2 OVERVIEW OF ANALYSIS AND REGULATORY CONTEXT

Federal, state, and local laws protect upland, wetland, and marine habitat for wildlife. Protecting habitat is necessary for the continued presence of wildlife species in urban environments, such as the city of Mukilteo.

2.1 Federal

Work associated with the project may be subject to the following federal regulations relevant to protecting fish, wildlife, and their habitat:

- Endangered Species Act. 1973. 16 United States Code (USC) 1531-1544, as amended.
- Migratory Bird Treaty Act. 1936. 16 USC 703-712, as amended.
- Bald and Golden Eagle Protection Act. 1940. 16 USC 668a-d, as amended.
- Magnuson-Stevens Fishery Conservation Management Act. 1976. Public Law 94-265, as amended.
- Marine Mammal Protection Act (MMPA). Title I. 1972. 16 USC 1361-1389, 16 USC 1401-1407, 1411-1417, and 1421-1421h, as amended.
- Clean Water Act. 1977. 33 USC 1251-1376, as amended.
- Clean Air Act. 1963. 42 USC 7401, as amended.
- National Environmental Policy Act. 1969. 42 USC 4321.

2.2 State

Work associated with the project may be subject to the following Washington State regulations relevant to protecting fish, wildlife, and their habitat:

- State Environmental Policy Act. 1971. Revised Code of Washington (RCW) 43.21C, and Washington Administrative Code (WAC) 197-11 and WAC 468-12. Olympia, Washington.
- Shoreline Management Act of 1971. 1971. RCW 90.58, WAC 173-18-100 and WAC 173-22. Olympia, Washington.
- Shoreline Substantial Development Permit. RCW 90.58.140(3) and WAC 173-27-150.
- Hydraulic Code. 1949. Chapter 77.55 RCW. Olympia, Washington.
- Fishways, flow and screening. 1949. RCW 77.57, as amended. Olympia, Washington.
- Clean Water Act certification.

2.3 Local

Work associated with the project may be subject to the following local regulations relevant to protecting fish, wildlife, and their habitat:

- Critical Areas Regulations. 2010. City of Mukilteo—Mukilteo Municipal Code (MMC) 17.52. Mukilteo, Washington.
- Shoreline Master Program. 1974. Mukilteo, Washington.

3 AFFECTED ENVIRONMENT

3.1 Methods

The study area boundary was defined as a 1-mile radius from the existing ferry terminal. In addition, biologists reviewed existing information on wildlife habitats present within a 5-mile radius of the existing ferry terminal. Information on upland, wetland, and marine wildlife habitat in the project vicinity was collected from existing maps and documents and during on-site investigations of the project site and vicinity on January 19, February 3, and March 17, 23, and 26, 2011. Habitats were evaluated from public rights-of-way and public land. Dive and beach surveys were conducted in September 9 and 10, 2004 to document eelgrass and macroalgae beds, crabs, geoducks, and other invertebrates. The information provided the basis for the description of the existing conditions, past and present land use, and the potential effects of the proposed project alternatives.

3.1.1 On-Site Wetland Reconnaissance

Project biologists performed reconnaissance-level surveys for the presence of wetlands. Established methodologies were used to identify the presence and approximate size of wetlands, but wetland boundaries were not delineated (identified with flagging) or surveyed on the ground.

To identify wetlands within the study area, project biologists used methods defined in the *Washington State Wetlands Identification and Delineation Manual*, the Routine Determination Method in the *Corps of Engineers Wetlands Delineation Manual,* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region* (Ecology 1997; Environmental Laboratory 1987; USACE 2010). The U.S. Army Corps of Engineers (USACE) requires the use of the federal delineation manual to implement the Clean Water Act. Washington State and all local governments must use the state delineation manual to implement the Shoreline Management Act and/or the local regulations adopted pursuant to the Growth Management Act. The methodology outlined in the manual requires the presence of three essential characteristics before an area is determined to be a wetland: wetland hydrology, hydric soils, and hydrophytic vegetation. Field indicators of these three characteristics must all be present in order to make a positive wetland determination. However, exceptions to this rule are permitted where problem areas or atypical situations are encountered. Project biologists followed the "routine on-site determination method" to identify wetland areas based on the presence or absence of wetland hydrology, hydric soils, and hydrophytic vegetation as required by USACE and Washington State Department of Ecology (Ecology).

