories, sonobuoys</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">None</td></tr>
</table>

## A.6 Naval Air Systems Command Testing Activities

Naval Air Systems Command testing events generally fall into the primary mission areas used by the Fleet and, in terms of their potential environmental effects, Naval Air Systems Command testing events are very similar to Fleet training events.

Platforms and systems tested by the Naval Air Systems Command are eventually transferred to the Fleet and used in Fleet training events. Those systems and platforms that are transferred to the Fleet within the timeframe of this document are analyzed in the training sections of this EIS/OEIS. The results of the analysis of platforms and systems used in training events may differ when the same platforms or systems are used during testing events because, for example, the location of the event may be different or the event may be conducted in a different manner. The following activity descriptions are specific to Naval Air Systems Command testing events.

### A.6.1 ANTI-SUBMARINE WARFARE

#### A.6.1.1 Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft – Directional Command Activated Sonobuoy System

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Submarine Warfare** | | |
| **Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft (Directional Command Activated Sonobuoy System [DICASS])** | **Short Description:**<br>This test evaluates the sensors and systems used by maritime patrol aircraft to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements. | |
| *Long Description* | Similar to Anti-Submarine Warfare Tracking Exercise – Maritime Patrol Aircraft, an Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft evaluates the sensors and systems used to detect and track submarines and to ensure that platform systems used to deploy the tracking systems perform to specifications and meet operational requirements. For this test event, P-3 or P-8A fixed-wing aircraft conduct anti-submarine warfare using passive and active sonobuoys (e.g., AN/SSQ-62 DICASS). This activity would be conducted in deep (typically beyond 100 ft.) waters and weapons testing could be initiated from a land base or surface ship. Some Anti-Submarine Warfare Maritime Patrol Aircraft Tracking Test – DICASS events could be conducted as part of a Coordinated Event with fleet training activities. | |
| *Information Typical to the Event* | **Platform:** Surface combatant, submarine, fixed-wing aircraft<br>**Systems:** Sonobuoys (AN/SSQ-62x DICASS and passive sonobuoys)<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 6 flight hours/event | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Sonar, sonobuoys (e.g., MF5), aircraft noise, vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Military expended materials strike, aircraft strike (seabirds only)<br>**Entanglement:** Parachutes/decelerators<br>**Ingestion:** Decelerator/parachutes | |
| *Detailed Military Expended Materials Information* | Sonobuoys, to include decelerator/parachutes, lead seawater batteries, lithium batteries (being phased out) | |
| *Assumptions Used for Analysis* | Assume one decelerator/parachute per sonobuoy | |

### A.6.1.2 Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft – Multistatic Active Coherent Sonobuoy System

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Submarine Warfare** | | |
| **Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft (Multistatic Active Coherent [MAC])** | **Short Description:**<br>This test evaluates the sensors and systems used by maritime patrol aircraft to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements. | |
| *Long Description* | Similar to Anti-Submarine Warfare Tracking Exercise – Maritime Patrol Aircraft, an Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft evaluates the sensors and systems used to detect and track submarines and to ensure that platform systems used to deploy the tracking systems perform to specifications and meet operational requirements. For this test event, P-3 or P-8A fixed-wing aircraft conduct anti-submarine warfare using passive and active sonobuoys (e.g., AN/SSQ-125 MAC). This activity would be conducted in deep (typically beyond 100 ft.) waters and weapons testing could be initiated from a land base or surface ship. Some Anti-Submarine Warfare Maritime Patrol Aircraft Tracking Test MAC events could be conducted as part of a Coordinated Event with fleet training activities. | |
| *Information Typical to the Event* | **Platform:** Surface combatant, submarine, fixed-wing aircraft, rotary wing aircraft<br>**Systems:** Sonobuoys (AN/SSQ-125 MAC and passive sonobuoys)<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 6 flight hours/event | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Sonar, sonobuoys (e.g., ASW2), aircraft noise, vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Military expended materials strike, aircraft strike (seabirds only)<br>**Entanglement:** Decelerator/parachutes<br>**Ingestion:** Decelerator/parachutes | |
| *Detailed Military Expended Materials Information* | Sonobuoys, to include decelerator/parachutes, lead seawater batteries, lithium batteries (being phased out) | |
| *Assumptions Used for Analysis* | Assume one decelerator/parachute per sonobuoy | |

### A.6.1.3 Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft – Signal, Underwater Sound Sonobuoys

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Anti-Submarine Warfare</td></tr>
<tr><td>Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft (Signal, Underwater Sound [SUS])</td><td colspan="2">Short Description:<br>This test evaluates the sensors and systems used by maritime patrol aircraft to communicate with submarines using any of the family of SUS systems.</td></tr>
<tr><td>Long Description</td><td colspan="2">Similar to Anti-Submarine Warfare Tracking Exercise – Maritime Patrol Aircraft, an Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft evaluates the sensors and systems used to detect and track submarines and to ensure that platform systems used to deploy the tracking systems perform to specifications and meet operational requirements. For this test event, P-3 or P-8A fixed-wing aircraft conduct anti-submarine warfare using passive and active sonobuoys (i.e., MK-84 SUS) and explosive sonobuoys (i.e., MK-61 SUS, MK-64 SUS, and MK-82 SUS). This activity would be conducted in deep (typically beyond 100 ft.) waters and weapons testing could be initiated from a land base or surface ship. Some Anti-Submarine Warfare Maritime Patrol Aircraft Tracking Test – SUS Sonobuoy events could be conducted as part of a Coordinated Event with fleet training activities.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Surface combatant, submarine, fixed-wing aircraft, rotary wing aircraft<br>Systems: Sonobuoys (MK-61 SUS, MK-64 SUS, MK-82 SUS, MK-84 SUS, and passive sonobuoys)<br>Ordnance/Munitions: High explosive sonobuoy systems described above<br>Targets: None<br>Duration: 6 flight hours/event</td><td>Location:<br>Offshore Area</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Sonar, sonobuoys (e.g., MF6), underwater explosions (e.g., E3), aircraft noise, vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Military expended materials strike, aircraft strike (seabirds only)<br>Entanglement: Decelerator/parachutes<br>Ingestion: Decelerator/parachutes, sonobuoy fragments</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">Sonobuoys, to include decelerator/parachutes, lead seawater batteries, lithium batteries (being phased out)</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">Assume one decelerator/parachute per sonobuoy</td></tr>
</table>

### A.6.1.4 Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft – Improved Extended Echo Ranging Sonobuoy System

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Anti-Submarine Warfare</td></tr>
<tr><td>Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft (Improved Extended Echo Ranging [IEER])</td><td colspan="2">Short Description:<br>The test evaluations the sensors and systems used by maritime patrol aircraft to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements.</td></tr>
<tr><td>Long Description</td><td colspan="2">Similar to Anti-Submarine Warfare Tracking Exercise – Maritime Patrol Aircraft, an Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft evaluates the sensors and systems used to detect and track submarines and to ensure that platform systems used to deploy the tracking systems perform to specifications and meet operational requirements. For this test event, P-3 or P-8A fixed-wing aircraft conduct anti-submarine warfare using passive and explosive sonobuoys (i.e., AN/SSQ-110 IEER). This activity would be conducted in deep (typically beyond 100 ft.) waters and weapons testing could be initiated from a land base or surface ship. Some Anti-Submarine Warfare Maritime Patrol Aircraft Tracking Test – IEER Sonobuoy events could be conducted as part of a Coordinated Event with fleet training activities.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Surface combatant, submarine, fixed-wing aircraft, rotary wing aircraft<br>Systems: Sonobuoys (AN/SSQ-110x IEER and passive sonobuoys)<br>Ordnance/Munitions: High explosive sonobuoy systems described above<br>Targets: None<br>Duration: 6 flight hours/event</td><td>Location:<br>Offshore Area</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Underwater explosions (e.g., E4), aircraft noise, tactical acoustic sonar, vessel and simulated vessel noise<br>Energy: None<br>Physical Disturbance and Strike: Military expended materials strike, aircraft strike (seabirds only)<br>Entanglement: Decelerator/parachutes<br>Ingestion: Decelerator/parachutes, sonobuoy fragments</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">Sonobuoys, to include decelerator/parachutes, lead seawater batteries, lithium batteries (being phased out)</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">Assume one decelerator/parachute per sonobuoy</td></tr>
</table>

### A.6.1.5 Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft – High Duty Cycle Sonobuoy System

| Activity Name | Activity Description | |
|---|---|---|
| **Anti-Submarine Warfare** | | |
| **Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft (High Duty Cycle [HDC])** | **Short Description:**<br>The test evaluations the sensors and systems used by maritime patrol aircraft to detect and track submarines and to ensure that aircraft systems used to deploy the tracking systems perform to specifications and meet operational requirements. | |
| *Long Description* | Similar to Anti-Submarine Warfare Tracking Exercise – Maritime Patrol Aircraft, an Anti-Submarine Warfare Tracking Test – Maritime Patrol Aircraft evaluates the sensors and systems used to detect and track submarines and to ensure that platform systems used to deploy the tracking systems perform to specifications and meet operational requirements. For this test event, P-3 or P-8A fixed-wing aircraft conduct anti-submarine warfare using passive and active sonobuoys (i.e., HDC sonar). This activity would be conducted in deep (typically beyond 100 ft.) waters and weapons testing could be initiated from a land base or surface ship. Some Anti-Submarine Warfare Maritime Patrol Aircraft Tracking Test – HDC Sonobuoy events could be conducted as part of a Coordinated Event with fleet training activities. | |
| *Information Typical to the Event* | **Platform:** Surface combatant, submarine, fixed-wing aircraft, rotary wing aircraft<br>**Systems:** Sonobuoys – HDC active and passive sonobuoys<br>**Ordnance/Munitions:** None<br>**Targets:** None<br>**Duration:** 6 flight hours/event | **Location:**<br>Offshore Area |
| *Potential Impact Concerns*<br>*(Information regarding deconstruct categories and stressors)* | **Acoustic:** Sonar, sonobuoys (e.g., ASW2), aircraft noise, vessel and simulated vessel noise<br>**Energy:** None<br>**Physical Disturbance and Strike:** Military expended materials strike, aircraft strike (seabirds only)<br>**Entanglement:** Decelerator/parachutes<br>**Ingestion:** Decelerator/parachutes | |
| *Detailed Military Expended Materials Information* | Sonobuoys, to include decelerator/parachutes, lead seawater batteries, lithium batteries (being phased out) | |
| *Assumptions Used for Analysis* | Assume one decelerator/parachute per sonobuoy | |

## A.6.2 ELECTRONIC WARFARE

### A.6.2.1 Flare Test

<table>
<tr><th>Activity Name</th><th colspan="2">Activity Description</th></tr>
<tr><td colspan="3">Electronic Warfare (EW)</td></tr>
<tr><td>Flare Test</td><td colspan="2">Short Description:<br>Flare tests evaluate newly developed or enhanced flares, flare dispensing equipment, or modified aircraft systems against flare deployment. Tests may also train pilots and aircrew in the use of newly developed or modified flare deployment systems. Flare tests are often conducted with other test events, and are not typically conducted as standalone tests.</td></tr>
<tr><td>Long Description</td><td colspan="2">Flare tests are conducted to evaluate new flares, newly developed or modified flare deployment systems; to ensure that other newly enhanced aircraft systems are compatible with flare deployment; and to train pilots and aircrew in the use of newly developed or modified flare deployment systems. Flare tests are often conducted with other test events, and are not typically conducted as stand-alone tests. During a flare test, flares (and in some cases chaff) are deployed, but no weapons are typically fired.<br>Fixed-wing aircraft deploy flares as a defensive tactic to disrupt the infrared missile guidance systems used by heat-seeking missiles, thereby causing the missile to lock onto the flare instead of onto the aircraft and enabling the aircraft to avoid the threat. In a typical scenario, an aircraft may detect the electronic targeting signals emitted from threat radars or missiles, or aircrew may visually identify a threat missile plume when a missile is launched. At a strategically appropriate time, the pilot dispenses flares and immediately maneuvers the aircraft to distract and defeat the threat. During a typical flare test, an aircraft will dispense flares 3,000 ft. above mean sea level, and flares are completely consumed while in the air.<br>Aircraft flares use a magnesium extruded flare grain. Flare types commonly deployed during Naval Air Systems Command testing activities include but are not limited to: MJU-57, MJU-49, and MJU-38 for high-speed aircraft and MJU-32 for low-speed aircraft.</td></tr>
<tr><td>Information Typical to the Event</td><td>Platform: Fixed-wing aircraft<br>Systems: Flares: MJU-57, MJU-49, and MJU-38 for high speed aircraft and MJU-32; Joint Allied Threat Assessment System/Common Infrared Countermeasures<br>Ordnance/Munitions: None<br>Targets: None<br>Duration: 2–4 flight hours/event</td><td>Location:<br>Offshore Area</td></tr>
<tr><td>Potential Impact Concerns<br>(Information regarding deconstruct categories and stressors)</td><td colspan="2">Acoustic: Aircraft noise<br>Energy: None<br>Physical Disturbance and Strike: Aircraft strike (birds only)<br>Entanglement: None<br>Ingestion: End caps</td></tr>
<tr><td>Detailed Military Expended Materials Information</td><td colspan="2">Flares (end caps and pistons), chaff</td></tr>
<tr><td>Assumptions Used for Analysis</td><td colspan="2">Flare use from all other events are captured under this activity.<br>Estimated 60 flares and 60 chaff cartridges per event</td></tr>
</table>

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# Appendix B: Federal Register Notices

institutions, and human rights communities.

Board members appointed by the Secretary of Defense, who are not full-time or permanent part-time federal employees, shall be appointed to serve as experts and consultants under the authority of 5 U.S.C. 3109 and shall serve as special government employee members. With the exception of travel and per diem for official Board related travel, Board members shall serve without compensation.

The Secretary of Defense may approve the appointment of Board members for one to four year terms of service; however, no member, unless authorized by the Secretary of Defense, may serve more than two consecutive terms of service. This same term of service limitation also applies to any DoD authorized subcommittees.

Whenever possible, appointments shall be staggered to avoid complete turnover of the Board's membership at one time. In addition, the Board may be assisted by non-voting subject matter experts or consultants. These consultants are designated at the request of the Board by the Secretary of the Army with the concurrence of the Secretary of Defense.

Each Board member is appointed to provide advice on behalf of the government on the basis of his or her best judgment without representing any particular point of view and in a manner that is free from conflict of interest.

The Department, when necessary, and consistent with the Board's mission and DoD policies and procedures may establish subcommittees deemed necessary to support the Board. Establishment of subcommittees will be based upon a written determination, to include terms of reference, by the Secretary of Defense, the Deputy Secretary of Defense or the advisory committee's sponsor. Such subcommittees shall not work independently of the chartered Board, and shall report all their recommendations and advice to the Board for full deliberation and discussion. Subcommittees have no authority to make decisions on behalf of the chartered Board; nor can any subcommittee or its members update or report directly to the Department of Defense or any Federal officers or employees.

All subcommittee members shall be appointed in the same manner as the Board members; that is, the Secretary of Defense shall appoint subcommittee members even if the member in question is already a Board member. Subcommittee members, with the approval of the Secretary of Defense, may serve a term of service on the subcommittee of one to four years; however, no member shall serve more than two consecutive terms of service on the subcommittee.

Subcommittee members, if not full-time or part-time government employees, shall be appointed to serve as experts and consultants under the authority of 5 U.S.C. 3109, and shall serve as special government employees, whose appointments must be renewed by the Secretary of Defense on an annual basis. With the exception of travel and per diem for official Board related travel, subcommittee members shall serve without compensation.

All subcommittees operate under the provisions of FACA, the Government in the Sunshine Act of 1976 (5 U.S.C. 552b), governing Federal statutes and regulations, and governing DoD policies/procedures.

**FOR FURTHER INFORMATION CONTACT:** Jim Freeman, Deputy Advisory Committee Management Officer for the Department of Defense, 703–692–5952.

**SUPPLEMENTARY INFORMATION:** The Board shall meet at the call of the Board's Designated Federal Officer, in consultation with the Board's Chairperson. The estimated number of Board meetings is one per year.

In addition, the Designated Federal Officer is required to be in attendance at all Board and subcommittee meetings for the entire duration of each and every meeting; however, in the absence of the Designated Federal Officer, the Alternate Designated Federal Officer shall attend the entire duration of the Board or subcommittee meeting.

Pursuant to 41 CFR 102–3.105(j) and 102–3.140, the public or interested organizations may submit written statements to Board of Visitors for the Western Hemisphere Institute for Security Cooperation membership about the Board's mission and functions. Written statements may be submitted at any time or in response to the stated agenda of planned meeting of Board of Visitors for the Western Hemisphere Institute for Security Cooperation.

All written statements shall be submitted to the Designated Federal Officer for the Board of Visitors for the Western Hemisphere Institute for Security Cooperation, and this individual will ensure that the written statements are provided to the membership for their consideration. Contact information for the Board of Visitors for the Western Hemisphere Institute for Security Cooperation Designated Federal Officer can be obtained from the GSA's FACA Database—*https://www.fido.gov/facadatabase/public.asp.*

The Designated Federal Officer, pursuant to 41 CFR 102–3.150, will announce planned meetings of the Board of Visitors for the Western Hemisphere Institute for Security Cooperation. The Designated Federal Officer, at that time, may provide additional guidance on the submission of written statements that are in response to the stated agenda for the planned meeting in question.

Dated: February 22, 2012.

**Aaron Siegel,**

*Alternate OSD Federal Register Liaison Officer, Department of Defense.*

[FR Doc. 2012–4440 Filed 2–24–12; 8:45 am]

BILLING CODE 5001–06–P

## DEPARTMENT OF DEFENSE

### Department of the Navy

### Notice of Intent To Prepare an Environmental Impact Statement/Overseas Environmental Impact Statement for Military Readiness Activities in the Northwest Training and Testing Study Area and To Announce Public Scoping Meetings

**AGENCY:** Department of the Navy, DoD.

**ACTION:** Notice.

**SUMMARY:** Pursuant to section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969, as implemented by the Council on Environmental Quality Regulations (40 Code of Federal Regulations Parts 1500–1508), and Executive Order 12114, the Department of the Navy (DoN) announces its intent to prepare an Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) to assess the potential environmental impacts associated with training and testing military readiness activities conducted in the Northwest Training and Testing (NWTT) Study Area (Study Area). The Study Area is composed of established maritime operating and warning areas in the eastern north Pacific Ocean region, located adjacent to the Northwest coast of the United States, to include the Strait of Juan de Fuca, Puget Sound, and the Behm canal in southeastern Alaska. The Study Area includes four existing range complexes and facilities: The Northwest Training Range Complex (NWTRC), the Naval Undersea Warfare Center (NUWC) Keyport Range Complex, Carr Inlet Operations Area, and the Southeast Alaska Acoustic Measurement Facility (SEAFAC). In addition to these range complexes, the Study Area also includes

pierside locations on Navy bases where sonar maintenance and testing occurs within the Study Area, and inland waters that are not part of the range complexes, where training and testing may occur.

The DoN is preparing this EIS/OEIS to renew current federal regulatory permits and authorizations, address proposed, future training and testing activities not covered under existing permits and authorizations (such as those activities proposed to be conducted in the Carr Inlet Operations Area), and include new platforms and weapons systems training and testing requirements.

The DoN will invite the National Marine Fisheries Service and the U.S. Fish and Wildlife Service to be cooperating agencies in preparation of this EIS and OEIS pursuant to 40 CFR 1501.6.

**DATES AND ADDRESSES:** Nine public scoping meetings will be held between 5 p.m. and 8 p.m. on:

- Tuesday, March 13, 2012. Oak Harbor School District Office, Administrative Services Center Board Room, 350 S. Oak Harbor Street, Oak Harbor, Washington 98277.
- Wednesday, March 14, 2012. Quilcene School District Multipurpose Room, 294715 U.S. Highway 101, Quilcene, Washington, 98376.
- Thursday, March 15, 2012. Central Kitsap High School Cafeteria, 3700 NW Anderson Hill Road, Silverdale, Washington 98383.
- Friday, March 16, 2012. Grays Harbor College HUB, 1620 Edward P. Smith Drive, Aberdeen, Washington 98520.
- Monday, March 19, 2012. Tillamook County Fairgrounds Auditorium, 4603 East 3rd Street, Tillamook, Oregon 97141.
- Tuesday, March 20, 2012. Hatfield Marine Science Center, 2030 SE Marine Science Drive, Newport, Oregon 97365.
- Thursday, March 22, 2012. Eureka Wharfinger Building, 1 Marina Way, Eureka, California 95501.
- Friday, March 23, 2012. Fort Bragg Town Hall, 363 North Main Street, Fort Bragg, California 95437.
- Tuesday, March 27, 2012. Ted Ferry Civic Center, 888 Venetia Way, Ketchikan, Alaska 99901.

Each of the nine scoping meetings will consist of an informal, open house session with information stations staffed by DoN representatives. Comments will be accepted from the public at all scoping meetings. Meeting details will be announced in local newspapers. Additional information concerning meeting times will be available on the EIS/OEIS web page located at: *http://www.NWTTEIS.com.*

**FOR FURTHER INFORMATION CONTACT:** Ms. Kimberly Kler, Naval Facilities Engineering Command, Northwest. Attention: NWTT EIS/OEIS, 1101 Tautog Circle, Suite 203, Silverdale, Washington 98315–1101.

**SUPPLEMENTARY INFORMATION:** The DoN's Proposed Action is to conduct training and testing activities, primarily within existing range complexes, operating areas, testing ranges, and select Navy pierside locations located in the Northwest.

The Study Area combines the at-sea portions (air and sea space) of the following range complexes that were previously analyzed under NEPA: The NWTRC and the NUWC Keyport Range Complex. The Study Area also includes Navy piers within Puget Sound where sonar maintenance and testing occurs, Carr Inlet Operations Area, and SEAFAC.

The air and sea space component of the NWTRC includes the area off the coast of Washington, Oregon, and northern California—out to approximately 250 nautical miles, specific training areas within the Strait of Juan de Fuca and Puget Sound, and the Olympic Military Operations Areas.

The NUWC Range Complex is composed of three geographically distinct range sites; two within Puget Sound and one in the Pacific Ocean. The Keyport Range Site is located in Kitsap County and includes portions of Liberty Bay and Port Orchard Reach (also known as Port Orchard Narrows). The Dabob Bay Range Complex Site is located in Hood Canal and Dabob Bay, in Jefferson, Mason, and Kitsap counties. The Quinault Underwater Tracking Range Site is located in the Pacific Ocean off the coast of Jefferson and Grays Harbor Counties in Washington.

The Carr Inlet Operations Area is located in southern Puget Sound, in an arm of water between Key Peninsula and Gig Harbor Peninsula.

The Southeast Alaska Acoustic Measurement Facility (SEAFAC) is located in the Western Behm Canal in Ketchikan Gateway Borough, Alaska.

The proposed action is to conduct military training and testing activities in the Study Area. The purpose of the Proposed Action is to achieve and maintain military readiness to meet the requirements of Title 10 of the U.S. Code, thereby ensuring the DoN meets its mission to maintain, train and equip combat-ready military forces capable of winning wars, deterring aggression, and maintaining freedom of the seas.

The alternatives analyzed in the NWTT EIS/OEIS are as follows.

(1) No Action Alternative: Baseline training and testing activities, as defined by existing DoN environmental planning documents, including the NWTRC EIS/OEIS and the NUWC Keyport Range Complex Extension EIS/OEIS.

(2) Alternative 1: The alternative consists of the No Action alternative, plus the all-inclusive Study Area, and adjustments to types and levels of activities, from the baseline as necessary to support current and planned DoN training and testing requirements. This Alternative considers:

- activities conducted throughout the Study Area, including testing activities at the Carr Inlet Operations Area and SEAFAC.
- mission requirements associated with force structure changes, including those resulting from the development, testing, and ultimate introduction of new platforms (ships and aircraft), and weapons systems into the fleet.

(3) Alternative 2: Consists of Alternative 1 plus, an increase in the tempo of training and testing activities.

Resource areas that will be addressed because of the potential effects from the Proposed Action include, but are not limited to, ocean and biological resources (including marine mammals and threatened and endangered species), terrestrial resources (including threatened and endangered species), sediments and water quality, air quality, airborne soundscape, cultural resources, transportation, regional economy, recreation, and public health and safety.

The scoping process will be used to identify community concerns and local issues that will be addressed in the EIS/OEIS. Federal agencies, Native American Indian Tribes and Nations, state agencies, local agencies, the public, and interested persons are encouraged to provide comments to the DoN to identify specific issues or topics of environmental concern that the commenter believes the DoN should consider.

All comments, provided orally or in writing at the scoping meetings, will receive the same consideration during EIS/OEIS preparation. Written comments must be postmarked no later than April 16, 2012, and should be mailed to: Ms. Kimberly Kler, Naval Facilities Engineering Command, Northwest, 1101 Tautog Circle, Suite 203, Silverdale, Washington 98315–1101, Attention: NWTT EIS/OEIS Project Manager.

Dated: February 22, 2012.

**J.M. Beal,**

*Office of the Judge Advocate General, U.S. Navy, Federal Register Liaison Officer.*

[FR Doc. 2012–4458 Filed 2–24–12; 8:45 am]

BILLING CODE 3810–FF–P

## DEPARTMENT OF EDUCATION

### Notice of Submission for OMB Review

**AGENCY:** Department of Education.

**ACTION:** Comment request.

**SUMMARY:** The Director, Information Collection Clearance Division, Privacy, Information and Records Management Services, Office of Management, invites comments on the submission for OMB review as required by the Paperwork Reduction Act of 1995 (Pub. L. 104–13).

**DATES:** Interested persons are invited to submit comments on or before March 28, 2012.

**ADDRESSES:** Written comments should be addressed to the Office of Information and Regulatory Affairs, Attention: Education Desk Officer, Office of Management and Budget, 725 17th Street NW., Room 10222, New Executive Office Building, Washington, DC 20503, be faxed to (202) 395–5806 or emailed to *oira_submission@omb.eop.gov* with a cc: to *ICDocketMgr@ed.gov*. Please note that written comments received in response to this notice will be considered public records.

**SUPPLEMENTARY INFORMATION:** Section 3506 of the Paperwork Reduction Act of 1995 (44 U.S.C. chapter 35) requires that the Office of Management and Budget (OMB) provide interested Federal agencies and the public an early opportunity to comment on information collection requests. The OMB is particularly interested in comments which: (1) Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility; (2) Evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used; (3) Enhance the quality, utility, and clarity of the information to be collected; and (4) Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

Dated: February 21, 2012.

Darrin A. King,

*Director, Information Collection Clearance Division, Privacy, Information and Records Management Services, Office of Management.*

### Institute of Education Sciences

*Type of Review:* New.

*Title of Collection:* Impact Evaluation of Teacher and Leader Evaluation Systems.

*OMB Control Number:* Pending.

*Affected Public:* State, Local, or Tribal Government.

*Total Estimated Number of Annual Responses:* 59.

*Total Estimated Annual Burden Hours:* 891.

*Abstract:* This information collection package requests clearance to recruit districts for a study of a performance evaluation system for principals and teachers. The study will provide important implementation and impact information on the kinds of performance evaluation systems currently discussed in federal policy. Study findings will be presented in two reports, one scheduled for release in late 2014 and the other in late 2015.

Copies of the information collection submission for OMB review may be accessed from the RegInfo.gov Web site at *http://www.reginfo.gov/public/do/PRAMain* or from the Department's Web site at *http://edicsweb.ed.gov*, by selecting the "Browse Pending Collections" link and by clicking on link number 04758. When you access the information collection, click on "Download Attachments " to view. Written requests for information should be addressed to U.S. Department of Education, 400 Maryland Avenue SW, LBJ, Washington, DC 20202–4537. Requests may also be electronically mailed to the Internet address *ICDocketMgr@ed.gov* or faxed to 202–401–0920. Please specify the complete title of the information collection and OMB Control Number when making your request.

Individuals who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8339.

[FR Doc. 2012–4375 Filed 2–24–12; 8:45 am]

BILLING CODE 4000–01–P

## DEPARTMENT OF EDUCATION

### Applications for New Awards; Technology and Media Services for Individuals With Disabilities—Educational Materials in Accessible Formats for Students With Visual Impairments and Other Print Disabilities

**AGENCY:** Office of Special Education and Rehabilitative Services, Department of Education.

**ACTION:** Notice.

### Overview Information

*Technology and Media Services for Individuals With Disabilities—Educational Materials in Accessible Formats for Students With Visual Impairments and Other Print Disabilities*

Notice inviting applications for new awards for fiscal year (FY) 2012.

Catalog of Federal Domestic Assistance (CFDA) Number: 84.327D.

**DATES:**

*Applications Available:* February 27, 2012.

*Deadline for Transmittal of Applications:* April 12, 2012.

*Deadline for Intergovernmental Review:* June 11, 2012.

### Full Text of Announcement

### I. Funding Opportunity Description

*Purpose of Program:* The purpose of the Technology and Media Services for Individuals with Disabilities program is to: (1) Improve results for students with disabilities by promoting the development, demonstration, and use of technology; (2) support educational media services activities designed to be of educational value in the classroom for students with disabilities; and (3) provide support for captioning and video description that is appropriate for use in the classroom.

*Priority:* In accordance with 34 CFR 75.105(b)(2)(v), this priority is from allowable activities specified in the statute (see sections 674(c)(1)(D) and 681(d) of the Individuals with Disabilities Education Act (IDEA) (20 U.S.C. 1474(c)(1)(D) and 1481(D)).

*Absolute Priority:* For FY 2012, this priority is an absolute priority. Under 34 CFR 75.105(c)(3), we consider only applications that meet this priority.

This priority is:

Dated: January 16, 2014.

**Kimberly D. Bose,**

*Secretary.*

[FR Doc. 2014–01334 Filed 1–23–14; 8:45 am]

BILLING CODE 6717–01–P

## DEPARTMENT OF ENERGY

### Federal Energy Regulatory Commission

### Supplemental Notice

| | Docket Nos. |
|---|---|
| Filing Requirements for El. Utility S.A. | RM01–8–000 |
| Electricity Market Transparency Provisions of Section 220 of the Federal Power Act. | RM10–12–000 |
| Revisions to Electric Quarterly Report Filing Process. | RM12–3–000 |
| Revised Public Utility Filing Requirements for Electric Quarterly Reports. | ER02–2001–000 |

Take notice that on December 20, 2013, the Commission issued a notice of technical conference on the Revisions to Electric Quarterly Report (EQR) Filing Process. The conference will take place on Wednesday, January 22, 2014 from 10:00 a.m. to 1:00 p.m. (EST), in the Commission Meeting Room at 888 First Street NE., Washington, DC 20426. The public may attend.

This supplemental notice is to clarify logistics for this event. Participants, either attending in person or on the webcast, are encouraged to preregister at *https://www.ferc.gov/whats-new/registration/eqr-01-22-14-form.asp.* There will be no teleconference available as mentioned in the initial notice. However, webcasting provides audio service and is archived. Participants may submit questions before or during the event via email to: *eqr@ferc.gov.* Please specify ''EQR Questions for Jan 22 Conference'' in the subject line or your emails.

This meeting/conference will be transcribed. Transcripts of the meeting/conference will be immediately available for a fee from Ace-Federal Reporters, Inc. (202–347–3700 or 1–800–336–6646). A free webcast of the meeting/conference is also available through *www.ferc.gov.* Anyone with Internet access who desires to listen to this event can do so by navigating to www.ferc.gov's Calendar of Events and locating this event in the Calendar. The event will contain a link to its webcast. The Capitol Connection provides technical support for the webcasts and offers the option of listening to the meeting via phone-bridge for a fee. If you have any questions, visit *www.CapitolConnection.org* or call 703–993–3100.

Any additional information regarding the agenda for the technical conference will be posted prior to the conference on the Calendar of Events on the Commission's Web site, *www.ferc.gov.*

Commission conferences are accessible under section 508 of the Rehabilitation Act of 1973. For accessibility accommodations, please send an email to *accessibility@ferc.gov* or call toll free 1–866–208–3372 (voice) or 202–208–1659 (TTY), or send a FAX to 202–208–2106 with the required accommodations.

For more information about the technical conference, please contact: Sarah McKinley, Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426, (202) 502–8368, *sarah.mckinley@ferc.gov.*

Dated: January 16, 2014.

**Kimberly D. Bose,**

*Secretary.*

[FR Doc. 2014–01336 Filed 1–23–14; 8:45 am]

BILLING CODE 6717–01–P

## ENVIRONMENTAL PROTECTION AGENCY

**[ER–FRL–9013–2]**

### Environmental Impact Statements; Notice of Availability

*Responsible Agency:* Office of Federal Activities, General Information (202) 564–7146 or *http://www.epa.gov/compliance/nepa/.*

**Weekly receipt of Environmental Impact Statements Filed 01/13/2014 Through 01/17/2014 Pursuant to 40 CFR 1506.9.**

**Notice**

Section 309(a) of the Clean Air Act requires that EPA make public its comments on EISs issued by other Federal agencies. EPA's comment letters on EISs are available at: *http://www.epa.gov/compliance/nepa/eisdata.html*

EIS No. 20140012, Draft EIS, HHS, GA, Centers for Disease Control and Prevention Roybal Campus 2015–2025 Master Plan, Comment Period Ends: 03/10/2014, Contact: George Chandler 404–245–2763

EIS No. 20140013, Third Final Supplement, USACE, NM, Rio Grande Floodway, San Acacia to Bosque del Apache Unit, Review Period Ends: 02/24/2014, Contact: Jerry Nieto 505–342–3362

EIS No. 20140014, Second Draft EIS (Tiering), FHWA, IL, Illiana Corridor Project Tier Two Transportation System Improvements, Comment Period Ends: 03/10/2014, Contact: Catherine A. Batey 217–492–4600

EIS No. 20140015, Final EIS, NPS, WY, Remote Vaccination Program to Reduce the Prevalence of Brucellosis in Yellowstone Bison, Review Period Ends: 02/24/2014, Contact: Jennifer Carpenter 307–344–2528

EIS No. 20140016, Draft EIS, USFWS, OH, Ballville Dam Project, Comment Period Ends: 03/26/2014, Contact: Brian Elkington 612–713–5168

EIS No. 20140017, Final EIS, USMC, CA, LEGISLATIVE—Renewal of the Chocolate Mountain Aerial Gunnery Range Land Withdrawal, Review Period Ends: 02/24/2014, Contact: Ms. Kelly Finn 619–532–4452

EIS No. 20140018, Draft EIS, USN, WA, Northwest Training and Testing, Comment Period Ends: 03/25/2014, Contact: John Mosher 360–257–3234

Dated: January 21, 2014.

**Dawn Roberts,**

*Management Analyst, NEPA Compliance Division, Office of Federal Activities.*

[FR Doc. 2014–01422 Filed 1–23–14; 8:45 am]

BILLING CODE 6560–50–P

## ENVIRONMENTAL PROTECTION AGENCY

**[EPA–HQ–OPP–2013–0776; FRL–9904–66]**

### Nominations to the FIFRA Scientific Advisory Panel; Request for Comments

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Notice.

**SUMMARY:** This notice provides the names, addresses, professional affiliations, and selected biographical data of persons recently nominated to serve on the Scientific Advisory Panel (SAP) established under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The Agency, at this time, anticipates selecting two new FIFRA SAP members to serve, as a result of membership terms that expire in 2014. Public comments on the current nominations are invited. These comments will be used to assist the Agency in selecting the new FIFRA SAP members.

**DATES:** Comments, identified by docket identification (ID) number EPA–HQ–OPP–2013–0776, must be received on or before February 10, 2014.

**ADDRESSES:** Submit your comments, identified by docket ID number EPA–

**Federal Register** / Vol. 79, No. 57 / Tuesday, March 25, 2014 / Notices **16317**

consists of approximately 235,000 acres. The EIS will assess proposed PCMS training, infrastructure improvement, and land management activities to support Fort Carson training requirements. It will also assess the impacts of reclassification of the airspace that overlies PCMS. The proposed action does not include, nor would it require, expansion of PCMS.

**ADDRESSES:** Comments on the Proposed Action or requests for additional information should be sent to the Fort Carson NEPA Program Manager, Directorate of Public Works, Environmental Division, 1626 Evans Street, Building 1219, Fort Carson, CO 80913–4362, or call (719) 526–4666. Comments may also be submitted via email to: *usarmy.carson.imcom-central.list.dpw-ed-nepa@mail.mil.*

**FOR FURTHER INFORMATION CONTACT:** The Fort Carson Public Affairs Office at (719) 526–1269, Monday through Friday, 7:30 a.m. to 4:00 p.m. MST; or by email to: *usarmy.carson.hqda-ocpa.list.pao-officer@mail.mil.*

**SUPPLEMENTARY INFORMATION:** The EIS is being prepared to meet the requirements of the National Environmental Policy Act (NEPA) to evaluate the environmental and socioeconomic impacts of implementing proposed actions at PCMS.

PCMS supports readiness training for units up to Brigade-size stationed at Fort Carson and for visiting Reserve and National Guard units. Training must fully integrate ground and air resources and reflect the modern battlefield environment for which Soldiers are preparing. The PCMS must accommodate training for current and emerging tactics and new equipment; provide training infrastructure, land and airspace within PCMS necessary to support training requirements; and support assigned and visiting units.

Advances in equipment and weapons systems, to include their incorporation into tactical units, dictate changes in how the Army trains, alterations to ranges (including range airspace) for maneuver training and doctrinal changes to accommodate mission-essential training prior to global deployments. PCMS must support training that incorporates these technological and doctrinal changes.

The proposed action would accommodate additional training tasks and equipment to enable training of current and future Fort Carson units. Additional tasks and equipment include unmanned aerial and ground systems, jamming systems, laser target sightings, non-explosive mortars up to 120 mm, and non-explosive aerial gunnery. Unmanned aerial systems would be reconnaissance systems, with no live-fire capability. The Army recently announced decisions to inactivate one Armor Brigade Combat Team (BCT), realign an Armor BCT and an Infantry BCT by adding an additional maneuver battalion to each, and convert the remaining Armor BCT to a Stryker BCT. The final configuration will result in three BCTs: One Armor, one Infantry, and one Stryker. PCMS must support the training needs of these BCTs. Reclassification of the special use airspace that overlies PCMS (not to extend over land outside the boundaries of PCMS) to restricted airspace is part of the proposed action. This reclassification is required to conduct integrated and realistic air and land training and to accommodate high-angle, indirect-fire weapon systems and airborne laser target sighting system training. This proposed reclassification would enable the safe integration of airborne systems (such as unmanned aerial systems) for force-on-force training. Artillery, high explosive aerial ordnance, and Stinger and Hellfire missiles will not be fired at PCMS. Non-dud producing munitions fired from aerial systems, including 5.56mm, 7.62mm, .50 caliber, 20mm, 30mm, 2.75'' inert rockets, none of which exceed 81mm, will not produce residual unexploded munitions.

The proposed action could have significant impacts to airspace, soil erosion, wildfire management, cultural resources, and water resources. Mitigation measures will be identified for adverse impacts.

The proposed action only considers activity within the boundaries of PCMS. The proposed action does not include, nor would it require, any expansion of PMCS. No additional land will be sought or acquired as a result of this action.

In addition to analyzing reasonably foreseeable cumulative impacts, which could include additional site infrastructure capable of hosting more local support staff, the EIS will also analyze a No Action Alternative. Under the No Action Alternative, current mission activities and training operations would continue, as well as range use and training land management. Management would continue to include routine maintenance and natural resource sustainment activities. This alternative, required by NEPA, encompasses baseline conditions and will serve as a benchmark against which the environmental impacts of the proposed action can be compared. Other reasonable alternatives will be considered for evaluation in the EIS.

Scoping and public comments: Governmental agencies, interest groups, and individuals are invited to participate in the scoping process. Public meetings will be held in Trinidad and La Junta, Colorado. Information on the time and location of the public meetings will be published locally. In addition, the Army will engage in consultation with federally recognized Native American tribes regarding the proposed action. The scoping process will help identify possible alternatives, potential environmental impacts, and key issues of concern to be analyzed in the EIS. It will also eliminate issues which are not significant or which have been covered by prior environmental reviews from detailed consideration. Written comments will be accepted within 30 days of publication of the Notice of Intent in the **Federal Register**.

**Brenda S. Bowen,**

*Army Federal Register Liaison Officer.*

[FR Doc. 2014–06423 Filed 3–24–14; 8:45 am]

BILLING CODE 3710–08–P

## DEPARTMENT OF DEFENSE

### Department of the Navy

### Notice of Extension of Comment Period for the Draft Environmental Impact Statement/Overseas Environmental Impact Statement for Military Readiness Activities in the Northwest Training and Testing Study Area

**AGENCY:** Department of the Navy, DoD.

**ACTION:** Notice.

**SUMMARY:** A notice of availability was published by the U.S. Environmental Protection Agency in the **Federal Register** (*79 FR 4158*) on January 24, 2014, for the Northwest Training and Testing (NWTT) Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). The public comment period ends on March 25, 2014. This notice announces a 21 day extension of the public comment period until April 15, 2014.

**FOR FURTHER INFORMATION CONTACT:** Naval Facilities Engineering Command Northwest, Attention: Ms. Kimberly Kler—NWTT EIS/OEIS Project Manager, 1101 Tautog Circle, Suite 203, Silverdale, WA 98315–1101; or *http://www.NWTTEIS.com.*

**SUPPLEMENTARY INFORMATION:** The public comment period on the NWTT EIS/OEIS will be extended until April 15, 2014. Comments may be submitted in writing to Naval Facilities Engineering Command Northwest, Attention: Ms. Kimberly Kler, NWTT EIS/OEIS Project Manager, 1101 Tautog Circle Suite 203, Silverdale, Washington, 98315–1101. In addition, comments may be submitted online at *http://www.NWTTEIS.com* during the comment period. All written comments must be postmarked by April 15, 2014, to ensure they become part of the official record. All written comments will be addressed for the Final EIS.

Copies of the Draft EIS/OEIS are available for public review at the following public libraries:

1. Everett Main Library, 2702 Hoyt Ave., Everett, WA 98201.
2. Gig Harbor Library, 4424 Point Fosdick Drive W., Gig Harbor, WA 98335.
3. Jefferson County Library—Port Hadlock, 620 Cedar Ave., Port Hadlock, WA 98339.
4. Kitsap Regional Library—Poulsbo, 700 NE Lincoln Road, Poulsbo, WA 98370.
5. Oak Harbor Public Library, 1000 SE Regatta Drive, Oak Harbor, WA 98277.
6. Port Angeles Main Library, 2210 S. Peabody St., Port Angeles, WA 98362.
7. Port Townsend Public Library, 1220 Lawrence St., Port Townsend, WA 98368.
8. Sylvan Way Library—Bremerton, 1301 Sylvan Way, Bremerton, WA 98310.
9. Timberland Regional Library—Aberdeen, 121 E. Market St., Aberdeen, WA 98520.
10. Timberland Regional Library—Hoquiam, 420 7th St., Hoquiam, WA 98550.
11. Driftwood Public Library, 801 SW Highway 101, Lincoln City, OR 97367.
12. Lincoln County Library District, 1247 NW Grove, No. 2, Newport, OR 97365.
13. Newport Public Library, 35 NW Nye St., Newport, OR 97365.
14. Astoria Public Library, 450 10th St., Astoria, OR 97103.
15. Tillamook Main Library, 1716 Third St., Tillamook, OR 97141.
16. Fort Bragg Branch Library, 499 Laurel St., Fort Bragg, CA 95437.
17. Humboldt County Public Library, Eureka Main Library, 1313 3rd St., Eureka, CA 95501.
18. Humboldt County Public Library, Arcata Main Library, 500 7th St., Arcata, CA 95521.
19. Juneau Public Library—Downtown Branch, 292 Marine Way, Juneau, AK 99801.
20. Ketchikan Public Library, 629 Dock St., Ketchikan, AK 99901.

Copies of the Draft EIS are available for electronic viewing at *http://www.NWTTEIS.com*.

Dated: March 19, 2014.

**P. A. Richelmi,**

*Lieutenant, Office of the Judge Advocate General, U.S. Navy, Alternate Federal Register Liaison Officer.*

[FR Doc. 2014–06505 Filed 3–24–14; 8:45 am]

BILLING CODE 3810–FF–P

## DEPARTMENT OF EDUCATION

[Docket No.: ED–2013–ICCD–0047]

## Agency Information Collection Activities; Submission to the Office of Management and Budget for Review and Approval; Comment Request; IDEA Part B State Performance Plan (SPP) and Annual Performance Report (APR)

**AGENCY:** Office of Special Education and Rehabilitative Services (OSERS), Department of Education (ED).

**ACTION:** Notice.

**SUMMARY:** In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. chapter 3501 *et seq.*), ED is proposing a revision of an existing information collection.

**DATES:** Interested persons are invited to submit comments on or before April 24, 2014.

**ADDRESSES:** Comments submitted in response to this notice should be submitted electronically through the Federal eRulemaking Portal at *http://www.regulations.gov* by selecting Docket ID number ED–2013–ICCD–0047 or via postal mail, commercial delivery, or hand delivery. If the regulations.gov site is not available to the public for any reason, ED will temporarily accept comments at *ICDocketMgr@ed.gov*. *Please note that comments submitted by fax or email and those submitted after the comment period will not be accepted; ED will ONLY accept comments during the comment period in this mailbox when the regulations.gov site is not available.* Written requests for information or comments submitted by postal mail or delivery should be addressed to the Director of the Information Collection Clearance Division, U.S. Department of Education, 400 Maryland Avenue SW., LBJ, Mailstop L–OM–2–2E319, Room 2E115, Washington, DC 20202.

**FOR FURTHER INFORMATION CONTACT:** For specific questions related to collection activities, please contact Rebecca Walawender, 202–245–7399.

**SUPPLEMENTARY INFORMATION:** The Department of Education (ED), in accordance with the Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3506(c)(2)(A)), provides the general public and Federal agencies with an opportunity to comment on proposed, revised, and continuing collections of information. This helps the Department assess the impact of its information collection requirements and minimize the public's reporting burden. It also helps the public understand the Department's information collection requirements and provide the requested data in the desired format. ED is soliciting comments on the proposed information collection request (ICR) that is described below. The Department of Education is especially interested in public comment addressing the following issues: (1) Is this collection necessary to the proper functions of the Department; (2) will this information be processed and used in a timely manner; (3) is the estimate of burden accurate; (4) how might the Department enhance the quality, utility, and clarity of the information to be collected; and (5) how might the Department minimize the burden of this collection on the respondents, including through the use of information technology. Please note that written comments received in response to this notice will be considered public records.

*Title of Collection:* IDEA Part B State Performance Plan (SPP) and Annual Performance Report (APR).

*OMB Control Number:* 1820–0624.

*Type of Review:* A revision of an existing information collection.

*Respondents/Affected Public:* Federal Government.

*Total Estimated Number of Annual Responses:* 60.

*Total Estimated Number of Annual Burden Hours:* 102,000.

*Abstract:* In accordance with 20 U.S.C. 1416(b)(1), not later than 1 year after the date of enactment of the Individuals with Disabilities Education, as revised in 2004, each State must have in place a performance plan that evaluates the States efforts to implement the requirements and purposes of Part B and describe how the State will improve such implementation. This plan is called the Part B State Performance Plan (Part B–SPP). In accordance with 20 U.S.C. 1416(b)(2)(C)(ii) the State shall report annually to the public on the performance of each local educational agency located in the State on the targets in the States performance plan. The State also shall report annually to the Secretary on the performance of the State under the States performance plan. This report is called the Part B Annual Performance Report (Part B–APR). Information Collection 1820–0624 corresponds to 34 CFR 300.600–300.602.

63610 Federal Register / Vol. 79, No. 206 / Friday, October 24, 2014 / Notices

organization and persons is encouraged. This meeting will be conducted in English and Spanish.

6. The Draft EIS/EIR is expected to be available for public review and comment in the fall of 2015, and a public meeting will be held after its publication.

Dated: October 2, 2014.

**David J. Castanon,**

*Chief, Regulatory Division.*

[FR Doc. 2014–25267 Filed 10–23–14; 8:45 am]

BILLING CODE 3720–58–P

## DEPARTMENT OF DEFENSE

### Department of the Navy

### Notice of Intent To Prepare a Supplement to the Draft Environmental Impact Statement/Overseas Environmental Impact Statement for Military Readiness Activities in the Northwest Training and Testing Study Area

**AGENCY:** Department of the Navy, DoD.

**ACTION:** Notice.

**SUMMARY:** The Department of the Navy (DoN) announces its intent to prepare a Supplement to the Draft Environmental Impact Statement (DEIS)/Overseas Environmental Impact Statement (OEIS) for the Northwest Training and Testing (NWTT) Study Area. This Supplemental DEIS/OEIS will focus on substantial changes in the proposed action and significant new information relevant to environmental concerns per 40 Code of Federal Regulations CFR 1502.9. The Supplemental DEIS/OEIS will also provide additional updated information to further the purposes of the National Environmental Policy Act (NEPA).

**SUPPLEMENTARY INFORMATION:** Pursuant to section 102(2)(c) of the NEPA, regulations implemented by the Council on Environmental Quality (40 CFR parts 1500–1508), and Presidential Executive Order 12114, the DoN announced its intent to prepare an EIS/OEIS for the NWTT Study Area in the **Federal Register** (FR) on February 27, 2012 (77 FR 11497), and invited the public to comment on the scope of the EIS/OEIS. A Draft EIS/OEIS was subsequently released on January 24, 2014 (79 FR 4158), in which the potential environmental effects associated with military readiness training and research, development, test, and evaluation activities (training and testing) conducted within the NWTT Study Area were evaluated.

Since the release of the DEIS/OEIS on January 24, 2014, the DoN has determined that a Supplemental DEIS/OEIS is warranted for two reasons. First, one activity, known as Tracking Exercises—Maritime Patrol (Extended Echo Ranging Sonobuoys), substantially changes the type and number of sonobuoys to be used. This change in the proposed action warrants preparation of a Supplemental DEIS/OEIS under 40 CFR 1502.9(c)(1)(i). Second, new information relevant to air quality emissions of inland water vessel movements associated with Maritime Security Operations warrants further consideration and preparation of an Supplemental DEIS/OEIS under 40 CFR 1502.9(c)(1)(ii).

All public comments received during the DEIS/OEIS comment period (January 24, 2014, through April 15, 2014) are still valid and are being considered in the Final EIS/OEIS for this action. Previously submitted comments need not be resubmitted. The Supplemental DEIS/OEIS is expected to be available in early December 2014. A Notice of Availability of the Supplemental DEIS/OEIS will be published in the **Federal Register** at that time, and the Supplemental DEIS/OEIS will be released for a public comment period of 45 days. No decision will be made to implement any alternative in the NWTT Study Area until the NEPA process is complete and a Record of Decision is signed by the DoN.

**FOR FURTHER INFORMATION CONTACT:** Naval Facilities Engineering Command Northwest, Attention: Ms. Kimberly Kler—NWTT EIS/OEIS Project Manager, 1101 Tautog Circle, Suite 203, Silverdale, WA 98315–1101.

**Authority:** 35 U.S.C. 207, 37 CFR part 404.

Dated: October 20, 2014.

**N.A. Hagerty-Ford,**

*Commander, Judge Advocate General's Corps, U.S. Navy, Federal Register Liaison Officer.*

[FR Doc. 2014–25316 Filed 10–23–14; 8:45 am]

BILLING CODE 3810–FF–P

## DEPARTMENT OF ENERGY

### Federal Energy Regulatory Commission

**[Docket No. CP14–555–000]**

### Dominion Transmission, Inc.: Notice of Application

Take notice that on September 30, 2014, Dominion Transmission, Inc. (Dominion). 120 Tredegar Street, Richmond, Virginia 23219 filed an application in the above referenced docket pursuant to section 7(c) of the Natural Gas Act (NGA) requesting authorization to construct and operate its Lebanon West II Project (Project), located in Armstrong, Allegheny, and Beaver Counties, Pennsylvania and Licking, Fayette, Coshocton, Tuscarawas, Harrison, Carroll, and Columbiana Counties, Ohio. Dominion asserts that the proposed project will provide 130,000 dekatherms per day of pipeline capacity on its TL–400 line from Pennsylvania to Ohio. The proposed project involves: (i) 10.08 miles of pipeline replacements; (ii) additional 10,915 horsepower at its existing Rural Valley Compressor Station; (iii) additional regulation at the Newark and Beaver Compressor Stations; and (iv) new valves and other minor facilities. Dominion estimates the cost of the Project to be $112 million, all as more fully set forth in the application which is on file with the Commission and open to public inspection. The filing is available for review at the Commission in the Public Reference Room or may be viewed on the Commission's Web site web at *http://www.ferc.gov* using the "eLibrary" link. Enter the docket number excluding the last three digits in the docket number field to access the document. For assistance, contact FERC at *FERCOnlineSupport@ferc.gov* or call toll-free, (886) 208–3676 or TYY, (202) 502–8659.

Any questions concerning this application may be directed to Matthew R. Bley, Director Gas Transmission Certificates, Dominion Transmission Inc., 701 East Cary Street, Richmond, Virginia 23219, by telephone at (804) 771–4399, by facsimile at (804) 771–4804, or by email at *Matthew.R.Bley@dom.com.*

Pursuant to section 157.9 of the Commission's rules (18 CFR 157.9), within 90 days of this Notice, the Commission staff will either: complete its environmental assessment (EA) and place it into the Commission's public record (eLibrary) for this proceeding; or issue a Notice of Schedule for Environmental Review. If a Notice of Schedule for Environmental Review is issued, it will indicate, among other milestones, the anticipated date for the Commission staff's issuance of the EA for this proposal. The filing of the EA in the Commission's public record for this proceeding or the issuance of a Notice of Schedule for Environmental Review will serve to notify federal and state agencies of the timing for the completion of all necessary reviews, and the subsequent need to complete all federal authorizations within 90 days of the date of issuance of the Commission staff's EA.

There are two ways to become involved in the Commission's review of this project. First, any person wishing to

75800 Federal Register / Vol. 79, No. 244 / Friday, December 19, 2014 / Notices

This filing is accessible on-line at *http://www.ferc.gov,* using the "eLibrary" link and is available for review in the Commission's Public Reference Room in Washington, DC. There is an "eSubscription" link on the Web site that enables subscribers to receive email notification when a document is added to a subscribed docket(s). For assistance with any FERC Online service, please email *FERCOnlineSupport@ferc.gov,* or call (866) 208–3676 (toll free). For TTY, call (202) 502–8659.

*Comment Date:* 5:00 p.m. Eastern Time on December 29, 2014.

Dated: December 8, 2014.

**Kimberly D. Bose,**

*Secretary.*

[FR Doc. 2014–29707 Filed 12–18–14; 8:45 am]

BILLING CODE 6717–01–P

## DEPARTMENT OF ENERGY

### Federal Energy Regulatory Commission

**[Docket No. ER15–595–000 ]**

### Covanta Fairfax, Inc.; Supplemental Notice That Initial Market-Based Rate Filing Includes Request for Blanket Section 204 Authorization

This is a supplemental notice in the above-referenced proceeding of Covanta Fairfax, Inc.'s application for market-based rate authority, with an accompanying rate tariff, noting that such application includes a request for blanket authorization, under 18 CFR part 34, of future issuances of securities and assumptions of liability.

Any person desiring to intervene or to protest should file with the Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426, in accordance with Rules 211 and 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.211 and 385.214). Anyone filing a motion to intervene or protest must serve a copy of that document on the Applicant.

Notice is hereby given that the deadline for filing protests with regard to the applicant's request for blanket authorization, under 18 CFR part 34, of future issuances of securities and assumptions of liability, is December 29, 2014.

The Commission encourages electronic submission of protests and interventions in lieu of paper, using the FERC Online links at *http://www.ferc.gov.* To facilitate electronic service, persons with Internet access who will eFile a document and/or be listed as a contact for an intervenor must create and validate an eRegistration account using the eRegistration link. Select the eFiling link to log on and submit the intervention or protests.

Persons unable to file electronically should submit an original and 5 copies of the intervention or protest to the Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426.

The filings in the above-referenced proceeding are accessible in the Commission's eLibrary system by clicking on the appropriate link in the above list. They are also available for electronic review in the Commission's Public Reference Room in Washington, DC. There is an eSubscription link on the Web site that enables subscribers to receive email notification when a document is added to a subscribed docket(s). For assistance with any FERC Online service, please email *FERCOnlineSupport@ferc.gov.* or call (866) 208–3676 (toll free). For TTY, call (202) 502–8659.

Dated: December 8, 2014.

**Kimberly D. Bose,**

*Secretary.*

[FR Doc. 2014–29706 Filed 12–18–14; 8:45 am]

BILLING CODE 6717–01–P

## DEPARTMENT OF ENERGY

### Federal Energy Regulatory Commission

**[Docket No. ER15–612–000]**

### Moore Energy, LLC; Supplemental Notice That Initial Market-Based Rate Filing Includes Request for Blanket Section 204 Authorization

This is a supplemental notice in the above-referenced proceeding, of Moore Energy, LLC's application for market-based rate authority, with an accompanying rate schedule, noting that such application includes a request for blanket authorization, under 18 CFR part 34, of future issuances of securities and assumptions of liability.

Any person desiring to intervene or to protest should file with the Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426, in accordance with Rules 211 and 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.211 and 385.214). Anyone filing a motion to intervene or protest must serve a copy of that document on the Applicant.

Notice is hereby given that the deadline for filing protests with regard to the applicant's request for blanket authorization, under 18 CFR part 34, of future issuances of securities and assumptions of liability is January 2, 2015.

The Commission encourages electronic submission of protests and interventions in lieu of paper, using the FERC Online links at *http://www.ferc.gov.* To facilitate electronic service, persons with Internet access who will eFile a document and/or be listed as a contact for an intervenor must create and validate an eRegistration account using the eRegistration link. Select the eFiling link to log on and submit the intervention or protests.

Persons unable to file electronically should submit an original and 5 copies of the intervention or protest to the Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426.

The filings in the above-referenced proceeding(s) are accessible in the Commission's eLibrary system by clicking on the appropriate link in the above list. They are also available for review in the Commission's Public Reference Room in Washington, DC. There is an eSubscription link on the Web site that enables subscribers to receive email notification when a document is added to a subscribed docket(s). For assistance with any FERC Online service, please email *FERCOnlineSupport@ferc.gov.* or call (866) 208–3676 (toll free). For TTY, call (202) 502–8659.

Dated: December 12, 2014.

**Nathaniel J. Davis, Sr.,**

*Deputy Secretary.*

[FR Doc. 2014–29700 Filed 12–18–14; 8:45 am]

BILLING CODE 6717–01–P

## ENVIRONMENTAL PROTECTION AGENCY

**[ER–FRL–9018–5]**

### Environmental Impact Statements; Notice of Availability

*Responsible Agency:* Office of Federal Activities, General Information (202) 564–7146 or *http://www.epa.gov/compliance/nepa/*

Weekly receipt of Environmental Impact Statements

Filed 12/08/2014 Through 12/12/2014

Pursuant to 40 CFR 1506.9.

#### Notice

Section 309(a) of the Clean Air Act requires that EPA make public its comments on EISs issued by other Federal agencies. EPA's comment letters on EISs are available at: *http://*

Federal Register / Vol. 79, No. 244 / Friday, December 19, 2014 / Notices 75801

*www.epa.gov/compliance/nepa/eisdata.html.*

*EIS No. 20140358, Draft EIS, HUD, CA,* Sunnydale-Velasco HOPE SF Master Plan Project, Comment Period Ends: 02/17/2015, Contact: Eugene Flannery 415–701–5598.

*EIS No. 20140359, Draft Supplement, FHWA, DC,* South Capitol Street, Comment Period Ends: 02/02/2015, Contact: Michael Hicks 202–219–3513.

*EIS No. 20140360, Draft EIS, USFWS, TX,* Southern Edwards Plateau Habitat Conservation Plan, Comment Period Ends: 03/fxsp0;20/2015, Contact: Vanessa Burge 505–248–6420.

*EIS No. 20140361, Final EIS, USFS, CO,* White River National Forest Oil and Gas Leasing, Review Period Ends: 02/10/ 2015, Contact: Sarah Hankens 970–625–6840.

*EIS No. 20140362, Final EIS, USFS, VA,* Revised Land and Resource Management Plan for the George Washington National Forest, Review Period Ends: 01/20/2015, Contact: Karen Overcash 540–265–5175.

*EIS No. 20140363, Draft EIS, FHWA, MN,* US Highway 53 from Virginia to Eveleth, Comment Period Ends: 02/02/2015, Contact: Philip Forst 651–291–6100.

*EIS No. 20140364, Draft EIS, APHIS, 00,* Feral Swine Damage Management: A National Approach, Comment Period Ends: 02/02/2015, Contact: Kimberly K. Wagner 608–837–2727.

*EIS No. 20140365, Final EIS, USACE, TX,* Dallas Floodway Project, Review Period Ends: 01/20/2015, Contact: Marcia Hackett 817–886–1373.

*EIS No. 20140366, Final EIS, NPS, DC,* Anacostia Park Wetlands and Resident Canada Goose Management Plan, Review Period Ends: 01/20/2015, Contact: Robert Mocko 202–690–5170.

*EIS No. 20140367, Draft EIS, USFS, OR,* Antelope Grazing Allotments, Comment Period Ends: 02/02/2015, Contact: Lucas Phillips 541–947–2151.

*EIS No. 20140368, Draft EIS, BLM, OR,* Land use Plan Amendments for the Boardman to Hemingway Transmission Line Project, Comment Period Ends: 03/19/2015, Contact: Tamara Gertsch 307–775–6115.

*EIS No. 20140369, Final EIS, NOAA, CA,* Cordell Bank and Gulf of the Farallones National Marine Sanctuaries Expansion, Review Period Ends: 01/20/2015, Contact: Helene Scalliet 301–713–7281.

*EIS No. 20140370, Draft Supplement, USN, WA,* Northwest Training and Testing, Comment Period Ends: 02/02/2015, Contact: John Mosher 360–257–3234.

*EIS No. 20140371, Draft EIS, USACE, CA,* South San Francisco Bay Shoreline Phase I, Comment Period Ends: 02/02/2015, Contact: William DeJager 415–503–6866.

*EIS No. 20140372, Draft EIS, DOE, 00,* Plains and Eastern Clean Line Transmission Project, Comment Period Ends: 02/02/2015, Contact: Jane Summerson 505–845–4091.

**Amended Notices**

*EIS No. 20140306, Draft EIS, USACE, CA,* River Islands at Lathrop, Phase 2B, Comment Period Ends: 01/23/2015, Contact: William Guthrie 916–557–5269.

Revision to the FR Notice Published 10/24/2014; Extending Comment Period from 12/08/2014 to 01/23/2015.

Dated: December 16, 2014.

**Dawn Roberts**

*Management Analyst, NEPA Compliance Division, Office of Federal Activities.*

[FR Doc. 2014–29784 Filed 12–18–14; 8:45 am]

BILLING CODE 6560–50–P

## ENVIRONMENTAL PROTECTION AGENCY

**[EPA–HQ–OPP–2014–0763; FRL–9918–44]**

## Registration Review; Pesticide Dockets Opened for Review and Comment

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Notice.

**SUMMARY:** With this notice, EPA is opening the public comment period for several registration reviews. Registration review is EPA's periodic review of pesticide registrations to ensure that each pesticide continues to satisfy the statutory standard for registration, that is, the pesticide can perform its intended function without unreasonable adverse effects on human health or the environment. Registration review dockets contain information that will assist the public in understanding the types of information and issues that the Agency may consider during the course of registration reviews. Through this program, EPA is ensuring that each pesticide's registration is based on current scientific and other knowledge, including its effects on human health and the environment. For flufenpyr-ethyl, EPA is seeking comment on the preliminary work plan, the ecological problem formulation, and the human health draft risk assessment. For Sodium Fluoride, Yellow Mustard Seed and Sulfonic Acid, EPA is seeking comment on the Combined Work Plan, Summary Document, and Proposed Interim Registration Review Decision, which includes the human health and ecological risk assessments. This notice also announces a registration review case closure for thiacloprid.

**DATES:** Comments must be received on or before February 17, 2015.

**ADDRESSES:** Submit your comments identified by the docket identification (ID) number for the specific pesticide of interest provided in the table in Unit III.A., by one of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the online instructions for submitting comments. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute.
- *Mail:* OPP Docket, Environmental Protection Agency Docket Center (EPA/DC), (28221T), 1200 Pennsylvania Ave. NW., Washington, DC 20460–0001.
- *Hand Delivery:* To make special arrangements for hand delivery or delivery of boxed information, please follow the instructions at *http://www.epa.gov/dockets/contacts.html.* Additional instructions on commenting or visiting the docket, along with more information about dockets generally, is available at *http://www.epa.gov/dockets.*

**FOR FURTHER INFORMATION CONTACT:**

*For pesticide specific information contact:* The Chemical Review Manager for the pesticide of interest identified in the table in Unit III.A.

*For general information contact:* Richard Dumas, Pesticide Re-Evaluation Division (7508P), Office of Pesticide Programs, Environmental Protection Agency, 1200 Pennsylvania Ave. NW., Washington, DC 20460–0001; telephone number: (703) 308–8015; fax number: (703) 308–8005; email address: *dumas.richard@epa.gov.*

**SUPPLEMENTARY INFORMATION:**

### I. General Information

*A. Does this action apply to me?*

This action is directed to the public in general, and may be of interest to a wide range of stakeholders including environmental, human health, farmworker, and agricultural advocates; the chemical industry; pesticide users; and members of the public interested in the sale, distribution, or use of pesticides. Since others also may be interested, the Agency has not attempted to describe all the specific

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# Appendix C: Agency Correspondence

## TABLE OF CONTENTS

**ESSENTIAL FISH HABITAT ASSESSMENT**



**NATIONAL HISTORIC PRESERVATION ACT COMPLIANCE**



**OLYMPIC COAST NATIONAL MARINE SANCTUARY CONSULTATION**



## LIST OF TABLES

There are no tables in this section.

## LIST OF FIGURES

There are no figures in this section.

DEPARTMENT OF THE NAVY
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:

5090
Ser N01CE1/0283
27 Feb 12

Dear Sir or Madam:

Subject: NOTIFICATION OF PREPARATION OF THE NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

This letter is to inform you that the United States (U.S.) Navy is preparing an EIS/OEIS to assess the potential environmental impacts from military readiness training and testing activities conducted in the Northwest.

The NWTT EIS/OEIS is an environmental planning analysis of military readiness activities to support re-issuance of authorization for permitted activities analyzed by the Navy in previous environmental documents, and to support authorization and permitting for additional activities in the Study Area.

The NWTT Study Area consists of air, land and sea space and includes the Northwest Training Range Complex, the Naval Undersea Warfare Center Keyport Range Complex, Carr Inlet Operations Area, the Southeast Alaska Acoustic Measurement Facility, and Navy pierside locations where sonar maintenance and testing occurs (see Enclosure 1).

The purpose of the Proposed Action is to conduct training and testing activities to ensure the Navy accomplishes its mission to maintain, train and equip combat-ready military forces capable of winning wars, deterring aggression and maintaining freedom of the seas. The Navy proposes to:

- Adjust training and testing activities to support current and planned Navy requirements.

- Accommodate evolving mission requirements associated with force structure changes, including those resulting from the development, testing and introduction of new vessels, aircraft and weapon system(s) into the Fleet.

Subject: NOTIFICATION OF PREPARATION OF THE NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

Environmental issues to be addressed in the EIS/OEIS include, but are not limited to, the following resource areas: ocean and biological resources (including marine mammals and threatened and endangered species), terrestrial resources, air quality, sediments and water quality, airborne soundscape, cultural resources, transportation, regional economy, recreation, and public health and safety. Your input in identifying specific issues and concerns that should be assessed, in these areas and any additional areas, is important to the process.

In compliance with the National Environmental Policy Act of 1969 (NEPA) the Navy is holding nine open house information sessions to support an early and open public process for determining the scope of issues to be addressed and for identifying significant issues related to the Proposed Action. Open house information sessions will inform the public of the Proposed Action and NEPA process and give community members an opportunity to submit comments on the scope, environmental resources or local issues to be addressed in the EIS/OEIS. Input from the public will be used to help identify potentially significant issues to be analyzed.

The information sessions will be conducted in an open house format and members of the public may arrive at any time during the advertised times. There will be no presentation or formal oral comment session; however, Navy representatives will be available to provide information and answer questions about the Proposed Action.

The open house information sessions will be held from **5 p.m. to 8 p.m.** at the following locations:

**In Washington:** **Tuesday, March 13, 2012**
Oak Harbor School District Office
Administrative Services Center Board Room
350 S. Oak Harbor St.
Oak Harbor

**Wednesday, March 14, 2012**
Quilcene School District Multipurpose Room
294715 U.S. Highway 101
Quilcene

2

Subject: NOTIFICATION OF PREPARATION OF THE NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

**Thursday, March 15, 2012**
Central Kitsap High School Cafeteria
3700 NW Anderson Hill Road
Silverdale

**Friday, March 16, 2012**
Grays Harbor College HUB
1620 Edward P. Smith Drive
Aberdeen

**In Oregon:** **Monday, March 19, 2012**
Tillamook County Fairgrounds Auditorium
4603 E. 3rd St.
Tillamook

**Tuesday, March 20, 2012**
Hatfield Marine Science Center
2030 SE Marine Science Drive
Newport

**In California:** **Thursday, March 22, 2012**
Eureka Public Marina, Wharfinger Building
#1 Marina Way
Eureka

**Friday, March 23, 2012**
Fort Bragg Town Hall
262 N. Main St.
Fort Bragg

**In Alaska:** **Tuesday, March 27, 2012**
Ted Ferry Civic Center
888 Venetia Way
Ketchikan

The Navy is also available to schedule a brief with your office on this project, if so desired. If you would like to schedule a brief, please contact Kimberly Kler at 360-396-0927 or Kimberly.kler@navy.mil.

Regardless of whether you are able to participate in the open house information sessions, you may send written comments to:

3

Subject: NOTIFICATION OF PREPARATION OF THE NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

Naval Facilities Engineering Command, Northwest
Attention: Mrs. Kimberly Kler - NWTT EIS/OEIS Project Manager
1101 Tautog Circle, Suite 203
Silverdale, WA 98315-1101

You may also submit comments online at www.NWTTEIS.com. All comments must be postmarked or received online by **April 27, 2012**, to be considered in the development of the EIS/OEIS.

For more information, please visit the project website at www.NWTTEIS.com or contact Mrs. Kimberly Kler, NWTT EIS/OEIS Project Manager, at 360-396-0927, or email kimberly.kler@navy.mil.

Sincerely,

Larry M. Foster

L. M. FOSTER
Director, Environmental Readiness
By direction

Enclosure: 1. Northwest Training and Testing Study Area

4

Enclosure 1: Northwest Training and Testing Study Area


5

DEPARTMENT OF THE NAVY
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N01CE1/0048
January 17, 2014

Dear Sir or Madam:

Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING (NWTT) DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

This letter is to inform you that the Department of the Navy (Navy) has prepared a Draft EIS/OEIS for military readiness training and testing activities conducted primarily within existing range complexes, operating areas and testing ranges of the NWTT Study Area. The Navy welcomes your comments on the Draft EIS/OEIS.

The NWTT Study Area (see Enclosure 1) is composed of established maritime operating areas and warning areas in the eastern North Pacific Ocean, including the Strait of Juan de Fuca, Puget Sound and Western Behm Canal in southeastern Alaska. The NWTT Study Area includes: air and water space within and outside Washington state waters, and outside state waters of Oregon and Northern California; four existing range complexes and facilities (the Northwest Training Range Complex, Naval Undersea Warfare Center Division Keyport Range Complex, Carr Inlet Operations Area and Southeast Alaska Acoustic Measurement Facility); and Navy pierside locations where sonar maintenance and testing occur, at Naval Base Kitsap Bremerton, Naval Base Kitsap Bangor and Naval Station Everett.

The Navy is proposing to continue to conduct training and testing activities, to include the use of active sonar and explosives, within the NWTT Study Area. Many of these training and testing activities have historically occurred in the NWTT Study Area and have been previously analyzed pursuant to the National Environmental Policy Act of 1969 and Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*.

The purpose of the Proposed Action is to ensure that the Navy accomplishes its mission to maintain, train and equip combat-

Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING (NWTT) DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

ready naval forces capable of winning wars, deterring aggression and maintaining freedom of the seas. This mission is achieved in part by training and testing within the NWTT Study Area. The NWTT EIS/OEIS also supports the renewal of federal regulatory permits and authorizations for current training and testing activities and future activities requiring environmental analysis.

The Navy is holding eight public meetings to inform the public about the Proposed Action and alternatives under consideration, and to provide an opportunity for the public to comment on the adequacy and accuracy of the analysis in the NWTT Draft EIS/OEIS. The public meetings will include an open house information session, during which time Navy representatives will be available to provide information and answer questions about the Proposed Action and Draft EIS/OEIS. A short presentation by the Navy will also take place during the meetings, and the public will have the opportunity to make oral and written comments to the official record. Comments will be accepted throughout the public meeting.

The public meetings will be held at the following locations and times:

**Open House Information Sessions: 5-8 p.m.**
**Navy Presentation: 6:30 p.m.**

**Date:** **Wednesday, February 26, 2014**
**Location:** Oak Harbor High School
Student Union Building
1 Wildcat Way
Oak Harbor, WA

**Date:** **Thursday, February 27, 2014**
**Location:** Cascade High School Student Commons
801 E. Casino Road
Everett, WA

**Date:** **Friday, February 28, 2014**
**Location:** North Kitsap High School Commons

2

Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING (NWTT) DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

1780 NE Hostmark St.
Poulsbo, WA

**Date:** **Monday, March 3, 2014**
**Location:** Astoria High School Student Commons
1001 W. Marine Drive
Astoria, OR

**Date:** **Tuesday, March 4, 2014**
**Location:** Isaac Newton Magnet School Gym
825 NE 7th St.
Newport, OR

**Date:** **Thursday, March 6, 2014**
**Location:** Red Lion Hotel
Redwood Ballroom
1929 4th St.
Eureka, CA

**Date:** **Friday, March 7, 2014**
**Location:** Redwood Coast Senior Center West Room
490 N. Harold St.
Fort Bragg, CA

**Date:** **Tuesday, March 11, 2014**
**Location:** Southeast Alaska Discovery Center Lobby
50 Main St.
Ketchikan, AK

A 60-day public comment period is open from January 24, 2014, to March 25, 2014, for the public to review the document and provide input. Comments may be submitted online at **www.NWTTEIS.com**, at the public meetings or by mail to:

Naval Facilities Engineering Command Northwest
Attention: Ms. Kimberly Kler - NWTT EIS/OEIS Project Manager
1101 Tautog Circle, Suite 203
Silverdale, WA 98315-1101

All comments must be postmarked or received online by **March 25, 2014**, for consideration in the Final EIS/OEIS. All comments

3

Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING (NWTT) DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

(oral or written) submitted during the 60-day public review period will become part of the official record on the Draft EIS/OEIS and will be responded to in the Final EIS/OEIS.

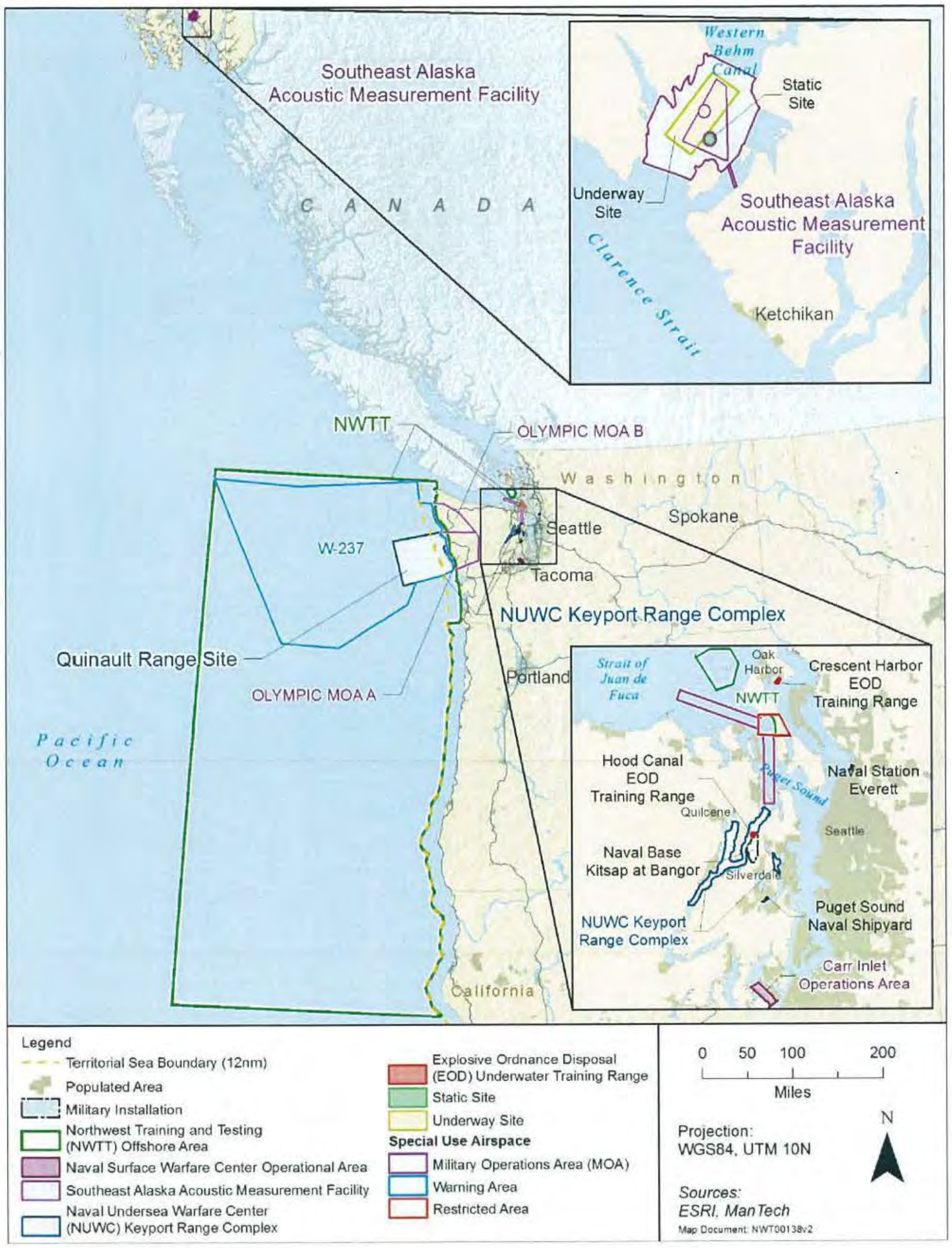
For more information about the project or to download the Draft EIS/OEIS, please visit the website at **www.NWTTEIS.com**. Additionally, a CD-ROM of the Draft EIS/OEIS is enclosed (see Enclosure 2).