3.1.2 On-Site Wildlife Habitat Classification

Project biologists also investigated the site to evaluate terrestrial wildlife habitat. Habitat assessment methods described in *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil 2001) were used to describe and evaluate common habitat types in the project vicinity. The naming conventions found in Johnson and O'Neil (2001) have been renamed for this report. For example, Westside lowland conifer-hardwood forest is referred to as upland forest in this report. Using this methodology, habitats were assessed at three levels of detail: wildlife habitat types, structural conditions, and habitat elements.

The term "wildlife habitat type" generally describes the type of vegetation cover present in an area. The type of vegetation is determined by climate, elevation, soils, hydrology, geology, and topography. Habitat types can also include areas disturbed by human activities, where grasses, forbs, shrubs, or tree saplings are the primary vegetation cover type. Wildlife habitat types directly influence the abundance and distribution of wildlife species.

"Structural conditions" refer to vegetation structure, such as tree or shrub height and tree-canopy closure. In urban areas, structural conditions are shaped by human land uses.

"Habitat elements" include downed wood, tree snags, street trees, ornamental landscaping, and roads. Habitat elements can have either positive or negative effects on wildlife species; for example, tree snags are often used by cavity-nesting birds such as woodpeckers, while roads may create a barrier to the movement of some wildlife species through the landscape.

Dive Surveys

Project biologists conducted dive surveys in 2005 in the project study area to evaluate potential impacts for a previous project design. Biologists surveyed for eelgrass, macroalgae, geoduck, fish, and other biological resources. Although these surveys are too old for permitting purposes and the boundaries and densities of the resources surveyed may have changed, they provide a basis for evaluating potential project impacts on those species. Additional surveys were carried out in July and September of 2011.

Federal- and State-Listed Species and Habitat Occurrence

The Endangered Species Act (ESA) of 1973, as amended, protects species listed by the federal government. The U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) administer the ESA. The USFWS (USFWS 2011) and NMFS (NMFS 2011) Web sites were used to establish which species protected under the ESA (known as "listed species") could potentially occur in the project vicinity.

The Washington Department of Fish and Wildlife (WDFW) also maintains a list of state Priority Habitats and Species (PHS)—a catalog of habitats and species (including federally listed species) that are a priority for conservation and management (WDFW 2011). To determine the potential occurrence of federally and state-listed species within the project area, project biologists reviewed PHS data, conducted habitat evaluations during site visits, and consulted local experts and existing literature.

A separate Biological Assessment (BA) is being prepared to comply with Section 7 of the ESA. The BA will include a detailed description of the life history of species listed under the ESA, their occurrence in the project area, and potential impacts associated with the project.

3.2 On-Site Existing Wetland Characteristics

The literature review performed for this project did not identify any wetlands within the area proposed for project construction. On-site investigations confirmed that no wetlands are present on the project site.

Estuarine wetlands are mapped by the National Wetlands Inventory (NWI) along all of the shoreline areas adjacent to Possession Sound. These wetlands are either aquatic bed or unconsolidated shore wetlands.

3.3 Terrestrial Wildlife Habitat Characteristics

Prior to European settlement, western lowland mixed conifer and hardwood forest covered most of the project area and the vicinity of the city of Mukilteo. The dominant tree species were western hemlock (*Tsuga heterophylla*) and Douglas fir (*Pseudotsuga menziesii*), with red alder (*Alnus rubra*), big-leaf maple (*Acer macrophyllum*), and shore pine (*Pinus contorta*) as associated species. This was a multi-canopy forest, with structures such as standing snags and downed logs present in abundance.

Today, the area encompassed by the project alternatives contains highly modified landscapes. Animals that use these habitats are adapted to human activity and disturbance. Two types of habitats are found in the proposed construction areas: Urban and Mixed Environs and Marine Nearshore.

3.4 Off-Site Habitats

Wildlife species found in off-site habitats may be affected by construction or operation of the project. These off-site habitats include Upland Forest and Palustrine (Freshwater) Wetland.