Sincerely,

L. M. FOSTER
By direction

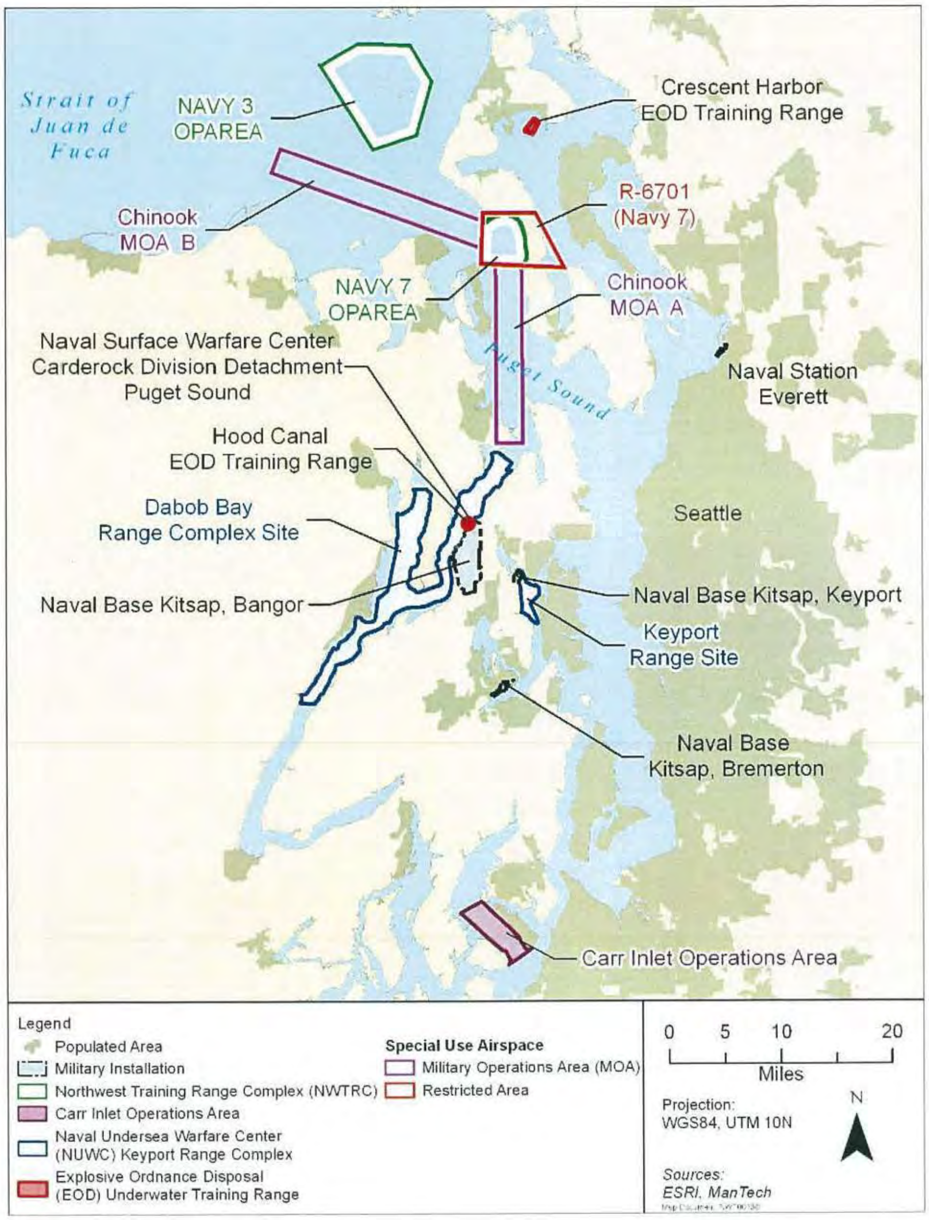
Enclosures: 1. Figures of the NWTT EIS/OEIS Study Area
2. Electronic Copy (CD-ROM) of NWTT Draft EIS/OEIS

Enclosure 1: Northwest Training and Testing Study Area




5

Enclosure 1: Inland Waters of the Northwest Training and Testing Study Area




6

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/1067
10 Oct 2014

From: Commander, U.S. Pacific Fleet
To: Chief of Naval Operations (N456)

Subj: NOTIFICATION OF PREPARATION OF THE NORTHWEST TRAINING AND TESTING (NWTT) SUPPLEMENT TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

Ref: (a) OPNAVINST 5090.1D, Environmental Readiness Program Manual

Encl: (1) Draft Federal Register Notice of Intent
(2) Draft Notice of Intent Brief
(3) Milestone Schedule

1. Per reference (a) this is to notify you that Commander, U.S. Pacific Fleet (COMPACFLT) is preparing a Supplement to the Draft NWTT EIS/OEIS to assess substantial changes in the proposed action and significant new information relevant to the environmental analysis per 40 Code of Federal Regulations (C.F.R.) 1502.9.

2. Specifically, for the activity, Tracking Exercises - Maritime Patrol (Extended Echo Ranging Sonobuoys), substantial changes the type and number of sonobuoys to be used is proposed. This change in the proposed action warrants preparation of a Supplemental Draft EIS/OEIS under 40 C.F.R. 1502.9(c)(1)(i). Additionally, new information relevant to air quality emissions of inland water vessel movements associated with Maritime Security Operations warrants further consideration and preparation of a Supplement under 40 C.F.R. 1502.9(c)(1)(ii).

3. Notice of Intent (NOI): The NOI to prepare the Supplement to the Draft EIS/OEIS is provided as enclosure (1) for review, approval, and publication in the Federal Register. COMPACFLT requests that the NOI be published no later than 24 Oct 2014 to facilitate timely execution of the Supplement to the Draft EIS/OEIS and incorporation into the Final EIS. COMPACFLT will not be conducting scoping, but will notify federal, state, and local elected officials, Native American Tribes, government

Subj: NOTIFICATION OF PREPARATION OF THE NORTHWEST TRAINING AND TESTING (NWTT) SUPPLEMENT TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

agencies and other interested parties identified on the current NWTT distribution list via a postcard mailer.

4. CNO Action: COMPACFLT requests that OPNAV N45 coordinate project review with Assistant Secretary of the Navy (Energy, Installation & Environment) and the Office of Legislative Affairs staff.

5. The technical point of contact for this matter is Mr. John Mosher, CPF Detachment Northwest Project Officer, (360) 257-3234 or email: john.g.mosher@navy.mil. The legal point of contact for this matter is CDR Joan Malik, JAGC, USN, Fleet Environmental Counsel, (808) 474-6389 or email: joan.malik@navy.mil.

JOHN VAN NAME
FOR

L. M. FOSTER
By direction

Copy to (w/o encls):
COMNAVAIRSYSCOM PATUXENT RIVER MD
COMNAVSEASYSCOM WASHINGTON DC
CNIC WASHINGTON DC
NAVFAC WASHINGTON DC
COMNAVREG NW SILVERDALE WA (N3, N45, N00L)
NAVFAC NW SILVERDALE WA (N00, N40, N45)
COMMANDER NAS WHIDBEY ISLAND OAK HARBOR WA (N00, N3, N45)
COMFLTFORCOM (N465, N73, N77)

2

DEPARTMENT OF THE NAVY
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/1284
December 12, 2014

Dear Sir or Madam:

Subject: NOTICE OF AVAILABILITY OF THE SUPPLEMENT TO THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

This letter is to inform you that the Department of the Navy (Navy) has prepared a Supplement to the Northwest Training and Testing (NWTT) Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS), which is available for review and comment. The Supplement focuses on substantial changes to the Navy's Proposed Action due to updated training requirements and new information relevant to environmental concerns per 40 Code of Federal Regulations § 1502.9. The National Marine Fisheries Service and the U.S. Coast Guard are cooperating agencies on the EIS/OEIS. The Navy requests and welcomes comments on the Supplement during the comment period.

Since the release of the NWTT Draft EIS/OEIS on January 24, 2014, the Navy determined that updated training requirements or new information would result in changes to the Proposed Action or analysis, and warranted the preparation of a Supplement to the Draft EIS/OEIS. These changes include:

- *Tracking Exercise - Maritime Patrol (Extended Echo Ranging Sonobuoys):* The type and number of sonobuoys used during this activity would substantially change.

- *Maritime Security Operations:* New information is available on air emissions from inland water vessel movements associated with this ongoing activity.

Other than these changes, the Draft EIS/OEIS remains valid and will be merged with the Supplement into the Final EIS/OEIS.

The Navy is holding four public meetings to inform the public about the Supplement to the Draft EIS/OEIS and potential environmental impacts, and to provide an additional opportunity for the public to comment on the adequacy and accuracy of the

Subject: NOTICE OF AVAILABILITY OF THE SUPPLEMENT TO THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

analysis in the Supplement. The public meetings will include an open house information session, during which time EIS team representatives will be available to provide information, answer questions and accept comments on the Supplement. The public can arrive any time during the advertised hours; the open house will not include a formal presentation or verbal comment session.

The public meetings will be held at the following locations and times:

**Open House Information Sessions: 5-8 p.m.**

**Date:** **Monday, January 12, 2015**
**Location:** Poulsbo Fire Station Conference Room
911 NE Liberty Road
Poulsbo, WA

**Date:** **Tuesday, January 13, 2015**
**Location:** Grays Harbor College HUB
1620 Edward P. Smith Drive
Aberdeen, WA

**Date:** **Wednesday, January 14, 2015**
**Location:** Isaac Newton Magnet School Commons
825 NE Seventh St.
Newport, OR

**Date:** **Friday, January 16, 2015**
**Location:** Eureka Public Marina, Wharfinger Building
Great Room
1 Marina Way
Eureka, CA

A 45-day public comment period is open from December 19, 2014, to February 2, 2015, for the public to review the document and provide input. Comments may be submitted online at **www.NWTTEIS.com**, at the public meetings or by mail to:

Naval Facilities Engineering Command Northwest
Attention: Ms. Kimberly Kler - NWTT EIS/OEIS Project Manager
1101 Tautog Circle, Suite 203
Silverdale, WA 98315-1101

2

Subject: NOTICE OF AVAILABILITY OF THE SUPPLEMENT TO THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

All comments on the Supplement must be postmarked or received online by February 2, 2015, for consideration in the Final EIS/OEIS. All comments submitted during the 45-day public review period will become part of the public record and will be responded to in the Final EIS/OEIS. All public comments previously received on this project are still valid and are being considered in the Final EIS/OEIS.

Additional information is available on the project website at www.NWTTEIS.com.

Sincerely,

Larry M. Foster

L. M. FOSTER
By direction

3

**DEPARTMENT OF THE NAVY**
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, DC 20350-2000

IN REPLY REFER TO

5090
N454/12U158071
16 February 2012

Mr. Eric C. Schwaab
Assistant Administrator
National Marine Fisheries Service
1315 East West Highway
Silver Springs, MD 20910

Dear Mr. Schwaab:

In accordance with the National Environmental Policy Act (NEPA), the United States (U.S.) Department of the Navy (Navy) is initiating the preparation of an Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) to assess the potential environmental impacts associated with two categories of Navy readiness activities: training and testing that include the use of active sonar and explosives in the Northwest Training and Testing (NWTT) Study Area. The NWTT Study Area is composed of established maritime operating and warning areas in the eastern North Pacific Ocean region, located adjacent to the northwest coast of the United States, and areas within the Strait of Juan de Fuca, Puget Sound, and the Behm Canal in southeastern Alaska. The NWTT Study Area (Study Area) includes four existing range complexes and facilities: the Northwest Training Range Complex, the Naval Undersea Warfare Center (NUWC) Keyport Range Complex, Carr Inlet Operations Area, and the Southeast Alaska Acoustic Measurement Facility (SEAFAC). In addition to these range complexes, the Study Area also includes select Navy pierside locations and inland waters that are not part of the range complexes where training and sonar testing may occur.

An important aspect of the NWTT EIS/OEIS will be the analysis of the acoustic effects to marine species protected under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). The NWTT EIS/OEIS is also intended to serve as a basis for the renewal of current regulatory permits and authorizations, address current training and testing not covered under the existing permits and authorizations, and obtain those permits and authorizations necessary to support force structure changes and emerging and future training and testing requirements. The MMPA Final Rule and ESA Section 7 Programmatic Biological Opinion for NWTRC will expire in October 2015 and June 2015, respectively. The NUWC Keyport Range Complex MMPA Final Rule and ESA Section 7 Programmatic Biological Opinion will expire in May and June of 2015, respectively. The NWTT EIS combines both the NWTRC and the NUWC Keyport Range Complex analysis; therefore, the earlier NWTRC MMPA and ESA dates will drive the requirements for NWTT permit completion.

To complete the analysis required by the permitting and consultation process, the Navy and the National Marine Fisheries Service (NMFS) will need to work together. Therefore, in accordance with the Council on Environmental Quality's (CEQ) NEPA guidelines (specifically

40 CFR Part 1501) and CEQ's 2002 guidance on cooperating agencies, the Navy requests that NMFS serve as a cooperating agency for the development of the NWTT EIS/OEIS.

As the lead agency, the Navy will be responsible for overseeing preparation of the EIS/OEIS that includes, but is not limited to, the following:

- Gathering all necessary background information and preparing the EIS/OEIS and all necessary permit applications associated with acoustic issues within the NWTT Study Area.
- Working with NMFS personnel to determine the method of estimating potential effects to protected marine species, including threatened and endangered species.
- Determining the scope of the EIS/OEIS, including the alternatives evaluated.
- Circulating the appropriate NEPA documentation to the general public and any other interested parties.
- Scheduling and supervising meetings held in support of the NEPA process, and compiling any comments received.
- Maintaining an administrative record and responding to any Freedom of Information Act requests relating to the EIS/OEIS.

The Navy respectfully requests that NMFS, in its role as a cooperating agency, provide support as follows:

- Provide timely comments after the Agency Information Meeting (which will be held at the onset of the EIS/OEIS process) and on working drafts of the EIS/OEIS documents. The Navy requests that comments on draft EIS/OEIS documents (Version 2) be provided within 30 working days.
- Respond to Navy requests for information, in particular, those related to review of the acoustic effects analysis and evaluation of the effectiveness of protection and mitigation measures.
- Coordinate, to the maximum extent practicable, any public comment periods that are necessary in the MMPA permitting process with the Navy's NEPA public comment periods.
- Participate, as necessary, in meetings hosted by the Navy for discussion of issues related to the EIS/OEIS, including public hearings and meetings.
- Adhere to the overall schedule as set forth by the Navy.
- Provide a formal, written response to this request.

2

The Navy views this agreement as important to the successful completion of the environmental planning process for the NWTT EIS/OEIS. It is the Navy's goal to complete the analysis as expeditiously as possible, while using the best scientific information available. National Marine Fisheries Service assistance will be invaluable in this endeavor.

The point of contact for this action is Ms. Karen M. Foskey, (703) 695-5193, email: Karen.Foskey@navy.mil.

Sincerely,

JOHN P. QUINN
Deputy Director, Energy and Environmental
Readiness Division (OPNAV N45)

Copy to:
OPNAV N43
Commander, U.S. Fleet Forces Command (N46)
Commander, U.S. Pacific Fleet (N01CE)
Commander, Naval Installations Command (N45)
Commander, Naval Sea Systems Command
Commander, Naval Air Systems Command
Commander, Navy Region Northwest (N40)
Commander, Navy Region Southwest (N40)
Commander, Naval Facilities Engineering Command, Northwest (N45)
Commander, Naval Facilities Engineering Command, Southwest (N45)

3

Enclosure 1: Northwest Training and Testing (NWTT) Study Area


4

Enclosure 2: NOTIONAL SCHEDULE OF EVENTS

NORTHWEST TRAINING AND TESTING
ENVIRONMENTAL IMPACT STATEMENT/
OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

| | |
|---|---|
| Notice of Intent Published in Federal Register | February 2012 |
| Scoping Meetings | March 2012 |
| Request for Marine Mammal Protection Act Letter of Authorization to National Marine Fisheries Service | July 2013 |
| Draft Environmental Impact Statement Notice of Availability | October 2013 |
| Draft Environmental Impact Statement Public Hearings | Oct-Nov 2013 |
| Final Environmental Impact Statement Notice of Availability | April 2015 |
| Record of Decision | July 2015 |

5

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910
THE DIRECTOR

Mr. John P. Quinn
Deputy Director, Energy and
Environmental Readiness Division
Department of the Navy
2000 Navy Pentagon
Washington, DC 20350-2000

JUL 11 2013

Dear Mr. Quinn:

Thank you for your letter requesting that NOAA's National Marine Fisheries Service (NMFS) participate as a cooperating agency in the preparation of an Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) to evaluate potential environmental effects of military readiness training and research, development, testing, and evaluation (RDT&E) activities conducted within the Northwest Training and Testing (NWTT) Study Area. We reaffirm our support of the Navy's decision to prepare an EIS/OEIS and agree to be a cooperating agency, due, in part, to our responsibilities under section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA) and section 7 of the Endangered Species Act.

In response to your letter, NMFS staff will continue to, to the extent possible,

- Provide timely review and comments, within 30 working days, after the Agency Information Meeting and on working drafts of the EIS/OEIS documents;
- Respond to Navy requests for information, in particular those related to the acoustic effects analysis and the evaluation of the effectiveness of protection and mitigation measures, in a timely manner;
- Participate in meetings, as necessary, hosted by the Navy to discuss issues related to the EIS/OEIS, including public hearings on the draft EIS/OEIS; and
- Adhere to the overall schedule as agreed upon by NMFS and the Navy.

If you need any additional information, please contact Ms. Jolie Harrison, NMFS Office of Protected Resources, at (301) 427-8401.

Sincerely,

Samuel D. Rauch, III
Deputy Assistant Administrator
for Regulatory Programs,
performing the functions and duties of the
Assistant Administrator for Fisheries

THE ASSISTANT ADMINISTRATOR
FOR FISHERIES

Printed on Recycled Paper

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, DC 20350-2000

5090
N454/12U158072
16 February 2012

Mr. Rowan W. Gould
Acting Director
U.S. Fish and Wildlife Service
1849 C Street, NW
Washington, D.C. 20240

Dear Mr. Gould:

In accordance with the National Environmental Policy Act (NEPA), the United States (U.S.) Department of the Navy (Navy) is initiating the preparation of an Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) to assess the potential environmental impacts associated with two categories of Navy readiness activities: training and testing that include the use of active sonar and explosives in the Northwest Training and Testing (NWTT) Study Area. The NWTT Study Area is composed of established maritime operating and warning areas in the eastern North Pacific Ocean region, located adjacent to the northwest coast of the United States, and areas within the Strait of Juan de Fuca, Puget Sound, and the Behm Canal in southeastern Alaska. The NWTT Study Area (Study Area) includes four existing range complexes and facilities: the Northwest Training Range Complex, the Naval Undersea Warfare Center (NUWC) Keyport Range Complex, Carr Inlet Operations Area, and the Southeast Alaska Acoustic Measurement Facility (SEAFAC). In addition to these range complexes, the Study Area also includes select Navy pierside locations and inland waters that are not part of the range complexes where training and sonar testing may occur.

An important aspect of the NWTT EIS/OEIS will be the analysis of the potential effects to species protected under the Endangered Species Act (ESA). The NWTT EIS/OEIS is also intended to serve as a basis for the renewal of current regulatory permits and authorizations; address current training and testing not covered under the existing permits and authorizations; and obtain those permits and authorizations necessary to support force structure changes and emerging and future training and testing requirements. The ESA Section 7 Programmatic Biological Opinion for NWTRC will expire in August 2015. The Programmatic Biological Opinion for NUWC Keyport expires in March 2016. The NWTT EIS combines both the NWTRC and the NUWC Keyport Range Complex, therefore, the earlier NWTRC ESA dates will drive the requirements for NWTT permit completion.

To complete the analysis required by the permitting and consultation process, the Navy and the U.S. Fish and Wildlife Service (USFWS) will need to work together. Therefore, in accordance with the Council on Environmental Quality's (CEQ) NEPA guidelines (specifically 40 CFR Part 1501) and CEQ's 2002 guidance on cooperating agencies, the Navy requests that USFWS serve as a cooperating agency for the development of the NWTT EIS/OEIS.

As the lead agency, the Navy will be responsible for overseeing preparation of the EIS/OEIS that includes, but is not limited to, the following:

- Gathering all necessary background information and preparing the EIS/OEIS and all necessary permit applications associated with acoustic issues within the NWTT Study Area.
- Working with U.S. Fish and Wildlife Service personnel to determine the method of estimating potential effects to threatened and endangered species.
- Determining the scope of the EIS/OEIS, including the alternatives evaluated.
- Circulating the appropriate NEPA documentation to the general public and any other interested parties.
- Scheduling and supervising meetings held in support of the NEPA process, and compiling any comments received.
- Maintaining an administrative record and responding to any Freedom of Information Act requests relating to the EIS/OEIS.

The Navy respectfully requests U.S. Fish and Wildlife Service, in its role as a cooperating agency, provide support as follows:

- Provide timely comments after the Agency Information Meeting (which will be held at the onset of the EIS/OEIS process) and on working drafts of the EIS/OEIS documents. The Navy requests that comments on draft EIS/OEIS documents (Version 2) be provided within 30 working days.
- Respond to Navy requests for information, in particular, those related to review of the acoustic effects analysis and evaluation of the effectiveness of protection and mitigation measures.
- Participate, as necessary, in meetings hosted by the Navy for discussion of issues related to the EIS/OEIS, including public hearings and meetings.
- Adhere to the overall schedule as set forth by the Navy.
- Provide a formal, written response to this request.

The Navy views this agreement as important to the successful completion of the environmental planning process for the NWTT EIS/OEIS. It is the Navy's goal to complete the analysis as expeditiously as possible, while using the best scientific information available. U.S. Fish and Wildlife Service assistance will be invaluable in this endeavor.

2

The point of contact for this action is Ms. Karen M. Foskey, (703) 695-5193, email: Karen.Foskey@navy.mil.

Sincerely,

John P. Quinn

JOHN P. QUINN
Deputy Director, Energy and Environmental Readiness Division (OPNAV N45)

Copy to:
OPNAV N43
Commander, U.S. Fleet Forces Command (N46)
Commander, U.S. Pacific Fleet (N01CE)
Commander, Naval Installations Command (N45)
Commander, Naval Sea Systems Command
Commander, Naval Air Systems Command
Commander, Navy Region Northwest (N40)
Commander, Navy Region Southwest (N40)
Commander, Naval Facilities Engineering Command, Northwest (N45)
Commander, Naval Facilities Engineering Command, Southwest (N45)
Ms. Robyn Thorson, Regional Director, U.S. Fish and Wildlife Service, Pacific Region, 911 NE 11th Avenue, Portland, OR 97232

3

Enclosure 1: Northwest Training and Testing (NWTT) Study Area


4

Enclosure 2: NOTIONAL SCHEDULE OF EVENTS

NORTHWEST TRAINING AND TESTING
ENVIRONMENTAL IMPACT STATEMENT/
OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

| | |
|---|---|
| Notice of Intent Published in Federal Register | February 2012 |
| Scoping Meetings | March 2012 |
| Navy Initiates Section 7 Consultation | April 2014 |
| Draft Environmental Impact Statement Notice of Availability | October 2013 |
| Draft Environmental Impact Statement Public Hearings | Oct-Nov 2013 |
| Final Environmental Impact Statement Notice of Availability | April 2015 |
| Record of Decision | July 2015 |

5

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N01CE1/1349
12 Nov 2013

Vice Admiral Paul F. Zukunft, USCG
Commander, Pacific Area/
Commander, Coast Guard Defense West Area
Building 51-6
Coast Guard Island
Alameda, CA 94501

Dear Admiral Zukunft:

Subj: NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS) - COOPERATING AGENCY

In accordance with the National Environmental Policy Act (NEPA), the United States Department of the Navy is initiating the preparation of an Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) to assess the potential environmental impacts associated with training and testing activities that include the use of active sonar and explosives in the Northwest Training and Testing (NWTT) Study Area.

The NWTT Study Area is composed of established maritime operating and warning areas in the eastern North Pacific Ocean region, located adjacent to the northwest coast of the United States, and areas within the Strait of Juan de Fuca, Puget Sound, and the Behm Canal in southeastern Alaska. The Study Area includes four existing range complexes and facilities: the Northwest Training Range Complex, the Naval Undersea Warfare Center Keyport Range Complex, the Carr Inlet Operations Area, and the Southeast Alaska Acoustic Measurement Facility.

In addition to these range complexes, the Study Area also includes select Navy pierside locations and inland waters that are not part of the range complexes where training and sonar testing may occur.

An important aspect of the NWTT EIS/OEIS will be the analysis of the potential effects to marine species protected under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). The NWTT EIS/OEIS is also intended to serve as a basis for the renewal of current regulatory permits and authorizations, address current training and testing not covered under the existing permits and authorizations, and obtains those permits and authorizations necessary to support force structure changes and emerging and future training and testing requirements.

Subj: NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS) – COOPERATING AGENCY

The proposed action of the EIS/OEIS is to conduct training and testing activities within the NWTT study area. The purpose of the proposed action is to achieve and maintain military readiness to meet the requirements of Title 10 of the U.S. Code, thereby ensuring that the Navy meets its mission to train and equip combat-ready forces capable of winning wars, deterring aggression, and maintaining freedom of the seas.

It has been identified that the U.S. Coast Guard conducts training activities within the NWTT Study Area, some of which are similar in nature to activities conducted by Navy units, and it has been determined that it would be appropriate to specifically incorporate Coast Guard at-sea gunnery training activities in the NWTT EIS/OEIS.

Therefore, in accordance with the Council on Environmental Quality's (CEQ) NEPA guidelines (specifically 40 CFR Part 1501) and CEQ's 2002 guidance on cooperating agencies, the Navy requests that the Coast Guard serves as a cooperating agency for the development of the NWTT EIS/OEIS.

As defined in 40 CFR Part 1501.6, the Navy is the lead agency for the NWTT EIS/OEIS. As the lead agency, the Navy shall:

- Request the participation of each cooperating agency in the NEPA process at the earliest possible time.
- Use the environmental analysis and proposals of cooperating agencies with jurisdiction by law or special expertise, to the maximum extent possible consistent with its responsibility as lead agency.
- Meet with the Coast Guard to discuss the EIS/OEIS process as requested.
- Circulate the appropriate NEPA documentation to the general public and any other interested parties.
- Schedule and supervise meetings held in support of the NEPA process, and compiling any comments received.
- Maintain an administrative record and response to any Freedom of Information Act requests relating to the EIS/OEIS.

Navy respectfully requests the Coast Guard, in its role as a cooperating agency, provide support as follows:

- Participate in the NEPA process.

Subj: NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS) - COOPERATING AGENCY

- Provide data to the Navy on Coast Guard activities that take place in the NWTT EIS/OEIS study area.
- Assume, on request of the Navy, responsibility for developing information and preparing environmental analyses, for which the Coast Guard has special expertise.
- Make available staff support at the lead agency's request to enhance the Navy's interdisciplinary capability.
- Participate, as necessary, in meetings hosted by the Navy for discussion of issues related to the EIS/OEIS.
- Utilize Coast Guard resources, including funding where appropriate, to support role as cooperating agency.
- Adhere to the overall schedule as set forth by the Navy.
- Provide a formal, written response to this request.

The Navy views this agreement as important to the successful completion of the environmental planning process for the NWTT EIS/OEIS. It is the Navy's goal to complete the analysis as expeditiously as possible, while using the best scientific information available. The Coast Guard's assistance will be invaluable in this endeavor.

We appreciate your consideration of our request and look forward to your response. The point of contact for this action is Mr. John Mosher, COMPACFLT N01CE1JM at (360) 257-3234, email: john.g.mosher@navy.mil.

Very respectfully,

B. J. MUILENBURG
Fleet Civil Engineer

Copy to:
OPNAV WASH DC (N45)
COMNAVSEASYSCOM WASH DC
COMNAVAIRSYSCOM PATXENT RIVER MD
COMNAVREG NW SEATTLE WA (N40)

3

U.S. Department of Homeland Security
United States Coast Guard

Commander
United States Coast Guard
Pacific Area

Coast Guard Island,
BLDG. 51-6
Alameda, CA 94501-5100
Staff Symbol: PAC-00
Phone: (510) 437-3522
Fax: (510) 437-3774

16475

# MEMORANDUM

From: P. F. Zukunft, VADM 12/20/13
CG PACAREA (PAC-00)

LCDR R. Brubaker
(510) 437-3643

To: RDML B. J. Muilenburg
Fleet Civil Engineer
United States Pacific Fleet

Subj: NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS) – COOPERATING AGENCY

Ref. (a) Your letter 5090 of 12 Nov 2013

1. The Coast Guard is pleased to accept the offer, as per reference (a), to participate as a cooperating agency in the subject EIS/OEIS. Doing so will materially further the Coast Guard's interest in the use of Navy range complexes for necessary Coast Guard weapons and military readiness training and will assist in mutual efforts associated with the operation of the Range Complex and establishment of safety zones in accordance with 33 Code of Federal Regulations (CFR) Part 165. As the Coast Guard is a military service and a branch of the Armed Forces, we believe that this action is, and will remain, in full compliance with 40 CFR Part 1501 and the council on Environmental Quality Cooperating Agency guidance issued on 30 January 2002.

2. The Coast Guard agrees with the Navy's statements on pages 2 and 3 of reference (a) concerning the Navy's actions as the lead agency in the EIS/OEIS. As a cooperating agency, the Coast Guard will, to the extent allowed by available resources and fiscal constraints:

- Participate in the NEPA process;
- Provide data to the Navy on Coast Guard activities and operations that take place in the NWTT EIS/OEIS study areas;
- Assume, on request of the Navy, responsibility for developing information and preparing environmental analyses, for which the Coast Guard has special expertise;
- Make available staff support at the lead agency's request to enhance the Navy's interdisciplinary capability, consistent with operational requirements;

Subj: NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS) – COOPERATING AGENCY

16475

- Participate, as necessary, in meetings hosted by the Navy for discussion of issues related to the EIS/OEIS;
- Utilize available Coast Guard resources, including funding where appropriate and available, to support our role as a cooperating agency; and
- Adhere to the overall schedule as set forth by the Navy.

3. As a cooperating agency, I request that the U.S. Coast Guard, as an armed force of the United States within the Department of Homeland Security, be expressly mentioned and described in the NWTT EIS/OEIS, and our operations and activities that take place in the study area be analyzed for environmental effects. To assist the Navy, the Coast Guard is providing operational data to the Navy on Coast Guard operations and activities that take place in the NWTT EIS/OEIS study areas, and we will continue to do so as necessary and appropriate.

4. This memo constitutes the formal written response requested by your letter. I request that the Navy supply the Coast Guard with two preliminary copies of all draft and final NWTT EISs/OEISs for our review of these documents, with a minimum 14 day response period in each instance. This action is important to the successful completion of the environmental planning process for the NWTT EIS/OEIS. We look forward to working with the Navy to facilitate mission accomplishment through productive use of the Northwest Training and Testing Range Complex.

5. The Coast Guard point of contact for all correspondence and exchanges of information with the Navy concerning the NWTT EIS/OEIS is Mr. Brad McKitrick, CG-OES-4 at (202) 372-1443, Bradley.K.McKitrick@uscg.mil.

#

Copy: DCMS
DCO
CG-4
CG-47
CG-0941
CG-7
CG-OES
CGD ELEVEN
CGD THIRTEEN
CGD SEVENTEEN

2

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
N01CE1/1554
17 Dec 2013

Ms. Donna Wieting
Director, Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
1315 East-West Highway
SSMC3, Room 13821
Silver Springs, MD 20910-3282

Dear Ms. Wieting:

SUBJECT: REQUEST FOR MARINE MAMMAL PROTECTION ACT (MMPA) INCIDENTAL TAKE AUTHORIZATION AND REGULATIONS FOR THE NORTHWEST TRAINING AND TESTING (NWTT) ACTIVITIES

In accordance with MMPA, as amended and 50 C.F.R. Part 216, the U.S. Navy requests 5-year incidental take authorization and regulations for the incidental taking of marine mammals associated with NWTT activities occurring within the NWTT Study Area.

The Proposed Action may incidentally expose marine mammals that reside within the NWTT study area to sound and other environmental stressors associated with training and testing activities. The enclosure further describes the NWTT activities and study area and provides the specific information required by National Marine Fisheries Service (NMFS) for consideration of an incidental take request.

The U.S. Navy requests the above regulations authorize, and the NMFS issue, two 5-year Letters of Authorizations; one issued to Commander, U.S. Pacific Fleet for training activities and one issued to Commander, Naval Sea Systems Command for testing activities. Addresses for these commands are provided below:

Commander, United States Pacific Fleet
Attn: N01CE1
250 Makalapa Drive
Pearl Harbor, HI 96860-3131

SUBJECT: REQUEST FOR MARINE MAMMAL PROTECTION ACT (MMPA) INCIDENTAL TAKE AUTHORIZATION AND REGULATIONS FOR THE NORTHWEST TRAINING AND TESTING (NWTT) ACTIVITIES

Commander, Naval Sea Systems Command
Attn: Code SEA 04R
1333 Isaac Hull Avenue, SE
Washington Navy Yard, Washington DC 20376

We appreciate your continued support in helping the U.S. Navy to meet its environmental responsibilities. My point of contact for this matter is Mr. Chip Johnson (619) 767-1567, or e-mail: chip.johnson@navy.mil.

Sincerely,

L. M. FOSTER
By direction

Enclosure: Request for Regulations and Letter of Authorization for the Incidental Taking of Marine Mammals Resulting from U.S. Navy Training and Testing Activities in the NWTT Study Area

Copy to:
Mr. Brian Hopper, F/PR1 Permits and Conservation Division, NMFS Office of Protected Resources
Mr. Stan Rogers, F/PR5 Endangered Species Act Interagency Cooperation Division, NMFS Office of Protected Resources

2

FINAL 26 September 2014

MEMORANDUM

From: Environmental Readiness Division (N465), U.S. Pacific Fleet
To: National Marine Fisheries Service Office of Protected Resources, Permits and Conservation Division (F/PR1)

Subj: CORRECTIONS AND REVISIONS TO THE U.S. NAVY'S NORTHWEST TRAINING AND TESTING LETTER OF AUTHORIZATION APPLICATION

Encl: (1) Transit Protection System Activity Addition to Navy NWTT Activities
(2) Emergent Training Adjustments for Additional AN/SSQ-125 MAC Sonobuoys
(3) Guadalupe fur seal effect analysis justification

1. To support the National Marine Fisheries Service's (NMFS) reinitiation of consultation on the Letter of Authorization (LOA) for the Navy's Northwest Training and Testing (NWTT) Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS), the U.S. Navy is proposing several revisions to its NWTT LOA application.

2. Some of the revisions explained in this memo also trigger the Navy's need to prepare a Supplemental NWTT EIS/OEIS. That NEPA action will likely be forthcoming. In terms of the NWTT LOA application, it remains the Navy's assertion that these revisions to the original December 19, 2013 NWTT LOA application do not change any of the Navy's impact assessments or previous conclusions within either the LOA application, the draft NWTT EIS/OEIS, or likely conclusions to be set forth in proposed Supplemental NWTT EIS/OEIS.

3. Enclosure 1-3 contains details of the Navy's reassessment by topic. Specific revisions include:

- Adding a new activity, Transit Protection System (TPS), to events within Puget Sound portion of NWTT. TPS events are not expected to have significant marine mammal impacts (Enclosure 1).

- Updates to exposure estimates for Chapter 5 of Navy's LOA application based on emergent changes to specific types of sonobuoy use. Entails use of additional multistatic active coherent (non-impulsive) sonobuoys (AN/SSQ-125 MAC) and the discontinued use of Improved Extended Echo Ranging (AN/SSQ-110 IEER) (impulsive) sonobuoys during training activities (Enclosure 2).

- Update to Guadalupe fur seal exposures based on further review of animal co-occurrence or lack of co-occurrence with specific Navy training and testing events (Enclosure 3).

FINAL 26 September 2014

Subj: CORRECTIONS AND REVISIONS TO THE U.S. NAVY'S NORTHWEST TRAINING AND TESTING LETTER OF AUTHORIZATION APPLICATION

- While revising the LOA application, the Navy took the opportunity to update revised stock information from NMFS' publication of their final 2013 Stock Assessment Reports (SAR) in August 2014. Any new species updates from the final 2013 SARs were applied to Chapter 3 of the LOA application. These updates do not affect marine mammal densities used for acoustic impact modeling nor change any Navy assessment or conclusion.

- The Navy also streamlined Chapter 11 mitigations for easier readability and consistency with prior Phase II LOA applications. No mitigation measures were changed or modified from previous submission, however.

Copy to:
OPNAV N45

26 September 2014

**ENCLOSURE 1. Transit Protection System Activity Addition to Navy NWTT Activities**

**Additional Navy Activity**

Following promulgation of the Navy' Draft Northwest Training and Testing (NWTT) Environmental Impact Statement/ Overseas Environmental Impact Statement (Navy 2014[1]) and associated December 2013 Letter of Authorization (LOA) application, an additional Navy activity was desired for inclusion within the overall framework of NWTT activities.

To that end, the Navy is analyzing potential environmental impacts of approximately 226 ongoing annual Maritime Security Operations events in Puget Sound and the Strait of Juan de Fuca. These critical events have been occurring since 2006 and exercise the Navy's Transit Protection System, where up to nine escort vessels provide protection during all nuclear ballistic missile submarine (SSBN) transits between the vessel's homeport and the dive/surface point in the Strait of Juan de Fuca or Dabob Bay.

During a Transit Protection System event, the security escorts enforce a moving 1,000 yard security zone around the SSBN to prevent other vessels from approaching while the SSBN is in transit on the surface. These events include security escort vessels, U.S. Coast Guard (USCG) personnel and their ancillary equipment and weapons systems.

The Transit Protection System involves the movement of security vessels and also includes periodic exercises and firearms training with blank rounds. Marine mammal impacts of these actions are similar in nature to those Navy activities captured in the Draft NWTT EIS/OEIS already and inclusion is assessed to be not significant under NEPA. The Transit Protection System does not involve in-water acoustic sources that are subject to regulation or that would otherwise affect marine species. Given the relative slow speed of the escorted and blocking vessels and multiple lookouts, no marine mammal vessel strikes are expected as a result of these events.

[1] Department of the Navy (Navy). 2014a. Northwest Training and Testing Environmental Impact Statement/ Overseas Environmental Impact Statement-Draft January 2014. United States Pacific Fleet, Pearl Harbor, HI.

Enclosure 1-1

26 September 2014

**ENCLOSURE 2. Emergent Training Adjustments for Additional AN/SSQ-125 MAC Sonobuoys**

**Background**

The Draft NWTT EIS was publically released for review and comment on 24 January, 2014. On 27 June, 2014 a reassessment of the requirements for future anti-submarine warfare training in the Pacific Northwest determined an increase in the number of AN/SSQ-125 Multistatic Active Coherent (MAC) sonobuoys was required necessitating changes to the Draft EIS and an amendment to the MMPA LOA application that was initially submitted to NMFS on 18 December, 2013.

The Fleets are in the process of a gradual transition of replacing AN/SSQ-110 explosive source sonobuoys with the third generation AN/SSQ-125 MAC sonobuoys that necessitates an increased training requirement with AN/SSQ-125 MAC sonobuoys for the NWTT EIS time frame. For the NWTT EIS and LOA application, the Navy needs to increase the previously requested AN/SSQ-125 MAC sonobuoy quantity from 20 to 720 sonobuoys per year. This increase is necessary based on the establishment of additional P-8 squadrons in the Pacific Northwest, and revised anti-submarine warfare squadron training proficiency requirements. The increased allotment of AN/SSQ-125 MAC sonobuoys will allow each aircrew to complete one live search training event per year.

Based on the training increase anticipated for AN/SSQ-125 MAC sonobuoys, total NWTT Level B exposures will increase annually from 24,211 to 107,070. Approximately 82% (87,515 exposures) of the new total would be attributed to two coastal ocean stocks of harbor porpoise. The Northern Oregon-Washington Coast harbor porpoise stock would increase from 2,147 to 35,006 Level B exposures and the Northern California-Southern Oregon stock of harbor porpoise would increase from 3,221 to 52,509 Level B exposures. The increase in sonobuoys for training does not result in any additional modeled Level A exposures for NWTT. All exposures are Level B behavioral exposures. There are no changes proposed to any NWTT testing activity and therefore no adjustments needed to the previously submitted testing take request. The reason for the substantial increase in harbor porpoise Level B exposures is the Navy's current use of the very conservative 120 dB step function criteria for this species. Another contributing factor to the substantial increase in Level B exposures is the Navy at the outset of Phase II modeling in 2008-2009 did not have sufficient information as to the precise operational use requirements planned for the SSQ-125 sonobuoys.

Associated with the required training increase for AN/SSQ-125 MAC sonobuoys, Fleet training use of AN/SSQ-110 explosive source sonobuoys has been discontinued, and AN/SSQ-110 sonobuoys are being removed from the NWTT LOA application and NWTT EIS/OEIS. Based on current Navy Acoustic Effects Model (NAEMO) parameters, removal of the previously modeled 150 AN/SSQ-110 sonobuoys does not result in large reductions in estimated marine mammal exposures; however, because the AN/SSQ-110 explosive source sonobuoys have greater potential to cause injury or mortality to marine animals, it is felt that the removal of AN/ SSQ-110 sonobuoys will result in a decrease in potential impacts to the overall marine environment.

Correspondingly, the Chapter 5 take tables for training activities in the revised NWTT LOA application have been adjusted to account for increased takes that would result from the Navy's proposed increased in AN/SSQ-125 MAC sonobuoy training, and decreases associated with removal of AN/SSQ-110 sonobuoys (Table 5-2). In addition, the ASW2 bin in Table 1-8 will be adjusted from "20" to "720", and the E4 bin in Table 1-10 will be adjusted from "150" to "0". **Table E2-1** of this Enclosure shows the species-specific take request changes for the September 2014 revised NWTT LOA application as compared to the December 2013 version.

Enclosure 2-1

26 September 2014

**Table E2-1. Training Take Request from Table 5-1 of NWTT LOA Application Comparing Sep 2014 and Dec 2013 Versions**

*[blue colored font denotes those species with changes; green font just to highlight harbor porpoise changes separate from other species; two species showing single-value changes the result of spreadsheet rounding, (Washington Inland Water stocks of harbor porpoise and harbor seal]*

| Species | Stock | Sep 2014 Annual | | Dec 2013 Annual | |
|---|---|---|---|---|---|
| | | Level B | Level A | Level B | Level A |
| North Pacific right whale | Eastern North Pacific | 0 | 0 | 0 | 0 |
| Humpback whale | Central North Pacific | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 12 | 0 | 12 | 0 |
| Blue whale | Eastern North Pacific | 5 | 0 | 5 | 0 |
| Fin whale | Northeast Pacific | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 25 | 0 | 24 | 0 |
| Sei whale | Eastern North Pacific | 0 | 0 | 0 | 0 |
| Minke whale | Alaska | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 18 | 0 | 18 | 0 |
| Gray whale | Eastern North Pacific | 6 | 0 | 6 | 0 |
| | Western North Pacific | 0 | 0 | 0 | 0 |
| Sperm whale | North Pacific | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 81 | 0 | 80 | 0 |
| *Kogia* (spp.) | California, Oregon, & Washington | 73 | 0 | 69 | 0 |
| Killer whale | Alaska Resident | 0 | 0 | 0 | 0 |
| | Northern Resident | 0 | 0 | 0 | 0 |
| | West Coast Transient | 9 | 0 | 8 | 0 |
| | East North Pacific Offshore | 13 | 0 | 13 | 0 |
| | East N. Pacific Southern Resident | 2 | 0 | 2 | 0 |
| Short-finned pilot whale | California, Oregon, & Washington | 0 | 0 | 0 | 0 |
| Short-beaked common dolphin | California, Oregon, & Washington | 734 | 0 | 715 | 0 |
| Bottlenose dolphin | California, Oregon, & Washington | 0 | 0 | 0 | 0 |
| Striped dolphin | California, Oregon, & Washington | 22 | 0 | 21 | 0 |
| Pacific white-sided dolphin | North Pacific | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 3,482 | 0 | 3,424 | 0 |
| Northern right whale dolphin | California, Oregon, & Washington | 1,332 | 0 | 1,309 | 0 |
| Risso's dolphin | California, Oregon, & Washington | 657 | 0 | 646 | 0 |
| Harbor porpoise | Southeast Alaska | 0 | 0 | 0 | 0 |
| | Northern Oregon/Washington Coast | 35,006 | 0 | 2,147 | 0 |
| | Northern California/Southern Oregon | 52,509 | 0 | 3,221 | 0 |
| | Washington Inland Waters | 1,417 | 1 | 1,416 | 1 |
| Dall's porpoise | Alaska | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 3,730 | 4 | 3,477 | 4 |
| Cuvier's beaked whale | Alaska | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 353 | 0 | 311 | 0 |
| Baird's beaked whale | Alaska | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 591 | 0 | 522 | 0 |
| *Mesoplodon* beaked whales | California, Oregon, & Washington | 1,417 | 0 | 1,247 | 0 |
| Steller sea lion | Eastern U.S. | 404 | 0 | 398 | 0 |
| Guadalupe fur seal | San Miguel Island | 7 | 0 | 37 | 0 |
| California sea lion | U.S. Stock | 814 | 0 | 803 | 0 |
| Northern fur seal | Eastern Pacific | 2,495 | 0 | 2,453 | 0 |
| | San Miguel Island | 37 | 0 | 37 | 0 |
| Northern elephant seal | California Breeding | 1,271 | 0 | 1,241 | 0 |
| Harbor seal | Clarence Strait | 0 | 0 | 0 | 0 |
| | OR/WA Coastal | 0 | 0 | 0 | 0 |
| | Washington Inland Waters | 548 | 4 | 547 | 4 |
| | **TOTALS** | **107,070** | [illegible] | **24,209** | [illegible] |

Enclosure 2-2

26 September 2014

**ENCLOSURE 3. Guadalupe fur seal effect analysis justification**

**Background**

During development of the Navy' Draft Northwest Training and Testing (NWTT) Environmental Impact Statement/ Overseas Environmental Impact Statement (Navy 2014a) and associated Letter of Authorization (LOA) application, the Navy was asked by NMFS to include a potential analysis of exposures to Guadalupe fur seals. Guadalupe fur seals are thought to currently be more infrequent and rare in distribution within the Pacific Northwest although there were historic and archeological records of presence in the past.

While there are past and current reports of Guadalupe fur seal strandings in the Pacific Northwest, NMFS does not have at-sea Guadalupe fur seal sightings from which to derive a density estimate. For the NWTT EIS/OEIS, the Navy elected to take a subset of Northern fur seal modeled exposures as a surrogate for Guadalupe fur seals (*see **Attachment** A of Enclosure 3*).

Essentially, a fraction of the northern fur seal modeled exposures from the Navy Acoustic Effects Model (NAEMO) were used for Guadalupe fur seals exposures based on a comparative ratio of expected occurrence offshore in NWTT for northern fur seals and Guadalupe fur seals (based on NMFS stranding records). Northern fur seal at-sea densities described on pages 320-324 of Navy (2014b) were derived as a single NWTT Study Area wide layer (0.106 animals/km$^2$ winter and spring, and 0.082 animals/km$^2$ summer and fall).

The estimated (not modeled) results for Guadalupe fur seals were incorporated directly into the Draft NWTT EIS/OEIS and original December 2013 NWTT LOA application.

This initial analysis, however, was done without consideration of the likely differences in biological at-sea distributions of both northern fur seals and Guadalupe fur seals. Northern fur seals have a documented highly pelagic distribution through the offshore waters of NWTT where the majority of Navy training would occur (Davis et al. 2008, NMFS 2007, Lee et al. 2014, Pelland et al. 2014, Sterling et al. 2014). This was the justification for the NWTT Study Area wide single density values by season (Navy 2014b). (*See also **Attachments** A and **B** of Enclosure 3*)

Within the Pacific Northwest, Guadalupe fur seals are more likely to be coastally distributed given their extralimital at-sea occurrence and associated stranding records (Lambourn et al. 2012). Strandings by year as reported by Lambourn et al. (2012) are shown in **Table E3-1**.

Most Guadalupe fur seal strandings in the Pacific Northwest likely represent young individuals at the extreme limits of their preferred geographic foraging range as indicated by the poor health of examined carcasses to date (see Figure 7 from Lambourn et al. 2012). All of the strandings were yearling Guadalupe fur seals with the exception of one thin, anemic, and half-blind adult female (Lambourn et al. 2012). There is no current evidence to support normal population expansion into the Pacific Northwest (e.g., lack of significant sightings of healthy individuals at-sea, lack of sightings of healthy individuals hauled-out on shore, etc.).

Enclosure 3-3

26 September 2014

During this same period, there were only three at-sea sightings of Guadalupe fur seals made within 30 miles from shore (Lambourn et al. 2012).

**Table E3-1. Guadalupe fur seal stranding in the Pacific Northwest 1992-2011.**

| Year | # Guadalupe fur seal strandings | Comments |
|---|---|---|
| 1992 | 1 | |
| 2005 | 1 | |
| 2006 | 3 | |
| 2007 | 19 * | June 20, 2007 -November 1 2007. Unusual Mortality Event declared by NMFS |
| 2008 | 5 * | |
| 2009 | 5 * | Unusual Mortality Event declared over by NMFS December 2009 |
| 2010 | 10 | |
| 2011 | 16 | |

*Of the 29 strandings, there was one live stranded female with the rest deceased with both sexes of yearlings. Based on examination by NMFS stranding personnel of 14 collected carcasses, most of the animals were assessed as being "thin". The live stranded adult female was acting disoriented. This animal was held for ten days at Point Defiance Zoo and Aquarium. She was thin, anemic, blind in the right eye and an old healed scar over her right shoulder. Teeth were broken on the right side of her jaw.

During similar time period, only three at-sea sightings of Guadalupe fur seals were made <30 mile from shore (Lambourn et al. 2012)

**Recommendation**

The Navy is proposing to modify the Guadalupe fur seal take number in the Final NWTT EIS/OEIS and associated revised LOA application to account for species specific biological differences in at-sea distributions within NWTT. This would limit Guadalupe fur seal exposures as compared to the process described in the Background above, as well as more realistically reflect impacts from offshore Navy training and testing events.

The first step in this reanalysis is an examination of the exact Navy events modeled in NAEMO that generated exposures for Northern fur seals. **Table E3-2** shows the percentages of model exposures by Navy activity. The Navy would then analyze the potential for co-occurrence of the activities resulting in exposures with the Guadalupe fur seal's distribution to determine if the currently predicted exposures should be modified.

For training, the Navy asserts that TRACKEX events typically conducted >50 nm from shore in the NWTT Study Area would have limited to no co-occurrence with Guadalupe fur seals and would not result in training related MMPA exposures. TRACKEX events account for 82% of exposures under NWTT EIS/OEIS Alternative 1 (preferred alternative) for the NWTT LOA application (**Table E3-2**). The remaining 18% of exposures were from offshore submarine sonar maintenance and offshore surface ship sonar maintenance. While these events would also likely be further offshore, the Navy cannot totally exclude such events from at-sea co-occurring with the Guadalupe fur seal.

Enclosure 3-4

26 September 2014

For testing, the Navy asserts that countermeasure testing and LCS mission package testing-ASW typically conducted >50 nm from shore in the NWTT Study Area would have limited to no co-occurrence with Guadalupe fur seals and would not result in testing MMPA exposures. Countermeasure testing and LCS mission package testing- ASW events account for 92% of exposures under the NWTT EIS/OEIS Alternative 1 (preferred alternative) for the NWTT LOA application (**Table E3-2**). The remaining 8% of exposures were from various testing activities with the majority (5.6%) from ASW-DDG-SSN testing which the Navy cannot totally exclude from at-sea co-occurrence with the Guadalupe fur seal.

Based on the results of this analysis, the Navy is modifying current NWTT EIS/OEIS tables and revised LOA application to account for a percentage decrease in Guadalupe fur seal take requests. For the revised NWTT LOA application, the Guadalupe fur seal Level B behavioral take request for training will change from "37" to "7" and for testing will change from "27" to "3".

**Table E3-2. Phase II NAEMO modeled exposures to Northern fur seal in relationship to Navy training events similar to NWTRC Phase I events and for NWTT.**

| NWTT events applicable to the NWTT LOA application | Dec 2013 Percentage of Northern fur seal modeled exposures | Dec 2013 Guadalupe fur seal take request | Proposed Aug 2014 Modification amount | *Revised Navy recommended Guadalupe fur seal take request* | Rational |
|---|---|---|---|---|---|
| **Training Activities Deemed to Not Have High Probability Of Overlap With Guadalupe Fur Seals** | | | | | |
| TRACKEX (Maritime patrol aircraft, submarine, surface ship) | 82% | 37 | -30 | 7 | 82% of exposures from TRACKEX, therefore 30 exposures (82% of 37) can be reduced |
| **Training Activities That Could Have Overlap With Guadalupe Fur Seals** | | | | | |
| Submarine sonar maintenance | 11% | | | | |
| Surface ship sonar maintenance | 7% | | | | |
| **Testing Activities Deemed to Not Have High Probability Of Overlap With Guadalupe Fur Seals** | | | | | |
| NAVSEA countermeasure testing | 81% | 27 | -24 | 3 | 92% of exposures from countermeasure testing and LCS package testing-ASW, therefore 24 exposures (92% of 27) can be reduced |
| NAVSEA LCS mission package testing- ASW | 11% | | | | |
| **Testing Activities That Could Have Overlap With Guadalupe Fur Seals** | | | | | |
| NAVSEA ASW-DDG-SSN | 6% | | | | |
| Various others | < 1% | | | | |

Enclosure 3-5

26 September 2014

***ATTACHMENT A to ENCLOSURE 3***

Text for Guadalupe fur seals from Navy's NWTT EIS/OEIS. From Navy (2014a[1]), page 3.4-115:

"There is insufficient information available for the accurate derivation of a density or abundance representing the likely presence of Guadalupe fur seals in the offshore portion of the Study Area given the emergent nature of the data associated with the return of this species to the Washington/Oregon coast. Although rare, Guadalupe fur seals are known to be present. In 2012, there were 58 Guadalupe fur seals found stranded on Washington/Oregon coast (Lambourn 2013, pers. comm.). Under the assumption that not more than 50 percent of animals (mostly young of the year) have stranded, the number of strandings in 2012 suggests there are approximately 116 Guadalupe fur seals present offshore in the Study Area. Given the offshore portion of the Study Area is approximately 416,845 km2 in area, this suggested number of animals present based on standings would translate to a density of 0.00028 Guadalupe fur seal per km2 in the Offshore Area. In comparison, in the warm season there should be 663 California stock1 of northern fur seal present in the same Offshore Area having a calculated density of 0.00159 per km2 or approximately 5.5 times that estimated for Guadalupe fur seal.

Given there is density data and acoustic effects modeling for northern fur seal, in a conservative approach (assumed to overestimate actual impacts) that provides for a quantification of effects to Guadalupe fur seals, the Navy has taken the acoustic effects modeling results for California stock northern fur seals as a surrogate for Guadalupe fur seals. This is suggested as a reasonable approach since the most recent stranding data suggests it should provide a conservative estimate of effects to Guadalupe fur seals. In addition, the seasonal presence for the two species/stocks is likely the same and both have a similar distance to cover from the Study Area migrating south to their rookery (for the California stock of northern fur seal, approximately 1,100 nm to the main rookery at San Miguel Island; and for Guadalupe fur seal, approximately 1,400 nm to Guadalupe Island). Given the latest abundance for California stock of northern fur seals as provided by Carretta et al. (2013) is n=9,968 (from a 2007 survey) and as provided in Esperon-Rodriguez and Gallo-Reynoso (2012) for Guadalupe fur seals is "14,000–15,000" (from a 2008 survey), it is assumed that potential differences in relative abundances for the two species in the Study Area are evened-out by the additional 360 mi. distance from the Guadalupe Island rookery.

For these reasons, the Navy will assume that the acoustic effects modeling results for the California stock of northern fur seal are a reasonable approximation and conservative estimation of effects to Guadalupe fur seals in the Study Area as a result of Navy training and testing activities."

[1] Department of the Navy (Navy). 2014a. Northwest Training and Testing Environmental Impact Statement/ Overseas Environmental Impact Statement- Draft January 2014. United States Pacific Fleet, Pearl Harbor, HI.

Enclosure 3 Attachment A-1

26 September 2014

REFERENCES:

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Department of the Navy (Navy). 2014a. Northwest Training and Testing Environmental Impact Statement/ Overseas Environmental Impact Statement- Draft January 2014. United States Pacific Fleet, Pearl Harbor, HI.

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National Marine Fisheries Service (NMFS). 2007. Conservation plan for the Eastern Pacific stock of northern fur seal (*Callorhinus ursinus*). National Marine Fisheries Service, Juneau, Alaska. 110 p.

Olesiuk, P.F. 2012. Habitat utilization by northern fur seals (*Callorhinus ursinus*) in the Northeastern Pacific Ocean and Canada. Fisheries and Oceans Canada. Research Document 2012/040. 27 p.

Pelland, N.A., J. T Sterling, M.A. Lea, N.A. Bond, R.R. Ream, C.M. Lee and C.C. Eriksen. 2014. Fortuitous encounters between seagliders and adult female northern fur seals (*Callorhinus ursinus*) off the Washington (USA) coast: Upper ocean variability and links to top predator behavior. PLoS One, 9(8). e101268. doi: 10.1371/journal.pone.0101268.

Sterling J.T., A.M. Springer, S.J. Iverson, S.P. Johnson, N.A. Pelland, D.S. Johnson, M-A. Lea, and N.A. Bond. 2014. The Sun, Moon, Wind, and Biological Imperative-Shaping Contrasting Wintertime Migration and Foraging Strategies of Adult Male and Female Northern Fur Seals (*Callorhinus ursinus*). PLoS ONE 9(4): e93068. doi:10.1371/journal.pone.0093068

Enclosure 3 Attachment B-1

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0032
January 9, 2015

Ms. Cathy Tortorici
Division Chief, Endangered Species Act
Interagency Cooperation Division
Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
SSMC3, Room 13821
1315 East-West Highway
Silver Spring, MD 20910-3282

SUBJECT: REQUEST FOR INITIATION OF ENDANGERED SPECIES ACT SECTION 7 FORMAL CONSULTATION FOR THE U.S. NAVY'S NORTHWEST TRAINING AND TESTING ACTIVITIES

Dear Ms. Tortorici:

In accordance with Section 7 of the Endangered Species Act (ESA), the U.S. Navy (Navy) requests initiation of formal consultation on Northwest Training and Testing (NWTT) activities occurring within the Pacific Ocean off the coast of Washington, Oregon, and Northern California, and in the inland waters of Washington (Puget Sound and the Strait of Juan de Fuca) and in Alaska (Western Behm Canal).

The proposed action "*may affect*" listed species and designated critical habitat in the NWTT Action Area. The NWTT Biological Evaluation (BE) (Enclosure 1) is the Navy's primary document that provides the required information pursuant to 50 C.F.R. §402.12(f). Those species and critical habitats with a "*no effect*" determination were not carried forward into the NWTT BE.

The complete list of ESA species and critical habitats evaluated and the Navy's determinations are provided in the attached summary table (Enclosure 2).

SUBJECT: REQUEST FOR INITIATION OF ENDANGERED SPECIES ACT SECTION 7 FORMAL CONSULTATION FOR THE U.S. NAVY'S NORTHWEST TRAINING AND TESTING ACTIVITIES

The Navy is requesting formal consultation on the ESA-listed species with a "*likely to adversely affect*" determination. The Navy is requesting concurrence on our "*not likely to adversely affect*" determinations for listed species and designated critical habitat. The Navy is also requesting a conference opinion on proposed critical habitats as identified in Enclosure (2).

We appreciate your continued support in helping the Navy meet its environmental responsibilities. My points of contact for this matter are Ms. Andrea Balla-Holden (360) 396-0002, andrea.ballaholden@navy.mil; or Mr. Chip Johnson (619) 767-1567, chip.johnson@navy.mil.

Sincerely,

L. M. FOSTER
By direction

Enclosures: 1. NWTT Biological Evaluation (CD-ROM)
2. Status & Effect Determinations of ESA-listed Species and Critical Habitat

2

DEPARTMENT OF THE NAVY
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0033
January 9, 2015

Eric Rickerson
Manager, Western Washington Fish and Wildlife Office
U.S. Fish and Wildlife Service
510 Desmond Drive SE, Suite 102
Lacey, WA 98503

SUBJECT: REQUEST FOR INITIATION OF ENDANGERED SPECIES ACT SECTION 7 FORMAL CONSULTATION FOR THE U.S. NAVY'S NORTHWEST TRAINING AND TESTING ACTIVITIES

Dear Mr. Rickerson:

In accordance with Section 7 of the Endangered Species Act (ESA), the U.S. Navy (Navy) requests initiation of formal consultation on Northwest Training and Testing (NWTT) activities occurring within the Pacific Ocean off the coast of Washington, Oregon, and Northern California, and in the inland waters of Washington (Puget Sound and the Strait of Juan de Fuca) and in Alaska (Western Behm Canal).

The proposed action "*may affect*" listed species and designated critical habitat in the NWTT Action Area. The NWTT Biological Evaluation (BE) (Enclosure 1) is the Navy's primary document that provides the required information pursuant to 50 C.F.R. §402.12(f). Those species and critical habitats with a "*no effect*" determination were not carried forward into the NWTT BE.

The Navy has concluded that the proposed project "*may affect, likely to adversely affect*" the marbled murrelet (*Brachyramphus marmoratus*) and bull trout (*Salvelinus confluentus*) by exposing them to sound and other environmental stressors associated with training and testing activities. The Navy requests formal consultation on these ESA-listed species.

The Navy also concludes that the proposed action "*may affect, not likely to adversely affect*" the following species

SUBJECT: REQUEST FOR INITIATION OF ENDANGERED SPECIES ACT SECTION 7 FORMAL CONSULTATION FOR THE U.S. NAVY'S NORTHWEST TRAINING AND TESTING ACTIVITIES

that occur in the NWTT Action Area: northern spotted owl (*Strix occidentalis caurina*), short-tailed albatross (*Phoebastria albatrus*), streaked horned lark (*Eremophila alpestris strigata*), and western snowy plover (*Charadrius nivosus nivosus*). The Navy requests concurrence on the ESA-listed species with "may affect, not likely to adversely affect" determinations.

The Navy has determined that the action would have "*no effect*" on critical habitat for bull trout, marbled murrelet, northern spotted owl, and western snowy plover. Streaked horned lark critical habitat does not occur in the Action Area, and short-tailed albatross critical habitat has not been designated. The yellow-billed cuckoo (*Coccyzus americanus*), Taylor's checkerspot butterfly (*Euphydryas editha taylori*), and golden paintbrush (*Castilleja levisecta*) do not occur in or near the NWTT Action Area. Those species and critical habitats with a "*no effect*" determinations were not carried forward in the NWTT BE.

The Navy is requesting formal consultation on the ESA-listed species with a "*likely to adversely affect*" determination. The Navy is requesting concurrence on our "*not likely to adversely affect*" determinations for listed species and designated critical habitat.

We appreciate your continued support in helping the Navy meet its environmental responsibilities. My points of contact for this matter are Ms. Cindi Kunz, (360)396-1860, cindi.kunz@navy.mil or Ms. Andrea Balla-Holden, andrea.ballaholden@navy.mil, (360)396-0002.

Larry M. Foster

L. M. FOSTER
By direction

Enclosure: 1. NWTT Biological Evaluation (CD-ROM)

2

# United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

JUN - 4 2015

In Reply Refer To:
**01EWFW00-2015-F-0251**

Commander Larry M. Foster
Department of the Navy, U.S. Pacific Fleet
Director, Fleet Environmental Readiness Division
250 Makalapa Drive
Pearl Harbor, Hawaii 96860-3131

Dear Commander Foster:

This letter is in response to your January 9, 2015, request for Section 7 consultation under the Endangered Species Act for the U.S. Navy's (Navy) Northwest Training and Testing Activities. Your letter and Biological Evaluation were received in our office on January 20, 2015.

The U.S. Fish and Wildlife Service (Service) has been reviewing and discussing the project with the Navy to get a complete and accurate description of the project activities. The Service has been coordinating with the Navy through emails, conference calls, and meetings to determine the location, duration, frequency, and stressors associated of each activity along the outer coast of northern California, Oregon, and Washington, and the inland waters of Puget Sound. Specifically, the Service requested information from the Navy on the land-based activities associated with the Electromagnetic Warfare Operations and more detail on project activities in emails and phone conversations in March, April 30 and May 11, 2015. We received responses and supplemental information on some of the questions from the Navy on April 1, 2015. The Service also requested the Navy to assist in filling out the project deconstruction matrix to determine individual activity locations and stressors to listed species. The Navy provided the requested information on May 8, and May 22, 2015.

The Service believes that the information provided by the Navy up to and including the information received on May 22, 2015, provides sufficient information to initiate formal consultation on that date. While the Service has initiated consultation, the complexity of the Navy's activities and the duration of the project out to the foreseeable future (the Service has yet to determine the exact date) will require continued coordination with the Navy throughout the consultation to obtain information on the activities to understand potential impacts on listed species. The Service may also need to meet with the Navy to discuss measures to minimize project effects.

The Service understands that the Navy needs a draft of the biological opinion in early July and the final biological opinion by the end of September 2015. The statutory 135day timeline for completing the consultation is October 4, 2015. The Service has this Navy consultation as a high priority and will try to complete the consultation by the end of September 2015. The Service can discuss with the Navy in early July the status of the Opinion and whether a draft that meets your needs will be available at that time. However, as this is a complex project, the Service will keep the Navy informed on the status of the biological opinion throughout the consultation process. If a request for an extension to the finalization date beyond October 14, 2015, is needed, the Service will notify the Navy by mid-July, 2015.

If you have any questions, please contact Martha Jensen, Federal Activities Branch Manager, at (360) 753-9000, email: martha_l_jensen@fws.gov, or Jim Muck, lead biologist, at (206) 526-4740, email jim_muck@fws.gov.

Sincerely,

for Eric V. Rickerson, State Supervisor
Washington Fish and Wildlife Office

cc:
NB Kitsap-Bangor, Silverdale, WA (C. Kunz)
NB Kitsap-Bangor, Silverdale, WA (A. Balla-Holden)
NAS Whidbey Island, Oak Harbor, WA (J. Mosher)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

SEP 18 2015

In Reply Refer To:
**01EWFW00-2015-F-0251**

Commander Larry M. Foster
Department of the Navy, U.S. Pacific Fleet
250 Makalapa Drive
Pearl Harbor, Hawaii 96860-3131

Dear Commander Foster:

This letter is to inform you of the status of the Section 7 consultation under the Endangered Species Act (Act) for the U.S. Navy's (Navy) Northwest Training and Testing Activities. The U.S. Fish and Wildlife Service (Service) received the Biological Evaluation and your letter requesting consultation on January 20, 2015, and initiated formal consultation on May 22, 2015. The complexity of the Navy's activities and our need for information necessary to complete the consultation are affecting our ability to meet the statutory timelines for completing the biological opinion. We request that the Navy agree to extend the consultation timeline to November 4, 2015.

While both parties have placed this project as a high priority and are working diligently, critical information on the Navy's effects are necessary for the Service's analyses. This information was not included in the Biological Evaluation. For instance, the Service requested the distances to effects thresholds from sonar and underwater detonations during a meeting with the Navy on June 15, 2015. On July 22, 2015, the Navy proposed new acoustic thresholds for effects for both fish and marbled murrelets for sonar and underwater detonations but did not provide the distances to our thresholds from these effects.

In 2011, the Navy and the Service convened a science panel comprised of experts in acoustics, avian and fisheries biologists, species experts, and Navy staff to determine injury thresholds for listed species associated with exposure to impulsive underwater sound. This panel provided the scientific basis for the thresholds currently in use. The newly proposed thresholds by the Navy are significantly higher than the thresholds established by the science panel for impulsive underwater sound. They are also significantly higher than what we have considered in our previous consultations when we have addressed effects to listed species from underwater explosions and sonar.

Since receiving the new proposed thresholds, the Navy, National Marine Fisheries Service, and the Service have had numerous conference calls and email exchanges to discuss the proposed criteria and thresholds. To date, no final decision has been made on the marbled murrelet thresholds for underwater explosives. On August 14, 2015, we received the distance thresholds for sonar that will be used for fish. On September 10, 2015, we received the distance to effects for fish for underwater explosives. Although the Navy has been very responsive and helpful in describing the wide range of activities and continues to compile the available science on underwater sound, our analysis of effects to listed species are delayed because we have not received the information necessary to complete the analyses. Additionally, the level of complexity of the Navy activities and the ongoing discussions on the new threshold criteria are delaying our ability to make progress on the consultation.

At this time, the Service requests a 30-day extension to complete the current consultation. The incidental take statements provided to the Navy in two biological opinions (13410-2009-F-0082 and 13410-2009-F-0104) may lapse and the Navy will no longer have incidental take authorization as required by the Act. At the request of the Navy the Service is reinititating both consultations to provide take authorization for current activities as described in these biological opinions through the remainder of this consultation. We request a written response indicating your agreement with the proposed consultation timeline.

If you have any questions, please contact Martha Jensen, Federal Activities Branch Manager, at (360) 753-9000, email martha_l_jensen@fws.gov, or Jim Muck, lead biologist, at (206) 526-4740, email jim_muck@fws.gov.

Sincerely,

for Tanya Sommer

Eric V. Rickerson, State Supervisor
Washington Fish and Wildlife Office

cc:
NB Kitsap-Bangor, Silverdale, WA (C. Kunz)
NB Kitsap-Bangor, Silverdale, WA (A. Balla-Holden)
NAS Whidbey Island, Oak Harbor, WA (J. Mosher)
USFWS, Portland, OR (T. Rabot)

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N01CE1/0267
23 Feb 12

The Honorable [Chairperson name]
Chairperson
[Tribe name]
[Tribe address]
[City, State, Zip code]

Dear Honorable [Chairperson name]:

SUBJECT: UNITED STATES (U.S.) NAVY'S NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

This to notify you that the U.S. Navy is beginning the process to prepare an EIS/OEIS to assess the potential environmental impacts from military readiness training and testing activities conducted in the Northwest.

The NWTT Study Area consists of air, land and sea space and includes the Northwest Training Range Conplex, the Naval Undersea Warfare Center Keyport Range Complex, Carr Inlet Operations Area, the Southeast Alaska Acoustic Measurement Facility, and Navy pierside locations where sonar maintenance and testing occurs (see Enclosure 1).

The purpose of the Proposed Action is to conduct training and testing activities to ensure the Navy accomplishes its mission to maintain, train and equip combat-ready military forces capable of winning wars, deterring aggression and maintaining freedom of the seas. The Navy proposes to:

- Adjust training and testing activities to support current and planned Navy requirements.

- Accommodate evolving mission requirements associated with force structure changes, including those resulting from the development, testing and introduction of new vessels, aircraft and weapon system(s) into the Fleet.

Additional information on this project can be found by visiting the NWTT EIS/OEIS web site at www.NWTTEIS.com.

SUBJECT: NAVY'S NORTHWEST TRAINING AND TESTING (NWTT) ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

The NWTT EIS/OEIS will provide environmental planning analysis for training and testing activities to support re-issuance of authorization for permitted activities analyzed by the Navy for the "*Northwest Training Range Complex EIS/OEIS*" and the "*NAVSEA Keyport Range Complex Extension EIS/OEIS*" as well as addressing analysis of additional Navy activities within the study area.

In the near future, you will receive additional correspondence from the Navy addressing the potential to invite consultation regarding this project. If you have questions, or require additional information, please contact Mr. George Hart of Commander, Navy Region Northwest at 360-315-5103, email: george.hart1@navy.mil.

Sincerely,

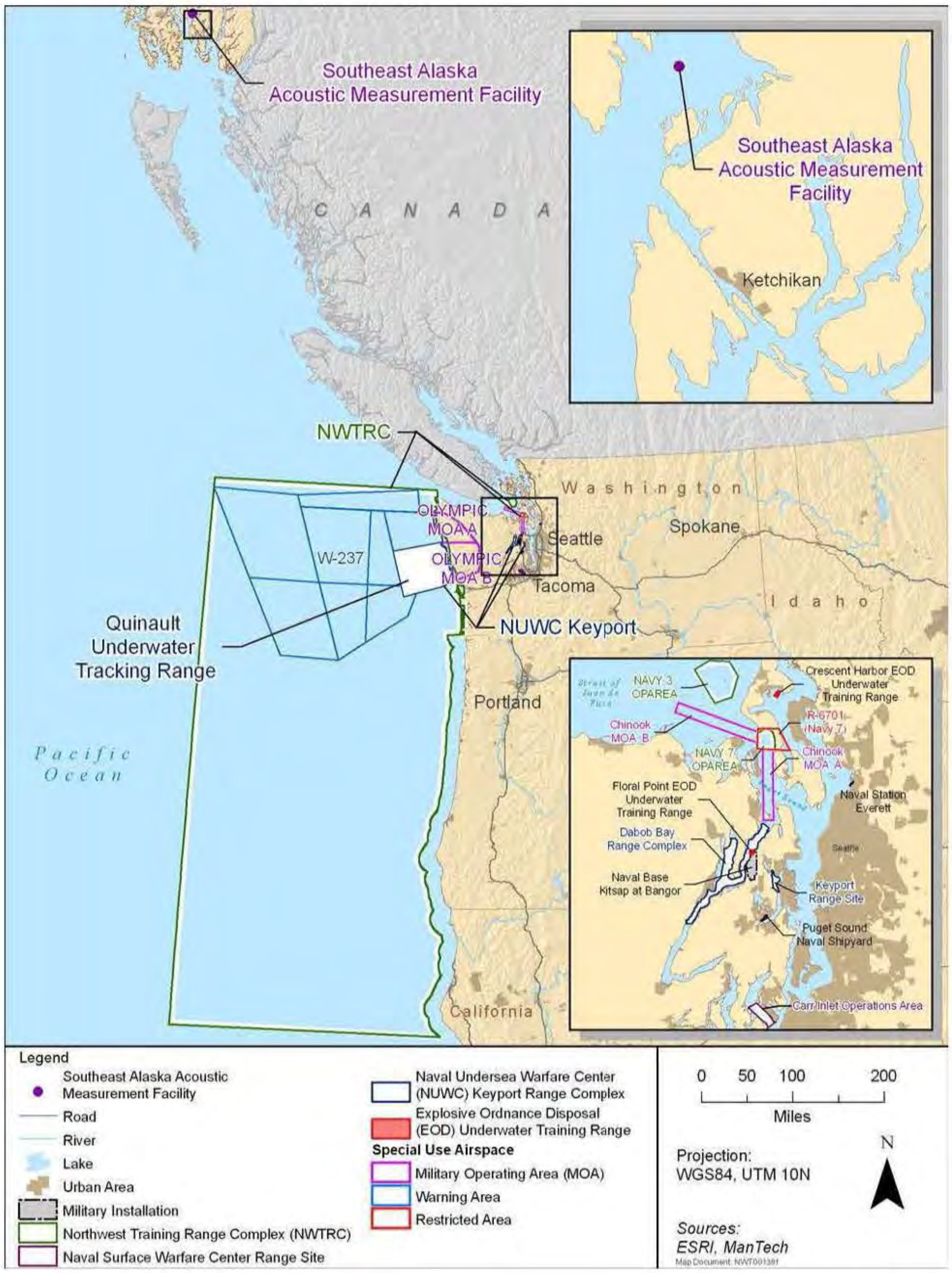
Larry M. Foster

L. M. FOSTER
Director, Environmental Readiness
By direction

Enclosure: 1. Northwest Training and Testing Study Area

2

Enclosure 1: Northwest Training and Testing Study Area




3

**DEPARTMENT OF THE NAVY**
NAVAL AIR STATION WHIDBEY ISLAND
OAK HARBOR, WASHINGTON 98278-5000

IN REPLY REFER TO:
5090
Ser N00/0043
January 14, 2014

The Honorable [redacted]

Dear Chairman:

Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

This letter is to inform you that the Department of the Navy (Navy) has prepared a Draft Environmental Impact Statement/ Overseas Environmental Impact Statement (EIS/OEIS) for military readiness training and testing activities conducted primarily within existing range complexes, operating areas and testing ranges of the Northwest Training and Testing (NWTT) Study Area. An electronic copy (CD-ROM) of the Draft EIS/OEIS is enclosed (see Enclosure 1), and additional information is available on the project website at **www.NWTTEIS.com**.

I would like to invite you to review the enclosed Draft EIS/OEIS and evaluate whether the Navy activities proposed in the EIS/OEIS have the potential to significantly affect tribal treaty harvest rights or cultural resources. This invitation is made pursuant to the Navy's policy for government-to-government consultation with American Indian and Alaska Native tribes.