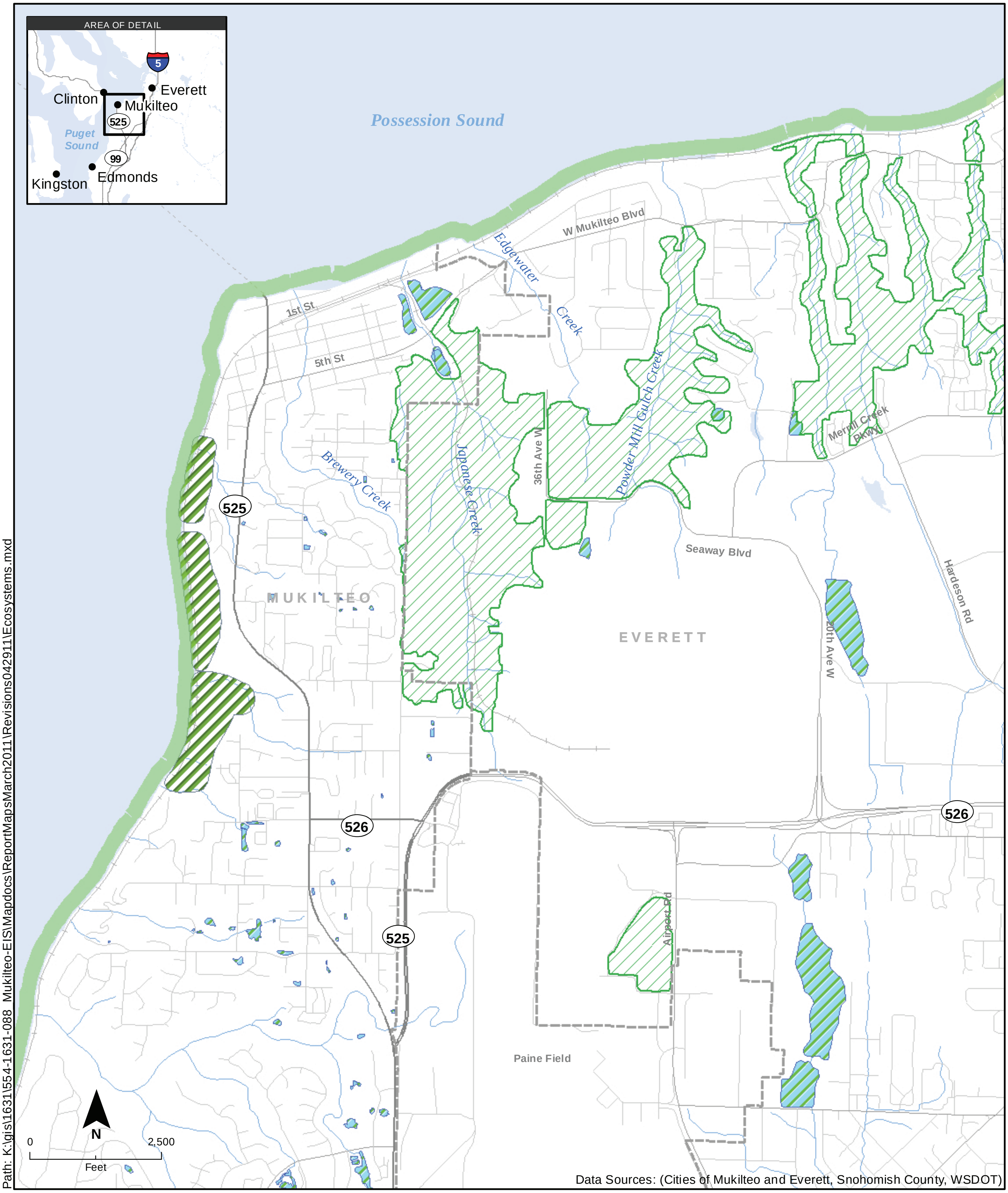
3.4.1 Upland Forest

Upland Forest habitat is present within 1 mile of the project area, primarily in Japanese Gulch, Brewery Gulch, and Edgewater Creek Gulch (Figure 8). These Upland Forests are typical of post-harvest old-growth, once present throughout much of the project area. WDFW has mapped much of Japanese Gulch habitat south of Fifth Street as a biodiversity area and corridor. The existing forest is second or third growth, and is dominated by red alder with lesser amounts of black cottonwood (*Populus balsamifera*), big-leaf maple, Douglas fir, western red cedar (*Thuja plicata*), and western hemlock. Understory species include salmonberry (*Rubus spectabilis*), red elderberry (*Sambucus racemosa*), Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), and piggy back plant (*Tolmiea menziesii*). A full list of plant species that may be found in the project vicinity is provided in Attachment A. A rail spur to the Boeing plant runs up Japanese Gulch next to Japanese Creek.

Upland Forest provides several features that are beneficial for wildlife habitat, such as a diversity of plant species, two to three canopy layers, surface waters (Japanese Creek, Brewery Creek, and Edgewater Creek), large and small snags, downed wood, and leaf litter. These forest areas persist as large streamside greenbelts in an otherwise developed landscape, providing refuge and corridors for wildlife moving to and from the Urban and Mixed Environs habitat areas.