The NWTT Study Area (see Enclosure 2) is composed of established maritime operating areas and warning areas in the eastern North Pacific Ocean, including the Strait of Juan de Fuca, Puget Sound and Western Behm Canal in southeastern Alaska. The NWTT Study Area includes: air and water space within and outside Washington state waters, and outside state waters of Oregon and Northern California; four existing range complexes and facilities (the Northwest Training Range Complex, Naval Undersea Warfare Center Division Keyport Range Complex, Carr Inlet Operations Area and Southeast Alaska Acoustic Measurement Facility); and Navy pierside locations where sonar maintenance

5090
Ser N00/0043
January 14, 2014

and testing occur (Naval Base Kitsap Bremerton, Naval Base Kitsap Bangor and Naval Station Everett).

The Navy proposes to conduct training and testing activities, to include the use of active sonar and explosives, within the NWTT Study Area. Many of these training and testing activities have historically occurred in the NWTT Study Area and have been previously analyzed pursuant to the National Environmental Policy Act of 1969 and Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*.

The purpose of the Proposed Action is to ensure that the Navy accomplishes its mission to maintain, train and equip combat-ready naval forces capable of winning wars, deterring aggression and maintaining freedom of the seas. This mission is achieved in part by training and testing within the NWTT Study Area. The NWTT EIS/OEIS also supports the renewal of federal regulatory permits and authorizations for current training and testing activities and future activities requiring environmental analysis.

Based upon the Navy's analysis presented in the Draft EIS/OEIS, the Proposed Action would not significantly impact or affect submerged historic or cultural properties, tribal rights or other tribal resources because proposed activities would occur in a manner unlikely to interfere with tribal treaty harvest rights or cultural resources. Additionally, access restrictions to co-use water areas would be of short duration and temporary due to the nature of the training and testing activities (see page ES-18 of the Executive Summary; Enclosure 3).

I respectfully request that you respond via written correspondence within 60 days of receipt of this letter whether or not you concur with our preliminary analysis. If you do not concur, please provide information describing the potentially affected areas and resources that may be impacted.

If you would like to initiate government-to-government consultation, please provide the name(s) and title(s) of the point of contact so my staff can coordinate our first meeting. I look forward to discussing your questions and concerns about the proposed project.

2

5090
Ser N00/0043
January 14, 2014

If you have any question or concerns, or require further information regarding this project, please contact me directly at Michael.nortier@navy.mil or 360-257-2037 or have your staff contact Mr. George Hart, at 360-315-5103, george.hart1@navy.mil.

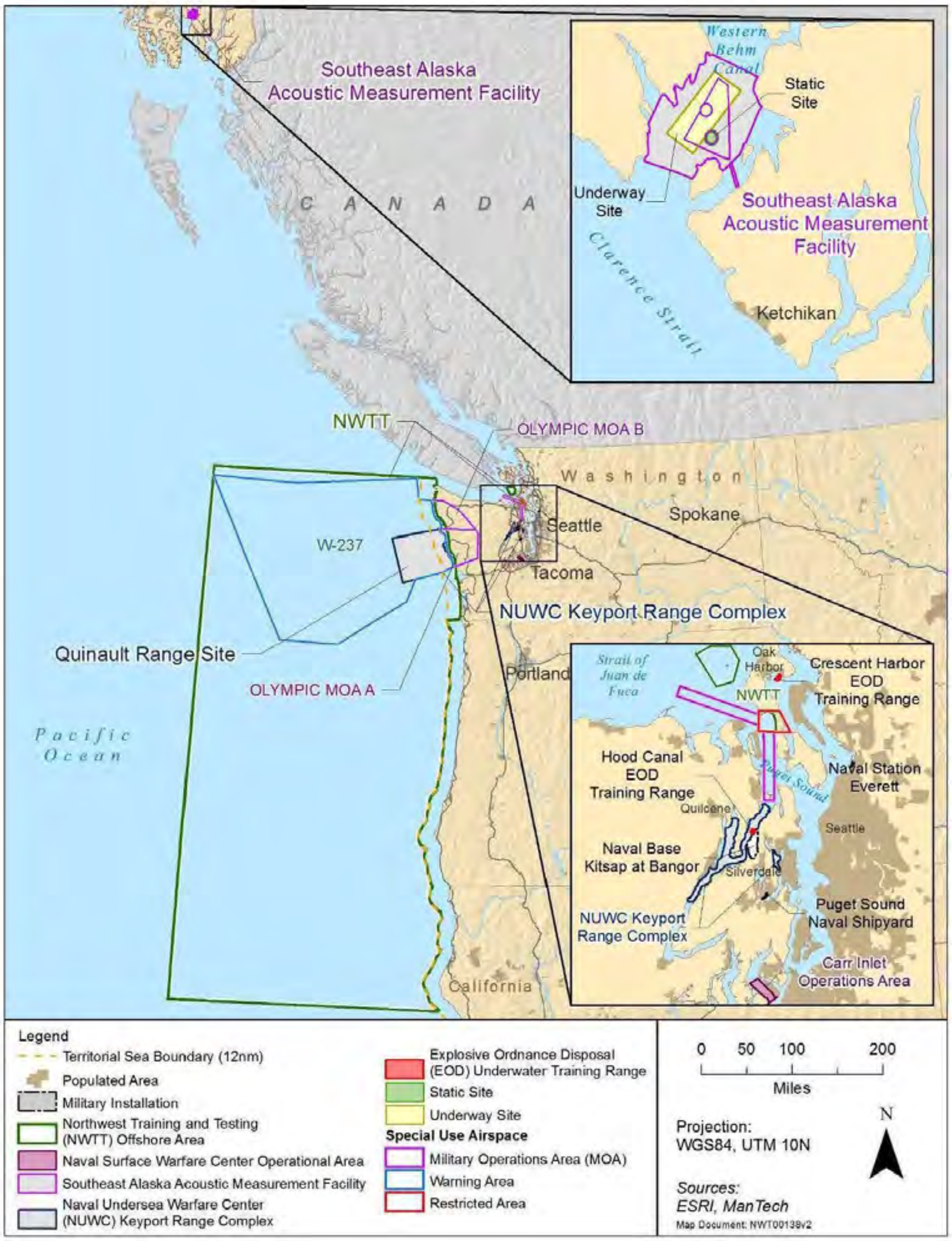
Sincerely,

MKNt

M. K. NORTIER
Captain, U.S. Navy
Commanding Officer

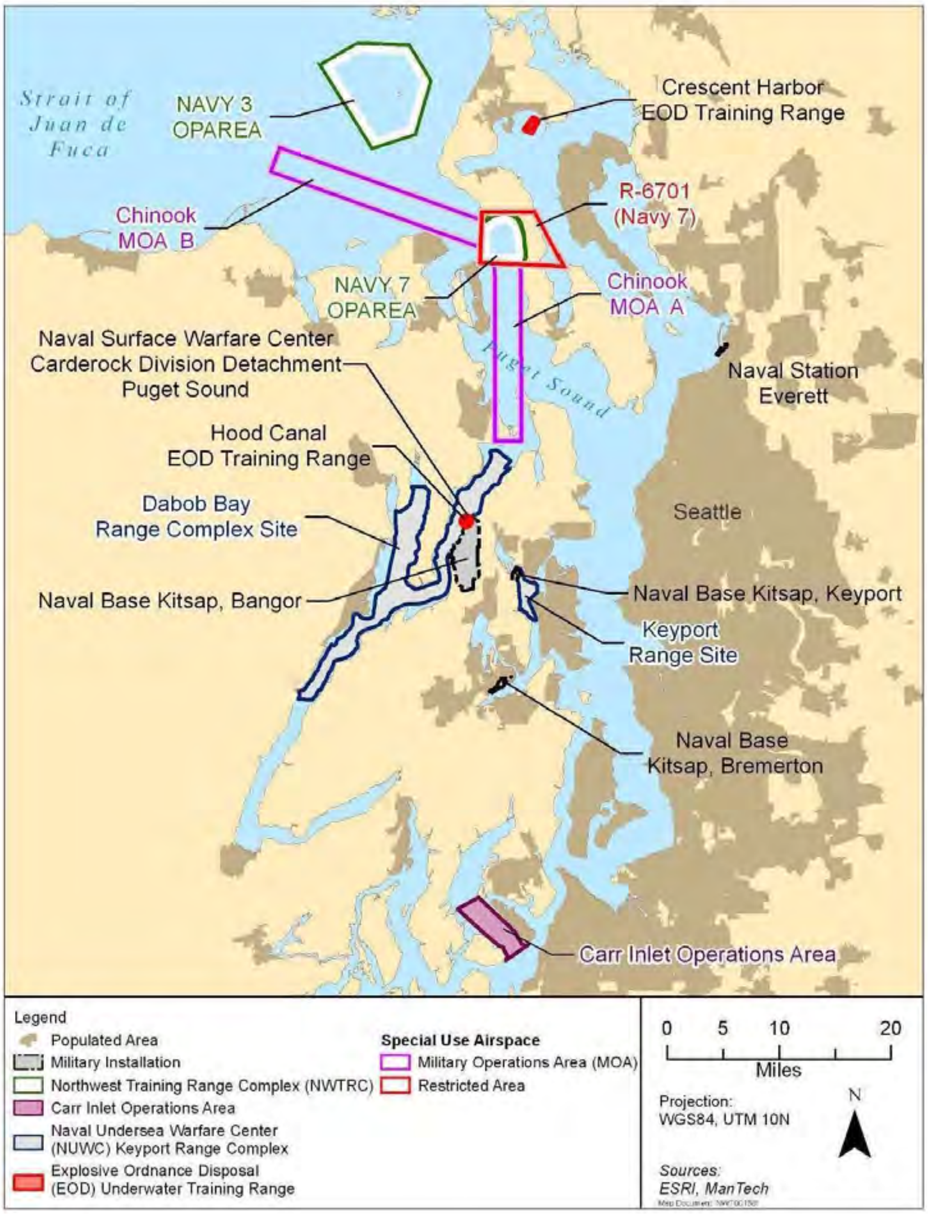
Enclosures:
1. Electronic Copy (CD-ROM) of NWTT Draft EIS/OEIS
2. Figures of the NWTT EIS/OEIS Study Area
3. NWTT Draft EIS/OEIS Executive Summary

Enclosure 2: Northwest Training and Testing Study Area




4

Enclosure 2: Inland Waters of the Northwest Training and Testing Study Area




5

DEPARTMENT OF THE NAVY
NAVAL AIR STATION WHIDBEY ISLAND
OAK HARBOR, WASHINGTON 98278-5000

IN REPLY REFER TO:
5090
Ser N00/0042
January 14, 2014

The Honorable [redacted]
[redacted]

Dear Chairman:

Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

This letter is to inform you that the Department of the Navy (Navy) has prepared a Draft Environmental Impact Statement/ Overseas Environmental Impact Statement (EIS/OEIS) for military readiness training and testing activities conducted primarily within existing range complexes, operating areas and testing ranges of the Northwest Training and Testing (NWTT) Study Area. An electronic copy (CD-ROM) of the Draft EIS/OEIS is enclosed (see Enclosure 1), and additional information is available on the project website at **www.NWTTEIS.com.**

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5090
Ser N00/0042
January 14, 2014

and testing occur (Naval Base Kitsap Bremerton, Naval Base Kitsap Bangor and Naval Station Everett).

The Navy proposes to conduct training and testing activities, to include the use of active sonar and explosives, within the NWTT Study Area. Many of these training and testing activities have historically occurred in the NWTT Study Area and have been previously analyzed pursuant to the National Environmental Policy Act of 1969 and Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*.

The purpose of the Proposed Action is to ensure that the Navy accomplishes its mission to maintain, train and equip combat-ready naval forces capable of winning wars, deterring aggression and maintaining freedom of the seas. This mission is achieved in part by training and testing within the NWTT Study Area. The NWTT EIS/OEIS also supports the renewal of federal regulatory permits and authorizations for current training and testing activities and future activities requiring environmental analysis.

Based upon the Navy's analysis presented in the Draft EIS/OEIS, the Proposed Action would not significantly impact or affect submerged historic or cultural properties, or other tribal resources because proposed activities would occur in a manner unlikely to interfere with tribal or cultural resources. Additionally, access restrictions to co-use water areas would be of short duration and temporary due to the nature of the training and testing activities (see page ES-18 of the Executive Summary; Enclosure 3).

I respectfully request that you respond via written correspondence within 60 days of receipt of this letter whether or not you concur with our preliminary analysis. If you do not concur, please provide information describing the potentially affected areas and resources that may be impacted.

If you would like to initiate government-to-government consultation, please provide the name(s) and title(s) of the point of contact so my staff can coordinate our first meeting. I look forward to discussing your questions and concerns about the proposed project.

2

5090
Ser N00/0042
January 14, 2014

If you have any question or concerns, or require further information regarding this project, please contact me directly at Michael.nortier@navy.mil or 360-257-2037 or have your staff contact Mr. George Hart, at 360-315-5103, george.hart1@navy.mil.

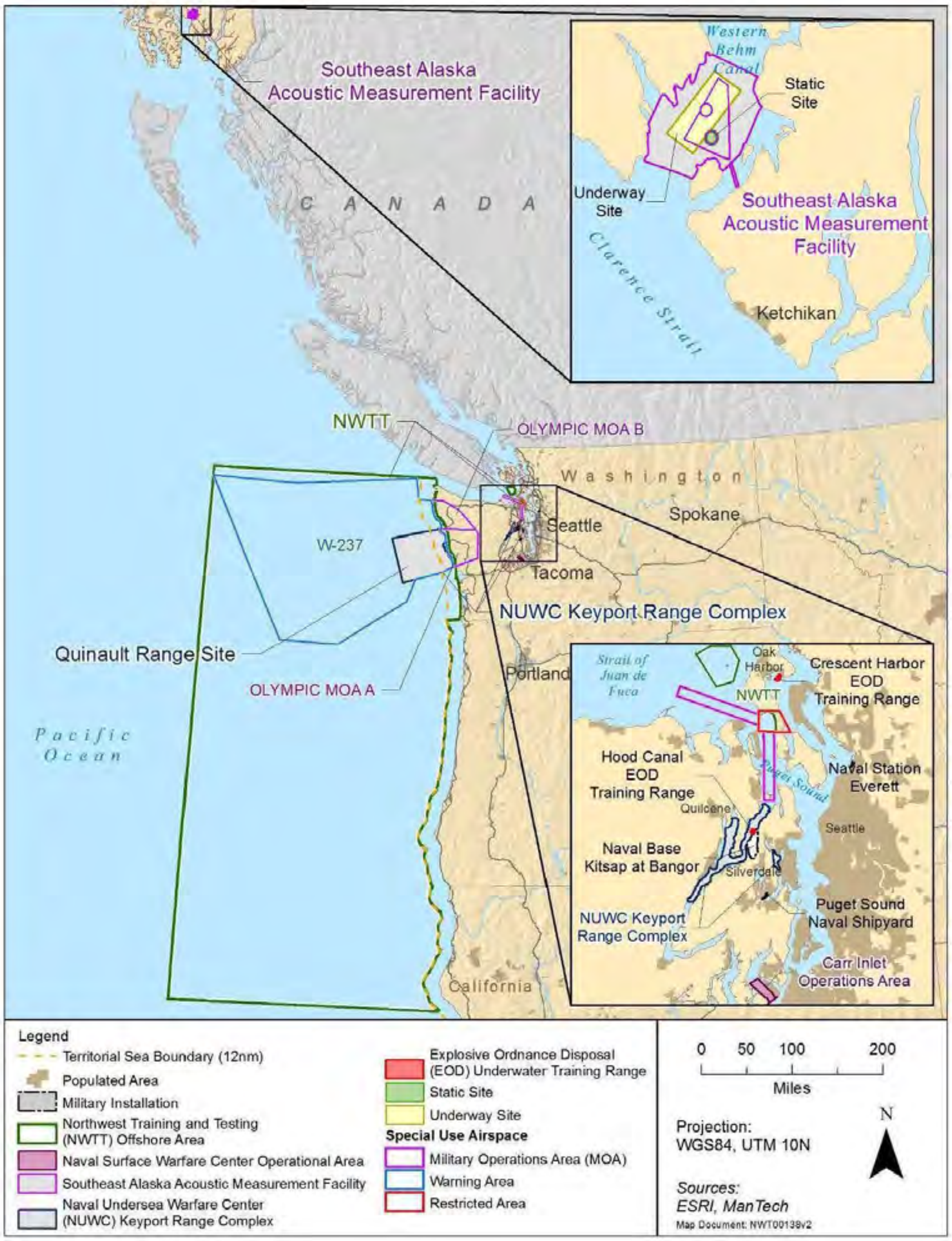
Sincerely,

M. K. NORTIER
Captain, U.S. Navy
Commanding Officer

Enclosures: 1. Electronic Copy (CD-ROM) of NWTT Draft EIS/OEIS
2. Figures of the NWTT EIS/OEIS Study Area
3. NWTT Draft EIS/OEIS Executive Summary

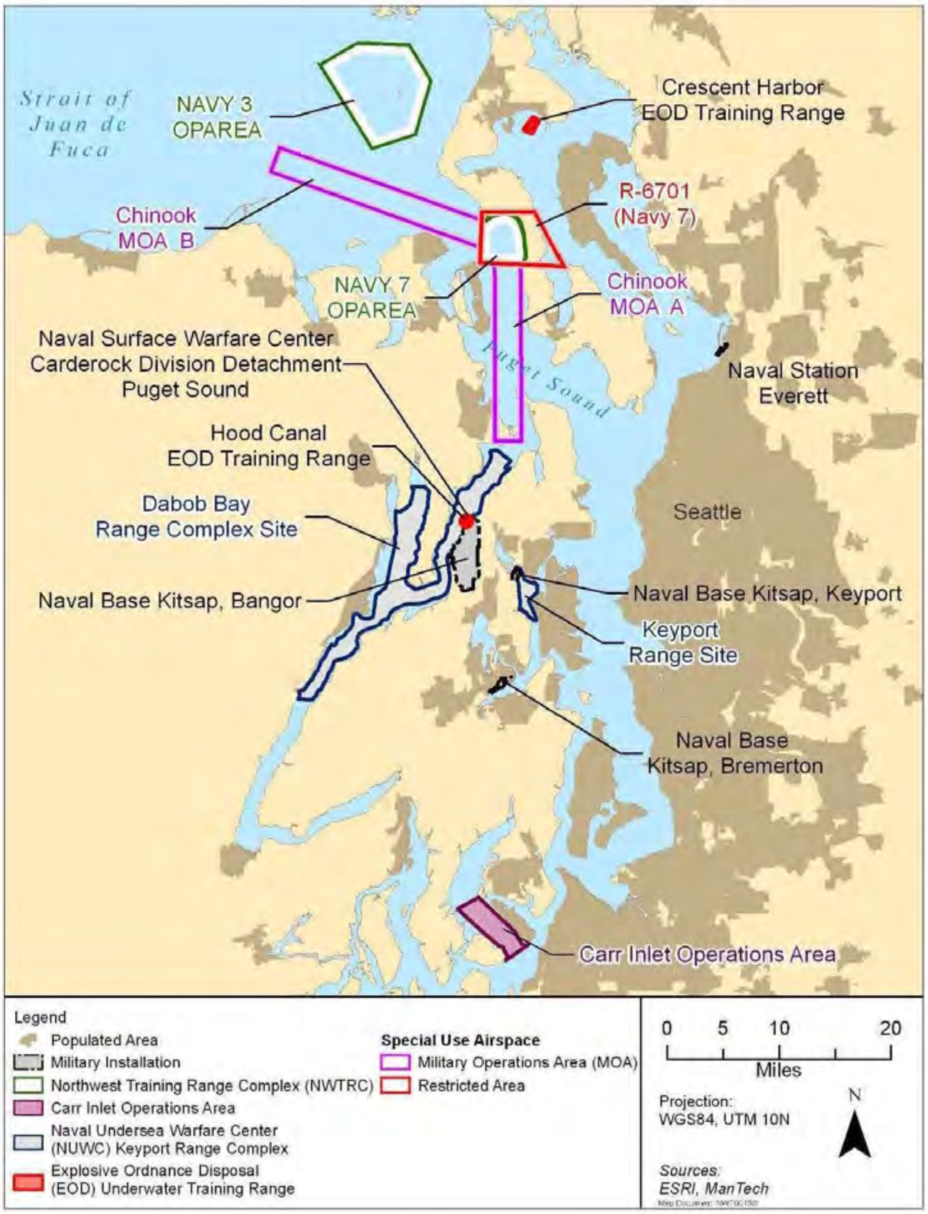
3

Enclosure 2: Northwest Training and Testing Study Area




4

Enclosure 2: Inland Waters of the Northwest Training and Testing Study Area




5

**DEPARTMENT OF THE NAVY**
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/00073
17 Jan 14

The Honorable [redacted]

Dear Chairman [redacted]:

Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

This letter is to inform you that the Department of the Navy (Navy) has prepared a Draft Environmental Impact Statement/ Overseas Environmental Impact Statement (EIS/OEIS) for military readiness training and testing activities conducted primarily within existing range complexes, operating areas and testing ranges of the Northwest Training and Testing (NWTT) Study Area. An electronic copy (CD-ROM) of the Draft EIS/OEIS is enclosed (see Enclosure 1), and additional information is available on the project website at www.NWTTEIS.com.

I would like to invite you to review the enclosed Draft EIS/OEIS and evaluate whether the Navy activities proposed in the EIS/OEIS have the potential to significantly affect tribal treaty harvest rights or cultural resources. This invitation is made pursuant to the Navy's policy for government-to-government consultation with American Indian and Alaska Native tribes.

The NWTT Study Area (see Enclosure 2) is composed of established maritime operating areas and warning areas in the eastern North Pacific Ocean, including the Strait of Juan de Fuca, Puget Sound and Western Behm Canal in southeastern Alaska. The NWTT Study Area includes: air and water space within and outside Washington state waters, and outside state waters of Oregon and Northern California; four existing range complexes and facilities (the Northwest Training Range Complex, Naval Undersea Warfare Center Division Keyport Range Complex, Carr Inlet Operations Area and Southeast Alaska Acoustic Measurement Facility); and Navy pierside locations where sonar maintenance and testing occur (Naval Base Kitsap Bremerton, Naval Base Kitsap Bangor and Naval Station Everett).

Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

The Navy proposes to conduct training and testing activities, to include the use of active sonar and explosives, within the NWTT Study Area. Many of these training and testing activities have historically occurred in the NWTT Study Area and have been previously analyzed pursuant to the National Environmental Policy Act of 1969 and Executive Order 12114, Environmental Effects Abroad of Major Federal Actions.

The purpose of the Proposed Action is to ensure that the Navy accomplishes its mission to maintain, train and equip combat-ready naval forces capable of winning wars, deterring aggression and maintaining freedom of the seas. This mission is achieved in part by training and testing within the NWTT Study Area. The NWTT EIS/OEIS also supports the renewal of federal regulatory permits and authorizations for current training and testing activities and future activities requiring environmental analysis.

Based upon the Navy's analysis presented in the Draft EIS/OEIS, the Proposed Action would not significantly impact or affect submerged historic or cultural properties, tribal rights or other tribal resources because proposed activities would occur in a manner unlikely to interfere with tribal treaty harvest rights or cultural resources. Additionally, access restrictions to co-use water areas would be of short duration and temporary due to the nature of the training and testing activities (see page ES-18 of the Executive Summary; Enclosure 3).

I respectfully request that you respond via written correspondence within 60 days of receipt of this letter whether or not you concur with our preliminary analysis. If you do not concur, please provide information describing the potentially affected areas and resources that may be impacted.

If you would like to initiate government-to-government consultation, please provide the name(s) and title(s) of the point of contact so my staff can coordinate our first meeting. I look forward to discussing your questions and concerns about the proposed project.

2

Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

If you have any question or concerns, or require further information regarding this project, please contact me directly at thomas.zwolfer@navy.mil or 360-627-4000; or have your staff contact Mr. George Hart, at 360-315-5103, george.hart1@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U.S. Navy
Commanding Officer

Enclosures:
1. Electronic Copy (CD-ROM) of NWTT Draft EIS/OEIS
2. Figures of the NWTT EIS/OEIS Study Area
3. NWTT Draft EIS/OEIS Executive Summary

3

**DEPARTMENT OF THE NAVY**
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/00085
17 Jan 14

The Honorable [redacted]

Dear Chairman [redacted]:

Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

This letter is to inform you that the Department of the Navy (Navy) has prepared a Draft Environmental Impact Statement/ Overseas Environmental Impact Statement (EIS/OEIS) for military readiness training and testing activities conducted primarily within existing range complexes, operating areas and testing ranges of the Northwest Training and Testing (NWTT) Study Area. An electronic copy (CD-ROM) of the Draft EIS/OEIS is enclosed (see Enclosure 1), and additional information is available on the project website at www.NWTTEIS.com.

The Navy has received the request from the [redacted] for government-to-government consultation regarding this project. My staff will contact Mr. [redacted] to coordinate our first meeting. I look forward to discussing your questions and concerns about the proposed project.

The NWTT Study Area (see Enclosure 2) is composed of established maritime operating areas and warning areas in the eastern North Pacific Ocean, including the Strait of Juan de Fuca, Puget Sound and Western Behm Canal in southeastern Alaska. The NWTT Study Area includes: air and water space within and outside Washington state waters, and outside state waters of Oregon and Northern California; four existing range complexes and facilities (the Northwest Training Range Complex, Naval Undersea Warfare Center Division Keyport Range Complex, Carr Inlet Operations Area and Southeast Alaska Acoustic Measurement Facility); and Navy pierside locations where sonar maintenance and testing occur (Naval Base Kitsap Bremerton, Naval Base Kitsap Bangor and Naval Station Everett).

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Subject: NOTICE OF AVAILABILITY OF THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

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The purpose of the Proposed Action is to ensure that the Navy accomplishes its mission to maintain, train and equip combat-ready naval forces capable of winning wars, deterring aggression and maintaining freedom of the seas. This mission is achieved in part by training and testing within the NWTT Study Area. The NWTT EIS/OEIS also supports the renewal of federal regulatory permits and authorizations for current training and testing activities and future activities requiring environmental analysis.

Based upon the Navy's analysis presented in the Draft EIS/OEIS, the Proposed Action would not significantly impact or affect submerged historic or cultural properties, tribal rights or other tribal resources because proposed activities would occur in a manner unlikely to interfere with tribal treaty harvest rights or cultural resources. Additionally, access restrictions to co-use water areas would be of short duration and temporary due to the nature of the training and testing activities (see page ES-18 of the Executive Summary; Enclosure 3).

If you have any question or concerns, or require further information regarding this project, please contact me directly at thomas.zwolfer@navy.mil or 360-627-4000, or have your staff contact Mr. George Hart, at 360-315-5103, george.hart1@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U.S. Navy
Commanding Officer

Enclosures: 1. Electronic Copy (CD-ROM) of NWTT Draft EIS/OEIS
2. Figures of the NWTT EIS/OEIS Study Area
3. NWTT Draft EIS/OEIS Executive Summary

2

DEPARTMENT OF THE NAVY
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/1067
10 Oct 2014

From: Commander, U.S. Pacific Fleet
To: Chief of Naval Operations (N456)

Subj: NOTIFICATION OF PREPARATION OF THE NORTHWEST TRAINING AND TESTING (NWTT) SUPPLEMENT TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

Ref: (a) OPNAVINST 5090.1D, Environmental Readiness Program Manual

Encl: (1) Draft Federal Register Notice of Intent
(2) Draft Notice of Intent Brief
(3) Milestone Schedule

1. Per reference (a) this is to notify you that Commander, U.S. Pacific Fleet (COMPACFLT) is preparing a Supplement to the Draft NWTT EIS/OEIS to assess substantial changes in the proposed action and significant new information relevant to the environmental analysis per 40 Code of Federal Regulations (C.F.R.) 1502.9.

2. Specifically, for the activity, Tracking Exercises - Maritime Patrol (Extended Echo Ranging Sonobuoys), substantial changes the type and number of sonobuoys to be used is proposed. This change in the proposed action warrants preparation of a Supplemental Draft EIS/OEIS under 40 C.F.R. 1502.9(c)(1)(i). Additionally, new information relevant to air quality emissions of inland water vessel movements associated with Maritime Security Operations warrants further consideration and preparation of a Supplement under 40 C.F.R. 1502.9(c)(1)(ii).

3. Notice of Intent (NOI): The NOI to prepare the Supplement to the Draft EIS/OEIS is provided as enclosure (1) for review, approval, and publication in the Federal Register. COMPACFLT requests that the NOI be published no later than 24 Oct 2014 to facilitate timely execution of the Supplement to the Draft EIS/OEIS and incorporation into the Final EIS. COMPACFLT will not be conducting scoping, but will notify federal, state, and local elected officials, Native American Tribes, government

Subj: NOTIFICATION OF PREPARATION OF THE NORTHWEST TRAINING AND TESTING (NWTT) SUPPLEMENT TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT (EIS/OEIS)

agencies and other interested parties identified on the current NWTT distribution list via a postcard mailer.

4. CNO Action: COMPACFLT requests that OPNAV N45 coordinate project review with Assistant Secretary of the Navy (Energy, Installation & Environment) and the Office of Legislative Affairs staff.

5. The technical point of contact for this matter is Mr. John Mosher, CPF Detachment Northwest Project Officer, (360) 257-3234 or email: john.g.mosher@navy.mil. The legal point of contact for this matter is CDR Joan Malik, JAGC, USN, Fleet Environmental Counsel, (808) 474-6389 or email: joan.malik@navy.mil.

John Van Name FOR

L. M. FOSTER
By direction

Copy to (w/o encls):
COMNAVAIRSYSCOM PATUXENT RIVER MD
COMNAVSEASYSCOM WASHINGTON DC
CNIC WASHINGTON DC
NAVFAC WASHINGTON DC
COMNAVREG NW SILVERDALE WA (N3, N45, N00L)
NAVFAC NW SILVERDALE WA (N00, N40, N45)
COMMANDER NAS WHIDBEY ISLAND OAK HARBOR WA (N00, N3, N45)
COMFLTFORCOM (N465, N73, N77)

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/1285
December 12, 2014

Dear Sir or Madam:

Subject: NOTICE OF AVAILABILITY OF THE SUPPLEMENT TO THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

This letter is to inform you that the Department of the Navy (Navy) has prepared a Supplement to the Northwest Training and Testing (NWTT) Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS), which is available for review and comment. The Supplement focuses on substantial changes to the Navy's Proposed Action due to updated training requirements and new information relevant to environmental concerns per 40 Code of Federal Regulations § 1502.9. The National Marine Fisheries Service and the U.S. Coast Guard are cooperating agencies on the EIS/OEIS. The Navy requests and welcomes comments on the Supplement during the comment period.

Since the release of the NWTT Draft EIS/OEIS on January 24, 2014, the Navy determined that updated training requirements or new information would result in changes to the Proposed Action or analysis, and warranted the preparation of a Supplement to the Draft EIS/OEIS. These changes include:

- *Tracking Exercise - Maritime Patrol (Extended Echo Ranging Sonobuoys):* The type and number of sonobuoys used during this activity would substantially change.

- *Maritime Security Operations:* New information is available on air emissions from inland water vessel movements associated with this ongoing activity.

Other than these changes, the Draft EIS/OEIS remains valid and will be merged with the Supplement into the Final EIS/OEIS.

Based upon the analysis presented in the Supplement to the Draft EIS/OEIS, Navy activities may impact American Indian traditional resources and access to fishing grounds in Puget Sound as identified in tribal treaties. The Navy has an active

Subject: NOTICE OF AVAILABILITY OF THE SUPPLEMENT TO THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

consultation process in place and will continue to consult on a government-to-government basis with potentially affected American Indian tribes regarding Navy activities that may have the potential to affect protected tribal treaty rights and resources.

The Navy is holding four public meetings to inform the public about the Supplement to the Draft EIS/OEIS and potential environmental impacts, and to provide an additional opportunity for the public to comment on the adequacy and accuracy of the analysis in the Supplement. The public meetings will include an open house information session, during which time EIS team representatives will be available to provide information, answer questions and accept comments on the Supplement. The public can arrive any time during the advertised hours; the open house will not include a formal presentation or verbal comment session.

The public meetings will be held at the following locations and times:

**Open House Information Sessions: 5-8 p.m.**

**Date:** **Monday, January 12, 2015**
**Location:** Poulsbo Fire Station Conference Room
911 NE Liberty Road
Poulsbo, WA

**Date:** **Tuesday, January 13, 2015**
**Location:** Grays Harbor College HUB
1620 Edward P. Smith Drive
Aberdeen, WA

**Date:** **Wednesday, January 14, 2015**
**Location:** Isaac Newton Magnet School Commons
825 NE Seventh St.
Newport, OR

**Date:** **Friday, January 16, 2015**
**Location:** Eureka Public Marina, Wharfinger Building
Great Room
1 Marina Way
Eureka, CA

2

Subject: NOTICE OF AVAILABILITY OF THE SUPPLEMENT TO THE NORTHWEST TRAINING AND TESTING DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

A 45-day public comment period is open from December 19, 2014, to February 2, 2015, for the public to review the document and provide input. Comments may be submitted online at **www.NWTTEIS.com**, at the public meetings or by mail to:

Naval Facilities Engineering Command Northwest
Attention: Ms. Kimberly Kler - NWTT EIS/OEIS Project Manager
1101 Tautog Circle, Suite 203
Silverdale, WA 98315-1101

All comments on the Supplement must be postmarked or received online by **February 2, 2015**, for consideration in the Final EIS/OEIS. All comments submitted during the 45-day public review period will become part of the public record and will be responded to in the Final EIS/OEIS. All public comments previously received on this project are still valid and are being considered in the Final EIS/OEIS.

A CD-ROM of the Supplement to the Draft EIS/OEIS is enclosed (see Enclosure 1). Additional information is available on the project website at **www.NWTTEIS.com**.

Sincerely,

L. M. FOSTER
By direction

Enclosure: 1. Electronic Copy (CD-ROM) of the Supplement to the NWTT Draft EIS/OEIS

3

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR. HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0259
March 17, 2015

Ms. Rebekah Padgett
Federal Permit Manager
Shorelands and Environmental Assistance Program
Washington State Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008-5452

Dear Ms. Padgett:

Subject: COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION FOR NORTHWEST TRAINING AND TESTING ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

Enclosed please find the Department of the Navy's Consistency Determination submitted per the Coastal Zone Management Act (CZMA) and 15 C.F.R. § 930. The Navy prepared a Draft Environmental Impact Statement/Overseas Environmental Impact Statement (DEIS/OEIS) for training and testing activities within the Northwest Training and Testing (NWTT) Study Area (Study Area) in accordance with the National Environmental Policy Act (NEPA) and Executive Order 12114 (Environmental Effects Abroad of Major Federal Actions). The NWTT DEIS/OEIS was submitted to the Washington State Department of Ecology (Ecology) in a letter dated January 23, 2014 (available at http://nwtteis.com/), and notice of a Supplement to the DEIS/OEIS was provided via postcard dated December 19, 2014. The Supplement included changes to the Proposed Action that included training off the coast of Washington and in Puget Sound. These changes, and the analysis of their impacts, are included in this Consistency Determination analysis.

Pursuant to Section 307(c)(1) of the federal CZMA, the Navy has determined that the Proposed Action is consistent to the maximum extent practicable with the enforceable policies of the Washington Coastal Zone Management (CZM) Program and associated counties' Shoreline Management Master Programs. The training and testing activities proposed to occur off the coast of Washington

Subject: COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION FOR NORTHWEST TRAINING AND TESTING ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

are similar in type and intensity to those covered in previous determinations, for which Ecology issued concurrences on September 30, 2008 and December 14, 2009. Ecology stated in both concurrences "that the proposed action is consistent to the maximum extent practicable with the enforceable policies of Washington's CZM Program and will not result in any significant impacts to the State's coast resources."

The Navy reviewed the Washington CZM Program to determine which enforceable policies are applicable to the Proposed Action (Enclosure 1) and conducted an effects test (Enclosure 2) to determine whether the Proposed Action would have reasonably foreseeable effects on a coastal use or resource. Only the Ocean Resources Management Act is applicable to the Proposed Action. Some elements of the Proposed Action could have reasonably foreseeable coastal effects.

**CONSISTENCY OF THE PROPOSED ACTION WITH ENFORCEABLE POLICIES OF THE WASHINGTON COASTAL ZONE MANAGEMENT PROGRAM**

| Enforceable Policy | Determination |
|---|---|
| Shoreline Management Act | Not Applicable |
| State Environmental Policy Act | Not Applicable |
| Ocean Resources Management Act | Consistent |
| Clean Water Act | Not Applicable |
| Clean Air Act | Not Applicable |
| Energy Facility Site Evaluation Council Law | Not Applicable |

The Navy points of contact for this information are Ms. Kimberly Kler at 360-649-1160, e-mail: Kimberly.kler@navy.mil.

Sincerely,

L. M. FOSTER
By direction

Enclosures: 1. Coastal Zone Consistency Determination for Federal Activities Form
2. Washington Coastal Consistency Determination

2

x x

**ENCLOSURE 1:**
**COASTAL ZONE CONSISTENCY DETERMINATION FOR FEDERAL ACTIVITIES FORM**
**DEPARTMENT OF THE NAVY, NORTHWEST TRAINING AND TESTING STUDY AREA**

Project Description: The purpose of the Proposed Action is to conduct training and testing activities primarily within existing range complexes, operating areas (OPAREAs), and testing ranges located in the Pacific Northwest of the United States, to include the Strait of Juan de Fuca, Puget Sound, and the Western Behm Canal in southeastern Alaska. Navy training and testing activities may include the use of impulse (e.g., explosives) and non-impulse sources (e.g., sonar and other active acoustic sources) within the Study Area. The Proposed Action also includes pierside maintenance of sonar and sonar testing within the Study Area. The Proposed Action does not include any land-based activity, land-based construction, at-sea construction, or changes in the geographic extent of existing training or testing areas. A detailed description of the Proposed Action can be found in Enclosure 2.

This action under CZMA§307(c)(3) is for a project that will take place within Washington's coastal zone or which will affect a land use, water use, or natural resource of the coastal zone. *(The coastal zone includes all parts of Clallam, Grays Harbor, Island, Jefferson, King, Kitsap, Mason, Pacific, Pierce, San Juan, Skagit, Snohomish, Thurston, Wahkiakum, and Whatcom counties.)*

The action complies with the following enforceable policies of the Coastal Zone Management Program (CZMP):

1. **Shoreline Management Act (SMA):**

| | | | |
|---|---|---|---|
| Is outside of SMA jurisdiction | (X) | | |
| Is under current SMA application | ( ) | SMA#__________ | Date Issued______ |
| Has a valid Shoreline Permit | ( ) | | |
| Has received an SMA Exemption | ( ) | | |

2. **State Water Quality Requirements:**

| | | | |
|---|---|---|---|
| Does not require water quality permits | (X) | | |
| Is under current water quality application | ( ) | | |
| Has received a short-term modification of water quality standards | ( ) | Mod# __________ | Date Issued______ |
| Has received a 401 Certification | ( ) | 401# __________ | Date Issued______ |

3. **State Air Quality Requirements:**

| | | | |
|---|---|---|---|
| Does not require air quality permits | (X) | | |
| Is under current application for air permit | ( ) | | |
| Has received an air permit from the local air authority | ( ) | Air Permit #______ | Date Issued______ |

**4. State Environmental Policy Act:**

| | | | |
|---|---|---|---|
| Is SEPA exempt | (X) | | |
| SEPA checklist submitted | ( ) | | |
| NEPA decision has been adopted by local government to satisfy SEPA | ( ) | | |
| SEPA decision issued | ( ) | SEPA#__________ | Date Issued_______ |

**5. Energy Facility Site Evaluation Council:**

| | | |
|---|---|---|
| Does not involve an energy project | (X) | |

**6. Ocean Resource Management Act:**

| | | |
|---|---|---|
| Use demands do not conflict or pose unacceptable environmental or social risk | (X) | See Enclosure 2 for Consistency Determination |

*Therefore, I certify that this action is consistent to the maximum extent practicable with the enforceable policies of Washington's approved coastal zone management program.*

Larry M. Foster Date 17 MAR 2015

(Signature)
L. M. FOSTER
By direction

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
*Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000*
*711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341*

May 15, 2015

L.M. Foster
Department of the Navy
United States Pacific Fleet
250 Makalapa Drive
Pearl Harbor, HI 96860

**RE: Coastal Zone Management Act (CZMA) Consistency Determination Status Letter for Northwest Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement, Pacific Ocean, Strait of Juan de Fuca, and Puget Sound, Washington**

Dear L.M. Foster:

The Department of Ecology (Ecology) received the CZMA Consistency Determination for the above project on March 23, 2015.

**Coastal Zone Management Consistency**

The enforceable policies of the CZM Program in Washington State include the:

- State Environmental Policy Act (SEPA);
- Shoreline Management Act (SMA);
- Clean Air Act (CAA);
- Federal Water Pollution Control Act (Clean Water Act);
- Ocean Resource Management Act (ORMA); and the
- Energy Facility Site Evaluation Council (EFSEC).

Certification of consistency with the CZM Program is Ecology's determination that a project complies with these statutes and regulations and will have minimal or no impact on coastal resources.

**Information Needed**

The following must be addressed before Ecology can concur with or object to your CZM certification statement:

- The cover letter accompanying the Navy's Consistency Determination states that "Only the Ocean Resources Management Act is applicable to the Proposed Action." Enclosure 2, Coastal Zone Consistency Determination for Federal Activities Form, indicates that the action is outside of SMA jurisdiction and indicates that ORMA is the only enforceable policy of Washington's CZM Program that applies to this action. While the Navy is complying with the National Environmental Policy Act rather than SEPA, and Ecology does not anticipate that the activities as described would require a Section 401 Water Quality Certification, air quality permit, or EFSEC review, Ecology does not concur with the Navy's assessment that the activities are outside of SMA jurisdiction and therefore do not apply. Many activities described would in fact occur within coastal counties and may have an effect on coastal resources; therefore, these activities should be analyzed under the SMA.

Note that while the Navy's analysis states that the activities are similar in type and intensity to those covered under previous CZM Consistency Determinations concurred with by Ecology, there are some critical differences not previously evaluated in those reviews, including the Puget Sound activities.

Ecology has 60 days from the receipt of the consistency analysis to make a CZM consistency determination. Due to the need for additional information, Ecology will want an extension and will follow up with Kimberly Kler. Additionally, we request a response to this letter within two weeks. We would be happy to set up a conference call with Navy staff to discuss this if it would be helpful.

Please contact me if you have any questions regarding your application or the CZM process at (425) 649-7129 or email rebekah.padgett@ecy.wa.gov.

Sincerely,

Rebekah R. Padgett
Federal Permit Manager
Shorelands and Environmental Assistance Program

Cc: Kimberly Kler, U.S. Navy

E-cc: Loree' Randall, Ecology

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
*Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000*
*711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341*

September 11, 2015

L.M. Foster
Department of the Navy
United States Pacific Fleet
250 Makalapa Drive
Pearl Harbor, HI 96860

**RE: Coastal Zone Consistency for Northwest Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement, Pacific Ocean, Strait of Juan de Fuca, and Puget Sound, Washington**

Dear L.M. Foster:

On March 23, 2015, Department of the Navy, United States Pacific Fleet (Navy) submitted a Consistency Determination with the Washington State Coastal Zone Management Program (CZMP) to the Department of Ecology (Ecology). The following sequence of revisions and extensions occurred during Ecology's federal consistency review:

- On May 21, 2015, Ecology and the Navy agreed to a CZM extension until July 21, 2015.
- A second extension was agreed to on July 17, 2015, extending the review period until August 20, 2015.
- On August 19, 2015, Ecology and the Navy agreed to a third CZM extension until September 8, 2015.
- A revised Consistency Determination was submitted to Ecology on August 21, 2015.
- On September 8, 2015, Ecology and the Navy agreed to a fourth CZM extension until September 11, 2015.
- A newly revised Consistency Determination was submitted to Ecology on September 9, 2015.

The Navy proposes to conduct training and testing activities in the Northwest Training and Testing Study Area within the eastern North Pacific Ocean Region, as well as the Strait of Juan de Fuca and Puget Sound. These activities include development, testing, and introduction of new vessels, aircraft, and weapons systems into the fleet, as well as training exercises. The proposal does not include any land-based activity, land- or water-based construction, or changes in the geographic extent of existing training or testing areas.

Pursuant to Section 307(c)(3) of the Coastal Zone Management Act of 1972 as amended, Ecology concurs with the Navy's determination that the proposed work is consistent with Washington's CZMP, provided the following conditions are met:

Department of the Navy
September 11, 2015
Page | 2

1. The Shoreline Management Act (SMA) and Shoreline Master Program (SMP) Guidelines are approved enforceable policies of Washington's CZMP. WAC 173-26-176(3)(c) addresses protection and restoration of the ecological functions of shoreline natural resources, and WAC 173-26-181 addresses protection of the resources and ecology of the shoreline.

   Within the Navy's Consistency Determination, reasonably foreseeable coastal effects are identified, including those to habitat, fish, other marine life, and birds within the coastal zone, including shorelines of the state. The Navy also noted that it will be conducting monitoring and implementing mitigation measures in consultation with the National Marine Fisheries Service and U.S. Fish and Wildlife Service.

   In order to confirm that the Navy meets the enforceable policies of the SMA and SMP Guidelines for activities covered under this Consistency Determination within all shorelines of the state (both "shorelines" and "shorelines of statewide significance," including: the Pacific Coast, Hood Canal, all waters of the Puget Sound, and the Strait of Juan de Fuca), the Navy shall submit to Ecology one hard copy and one compact disc with electronic documents of the following:
   a) Monitoring plans for habitat and species (e.g., fish, shellfish and other invertebrates, marine mammals, and sea turtles),
   b) Results of all monitoring activities,
   c) Mitigation plans, and
   d) Mitigation measures taken.

2. The Ocean Resource Management Act (ORMA) and General Ocean Use Guidelines are also approved enforceable policies of Washington's CZMP. RCW 43.143.030(2)(c) addresses long-term significant adverse impacts to coastal or marine resources or uses; RCW 43.143.030(2)(d) addresses avoidance and minimization of adverse environmental impacts with special protection for specific areas such as Olympic National Park; WAC 173-26-360(7)(j) addresses prevention, avoidance, and minimization of adverse impacts on migration routes and habitat areas of endangered or threatened species, as well as those that are environmentally critical and sensitive; WAC 173-26-360(7)(m) addresses minimization of adverse impacts on fishing grounds, aquatic lands, or other renewable resource ocean use areas during times of use or when the resource could be adversely impacted; WAC 173-26-360(7)(n) addresses avoidance of environmentally critical and sensitive habitats and migration routes during critical times those areas or species could be affected; and WAC 173-26-360(7)(u) addresses prevention, avoidance, and minimization of adverse impacts on the marine, estuarine, or upland environment, particularly during critical migration periods and life stages of marine species and critical oceanographic processes.

   In order to confirm that the Navy meets the enforceable policies of ORMA and the General Ocean Use Guidelines for activities covered under this Consistency Determination within the Pacific Ocean, extending from Cape Flattery south to Cape Disappointment, beginning at the mean high tide line and running seaward for 200 miles, the Navy shall submit to Ecology one hard copy and one compact disc with electronic documents of the following:

Department of the Navy
September 11, 2015
Page | 3

a) Monitoring plans for habitat and species (e.g., fish, shellfish and other invertebrates, marine mammals, and sea turtles),
b) Results of all monitoring activities,
c) Mitigation plans, and
d) Mitigation measures taken.

All submittals should reference this Consistency Determination and be sent to: 401/CZM Federal Permit Coordinator, Shorelands and Environmental Assistance Program, PO Box 47600, Lacey, WA 98504 or by email to fednotification@ecy.wa.gov

Pursuant to 15 C.F.R SS 930.4, if the conditions above are not met, then all parties shall treat this conditional concurrence letter as an objection.

If you have any questions regarding Ecology's consistency determination please contact Rebekah Padgett at (425) 649-7129.

## YOUR RIGHT TO APPEAL

You have a right to appeal this Order to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do all of the following within 30 days of the date of receipt of this Order:

- File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Order on Ecology in paper form - by mail or in person. (See addresses below.) Email is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

## ADDRESS AND LOCATION INFORMATION

| Street Addresses | Mailing Addresses |
|---|---|
| **Department of Ecology**<br>Attn: Appeals Processing Desk<br>300 Desmond Drive SE<br>Lacey, WA 98503 | **Department of Ecology**<br>Attn: Appeals Processing Desk<br>PO Box 47608<br>Olympia, WA 98504-7608 |
| **Pollution Control Hearings Board**<br>1111 Israel RD SW<br>STE 301<br>Tumwater, WA 98501 | **Pollution Control Hearings Board**<br>PO Box 40903<br>Olympia, WA 98504-0903 |

Department of the Navy
September 11, 2015
Page | 4

Sincerely,

Paul Anderson, Wetlands/401 Unit Supervisor
Shorelands and Environmental Assistance Program
Northwest Regional Office

PA:rrp:ap

By certified mail: 7012 1640 0000 6245 7876

cc: Cyrilla Cook, Washington Department of Natural Resources
Chris Waldbillig, Washington Department of Fish and Wildlife
Mark Delaplaine, California Coastal Commission
Patty Snow, Oregon Coastal Management Program

e-cc: Kimberly Kler, U.S. Navy kimberly.kler@navy.mil
LCDR Laura Bishop, U.S. Navy laura.e.bishop@navy.mil
John Mosher, U.S. Navy john.g.mosher@navy.mil
Kris Wall, NOAA OCRM kris.wall@noaa.gov
Kerry Kehoe, NOAA OCRM kerry.kehoe@noaa.gov
Loree' Randall – HQ
Terry Swanson – HQ
Anne Dettelbach – NWRO
ecyrefedpermits@ecy.wa.gov

DEPARTMENT OF THE NAVY
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR. HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0181
February 27, 2015

Juna Hickner
Federal Consistency Coordinator
Oregon Coastal Management Program
Department of Land Conservation and Development
635 Capitol Street NE, Suite 150
Salem, OR 97301-2540

Dear Ms. Hickner:

Subject: COASTAL ZONE MANAGEMENT ACT NEGATIVE DETERMINATION FOR NORTHWEST TRAINING AND TESTING ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

Enclosed please find the Department of the Navy's Negative Determination under the Coastal Zone Management Act of 1972, as amended (16 United States Code 1456), as implemented by the provisions of 15 Code of Federal Regulations Section 930.35, and by the Oregon Department of Land Conservation and Development as required by Oregon Administrative Code 660, Division 35, Section 20.

The Navy is proposing to continue to conduct selected training and testing activities off the Oregon coast, outside the Oregon coastal zone. These training and testing activities are necessary to achieve and maintain military readiness, as articulated in the Northwest Training and Testing (NWTT) Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). A copy of the NWTT Draft EIS/OEIS was previously provided to the Department of Land Conservation and Development by letter dated January 23, 2014, and notice of a Supplement to the Draft EIS/OEIS was provided by letter dated December 12, 2014. The NWTT Draft EIS/OEIS and Supplement are also available at http://nwtteis.com/. The training activities proposed to occur off the coast of Oregon are similar in type and level of intensity to those covered in a previous Negative Determination for the Northwest Training Range Complex, for which the Department of Land Conservation and Development issued

1

Subject: COASTAL ZONE MANAGEMENT ACT NEGATIVE DETERMINATION FOR NORTHWEST TRAINING AND TESTING ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

a concurrence on November 3, 2009. Additionally, the NWTT Draft EIS/OEIS and this Negative Determination now include Navy testing activities, which are similar to the training activities already addressed.

Pursuant to Section 307(c) (1) of the federal Coastal Zone Management Act, the Navy has determined that the Proposed Action would have no reasonably foreseeable effects to Oregon's coastal uses or resources, as all training and testing activities would occur greater than 12 nautical miles from shore, with most expected to occur greater than 50 nautical miles from shore. Additionally, it is anticipated that less than ten percent of all NWTT activities would occur off the Oregon coast, due to the considerable distance from Navy installations located in Washington State. The basis for this Negative Determination is detailed in Enclosure 1.

The Navy point of contact for this information is Ms. Anna Whalen at 360-396-0256, e-mail: anna.whalen@navy.mil.

Sincerely,

L. M. FOSTER
By direction

Enclosure: 1. CZMA Negative Determination for Oregon

2

Oregon
Kate Brown, Governor

**Oregon Coastal Management Program**
Department of Land Conservation and Development
635 Capitol Street, Suite 150
Salem, Oregon 97301-2540
Phone (503) 373-0050
FAX (503) 378-6033
www.oregon.gov/LCD/OCMP

June 3, 2015

Mr. L.M. Foster, Commander
Department of the Navy, United State Pacific Fleet
250 Makalapa Drive
Pearl Harbor, Hawaii 96860-3131

| | |
|---|---|
| Re: | Coastal Zone Management Act Negative Determination |
| Project: | Northwest Training and Testing Environmental Impact Statement / Overseas Environmental Impact Statement |
| Agency: | Department of the Navy |
| Location: | Coast wide, outside of the coastal zone |

Dear Commander Foster,

The Oregon Department of Land Conservation and Development (DLCD) has reviewed the Negative Determination provided by the Department of Navy, United States Pacific Fleet, for consistency with the Oregon Coastal Management Program (OCMP). As a Federal agency activity, the proposed action is subject to consistency review pursuant to Section 307 of the Coastal Zone Management Act (CZMA) and attendant regulations of 15 CFR Part 930, Subpart C.
The Navy is proposing to continue to conduct selected training and testing activities off the Oregon coast, outside the Oregon coastal zone. DLCD received a copy of the Environmental Impact Statement on January 23, 2014. The training activities proposed to occur off the coast of Oregon are similar in type and level of intensity to those covered in a previous Negative Determination for the Northwest Training Range Complex, for which DLCD issued a concurrence on November 3, 2009. The Navy determined that the proposed action would have no reasonably foreseeable effects to Oregon's coastal uses or resources, as all training and testing activities would occur greater than 12 nautical miles from shore, with most expected to occur greater than 50 nautical miles from shore. Additionally, less than ten percent of all activities would occur off the Oregon coast.

**Consistency Decision**
DLCD **concurs** with the Navy's negative determination that the proposed project, as described in the negative determination and environmental impact assessment, will have no reasonably foreseeable effect to Oregon's coastal uses or resources. If you have any questions regarding this coastal zone management consistency finding or the consistency review process, please contact me at 503-373-0050 ext. 253 or at *heather.wade@state.or.us*

Sincerely,

*Heather B. Wade*

Heather Wade
Coastal State-Federal Relations Coordinator

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0148
February 17, 2015

Mr. Mark Delaplaine
Federal Consistency Manager
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

Dear Mr. Delaplaine:

Subject: COASTAL ZONE MANAGEMENT ACT NEGATIVE DETERMINATION FOR NORTHWEST TRAINING AND TESTING ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

Enclosed please find the Department of the Navy's Negative Determination under the Coastal Zone Management Act (CZMA) of 1972, as amended (16 United States Code 1456), as implemented by the provisions of 15 Code of Federal Regulations Section 930.35.

The Navy is proposing to continue to conduct selected training and testing activities off the northern California coast, outside the California coastal zone. These training and testing activities are necessary to achieve and maintain military readiness, as articulated in the Northwest Training and Testing (NWTT) Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). A copy of the Draft EIS/OEIS was previously provided to the California Coastal Commission by letter dated January 23, 2014, and notice of a Supplement to the Draft EIS/OEIS was provided by letter dated December 12, 2014. The NWTT Draft EIS/OEIS and Supplement are also available at http://nwtteis.com/. The training activities proposed to occur off the coast of northern California are similar in type and level of intensity to those covered in a previous Negative Determination for the Northwest Training Range Complex, for which the California Coastal Commission issued a concurrence on December 22, 2009 (ND-066-09). Additionally, the NWTT Draft EIS/OEIS and the Negative Determination now include Navy testing activities, which are similar to the training activities already addressed.

Subject: COASTAL ZONE MANAGEMENT ACT NEGATIVE DETERMINATION FOR NORTHWEST TRAINING AND TESTING ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

Pursuant to Section 307(c)(1) of the federal CZMA, the Navy has determined that the Proposed Action would have no reasonably foreseeable effects on California's coastal uses or resources, as all training and testing activities would occur greater than 12 nautical miles from shore, with most expected to occur greater than 50 nautical miles from shore. Additionally, it is anticipated that less than one percent of all NWTT activities would occur off the northern California coast, due to the great distance from Navy installations located in Washington State. The basis for this Negative Determination is detailed in Enclosure 1.

The Navy points of contact for this information are Ms. Anna Whalen at 360-396-0256, e-mail: anna.whalen@navy.mil and LCDR Gretchen Sosbee at 619-532-1396, e-mail: gretchen.sosbee@navy.mil.

Sincerely,

Lary M. Foster

L. M. Foster
By direction

Enclosure: 1. CZMA Negative Determination for California

STATE OF CALIFORNIA—NATURAL RESOURCES AGENCY EDMUND G. BROWN, JR., *GOVERNOR*

**CALIFORNIA COASTAL COMMISSION**

45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE (415) 904-5200
FAX (415) 904-5400
TDD (415) 597-5885

April 28, 2015

L.M. Foster
Department of the Navy
Commander
United States Pacific Fleet
250 Makalapa Dr.
Pearl Harbor, HA 96860-3131

Attn: Anna Whalen, Gretchen Sosbee

Re: **ND-0009-15**, Navy, Negative Determination, Navy Training Activities, Northwest Training Range Complex (NWTRC), offshore of northern California

Dear L.M. Foster:

The Navy has submitted a negative determination for the California component of its Northwest Training and Testing Activities (NWTT). The NWTT area extends offshore the states of Washington, Oregon, and northern California (Humboldt and Del Norte Counties) (Attachment 1). Most of the training activities would occur offshore of the state of Washington, and the Navy has submitted a separate consistency determination to the state of Washington, as well as a Negative Determination to the State of Oregon. The activities off California counties would be at least 12 nautical miles (nmi) offshore, and the Navy indicates most would occur approximately 50 nmi offshore. Because the primary Navy assets supplying the training vessels are homeported in Washington, the Navy indicates the only time California offshore waters would constitute training/testing locations would be when vessels are in transit to and from bases and/or ports to the south.

The Navy's conclusion of no "reasonably foreseeable coastal effects" on California's coastal zone relies primarily on three factors: (1) the vast majority of the activities would occur very far (hundreds of miles) north of California; (2) the California activities would be outside the California coastal zone (at a minimum of 9 nmi outside state waters); and (3) the Navy implements mitigation protocols to monitor and reduce acoustic effects when marine mammals are observed within the specified distances of the active sonars or explosives used. For the reasons expressed below, we question the Navy's reliance on each of these factors to establish a showing of no "reasonably foreseeable effects" on California coastal zone resources.

**Numbers of Animals Affected**
The Navy's letters of request for Incidental Harassment Authorizations (IHAs) submitted to the National Marine Fisheries Service (NMFS) indicate very high levels of marine mammal disturbances throughout the project area (Attachment 2). Under such

Page 2

circumstances, the Commission does not need precise estimates of "take" offshore of California under the Marine Mammal Protection Act (MMPA) to enable it to determine an activity's consistency to the maximum extent practicable with the enforceable policies of the California Coastal Management Program. The Commission generally considers very large "take" estimates to be strong evidence that an activity crosses the threshold level of "effects," when the affected animals in question are marine mammals (or sea turtles) that swim in and out of the California coastal zone (and thus spend portions of their life cycle within the coastal zone).

In its application to NMFS, the Navy requests permission for over 100,000 "Level B" harassments[1] (over 1/2 million animals over 5 years), most of which are characterized (under NMFS Stock Assessment Report Criteria) as "California, Oregon & Washington" stocks. Animals so listed may be present off any of the three states at any given time. Even accepting the Navy's estimate that the overall number of marine mammal harassments occurring in California offshore waters would be roughly only 1% of the three-state totals (and not considering harassments outside of California waters that may affect California coastal resources), this would still leave sufficiently large numbers of animals behaviorally affected off the coast of California to warrant the conclusion that the project would affect California coastal zone marine mammals. Even just 1% would mean over 1,000 animals would potentially harassed off California per year (and over 5,000 animals over 5 years). If these effects occurred during biologically significant behaviors (such as communication, breeding, or feeding), they could result in not just individual behavioral reactions, but population-level impacts as well.

On December 22, 2009, when the Commission staff concurred with the Navy's negative determination for the previous round of Northwest Training and Testing (ND-066-09), that concurrence was based on the Navy's representation that the California offshore activities would be very limited, as follows:

> *In summary, the California offshore activities of potential concern would consist of: (1) approximately 16 hours per year of airspace activities off California; (2) up to 1 hour of mid-frequency sonar use per year; (3) tracking by sonobuoys using active and passive sonar; (4), a small number of explosives munitions per year (up to four explosives, less than 1000 lb. each); and (5) surface firing of relatively small caliber munitions. Most of the activities would take place 50 nautical miles (nm) or more offshore, and all would be 12 nm or more offshore.*

However, in its current proposal the Navy has made it more difficult to determine effects, given that the language describing training locations is more open-ended. Accordingly,

---

[1] **Harassment:** Under the 1994 Amendments to the MMPA, "Level B" harassment is defined as: "… any act of pursuit, torment, or annoyance which … has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Page 3

the Commission staff requested clarification from the Navy in an attempt to identify training levels off California. The Navy's responses acknowledge the difficulty in quantifying training levels off California and stress a need for operational flexibility. In its responses to the Commission staff's request for a defined upper limit off California for these activities, the Navy stated (email communications, 4/15/15, from John Mosher, Navy, to Mark Delaplaine, CCC):

> *Since this portion of the study area is very far from where Navy units are based in Washington State or in southern California, the activities conducted in this area have been those completed while vessels are in transit between the installations in Washington and southern California. Again, these are Navy activities that have occurred in the past and are proposed to continue into the foreseeable future and would only occur greater than 12 nm off the California Coast. The best estimates that were provided in the past for the NWTRC EIS are still accurate for the foreseeable future and for the NWTT EIS. No major variances are expected to these estimates, though it should be noted that some fluctuations in activities are possible. Training usage reports over the past 4 years have shown that some years will have no activities whatsoever off the northern California coast, while other years MAY have slight variations above what was estimated. I emphasize "MAY", as it is not always possible to fix a specific location to all activities, on which I will elaborate.*
>
> *As training and testing activities are being conducted, it is not practical in implementation to require a Navy vessel or aircraft to track its specific location when conducting certain activities relative to an imaginary line that separates Oregon waters from California waters, all while operating often 50 to 250 nm from the coast, at various speeds and over potentially lengthy durations. For these reasons establishing firm upper limits for activities off each specific state is not possible.*
>
> *While we cannot provide annual reports of specific activities that occur over 12 nm off the northern California coast, the Navy provides annual unclassified reports of certain permitted activities for its range areas (specifically active sonar and explosives use) to the NMFS; however, these reports only indicate if annual usage was within the permit allowances. Additionally, the Navy submits annual classified reports to NMFS, and though these reports indicate some specifics on usage locations, they do not specify quantities utilized relative to individual states, just usage within the range area as a whole (as noted many of these activities occur very far off the coast and well outside state waters).*
>
> *Regarding your final question about usage over the last 5 years, we have not completed the full 5 year cycle for NWTRC activities yet, but over the past 4 years and 5 months, we can generally state that the activities provided in our previous estimates to you were in keeping with those projections. Not all of these events can be tracked with precise locations; for example usage of shipboard sonar or*

> *deployment of sonobuoys from aircraft can be represented with a generalized location, but vessels and aircraft frequently move over extended distances and periods of time during some activities. Additionally, the Navy can state that no use of explosive ordnance occurred in the portion of the range area off the northern California coast over this 4 year, 5 month period, and it is expected that activities of this type would be a very rare occurrence in these waters in the foreseeable future. Furthermore, across the entire 3-state NWTRC area, all permitted activities were far below the 5 year authorizations and in most cases were far below the individual annual authorizations.*

Unfortunately, the open-ended nature of these responses make it extremely difficult to assess the potential impact or verify the levels of training activities off California, or to conclude they would not affect California coastal zone resources.

**Distance Offshore**
The Commission's April, 2013 findings in reviewing the most recent Navy SOCAL Testing and Training proposal (Consistency Determination CD-008-13) contained a three-page discussion of Commission and Navy positions concerning coastal zone effects from loud Navy mid-frequency active sonar and other acoustic activities in federal waters off Southern California (many of which were tens of miles offshore). We will not belabor the point here, but will reiterate the Commission's position that effects occurring 10s of miles offshore on species that swim into and out of the coastal zone constitute coastal zone resource effects. (For additional background, see pp. 19-22 of the document at this link: http://documents.coastal.ca.gov/reports/2013/4/W13a-4-2013.pdf.)

In its findings the Commission (among other assertions) cited a historic NOAA letter dated March 10, 1995, responding to the Commission's request from the Office of Coastal Resource Management (OCRM)[2] to review the effects of the "ATOC"[3] sound source, located 48 nmi offshore of San Mateo County. In that letter NOAA affirmed that "sounds emanating from the ATOC sound source can be reasonably expected to affect marine mammals that are resources of both the outer continental shelf ("OCS") and the coastal zone…" and "OCRM has determined that the marine animals at issue that ply the waters of the coastal zone and the OCS are coastal resources."

**Mitigation Protocols**
The Commission has historically found that Navy military training and testing mitigation protocols involving underwater active mid-frequency sonar are not adequate to protect marine mammals and sea turtles from the effects of mid-frequency sonar (as discussed in detail in the Commission's findings on Navy consistency determinations CD-086-06 (adopted in January, 2007), CD-049-08 (adopted in October, 2008), and, most recently, CD-008-13-SOCAL Testing and Training Exercises (adopted in April, 2013).

---

[2] Now OCM – Office for Coastal Management.

[3] ATOC is the acronym for Scripps Institution of Oceanography's Acoustic Thermometry of Ocean Climate, reviewed by the Commission as Consistency Certification CC-110-94.

(See, e.g., pp. 36-46 of the report at the same link as above.)

As mentioned above, we will not belabor this point either in this letter, which is focused on the threshold question of effects, rather than the proposal's consistency to the maximum extent practicable with the enforceable policies of the CCMP. The point we are making in this letter is simply that the existing protocols (which are similar to those implemented in SOCAL (See Attachment 5 for NWTT protocols) are insufficient to avoid generating "effects" on coastal zone marine resource species. Briefly, not all animals will be observed, and even with the protocols in place, the received sound levels for some species would be sufficiently loud to result in serious physiological damage, and for many species to cause aversive reactions potentially during important biological behaviors.

In conclusion, for the reasons discussed above, we disagree with the Navy's conclusion that the activities would not affect any resource of the California coastal zone, and we therefore request that the Navy submit a federal consistency determination to California for the California portion of the NWTT, including a complete analysis of the project's consistency with enforceable policies of the CCMP (i.e., the Chapter 3 policies of the Coastal Act). We are therefore notifying the Navy that the Commission staff **disagrees** that the proposed testing and training activities would not adversely affect California coastal zone resources. We therefore **object** to your negative determination made pursuant to 15 CFR Section 930.35 of the NOAA implementing regulations and request submittal of a consistency determination. Please contact Mark Delaplaine at (415) 904-5289 if you have any questions regarding this matter.

Sincerely,

(for) CHARLES LESTER
Executive Director

Attachments:

1. NWTT Area Maps
2. Navy IHA Request Table 5-2 - "Take" Estimates for Training
3. Navy IHA Request Table 1-8 – Annual Hours of Sonar Used During Training
4. Navy IHA Request Table 1-3 – Categories of Active Acoustic Sources
5. Navy Mitigation Protocols

cc: Arcata District Office
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Attachment 1



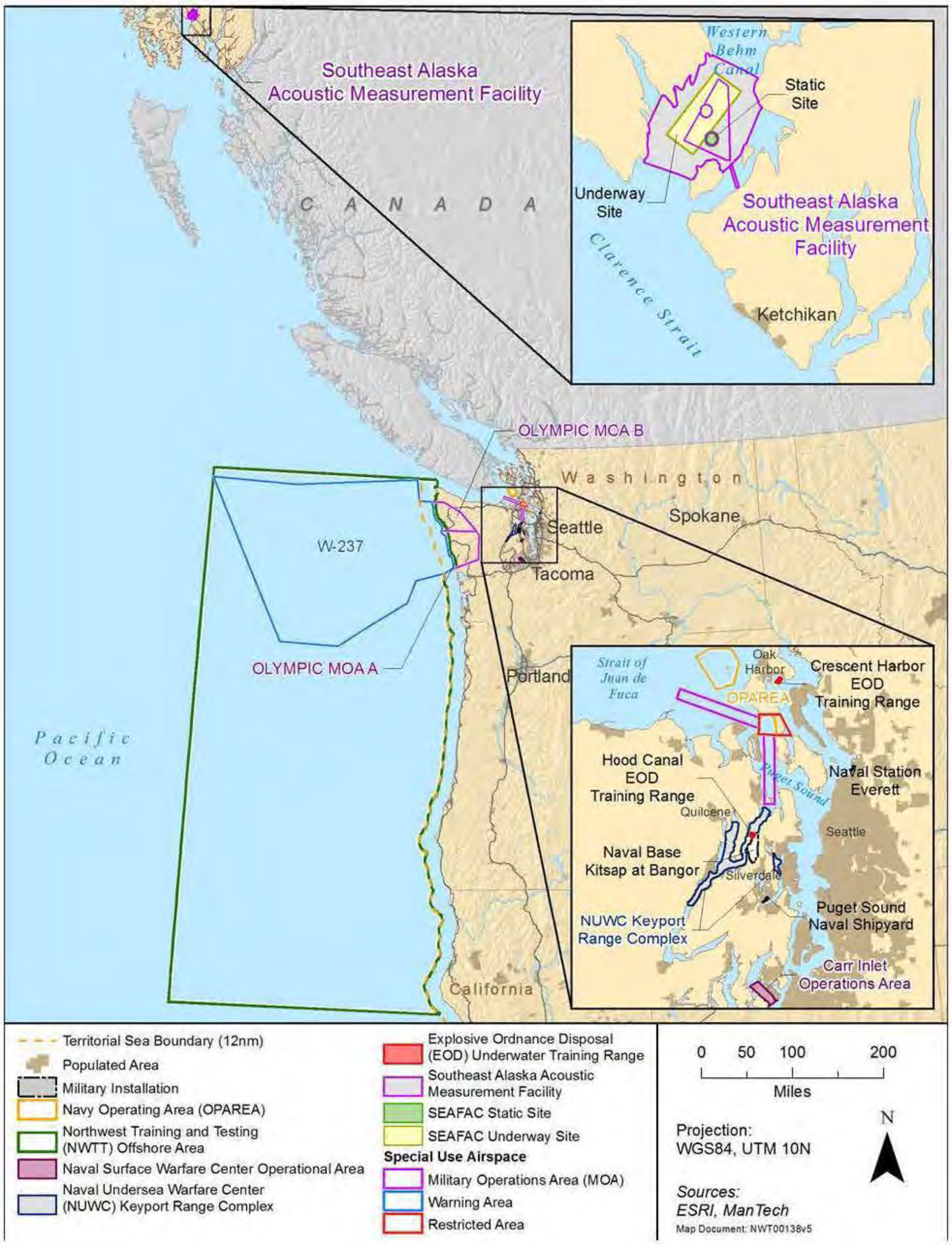


**Figure 1: Northwest Training and Testing Study Area**


**Figure 2: Portion of the Offshore Area of the Northwest Training and Testing Study Area Adjacent to California**

Attachment 2



**Table 5-2: Species Specific Take Requests from Modeling Estimates of Impulsive and Non-Impulsive Source Effects for All Training Activities**

| Species | Stock | Max. Annual | | 5-Year | |
|---|---|---|---|---|---|
| | | Level B | Level A | Level B | Level A |
| North Pacific right whale | Eastern North Pacific | 0 | 0 | 0 | 0 |
| Humpback whale | Central North Pacific | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 12 | 0 | 60 | 0 |
| Blue whale | Eastern North Pacific | 5 | 0 | 25 | 0 |
| Fin whale | Northeast Pacific | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 25 | 0 | 125 | 0 |
| Sei whale | Eastern North Pacific | 0 | 0 | 0 | 0 |
| Minke whale | Alaska | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 18 | 0 | 90 | 0 |
| Gray whale | Eastern North Pacific | 6 | 0 | 30 | 0 |
| | Western North Pacific | 0 | 0 | 0 | 0 |
| Sperm whale | North Pacific | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 81 | 0 | 405 | 0 |
| *Kogia* (spp.) | California, Oregon, & Washington | 73 | 0 | 365 | 0 |
| Killer whale | Alaska Resident | 0 | 0 | 0 | 0 |
| | Northern Resident | 0 | 0 | 0 | 0 |
| | West Coast Transient | 9 | 0 | 39 | 0 |
| | East North Pacific Offshore | 13 | 0 | 65 | 0 |
| | East N. Pacific Southern Resident | 2 | 0 | 6 | 0 |
| Short-finned pilot whale | California, Oregon, & Washington | 0 | 0 | 0 | 0 |
| Short-beaked common dolphin | California, Oregon, & Washington | 734 | 0 | 3,670 | 0 |
| Bottlenose dolphin | California, Oregon, & Washington | 0 | 0 | 0 | 0 |
| Striped dolphin | California, Oregon, & Washington | 22 | 0 | 110 | 0 |
| Pacific white-sided dolphin | North Pacific | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 3,482 | 0 | 17,408 | 0 |
| Northern right whale dolphin | California, Oregon, & Washington | 1,332 | 0 | 6,660 | 0 |
| Risso's dolphin | California, Oregon, & Washington | 657 | 0 | 3,285 | 0 |
| Harbor porpoise | Southeast Alaska | 0 | 0 | 0 | 0 |
| | Northern Oregon/Washington Coast | 35,006 | 0 | 175,030 | 0 |
| | Northern California/Southern Oregon | 52,509 | 0 | 262,545 | 0 |
| | Washington Inland Waters | 1,417 | 1 | 4,409 | 5 |
| Dall's porpoise | Alaska | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 3,732 | 4 | 18,188 | 20 |
| Cuvier's beaked whale | Alaska | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 353 | 0 | 1,765 | 0 |
| Baird's beaked whale | Alaska | 0 | 0 | 0 | 0 |
| | California, Oregon, & Washington | 591 | 0 | 2,955 | 0 |
| *Mesoplodon* beaked whales | California, Oregon, & Washington | 1,417 | 0 | 7,085 | 0 |
| Steller sea lion | Eastern U.S. | 404 | 0 | 1,986 | 0 |
| Guadalupe fur seal | Guadalupe Island | 7 | 0 | 35 | 0 |
| California sea lion | U.S. Stock | 814 | 0 | 4,038 | 0 |
| Northern fur seal | Eastern Pacific | 2,495 | 0 | 12,475 | 0 |
| | California | 37 | 0 | 185 | 0 |
| Northern elephant seal | California Breeding | 1,271 | 0 | 6,353 | 0 |
| Harbor seal | Clarence Strait | 0 | 0 | 0 | 0 |
| | OR/WA Coastal | 0 | 0 | 0 | 0 |
| | Washington Inland Waters | 548 | 4 | 2,390 | 20 |
| Northern sea otter | Southeast Alaska | 0 | 0 | 0 | 0 |
| | Washington | 0 | 0 | 0 | 0 |
| | **TOTALS** | **107,072** | **9** | **531,782** | **45** |

Attachment 3



### 1.6.3 SUMMARY OF IMPULSIVE AND NON-IMPULSIVE SOURCES

The Navy is requesting the level of take discussed in Chapter 5 based on the annual sonar and other active acoustic and explosive bin use listed in the following sections.

#### 1.6.3.1 Training Sonar and Other Active Acoustic Source Classes

Table 1-8 provides a quantitative annual summary of training activities by sonar and other active acoustic source class analyzed in this LOA request.

**Table 1-8: Annual Hours of Sonar and Other Active Acoustic Sources Used during Training within the Study Area**

| Source Class Category | Source Class | Units | Annual Use |
|---|---|---|---|
| **Mid-Frequency (MF)** Active sources from 1 to 10 kHz | **MF1** | Hours | 166 |
| | **MF3** | Hours | 70 |
| | **MF4** | Hours | 4 |
| | **MF5** | Items | 896 |
| | **MF11** | Hours | 16 |
| **High-Frequency (HF):** Tactical and non-tactical sources that produce signals greater than 10 kHz but less than 100 kHz | **HF1** | Hours | 48 |
| | **HF4** | Hours | 384 |
| | **HF6** | Hours | 192 |
| **Anti-Submarine Warfare (ASW)** Active ASW sources | **ASW2** | Items | 720 |
| | **ASW3** | Hours | 78 |

Attachment 4



### 1.5.6 SOURCE CLASSES ANALYZED FOR TRAINING AND TESTING

For this LOA request, Table 1-1 shows the impulsive sources (e.g., underwater explosives) associated with Navy training and testing activities analyzed in the Study Area.

Table 1-2 shows non-impulsive sources (e.g., sonar) associated with Navy training activities analyzed in this application.

Table 1-3 shows the non-impulsive sources associated with Navy testing.

**Table 1-1: Training and Testing Impulsive (Explosives) Source Classes Analyzed**

| Source Class | Representative Munitions | Net Explosive Weight (pounds [lb.]) |
|---|---|---|
| E1 | Medium-caliber projectiles | 0.1–0.25 |
| E3 | Large-caliber projectiles | > 0.5–2.5 |
| E4 | Improved Extended Echo Ranging Sonobuoy | > 2.5–5.0 |
| E5 | 5-inch projectiles | > 5–10 |
| E8 | MK-46 torpedo | > 60–100 |
| E10 | Air-to-surface missile | > 250–500 |
| E11 | MK-48 torpedo | > 500–650 |
| E12 | 2,000 lb. bomb | > 650–1,000 |

**Table 1-2: Non-Impulsive Training Source Classes Quantitatively Analyzed**

| Source Class Category | Source Class | Description |
|---|---|---|
| **Mid-Frequency (MF)**: Tactical and non-tactical sources that produce mid-frequency (1–10 kHz) signals | MF1 | Hull-mounted surface ship sonar (e.g., AN/SQS-53C and AN/SQS-60) |
| | MF3 | Hull-mounted submarine sonar (e.g., AN/BQQ-10) |
| | MF4 | Helicopter-deployed dipping sonar (e.g., AN/AQS-22 and AN/AQS-13) |
| | MF5 | Active acoustic sonobuoys (e.g., DICASS) |
| | MF11 | Hull-mounted surface ship sonar with an active duty cycle greater than 80% |
| **High-Frequency (HF):** Tactical and non-tactical sources that produce high-frequency (greater than 10 kHz but less than 100 kHz) signals | HF1 | Hull-mounted submarine sonar (e.g., AN/BQQ-10) |
| | HF4 | Mine detection, classification, and neutralization sonar (e.g., AN/SQS-20) |
| | HF6 | Active sources (equal to 180 dB and up to 200 dB) |
| **Anti-Submarine Warfare (ASW):** Tactical sources such as active sonobuoys and acoustic countermeasures systems used during the conduct of ASW training activities | ASW2 | Mid-frequency Multistatic Active Coherent sonobuoy (e.g., AN/SSQ-125) |
| | ASW3 | Mid-frequency towed active acoustic countermeasure systems (e.g., AN/SLQ-25) |

**Table 1-3: Non-Impulsive Testing Source Classes Quantitatively Analyzed**

| Source Class Category | Source Class | Description |
|---|---|---|
| **Low-Frequency (LF):** Sources that produce low-frequency (less than 1 kHz) signals | LF4 | Low-frequency sources equal to 180 dB and up to 200 dB |
| | LF5 | Low-frequency sources less than 180 dB |
| **Mid-Frequency (MF):** Tactical and non-tactical sources that produce mid-frequency (1–10 kHz) signals | MF3 | Hull-mounted submarine sonar (e.g., AN/BQQ-10) |
| | MF4 | Helicopter-deployed dipping sonar (e.g., AN/AQS-22 and AN/AQS-13) |
| | MF5 | Active acoustic sonobuoys (e.g., DICASS) |
| | MF6 | Active underwater sound signal devices (e.g., MK-84) |
| | MF8 | Active sources (greater than 200 dB) |
| | MF9 | Active sources (equal to 180 dB and up to 200 dB) |
| | MF10 | Active sources (greater than 160 dB, but less than 180 dB) not otherwise binned |
| | MF11 | Hull-mounted surface ship sonar with an active duty cycle greater than 80% |
| | MF12 | High duty cycle – variable depth sonar |
| **High-Frequency (HF):** Tactical and non-tactical sources that produce high-frequency (greater than 10 kHz but less than 100 kHz) signals | HF1 | Hull-mounted submarine sonar (e.g., AN/BQQ-10) |
| | HF3 | Hull-mounted submarine sonar (classified) |
| | HF5[1] | Active sources (greater than 200 dB) |
| | HF6 | Active sources (equal to 180 dB and up to 200 dB) |
| **Very High-Frequency (VHF):** Tactical and non-tactical sources that produce signals greater than 100 kHz but less than 200 kHz | VHF2 | Active sources with a frequency greater than 100 kHz, up to 200 kHz with a source level less than 200 dB |
| **Anti-Submarine Warfare (ASW):** Tactical sources such as active sonobuoys and acoustic countermeasures systems used during the conduct of ASW testing activities | ASW1 | Mid-frequency Deep Water Active Distributed System (DWADS) |
| | ASW2 | Mid-frequency Multistatic Active Coherent sonobuoy (e.g., AN/SSQ-125) – sources analyzed by number of items (sonobuoys) |
| | ASW2 | Mid-frequency Multistatic Active Coherent sonobuoy (e.g., High Duty Cycle) – Sources that are analyzed by hours |
| | ASW3 | Mid-frequency towed active acoustic countermeasure systems (e.g., AN/SLQ-25) |
| | ASW4 | Mid-frequency expendable active acoustic device countermeasures (e.g., MK-3) |
| **Torpedoes (TORP):** Source classes associated with the active acoustic signals produced by torpedoes | TORP1 | Lightweight torpedo (e.g., MK-46, MK-54) |
| | TORP2 | Heavyweight torpedo (e.g., MK-48, electric vehicles) |
| **Acoustic Modems (M):** Systems used to transmit data acoustically through water | M3 | Mid-frequency acoustic modems (greater than 190 dB) (e.g., Underwater Emergency Warning System, Aid to Navigation) |
| **Swimmer Detection Sonar (SD):** Systems used to detect divers and submerged swimmers | SD1 | High-frequency sources with short pulse lengths, used for the detection of swimmers and other objects for the purpose of port security |
| **Synthetic Aperture Sonar (SAS):** Sonar in which active acoustic signals are post-processed to form high-resolution images of the seafloor | SAS2 | High frequency unmanned underwater vehicle (UUV) (e.g., UUV payloads) |

1 Notes: (1) For this analysis, HF5 consists of only one source; the modeling was conducted specifically for that source. (2) DICASS = Directional Command Activated Sonobuoy System

Attachment 5



**Table 5-2: Summary of Recommended Mitigation Measures; Extracted from Table 5.4-1 in the Draft EIS/OEIS and Updated to Reflect Changes in Mitigation Measures**

| Activity Category or Mitigation Area | Recommended Lookout Procedural Measure | Recommended Mitigation Zone and Protection Focus | Current Measure and Protection Focus |
|---|---|---|---|
| **Acoustic Stressors – Sonar and Other Active Acoustic Sources** | | | |
| Low-Frequency and Hull-Mounted Mid-Frequency Active Sonar during Anti-Submarine Warfare and Mine Warfare | Training: 2 Lookouts (general), 1 Lookout (minimally manned, moored, or anchored)<br>Testing: 2 Lookouts (general), 1 Lookout (small boats, minimally manned, moored, anchored, pierside, or shore-based) | Training: 1,000 yd. (920 m) and 500 yd. (460 m) power downs and 200 yd. (180 m) shutdown for cetaceans and sea turtles (excludes bow-riding dolphins), 100 yd. (90 m) mitigation zone for pinnipeds (excludes haulouts).<br>Testing: ~~Cetacean mitigation zone 1,000 yd. (920 m), 100 yd. (90 m) for pinnipeds (excludes haulouts), from intended track of the test unit.~~ **1,000 yd. (920 m) and 500 yd. (460 m) power downs for sources that can be powered down and 200 yd. (180 m) shutdown for cetaceans, 100 yd. (90 m) for pinnipeds** | Training: 1,000 yd. (920 m) and 500 yd. (460 m) power downs and 200 yd. (180 m) shutdown for marine mammals and sea turtles.<br>Testing: Observation conducted from all participating surface craft and, where available, adjacent shore sites, with a cetacean mitigation zone 1,000 yd. (920 m), 100 yd. (90 m) for pinnipeds from intended track of the test unit. |
| **Explosive and Impulse Sound** | | | |
| Improved Extended Echo Ranging Sonobuoys | Training: 1 Lookout<br>Testing: 1 Lookout | Training: ~~600 yd. (550 m) for marine mammals, sea turtles, and concentrations of floating vegetation.~~ **n/a**<br>Testing: ~~Same as Training~~ **600 yd. (550 m) for marine mammals, sea turtles, and concentrations of floating vegetation.** | Training: 1,000 yd. (920 m) for marine mammals and sea turtles.<br>Testing: Same as Training |
| Explosive Signal Underwater Sound buoys using ~~0.6~~ **>0.5**–2.5 lb. NEW | Training: 1 Lookout<br>Testing: 1 Lookout | Training: 350 yd. (320 m) for marine mammals, sea turtles, and concentrations of floating vegetation.<br>Testing: Same as Training | None |

**Table 5-2: Summary of Recommended Mitigation Measures; Extracted from Table 5.4-1 in the Draft EIS/OEIS and Updated to Reflect Changes in Mitigation Measures (continued)**

| Activity Category or Mitigation Area | Recommended Lookout Procedural Measure | Recommended Mitigation Zone and Protection Focus | Current Measure and Protection Focus |
|---|---|---|---|
| **Explosive and Impulse Sound (continued)** | | | |
| Mine Countermeasures and Mine Neutralization using Positive Control Firing Devices | Training: 2 Lookouts (1 each on 2 survey boats)<br>Testing: n/a | Training: ~~700 yd. (640 m)~~ **400 yd. (366 m)** for **>0.5**-2.5 lb. charge for marine mammals, turtles, and marbled murrelet.<br>~~330 yd. (300 m) for up to 1.5 lb. charge for marbled murrelet.~~<br>~~110 yd. (100 m) for 1 ounce charge marbled murrelet.~~<br>Testing: n/a | Training: 700 yd. (640 m) for up to 2.5 lb. charge for marine mammals, turtles, and marbled murrelet.<br>330 yd. (300 m) for up to 1.5 lb. charge for marbled murrelet.<br>110 yd. (100 m) for 1 ounce charge marbled murrelet.<br>Testing: n/a |
| ~~Mine Neutralization Activities Using Diver-Placed Time-Delay Firing Devices~~ | ~~Training: 4 Lookouts (2 each on 2 survey boats)~~<br>~~Testing: n/a~~ | ~~Training: 700 yd. (640 m) for up to 2.5 lb. charge for marine mammals, turtles, and marbled murrelet.~~<br>~~330 yd. (300 m) for up to 1.5 lb. charge for marbled murrelet.~~<br>~~110 yd. (100 m) for 1 ounce charge marbled murrelet.~~<br>~~Testing: n/a~~ | ~~Training: 700 yd. (640 m) for up to 2.5 lb. charge for marine mammals, turtles, and marbled murrelet.~~<br>~~330 yd. (300 m) for up to 1.5 lb. charge for marbled murrelet.~~<br>~~110 yd. (100 m) for 1-ounce charge marbled murrelet.~~<br>~~Testing: n/a~~ |

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0481
May 18, 2015

Mr. Mark Delaplaine
Federal Consistency Manager
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

Dear Mr. Delaplaine:

Subject: REVISED COASTAL ZONE MANAGEMENT ACT NEGATIVE DETERMINATION FOR NORTHWEST TRAINING AND TESTING ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

In response to the California Coastal Commission's letter dated April 28, 2015 and a follow-on conference call on May 7, 2015, the Navy is submitting the enclosed revised Negative Determination under the Coastal Zone Management Act (CZMA) of 1972, as amended (16 United States Code 1456), as implemented by the provisions of 15 Code of Federal Regulations Section 930.35.

The revised Negative Determination better quantifies the Navy's estimates of training and testing activities included in the Northwest Training and Testing (NWTT) Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) that could potentially occur in waters off the northern California coast, outside the California coastal zone.

The Navy believes that the updated estimates of potential Navy activities and expanded explanation help clarify the Navy's "no reasonably foreseeable effects" conclusion on California's coastal uses or resources and are consistent with the Navy's Negative Determination for the Northwest Training Range Complex, for which the California Coastal Commission issued a concurrence on December 22, 2009 (ND-066-09).

Please note that the Navy reviewed all the proposed actions that were included in the previous Negative Determination submitted to the California Coastal Commission on February 17, 2015 and has removed several activities from consideration, concluding that these activities have not occurred in the recorded past, nor are expected to occur off the northern California coast in the foreseeable future.

Subject: REVISED COASTAL ZONE MANAGEMENT ACT NEGATIVE DETERMINATION FOR NORTHWEST TRAINING AND TESTING ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

The Navy points of contact for this information are Ms. Kimberly Kler at 360-551-4704, e-mail: kimberly.kler@navy.mil and LCDR Gretchen Sosbee at 619-532-1396, e-mail: gretchen.sosbee@navy.mil.

Sincerely,

L. M. Foster
Director, Environmental Readiness
By direction

Enclosure: 1. Revised CZMA Negative Determination for California

Cc: REC, CNRSW

2

5STATE OF CALIFORNIA -- NATURAL RESOURCES AGENCY EDFMUND G. BROWN JR., *Governor*

**CALIFORNIA COASTAL COMMISSION**
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SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200

June 15, 2015

L.M. Foster, Director
Environmental Readiness
Department of the Navy
Commander
United States Pacific Fleet
250 Makalapa Dr.
Pearl Harbor, HA 96860-3131

Attn: Kimberly Kler, Gretchen Sosbee

Re: **ND-0018-15**, Navy, Negative Determination, Navy Training Activities, Northwest Training and Testing Activities (NWTT), offshore of northern California

Dear L.M. Foster:

On April 28, 2015, the Commission staff objected to a negative determination the Navy submitted on March 3, 2015, for the California component of its Northwest Training and Testing Activities (NWTT), offshore of northern California (ND-0009-15). The NWTT area extends offshore the states of Washington, Oregon, and northern California (Humboldt and Del Norte Counties). The NWTT activities are typically authorized for five-year periods, and as was the case for the previous five-year period, most of the activities would occur offshore of the state of Washington. The Navy has submitted separate determinations (under the Coastal Zone Management Act) to the states of Washington and Oregon.

The activities off California would take place at least 12 nautical miles (nmi) offshore, and the Navy indicates most would occur approximately 50 nmi offshore. Because the primary Navy assets supplying the training vessels are homeported in Washington, the Navy indicates the only time California offshore waters would be used for training/testing would be when vessels are in transit to and from bases and/or ports to the south.

Despite these limitations on activity locations, our April 28, 2015, objection letter raised concerns over the manner in which the Navy described the extent of the testing and training activities, particularly when compared with the way in which the activities had been described in the Navy's 2009 negative determination (ND-066-09), which we concurred with on December 22, 2009.

The activities as described in 2009 had been narrowly constrained, in terms of the likely extent of activities offshore of California, whereas the March 3, 2015, submittal described the activities in a manner we felt was more ambiguous, such that we had

Page 2

difficulty determining with any certainty the levels of activities off California, and consequently, the extent of reasonably foreseeable effects on California coastal zone resources.

As our April 28, 2015, letter to you noted, our 2009 administrative concurrence had been based on the Navy's representation that the California offshore activities would be very limited, and which the Navy had summarized (in 2009) as follows:

> *In summary, the California offshore activities of potential concern would consist of: (1) approximately 16 hours per year of airspace activities off California; (2) up to 1 hour of mid-frequency sonar use per year; (3) tracking by sonobuoys using active and passive sonar; (4), a small number of explosives munitions per year (up to four explosives, less than 1000 lb. each); and (5) surface firing of relatively small caliber munitions. Most of the activities would take place 50 nautical miles (nm) or more offshore, and all would be 12 nm or more offshore.*

In its resubmittal and response to our April 28, 2015, objection letter, the Navy has clarified that the range, location, and extent of activities off California would be very similar to those described in 2009 and occur "very infrequently," and that the primary expansions of activities being conducted (such as use of sonobuoys), as described in the Navy's Supplemental Draft EIS/OEIS would not occur off California. This Supplement addressed changes to the types and number of sonobuoys to be used in association with aircraft tracking activities, and air quality effects associated with inland activities proposed in Washington.

The Navy now states:

> *In summary ... the California offshore activities of potential concern would consist of (1) up to 2 surface firing events per year using non-explosive ordnance, (2) up to 1 hour of mid-frequency sonar use per year, (3) approximately 30 hours per year of airspace activities off California, (4) tracking by sonobuoys using active and passive sonar, and (5) less than one percent (1%) of any testing may occur off California.*

Finally, upon further questioning by the Commission staff's request, the Navy has also clarified that the sonobuoys use involving active sonar would be limited to no more than a few hours of use per year (i.e., less than 4 hours).

Under the federal consistency regulations (Section 930.35), a negative determination can be submitted for an activity that the federal agency determines will not have coastal effects and "which is the same as or similar to activities for which consistency determinations have been prepared in the past." We **agree** that it does not appear reasonably foreseeable that the proposed activities, with the clarifications provided in the Navy's resubmittal, would affect California coastal zone resources, and that they can be considered the same as or similar to the previous 2009 negative determination for Navy Northwest Training activities with which we concurred.

Page 3

Finally, and as we noted in 2009, our concurrence with this determination is not in any way meant to convey the message that the Commission's concerns over use of mid-frequency sonar have been diminished, as expressed its actions on Navy SOCAL consistency determinations (CD-008-13, and CD-049-08, and CD-086-06). The reason this NWTT matter is being treated administratively is rather due to the fact that the sonar use off California would be limited to only a few hours per year, compared to the over 19,000 hours per year of sonar use off southern California. Thus, while we are agreeing with your determination, please note that we do not intend the Navy to be left with the impression that the Commission has changed its position over the need for additional mitigation measures to protect marine mammals and sea turtles from the effects of mid-frequency sonar (as discussed in detail in the Commission's findings in the above-referenced consistency determinations). We continue to believe additional measures as described in those findings are warranted, and we continue to urge the Navy to implement (and NMFS to require) them. With that understanding, we **concur** with your negative determination for the NWTT activities made pursuant to 15 CFR Section 930.35 of the NOAA implementing regulations. Please contact Mark Delaplaine at (415) 904-5289 if you have any questions regarding this matter.

Sincerely,

(for) CHARLES LESTER
Executive Director

cc: Arcata District Office
Office for Coastal Management (David Kaiser, Kerry Kehoe)
Washington and Oregon State Coastal Management Programs
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Page 4

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IN REPLY REFER TO:
5090
Ser N465/0234
12 Mar 2015

Mr. Kim Kratz
Assistant Regional Administrator
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1201 NE Lloyd Blvd
Portland, OR 97232-1274

SUBJECT: ESSENTIAL FISH HABITAT ASSESSMENT FOR THE NORTHWEST TRAINING AND TESTING ACTIVITIES

Dear Mr. Kratz:

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the U.S. Navy (Navy) has prepared an Essential Fish Habitat (EFH) Assessment for the training and testing activities conducted within the Northwest Training and Testing (NWTT) Study Area. The Navy's assessment concludes that EFH within the Washington, Oregon and California portions of the NWTT Study Area may be adversely affected by training and testing activities and requests initiation of the MSA's EFH consultation process. The Navy has determined that the Proposed Action will have no effect on EFH in Western Behm Canal, Alaska, therefore these species and habitats are not included in this analysis.

Additional information on NWTT may be found at the project website (www.NWTTEIS.com), including the EFH assessment, the Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS), and Supplement to the Draft EIS/OEIS prepared by the Navy to analyze potential environmental impacts that could result from activities under the Proposed Action. The Navy's preferred alternative in the Draft EIS/OEIS and analyzed in the EFH Assessment is Alternative 1.

We appreciate your continued support in helping the U.S. Navy meet its environmental responsibilities. Please note that due to the large NWTT study area and EFH designations spanning the West Coast, a similar letter and copy of the EFH Assessment is

SUBJECT: ESSENTIAL FISH HABITAT ASSESSMENT FOR THE NORTHWEST TRAINING AND TESTING ACTIVITIES

concurrently being sent to the National Marine Fisheries Service's (NMFS) California Coastal Area Office. The Navy appreciates coordination between the two NMFS offices as part of the consultation. My point of contact for this matter is Ms. Andrea Balla-Holden (360) 396-0002, or email: andrea.ballaholden@navy.mil.

Sincerely,

L. M. FOSTER
Director, Environmental Readiness
By direction

Enclosure: EFH Assessment for NWTT (hard copy and CD-ROM)

Copy to: (w/o encl)
Mr. Stan Rogers, NMFS Office of Protected Resources
Mr. Brian Hopper, NMFS Office of Protected Resources
Ms. Irma Lagomarsino, NMFS Assistant Regional Administrator, California Coastal Area Office
Dr. Kelly Ebert, CNO N45

2

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0245
12 Mar 2015

Ms. Irma Lagomarsino
Assistant Regional Administrator
California Coastal Area Office
National Marine Fisheries Service
1655 Heindon Rd
Arcata, CA 95521

SUBJECT: ESSENTIAL FISH HABITAT (EFH) ASSESSMENT FOR THE NORTHWEST TRAINING AND TESTING (NWTT) ACTIVITIES

Dear Ms. Lagomarsino:

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the U.S. Navy (Navy) has prepared an EFH Assessment for the training and testing activities conducted within the NWTT Study Area. The Navy's assessment concludes that EFH within the Washington, Oregon and California portions of the NWTT Study Area may be adversely affected by training and testing activities and requests initiation of the MSA's EFH consultation process. The Navy has determined that the Proposed Action will have no effect on EFH in Western Behm Canal, Alaska, therefore these species and habitats are not included in this analysis.

Additional information on NWTT may be found at the project website (www.NWTTEIS.com), including the EFH assessment, the Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS), and Supplement to the Draft EIS/OEIS prepared by the Navy to analyze potential environmental impacts that could result from activities under the Proposed Action. The Navy's preferred alternative in the Draft EIS/OEIS and analyzed in the EFH Assessment is Alternative 1.

We appreciate your continued support in helping the U.S. Navy meet its environmental responsibilities. Please note that due to the large NWTT study area and EFH designations spanning the West Coast, a similar letter and copy of the EFH Assessment is concurrently being sent to the National Marine Fisheries

SUBJECT: ESSENTIAL FISH HABITAT (EFH) ASSESSMENT FOR THE NORTHWEST TRAINING AND TESTING (NWTT) ACTIVITIES

Service's (NMFS) Oregon and Washington Coastal Area Office. The Navy appreciates coordination between the two NMFS offices as part of the consultation. My point of contact for this matter is Ms. Andrea Balla-Holden (360) 396-0002, or email: andrea.ballaholden@navy.mil.

Sincerely,

L. M. FOSTER
Director, Environmental Readiness
By direction

Enclosure: EFH Assessment for NWTT (hard copy and CD-ROM)

Copy to: (w/o encl)
Mr. Stan Rogers, NMFS Office of Protected Resources
Mr. Brian Hopper, NMFS Office of Protected Resources
Mr. Kim Kratz, NMFS Assistant Regional Administrator, Oregon Washington Coastal Area Office
Dr. Kelly Ebert, CNO N45

2

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0235
March 11, 2015

Judith E. Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, AK 99501-3565

SUBJECT: INITIATION OF CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT AND DEFINITION OF THE AREA OF POTENTIAL EFFECT FOR NAVY NORTHWEST TRAINING AND TESTING

Dear Ms. Bittner:

The U.S. Navy (Navy) is initiating consultation in accordance with Section 106 of the National Historic Preservation Act (NHPA) as amended and 36 CFR Part 800, for proposed Northwest Training and Testing (NWTT) activities. NWTT was previously introduced to your office through a notice of availability for a Draft Environmental Impact Statement/Overseas Environmental Impact Statement.

This letter is to formally initiate consultation on the NWTT Section 106 undertaking and request your concurrence with our definition of the Area of Potential Effect (APE).

The Navy is currently defining the APE as the entire NWTT Study Area (Enclosure 1) but will be further refining the APE as specific properties of concern to the interested parties, such as tribes, are identified and potential effects are assessed through consultation.

The NWTT Study Area and APE comprise established maritime operating areas and warning areas in the eastern North Pacific Ocean, including Western Behm Canal in southeastern Alaska. The NWTT Study Area includes: air and water space within and outside Washington state waters, and outside-state-waters of Oregon and Northern California; four existing range complexes and facilities (the Northwest Training Range Complex, Naval Undersea Warfare Center Division Keyport Range Complex, Carr Inlet Operations Area and Southeast Alaska Acoustic Measurement Facility); and Navy pier-side locations where sonar maintenance and testing occur (Naval Base Kitsap Bremerton, Naval Base Kitsap Bangor and Naval Station Everett).

The Navy proposes to conduct training and testing activities, to include the use of active sonar and explosives, within the NWTT Study

SUBJECT: INITIATION OF CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT AND DEFINITION OF THE AREA OF POTENTIAL EFFECT FOR NAVY NORTHWEST TRAINING AND TESTING

Area. Some of these training and testing activities have historically occurred in the NWTT APE and were the subject of consultation with your office pursuant to the NHPA. Please refer to correspondence 3130-1R (Navy) dated December 7, 1987 for the Southeast Alaska Acoustic Measurement Facility (SEAFAC).

The purpose of the proposed undertaking is to ensure that the Navy accomplishes its mission to maintain, train, and equip combat-ready naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. This mission is achieved in part by training and testing within the NWTT APE. The NWTT EIS/OEIS and NHPA compliance also supports the renewal of federal regulatory permits and authorizations for current training and testing activities and future activities requiring environmental analysis.

The Navy is currently conducting a multi-media public outreach and communication effort pursuant to the National Environmental Policy Act (NEPA). The Navy is using the project public meetings and comments received to identify potential parties interested in a broad array of cultural resources, including historic properties located in the NWTT APE. At this time, the Navy has not received any requests from representatives of local governments, interested individuals or organizations requesting consulting party status.

In addition to the public engagement, the Navy has initiated consultation specific to the NHPA with four Alaska tribes and is in the process of scheduling meetings with those that have requested consultation and/or expressed specific comments or concerns about properties of traditional religious or cultural importance to them.

The Navy requests your concurrence with the APE for this proposed undertaking. If you require additional information or have any questions regarding this project, please contact Mr. David Grant, Archaeologist, NAVFAC NW, at (360) 396-0919 or by email, dave.m.grant@navy.mil.

Sincerely,

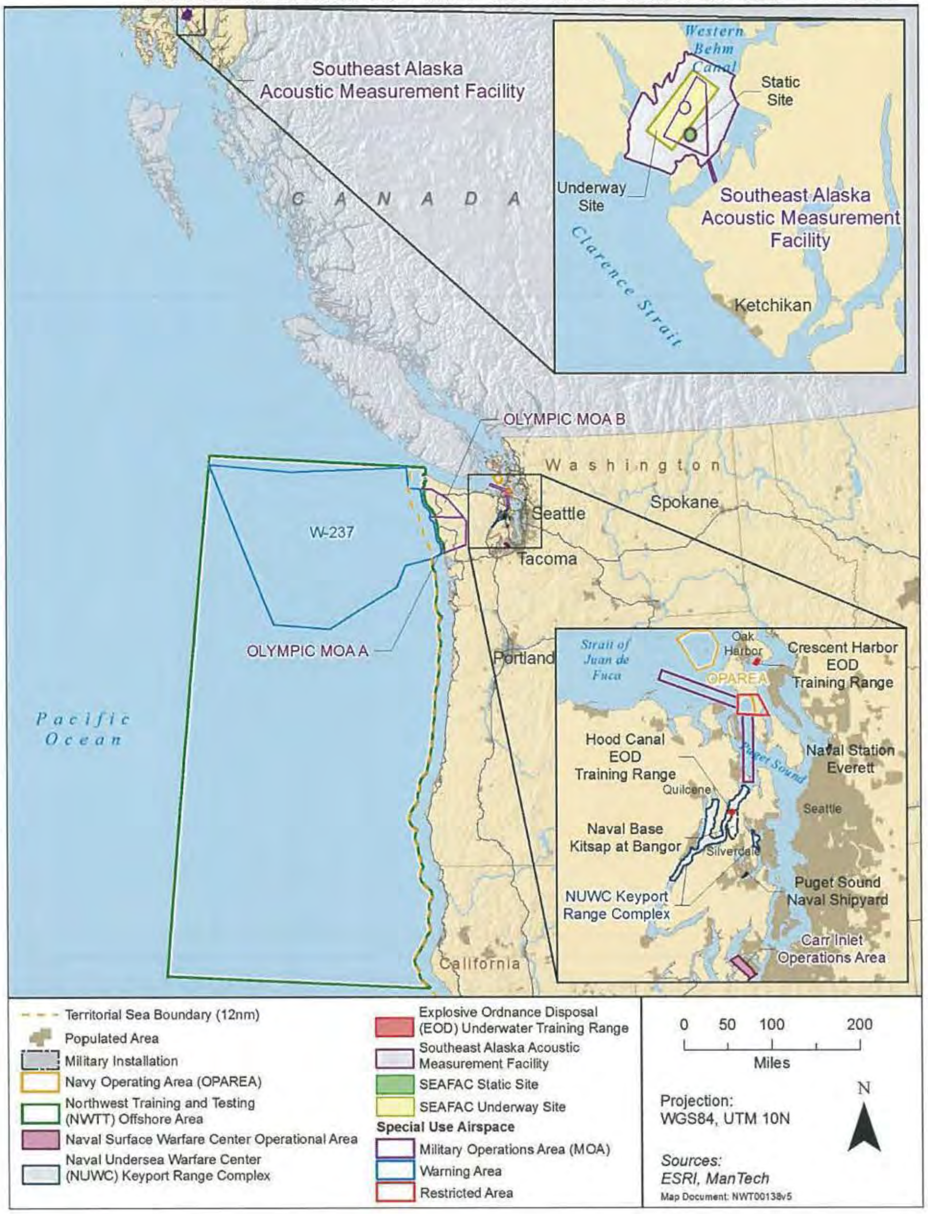
L. M. Foster

L. M. FOSTER
By direction

Enclosure: 1) NWTT Study Area and Area of Potential Effect

Copy to: See Attached Distribution

SUBJECT: INITIATION OF CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT AND DEFINITION OF THE AREA OF POTENTIAL EFFECT FOR NAVY NORTHWEST TRAINING AND TESTING



SUBJECT: INITIATION OF CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT AND DEFINITION OF THE AREA OF POTENTIAL EFFECT FOR NAVY NORTHWEST TRAINING AND TESTING

Copy to: Tribal Distribution List

1. Ketchikan Indian Corporation
   Ms. Sheryl Dewitt, Cultural Resources
   1922 Fairy Chasm
   Ketchikan, AK 99901

2. Central Council of the Tlingit and Haida Indian Tribes
   Mr. Harold Jacobs, Cultural Resources Specialist
   320 W Willoughby Avenue
   Suite 300
   Juneau, AK 99801

3. Metlakatla Indian Community Annette Island Reserve
   The Honorable Audrey Hudson, Mayor and Cultural Resources Specialist
   PO Box 8
   Metlakatla, AK 99926-0008

4. Organized Village of Saxman
   The Honorable Lee Wallace, President
   Route 2, Box 2 - Saxman
   Ketchikan, AK 99901

THE STATE of ALASKA

GOVERNOR BILL WALKER

**Department of Natural Resources**

DIVISION OF PARKS AND OUTDOOR RECREATION
OFFICE OF HISTORY AND ARCHAEOLOGY

550 West 7th Avenue, Suite 1310
Anchorage, AK 99501-3565
Main: 907.269.8721
Fax: 907.269.8908

April 6, 2015

File No.: 3130-1R NAVY

L.M. Foster
Department of the Navy
Commander
United States Pacific Fleet
250 Makalapa Drive
Pearl Harbor, Hawaii 96860-3131

Subject: Initiation of Consultation under Section 106 of the National Historic Preservation Act and Definition of the Area of Potential Effect for Navy Northwest Training and Testing

Dear Commander Foster:

The Alaska State Historic Preservation Office (AK SHPO) received your correspondence (dated March 11, 2015) on March 20, 2015.

Following our review of the documentation provided and in response to your request to initiate consultation, we have no objection to the area of potential effects (APE) as presently proposed. We look forward to continued consultation with the Navy on the identification and evaluation of any historic properties – including submerged resources – within the APE and continued consultation on the assessment of effects from the undertaking.

Please note that as stipulated in 36 CFR 800.3, other consulting parties such as the local government and Tribes are required to be notified of the undertaking. Additional information provided by the local government, Tribes or other consulting parties may cause our office to re-evaluate our comments and recommendations. Please note that our comment letter does not end the 30-day review period provided to other consulting parties.

Thank you for the opportunity to comment. Please contact Shina duVall at 269-8720 or shina.duvall@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner
State Historic Preservation Officer

JEB:sad

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0619
June 23, 2015

Judith E. Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, AK 99501-3565

SUBJECT: DETERMINATION OF EFFECT AND REQUEST FOR CONCURRENCE FOR NAVY NORTHWEST TRAINING AND TESTING

Dear Ms. Bittner:

Thank you for your letter of April 6, 2015 concurring with the defined area of potential effects (APE) for proposed Northwest Training and Testing (NWTT) activities (File No. 3130-1R NAVY).

As you may recall, the Navy proposes to continue to conduct training and testing activities within the NWTT APE. It should be noted that only limited testing activities are proposed to be conducted within the Alaskan waters portion of the APE, and no use of explosives or expended materials is proposed in this area.

Efforts to identify historic properties within the NWTT APE focused on archival research and solicitation of information from potentially knowledgeable and interested parties per 36 CFR 800.3(a)(3)&(4).

Cultural resources information relevant to the APE, specifically the Western Behm Canal in southeastern Alaska, was derived from the National Register Information System, the National Oceanic and Atmospheric Administration Automated Wreck and Obstruction Information System, and the Bureau of Ocean Energy Management's Alaskan shipwreck inventory.

A predictive model was developed for southeast Alaska by Monteleone in 2013, but specific paleo-landscape settings of inundated prehistoric sites associated with early maritime migrations were not identified. Monteleone's team conducted limited underwater surveys to test the model, but no areas in the Western Behm Canal were surveyed. No inundated prehistoric sites have been identified in the Western Behm Canal. Queries to the Alaskan shipwreck inventories were completed for Behm Canal and other named areas in the immediate vicinity of the NWTT APE, including Clover Passage, Clover Pass, Naha

SUBJECT: DETERMINATION OF EFFECT AND REQUEST FOR CONCURRENCE FOR NAVY NORTHWEST TRAINING AND TESTING

Bay, Bond Bay, Helm Bay, Wading Cove and Raymond Cove. The results of the search indicated the presence of 29 shipwrecks and other obstructions within or near the NWTT APE (Enclosure 1). These included steamers, a skiff, a ferry, a salmon troller and numerous gas screws. None of these shipwrecks have been evaluated for eligibility to the National Register of Historic Places (NRHP).

The Navy conducted public outreach and solicited federally-recognized tribes regarding the proposed NWTT undertaking, including efforts to identify parties potentially interested in participating in the process for Section 106 of the National Historic Preservation Act. The recipients of this outreach included local governments, such as the City of Ketchikan and the Ketchikan Gateway Borough, and Alaska Native tribes, including the Ketchikan Indian Corporation, Central Council of the Tlingit and Haida Indian Tribes, Metlakatla Indian Community Annette Island Reserve and the Organized Village of Saxman. No historic properties of traditional religious or cultural importance to these tribes have been identified within the APE.

No historic properties or effects on historic properties eligible for or listed in the NRHP or traditional cultural properties have been identified to date. Additionally, the nature of the testing activities has a low potential to affect any unidentified properties. The Navy has determined that the potential effects of its proposed activities would not affect character defining features that would qualify these types of submerged structures or objects for listing in the NRHP or result in potential loss of information from inundated archaeological deposits. Accordingly, the Navy has determined the proposed undertaking will result in No Adverse Effect on Historic Properties.

The Navy requests your concurrence with this determination. If you require additional information or have any questions regarding these activities, please contact Mr. David Grant, Archaeologist, NAVFAC NW, at (360) 396-0919 or by email, dave.m.grant@navy.mil.

Sincerely,

Larry M. Foster

L. M. FOSTER
By direction

Enclosure: 1. Known Shipwrecks and Obstructions in Western Behm Canal, Alaska.

Copy to: See Attached Distribution

SUBJECT: DETERMINATION OF EFFECT AND REQUEST FOR CONCURRENCE FOR NAVY NORTHWEST TRAINING AND TESTING

Copy to: Tribal Distribution List

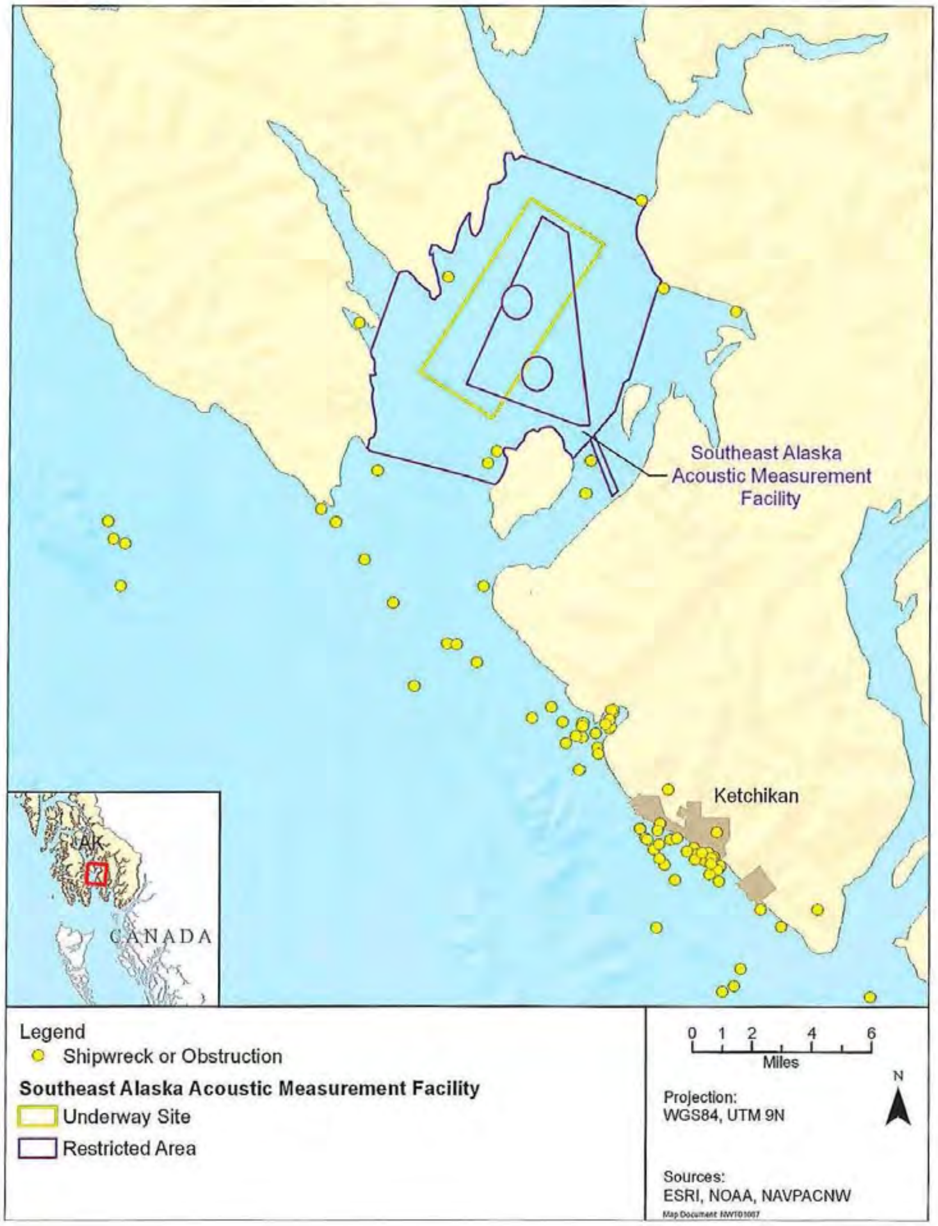
1. Ketchikan Indian Corporation
   Ms. Sheryl Dewitt, Cultural Resources
   1922 Fairy Chasm
   Ketchikan, AK 99901

2. Central Council of the Tlingit and Haida Indian Tribes
   Mr. Harold Jacobs, Cultural Resources Specialist
   320 W Willoughby Avenue
   Suite 300
   Juneau, AK 99801

3. Metlakatla Indian Community Annette Island Reserve
   The Honorable Audrey Hudson, Mayor and Cultural Resources Specialist
   PO Box 8
   Metlakatla, AK 99926-0008

4. Organized Village of Saxman
   The Honorable Lee Wallace, President
   Route 2, Box 2 - Saxman
   Ketchikan, AK 99901

SUBJECT: DETERMINATION OF EFFECT AND REQUEST FOR CONCURRENCE FOR NAVY NORTHWEST TRAINING AND TESTING




Enclosure 1: Known Shipwrecks and Obstructions in Western Behm Canal, Alaska.

THE STATE of ALASKA

GOVERNOR BILL WALKER

**Department of Natural Resources**

DIVISION OF PARKS AND OUTDOOR RECREATION

OFFICE OF HISTORY AND ARCHAEOLOGY

550 West 7th Avenue, Suite 1310
Anchorage, AK 99501-3565
Main: 907.269.8721
Fax: 907.269.8908

July 20, 2015

File No.: 3130-1R NAVY

L.M. Foster
Department of the Navy
Commander
United States Pacific Fleet
250 Makalapa Drive
Pearl Harbor, Hawaii 96860-3131

Subject: Navy Northwest Training and Testing

Dear Commander Foster:

The Alaska State Historic Preservation Office (AK SHPO) received your correspondence (dated June 23, 2015) on June 30, 2015.

Following our review of the most recent documentation provided, we concur that a finding of **no adverse effect** is appropriate for the proposed undertaking.

As stipulated in 36 CFR 800.3, other consulting parties such as the local government and Tribes are required to be notified of the undertaking. Additional information provided by the local government, Tribes or other consulting parties may cause our office to re-evaluate our comments and recommendations. Please note that our comment letter does not end the 30-day review period provided to other consulting parties.

Should unidentified archaeological resources be discovered in the course of the project, work must be interrupted until the resources have been evaluated in terms of the National Register of Historic Places eligibility criteria (36 CFR 60.4) or the Alaska Landmarks Register in consultation with our office.

Thank you for the opportunity to comment. Please contact Shina duVall at 269-8720 or shina.duvall@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner
State Historic Preservation Officer

JEB:sad

**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0236
March 11, 2015

Allyson Brooks, Ph.D.
State Historic Preservation Officer
Washington Department of Archaeology & Historic Preservation
P.O. Box 48343
Olympia, WA 98504-8343

SUBJECT: INITIATION OF CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT AND DEFINITION OF THE AREA OF POTENTIAL EFFECT FOR NAVY NORTHWEST TRAINING AND TESTING

Dear Ms. Brooks:

The U.S. Navy (Navy) is requesting to initiate consultation in accordance with Section 106 of the National Historic Preservation Act (NHPA) as amended by 36 CFR Part 800, for ongoing Northwest Training and Testing (NWTT) activities. Your office was previously advised of the NWTT project through a notice of availability for a Draft Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). Please see your letter in response to this notification dated February 13, 2014 (DAHP Log No. 021314-41-USN).

This letter is to formally initiate consultation on the NWTT Section 106 undertaking and request your concurrence with our definition of the Area of Potential Effect (APE).

The Navy is currently defining the APE as the entire NWTT Study Area (Enclosure 1), but will further refine the APE if specific properties of concern to interested parties, such as federally recognized tribes, are identified and potential effects are assessed through consultation.

The NWTT Study Area and APE comprise established maritime operating areas and warning areas in the eastern North Pacific Ocean, including the Strait of Juan de Fuca, Puget Sound, and Western Behm Canal in southeastern Alaska. The NWTT Study Area includes: air and water space within and outside Washington state waters, and outside-state-waters of Oregon and Northern California; four existing range complexes and facilities (the Northwest Training Range Complex, Naval Undersea Warfare Center Division Keyport Range Complex, Carr Inlet Operations Area and Southeast Alaska Acoustic Measurement Facility); and Navy pier-side locations where sonar maintenance and testing occur (Naval Base Kitsap Bremerton, Naval Base Kitsap Bangor and Naval Station Everett).

SUBJECT: INITIATION OF CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT AND DEFINITION OF THE AREA OF POTENTIAL EFFECT FOR NAVY NORTHWEST TRAINING AND TESTING

Within the NWTT Study Area, the Navy proposes to continue to conduct training and testing activities. Many of these training and testing activities have historically occurred in the Northwest Training Range Complex and NUWC Keyport Range Complex APE and were the subject of consultation with your office pursuant to the NHPA resulting in concurrence with determinations of no adverse effect (DAHP Log Nos. 092308-10-USN and 031809-14-USN).

The purpose of the proposed undertaking is to ensure that the Navy accomplishes its mission to maintain, train, and equip combat-ready naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. This mission is achieved in part by training and testing within the NWTT APE. The NWTT EIS/OEIS and NHPA compliance also supports the renewal of federal regulatory permits and authorizations for current training and testing activities and future activities requiring environmental analysis.

For the NWTT EIS/OEIS, the Navy is engaged in a multi-media public outreach and communication effort pursuant to the National Environmental Policy Act (NEPA). The Navy is using the project public meetings and comments received to identify potential parties interested in a broad array of cultural resources, including historic properties located in the NWTT APE. At this time, the Navy has not received any requests from representatives of local governments, interested individuals or organizations requesting consulting party status.

In addition to the public engagement, the Navy has initiated consultation specific to the NHPA with 26 Washington tribes and nations and is in the process of scheduling meetings with those that have requested consultation and/or expressed specific comments or concerns about properties of traditional religious or cultural importance.

The Navy requests your concurrence with the NWTT APE for this proposed undertaking. The NWTT EIS/OEIS can be accessed at www.NWTTEIS.com. If you require additional information or have questions regarding this project, please contact Mr. David Grant, Archaeologist, Naval Facilities Engineering Command Northwest, at (360) 396-0919 or by email: dave.m.grant@navy.mil.

Sincerely,

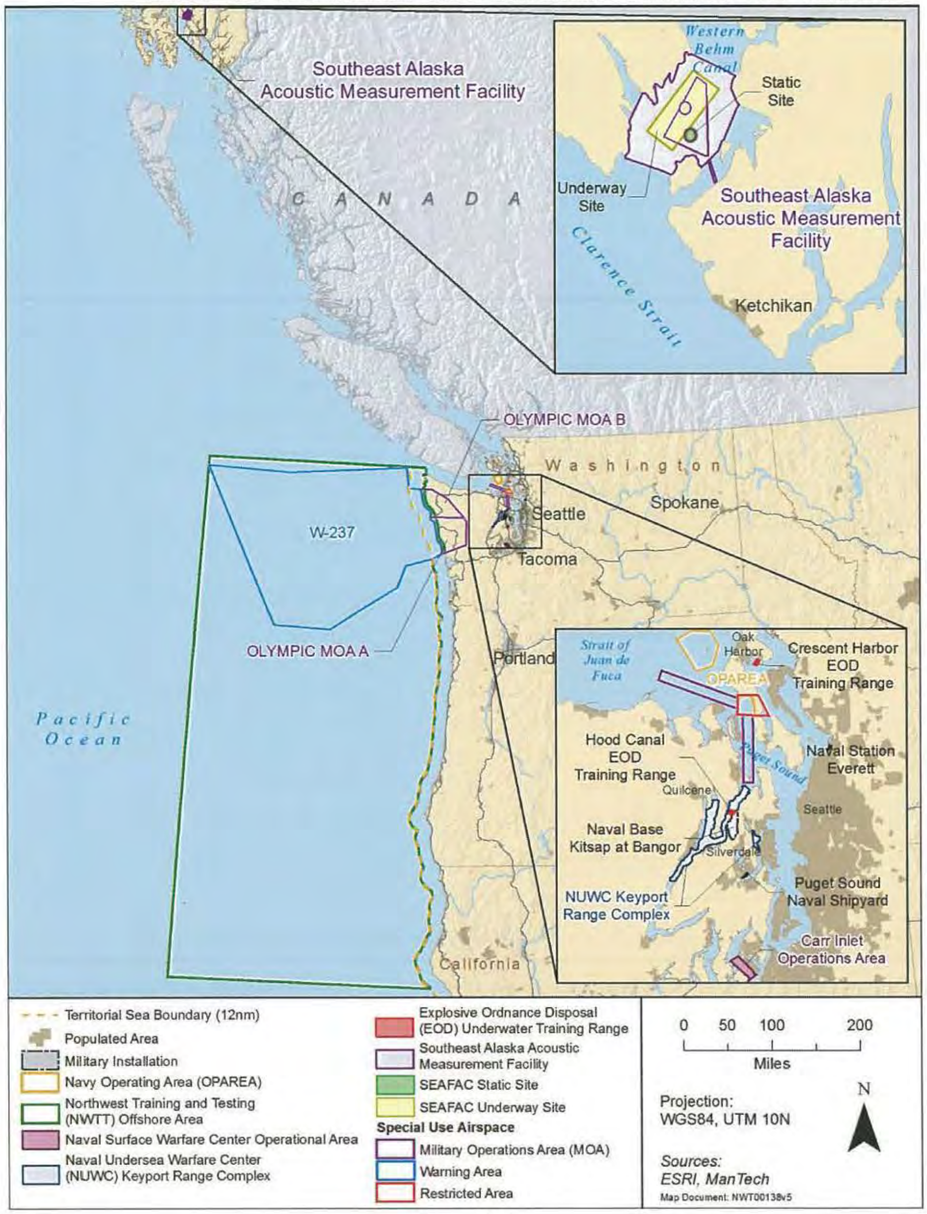
L. M. Foster

L. M. FOSTER
By direction

Enclosures: 1) NWTT Study Area and Area of Potential Effect

Copy to: See Attached Distribution

SUBJECT: INITIATION OF CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT AND DEFINITION OF THE AREA OF POTENTIAL EFFECT FOR NAVY NORTHWEST TRAINING AND TESTING



SUBJECT: INITIATION OF CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT AND DEFINITION OF THE AREA OF POTENTIAL EFFECT FOR NAVY NORTHWEST TRAINING AND TESTING

Copy to: Tribal Distribution List

1. Confederated Tribes and Bands of the Yakama Nation
   Ms. Kate Valdez, Tribal Historic Preservation Officer
   PO Box 151
   Toppenish, WA 98948

2. Confederated Tribes of the Chehalis Reservation
   Mr. Richard Bellon, Acting Tribal Historic Preservation Officer
   420 Howanut Drive
   Oakville, WA 98562

3. Cowlitz Indian Tribe
   Mr. Dave Burlingame, Cultural Resources
   PO Box 2547
   Longview, WA 98632-8594

4. Hoh Tribe
   Kelly Rosales, Cultural Resources
   Post Office Box 2196
   Forks, WA 98331

5. Jamestown S'Klallam Tribe
   Mr. Gideon Cauffman, Cultural Resources
   1033 Old Blyn Highway
   Sequim, WA 98382-9342

6. Lower Elwha Klallam Tribe
   Mr. Bill S. White, Archaeologist, Cultural Resources
   2851 Lower Elwha Road
   Port Angeles, WA 98363

7. Lummi Nation
   Ms. Lena Tso, Tribal Historic Preservation Officer
   2616 Kwina Drive
   Bellingham, WA 98226

8. Makah Indian Tribe of the Makah Reservation
   Ms. Janine Bowechop, Tribal Historic Preservation Officer and Director, Makah Cultural and Research Center*
   PO Box 160
   Neah Bay, WA 98357

9. Muckleshoot Indian Tribe of the Muckleshoot Reservation
   Ms. Laura Murphy, Archaeologist, Cultural Resources
   39015 172nd Avenue SE
   Auburn, WA 98092

10. Nisqually Indian Tribe of the Nisqually Reservation
    Ms. Jackie Wall, Tribal Historic Preservation Officer
    4820 She-Nah-Num Dr. SE
    Olympia, WA 98513-9105

SUBJECT: INITIATION OF CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT AND DEFINITION OF THE AREA OF POTENTIAL EFFECT FOR NAVY NORTHWEST TRAINING AND TESTING

11. Nooksack Indian Tribe of Washington
George Swanaset, Jr., Tribal Historic Preservation Officer
PO Box 157
Deming, WA 98244

12. Port Gamble S'Klallam Tribe
Josh Wisniewski, Ph.D., Tribal Historic Preservation Officer
31912 Little Boston Road
Kingston, WA 98346

13. Puyallup Tribe of the Puyallup Reservation
Brandon Reynon, Cultural Resources
3009 East Portland Avenue
Tacoma, WA 98404

14. Quileute Tribe of the Quileute Reservation
Deanna Hobson, Cultural Resources
PO Box 279
La Push, WA 98350-0279

15. Quinault Indian Nation
Ms. Justine James, Cultural Resources
PO Box 189
Taholah, WA 98587-0189

16. Samish Indian Nation
PO Box 217
Anacortes, WA 98221

17. Sauk-Suiattle Indian Tribe
The Honorable Norma Joseph
Chairwoman and Director of Cultural Resources
5318 Chief Brown Lane
Darrington, WA 98241

18. Shoalwater Bay Tribe of the Shoalwater Bay Reservation
Mr. Earl Davis, Cultural Resources Specialist
PO Box 130
Tokeland, WA 98580

19. Skokomish Indian Tribe
Ms. Kris Miller, Tribal Historic Preservation Officer
80 N. Tribal Center Road
Skokomish Nation, WA 98584

20. Snoqualmie Indian Tribe
Ms. Lora Pennington Cultural Resource Director and Tribal Historic Preservation Officer
8130 Railroad Ave SE, PO Box 969
Snoqualmie, WA 98065

SUBJECT: INITIATION OF CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT AND DEFINITION OF THE AREA OF POTENTIAL EFFECT FOR NAVY NORTHWEST TRAINING AND TESTING

21. Squaxin Island Tribe
Ms. Rhonda Foster, Tribal Historic Preservation Officer and Director, Cultural Resources Department
SE 10 Squaxin Lane
Shelton, WA 98584

22. Stillaguamish Tribe of Indians of Washington
Mr. Kerry Lyste, Cultural Resources Specialist
4126 172nd Street
Arlington, WA 98223

23. Suquamish Indian Tribe of the Port Madison Reservation
Mr. Dennis E. Lewarch, Tribal Historic Preservation Officer
PO Box 498
Suquamish, WA 98392

24. Swinomish Indian Tribal Community
Larry W. Campbell, Tribal Historic Preservation Officer
SITC Cultural Resource Protection Office
11430 Moorage Way
La Conner, WA 98257-8707

25. Tulalip Tribes of Washington
Mr. Richard Young, Cultural Resources
Hibulb Cultural Center and Natural History Preserve
6410 23rd Avenue NE
Tulalip, WA 98271

26. Upper Skagit Indian Tribe
Mr. Scott Schuyler, Cultural Resources
25944 Community Plaza
Sedro Woolley, WA 98284

dahp

protect the past · shape the future

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

May 22, 2015

Commander Larry M. Foster
United States Pacifc Fleet
250 Makalapa Drive
Pearl Harbor, Hawaii 96860-3131

In future correspondence please refer to:
Log: 021314-41-USN
Re: Northwest Training and Testing (NWTT) Area of Potential Effect

Dear Commander Foster:

Thank you for your letter to State Historic Preservation Officer (SHPO) Allyson Brooks regarding the above referenced proposed action. Based upon your letter we understand that the U.S. Navy is formally initiating Section 106 consultation on the proposed Northwest Training and Testing (NWTT) in Washington state water and air space. In addition to Pacific Ocean waters off Alaska, California, Oregon, and Washington, other areas in the proposed APE include Hood Canal, Carr Inlet, Strait of Juan de Fuca, and Puget Sound.

In response, we concur with the definition of the APE as described in your letter and attached figure. Based upon our understanding of the proposal, archaeological, cultural, and historic properties may be affected by: increased sound levels; visual impacts from the introduction into the setting of vessels, aircraft, and equipment; and operations that may affect cultural practices. Please note that our concurrence on the APE is subject to change based upon new information about the proposal and/or comments you receive from other interested/affected parties including Tribes, local governments, and property owners within or near the APE.

Also, the Department of Archaeology and Historic Preservation (DAHP) looks forward to receiving the results of your cultural resources survey efforts, your consultation with the concerned tribes, and cultural resources survey report. We appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36 CFR 800.4(a)(4). Again, please note that our concurrence on the APE may be revised in the future should the Port Gamble S'Klallam Tribe and other concerned/affected tribe(s) provide additional information or comments about cultural resources, including Traditional Cultural Places (TCPs) that may be affected by this proposal. In that event, our recommendation may include adjusting the APE to make sure tribal concerns are taken into consideration.

State of Washington • **Department of Archaeology & Historic Preservation**
P.O. Box 48343 • Olympia, Washington 98504-8343 • (360) 586-3065
www.dahp.wa.gov

THE SEAL OF THE STATE OF WASHINGTON 1889

Commander Larry M. Foster
May 22, 2015
Page Two

The above comments and recommendations are based on the information available at the time of this review and on behalf of the SHPO in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36 CFR 800.

Thank you for the opportunity to review and comment. If you have any questions, please feel free to contact me at 360-586-3073 or greg.griffith@dahp.wa.gov.

Sincerely,

Gregory Griffith
Deputy State Historic Preservation Officer

C: Kristin Griffin, Ebeys Landing National Historical Reserve
Jon McDonagh, City of Port Townsend
Josh Wisniewski, Port Gamble S'Klallam THPO

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**DEPARTMENT OF THE NAVY**
COMMANDER
UNITED STATES PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-3131

IN REPLY REFER TO:
5090
Ser N465/0701
July 20, 2015

Allyson Brooks, Ph.D.
State Historic Preservation Officer
Washington Department of Archaeology & Historic Preservation
P.O. Box 48343
Olympia, WA 98504-8343

SUBJECT: REQUEST FOR CONCURRENCE ON DETERMINATION OF NO ADVERSE EFFECT ON HISTORIC PROPERTIES FROM NAVY NORTHWEST TRAINING AND TESTING

Dear Dr. Brooks:

Thank you for your letter of May 22, 2015 concurring with the defined area of potential effects (APE) for proposed Navy Northwest Training and Testing (NWTT) activities (DAHP Log. No. 021314-41-USN).

To continue our consultation process in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. § 470 et seq.), this letter notifies you of Navy's determination of no adverse effect on historic properties by the proposed NWTT activities, provides the steps taken and information reviewed in support of this determination, and seeks your concurrence.

In accordance with the NHPA and its implementing regulation, 36 C.F.R. 800, the Navy focused on archival research and solicitation of information from potentially knowledgeable and interested parties, looking to identify those property types within the APE where the activities associated with NWTT could adversely affect those characteristics that would make them eligible for listing in the National Register of Historic Places (NRHP). First, the Navy used archival research to identify submerged resources and assess potential to physically damage those resources from training and testing that includes underwater explosions and expended materials. Second, outreach to interested parties resulted in no identification of historic properties that would be affected by noise or visual aspects from NWTT activities. Third, the Navy solicited information from federally recognized tribes about knowledge and concerns about properties of religious and cultural importance per 36 C.F.R. 800.4(a)(4).

First, the Navy reviewed existing information on historic properties within the APE, specifically focusing on those property types within the APE where the activities associated with NWTT could

5090
Ser N465/0701
July 20, 2015

adversely affect those characteristics that would make them eligible for listing in the NRHP. The Navy primarily looked for submerged resources within NWTT APE and any potential for physical damage to these resources from underwater explosions and expended materials. The potentially affected submerged prehistoric and historic resources that the Navy assessed are those that occur or could occur in the APE in Washington State waters around the Pacific Ocean, the Strait of Juan de Fuca, and the inland passages and bays of Puget Sound.

The Navy's archival research focused on previous environmental documents, databases, and predictive models. Previous environmental documents reviewed for general information include the *Northwest Training Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS)*, the *Naval Undersea Warfare Center Keyport Range Complex Extension EIS/OEIS*, the *TRIDENT Support Facilities Explosives Handling Wharf II EIS*, and the *Historic and Archeological Resources Protection Plan for the Naval Air Station Whidbey Island, Washington.*

The following databases were reviewed for information on submerged resources in the APE, the resource types, and eligibility for listing in the NRHP: Washington Information System for Architectural and Archaeological Records Data, and National Oceanic and Atmospheric Administration Automated Wreck and Obstruction Information System, and the National Register Information System (NRIS).

The Navy also reviewed a predictive model for submerged prehistoric resources prepared by ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research in 2013. Based on this model, the Inland Waters of the APE have a lower probability for inundated prehistoric sites because of the lack of paleo-landscape features (e.g., estuaries and streams) associated with concentrated resource availability. The Offshore Area of the APE has an increased probability for inundated prehistoric sites from the large embayments of Grays Harbor and Willapa Bay, which were produced as rising sea level drowned large incised river valleys of the paleo-landscape. The Offshore Area of the NWTT Study Area contains shipwrecks and submerged aircraft primarily associated with maritime trade, transport and military activities, and includes many shipwrecks (Enclosure 1). The Strait of Juan de Fuca and Puget Sound also contain an extensive collection of wrecks and submerged aircraft (Enclosure 2).

Second, outreach to interested parties resulted in no identification of historic properties that would be affected by noise or visual aspects from the NWTT undertaking. Regarding aircraft and vessel noise, the Navy was mindful of the high level of attention received by other proposed and potential activities, specifically Electronic Warfare training on the Olympic Peninsula and ongoing and future operations of Navy aircraft at Outlying Landing Field

2

5090
Ser N465/0701
July 20, 2015

Coupeville. Accordingly, efforts focused on clearly defining the NWTT undertaking to potential interested parties as a continuation of long standing training in existing military operating areas. The Navy ensured that concerned groups had an opportunity to comment regarding aircraft and vessel noise and visibility in the NWTT EIS/OEIS process. No concerns regarding potential noise effects or visibility of aircraft or vessels to historic properties within the NWTT APE were identified.

Third, the Navy took steps to gather information from potentially knowledgeable and interested parties to identify parties potentially interested in participating in the Section 106 consultation process pursuant to the NHPA. The recipients of this outreach included numerous federal, state, and local agencies and officials, congressional representatives, non-governmental organizations and private individuals. The Navy also conducted public outreach and solicited knowledge and concerns about historic properties from 26 federally-recognized tribes and nations in Washington to identify historic properties and potential effects on them by activities within NWTT APE.

Of the tribes that responded to this solicitation, only the Port Gamble S'Klallam Tribe (the Tribe) expressed concerns about the proposed NWTT training activities. The Tribe indicated that northern Hood Canal represents a network of marine resource locations and other site types within the context of a traditional cultural landscape. The Tribe encouraged the Navy to define the APE accordingly and consider direct, indirect, and cumulative effects on this landscape. The Tribe has not formally described, inventoried, or evaluated this network of sites, but believes it is likely eligible for listing in the NRHP as a traditional cultural property.

The Port Gamble S'Klallam Tribal Historic Preservation Officer (THPO) has expressed the opinion to Navy staff that temporary delay of access to traditional resource gathering sites, added to loss of access in restricted areas at the Naval Base Kitsap Bangor waterfront, represent changes of use that could adversely affect the integrity of historic properties through the loss of opportunities for cultural practices that also propagate cultural knowledge. The THPO also expressed a concern over the Navy's project-by-project approach to potential direct, indirect, and cumulative effects on this landscape and individual locations within it. The THPO asserted that the Navy should review the effects of the full range of Navy projects within northern Hood Canal, to include training and testing, installation and vessel operations, and construction activities, either within the context of a formal programmatic agreement or on a government-to-government basis.

While the Navy is amenable to exploring options for a programmatic approach, as appropriate, to date the Tribe has not delineated the portion of the northern Hood Canal within the overall NWTT APE wherein

3

5090
Ser N465/0701
July 20, 2015

their traditional properties and networks are located, nor has it shared the location of specific historic properties.

Also, consultation to date has resulted in no identification of historic properties of traditional religious or cultural importance to the other 25 tribes and nations. Without identification of specific cultural features or historic properties of traditional or cultural importance in the APE, the Navy concludes that no cultural resources eligible for or listed in the NRHP or traditional cultural properties have been identified in either the Offshore Area or Inland Waters of the NWTT Study Area.

In summary, no historic properties or effects on historic properties eligible for or listed in the NRHP or traditional cultural properties have been identified. The nature of the NWTT activities has a low potential to affect unidentified properties, and the Navy has determined that any potential effects would not adversely affect character defining features that would qualify these types of submerged structures or objects for listing in the NRHP or result in potential loss of information from inundated archaeological deposits. Effects from noise on unidentified properties would similarly be unlikely to be adverse. The Navy solicited information about properties of religious or cultural importance to 26 federally-recognized tribes and nations in Washington. In response to comments from the Port Gamble S'Klallam Tribe's THPO, the Navy solicited the boundaries of the Tribe's stated traditional marine landscape and identification of specific historic properties therein. To date, the Navy has not received information about specific historic properties of traditional religious or cultural importance to the Tribe within the NWTT APE.

For the aforementioned reasons, the Navy has determined the proposed NWTT training and testing undertaking will result in No Adverse Effect on Historic Properties.

The Navy requests your concurrence with this determination. If you require additional information or have any questions, please contact Mr. David Grant, Archaeologist, Naval Facilities Engineering Command Northwest, at (360) 396-0919 or dave.m.grant@navy.mil.

Sincerely,

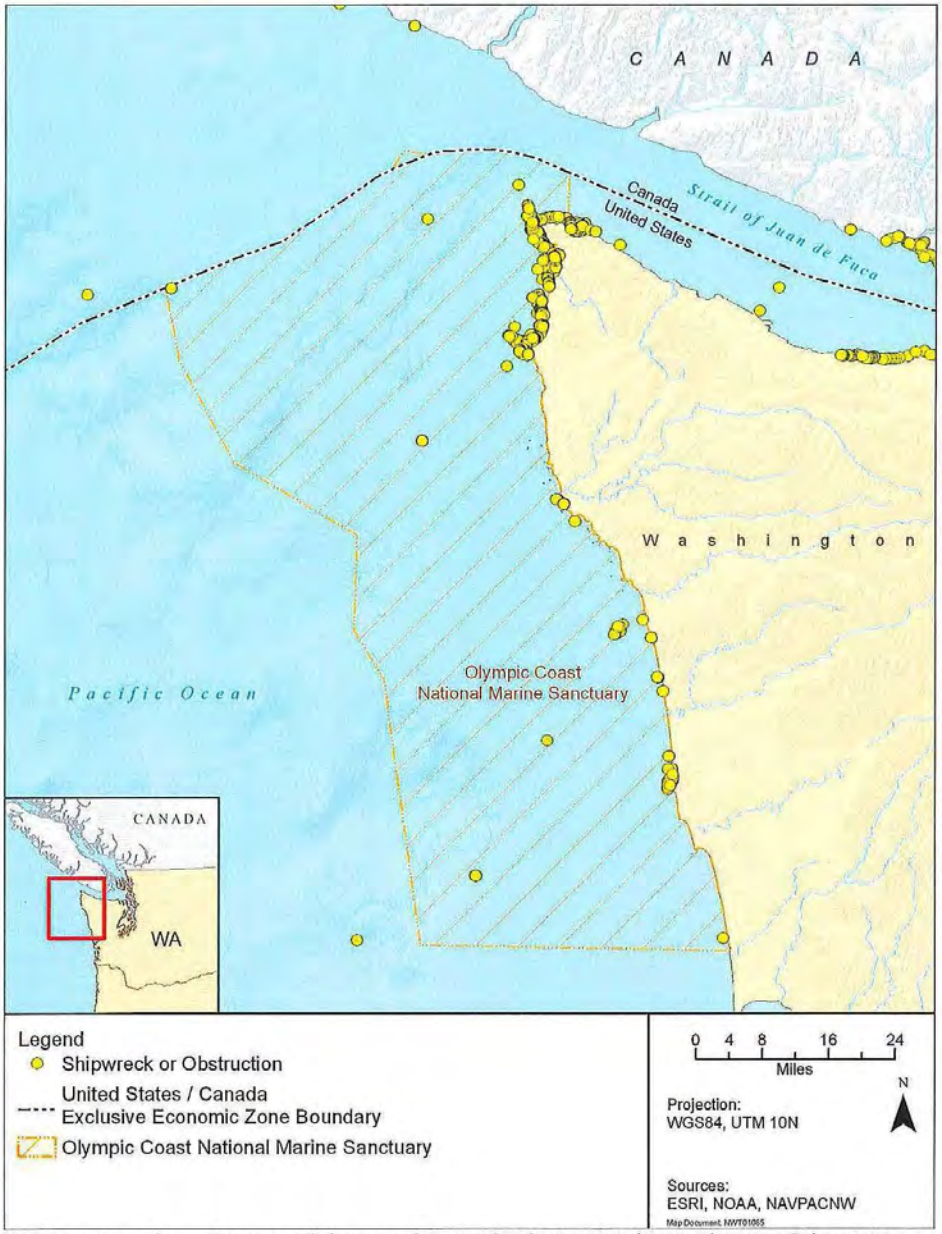
L. M. FOSTER
By direction

Enclosures (2)

Copy to: See Attached Distribution

4

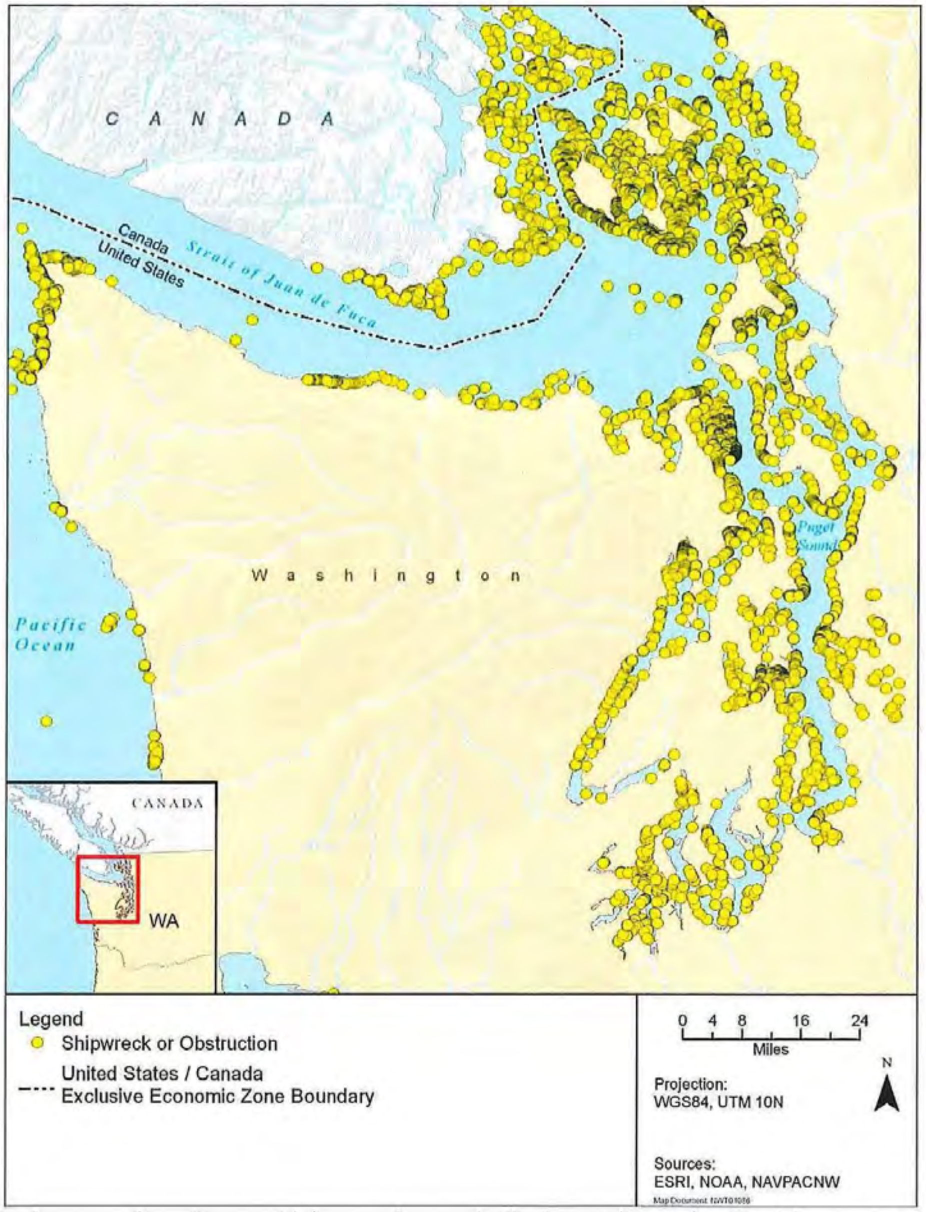
5090
Ser N465/0701
July 20, 2015




Enclosure 1: Known Shipwrecks and Obstructions in Washington Coastal and Offshore Portion of NWTT APE.

5

5090
Ser N465/0701
July 20, 2015




Enclosure 2: Known Shipwrecks and Obstructions in Washington Inland Waters Portion of NWTT APE.

6

Copy to: Tribal Distribution List

1. Confederated Tribes and Bands of the Yakama Nation
   Ms. Kate Valdez, Tribal Historic Preservation Officer
   PO Box 151
   Toppenish, WA 98948

2. Confederated Tribes of the Chehalis Reservation
   Mr. Richard Bellon, Acting Tribal Historic Preservation Officer
   420 Howanut Drive
   Oakville, WA 98562

3. Cowlitz Indian Tribe
   Mr. Dave Burlingame, Cultural Resources
   PO Box 2547
   Longview, WA 98632-8594

4. Hoh Tribe
   Kelly Rosales, Cultural Resources
   Post Office Box 2196
   Forks, WA 98331

5. Jamestown S'Klallam Tribe
   Mr. Gideon Cauffman, Cultural Resources
   1033 Old Blyn Highway
   Sequim, WA 98382-9342

6. Lower Elwha Klallam Tribe
   Mr. Bill S. White, Archaeologist, Cultural Resources
   2851 Lower Elwha Road
   Port Angeles, WA 98363

7. Lummi Nation
   Ms. Lena Tso, Tribal Historic Preservation Officer
   2616 Kwina Drive
   Bellingham, WA 98226

8. Makah Indian Tribe of the Makah Reservation
   Ms. Janine Bowechop, Tribal Historic Preservation Officer and Director, Makah Cultural and Research Center*
   PO Box 160
   Neah Bay, WA 98357

9. Muckleshoot Indian Tribe of the Muckleshoot Reservation
Ms. Laura Murphy, Archaeologist, Cultural Resources
39015 172nd Avenue SE
Auburn, WA 98092

10. Nisqually Indian Tribe of the Nisqually Reservation
Ms. Jackie Wall, Tribal Historic Preservation Officer
4820 She-Nah-Num Dr. SE
Olympia, WA 98513-9105

11. Nooksack Indian Tribe of Washington
George Swanaset, Jr., Tribal Historic Preservation Officer
PO Box 157
Deming, WA 98244

12. Port Gamble S'Klallam Tribe
Josh Wisniewski, Ph.D., Tribal Historic Preservation Officer
31912 Little Boston Road
Kingston, WA 98346

13. Puyallup Tribe of the Puyallup Reservation
Brandon Reynon, Cultural Resources
3009 East Portland Avenue
Tacoma, WA 98404

14. Quileute Tribe of the Quileute Reservation
Deanna Hobson, Cultural Resources
PO Box 279
La Push, WA 98350-0279

15. Quinault Indian Nation
Ms. Justine James, Cultural Resources
PO Box 189
Taholah, WA 98587-0189

16. Samish Indian Nation
PO Box 217
Anacortes, WA 98221

17. Sauk-Suiattle Indian Tribe
The Honorable Norma Joseph
Chairwoman and Director of Cultural Resources
5318 Chief Brown Lane
Darrington, WA 98241

18. Shoalwater Bay Tribe of the Shoalwater Bay Reservation
Mr. Earl Davis, Cultural Resources Specialist
PO Box 130
Tokeland, WA 98580

19. Skokomish Indian Tribe
Ms. Kris Miller, Tribal Historic Preservation Officer
80 N. Tribal Center Road
Skokomish Nation, WA 98584

20. Snoqualmie Indian Tribe
Ms. Lora Pennington Cultural Resource Director and Tribal Historic Preservation Officer
8130 Railroad Ave SE, PO Box 969
Snoqualmie, WA 98065

21. Squaxin Island Tribe
Ms. Rhonda Foster, Tribal Historic Preservation Officer and Director, Cultural Resources Department
SE 10 Squaxin Lane
Shelton, WA 98584

22. Stillaguamish Tribe of Indians of Washington
Mr. Kerry Lyste, Cultural Resources Specialist
4126 172nd Street
Arlington, WA 98223

23. Suquamish Indian Tribe of the Port Madison Reservation
Mr. Dennis E. Lewarch, Tribal Historic Preservation Officer
PO Box 498
Suquamish, WA 98392

24. Swinomish Indian Tribal Community
Larry W. Campbell, Tribal Historic Preservation Officer
SITC Cultural Resource Protection Office
11430 Moorage Way
La Conner, WA 98257-8707

25. Tulalip Tribes of Washington
Mr. Richard Young, Cultural Resources
Hibulb Cultural Center and Natural History Preserve
6410 23rd Avenue NE
Tulalip, WA 98271

26. Upper Skagit Indian Tribe
Mr. Scott Schuyler, Cultural Resources
25944 Community Plaza
Sedro Woolley, WA 98284

**DEPARTMENT OF THE NAVY**
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IN REPLY REFER TO:
5090
Ser N465/0955
September 2, 2015

Ms. Carol Bernthal
Superintendent
National Oceanic and Atmospheric Administration
Olympic Coast National Marine Sanctuary
115 East Railroad Avenue Suite 301
Port Angeles, WA 98362

Dear Ms. Bernthal:

SUBJECT: REQUEST FOR CONSULTATION FOR U.S. NAVY TRAINING AND TESTING ACTIVITIES WITHIN THE OLYMPIC COAST NATIONAL MARINE SANCTUARY

In accordance with the National Marine Sanctuary Act, the U.S. Navy requests consultation associated with U.S. Navy training and testing activities within the Northwest Training and Testing (NWTT) Study Area where it overlaps the Olympic Coast National Marine Sanctuary (OCNMS).

The small subset of the U.S. Navy's NWTT activities occurring within the OCNMS are identified and analyzed in Enclosure 1.

We appreciate your continued support in helping the U.S. Navy meet its environmental responsibilities. My point of contact for this matter is Ms. Andrea Balla-Holden at (360) 396-0002, or e-mail: andrea.ballaholden@navy.mil.

Sincerely,

L. M. FOSTER
By direction

Enclosure: 1. Sanctuary Resource Statement For the U.S. Navy's NWTT Activities in the OCNMS

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