Species observed in Upland Forest areas during the site investigations included hairy woodpecker (*Picoides villosus*), pileated woodpecker (*Dryocopus pileatus*), chestnut-backed chickadee (*Parus rufescens*), European starling (*Sturmus vulgaris*), and common crow (*Corvus corax*). WDFW PHS data identify two bald eagle (*Haliaeetus leucocephalus*) nests in Japanese Gulch, and the entire shoreline as foraging habitat. Some of the more common species expected to use this environment include coyote (*Canis latrans*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), common garter snake (*Thamnophis sirtalis*), northwest salamander (*Ambystoma gracile*), downy woodpecker (*Picoides pubescens*), northern flicker (*Colaptes cafer*), Bewick's wren (*Thryomanes bewickii*), black-capped chickadee (*Parus atricapilus*), Hutton's vireo (*Vireo huttoni*), varied thrush (*Ixoreus naevius*), Wilson's warbler (*Wilsonia pusilla*), red-tailed hawk (*Buteo jamaicensis*), sharp-shinned hawk (*Accipiter striatus*) and winter wren (*Troglodytes troglodytes*). A full list of species expected to use this habitat is provided in Attachment B.

A portion of Japanese Gulch, located south of Fifth Street, contains islands of grassland habitat, likely the result of mowing and maintenance (Attachment C, Photograph 1). These mowed areas are dominated by tall fescue (*Festuca arundinacea*), reed canarygrass (*Phalaris arundinacea*), other grass species, soft rush (*Juncus effusus*), and creeping buttercup (*Ranunculus repens*).



Legend

- Marine Nearshore Habitat
- Biodiversity Areas And Corridor
- Wetlands
- Rare and Imperiled Plant Community

Note: All locations estimated.

Figure 8. **Ecosystems in the Project Vicinity**

These grassland islands provide habitat for reptile species such as common garter snake and western fence lizard (*Sceloporus occidentalis*); bird species including European starling, savannah sparrow (*Passercullus sanwichensis*), and song sparrow (*Melospiza melodia*); and mammal species such as voles (Microtus spp.), cottontail rabbit (*Sylvilagus floridanus*), and coast mole (*Scapanus orarius*). Red-tailed hawk, bald eagle, and great blue heron (*Ardea herodias*) may forage here for small mammals.

Edge habitat is formed where two or more habitats come together, in this case, grassland and Upland Forest edges. Edge habitat is typically used by a larger number of species than any one habitat, because they provide diverse habitat conditions that species may access from the adjacent habitats. Edge habitats are used by any of the species noted above, but also include other species such as spotted towhee (*Pipilo erythrophthalmus*), brown-headed cowbird (*Molothrus ater*), American robin (*Turdus americanus*), rufous and Anna's hummingbirds (*Selasphorus rufus* and *Calypte anna*), and white-crowned sparrow (*Zonotrichia leucophrys*).

Freshwater Wetland

Palustrine (or freshwater) wetlands are present within Japanese Gulch, where they are associated with Japanese Creek, and in depressions at some distance from the stream (Figure 8 and Attachment C, Photograph 2). The wetland complex associated with the creek is approximately 100 feet from the project limits. The wetland has emergent, shrub, and forested components. Emergent habitat is dominated by forb species such as reed canarygrass, creeping buttercup, and rushes (*Juncus* spp.). Scrub-shrub habitats are dominated by shrubs such as salmonberry and Himalayan blackberry, along with sapling red alders. The forested wetland habitat is dominated by red alder with salmonberry, creeping buttercup, piggy back plant, skunk cabbage (*Lysichiton americanus*), and lesser periwinkle (*Vinca minor*) in the understory. Snags are scattered in the shrub and forested wetland habitats. As part of a stream restoration project performed by the City of Mukilteo in 2010, a portion of the shrub habitat was cleared of vegetation, including Himalayan blackberry, and replanted with native shrub and tree species.

South of Fifth Street, another Palustrine Wetland complex mapped by the NWI (USFWS 1987) is located adjacent to Upland Forest habitat (Attachment C, Photograph 3). The Palustrine Wetland is composed of Forested and Open Water habitats. The Forested community, which follows portions of Japanese Creek and rings the Open Water, consists mainly of red alder, with an understory of salmonberry, Himalayan blackberry, reed canarygrass, and piggy back plant.

Wildlife species observed in the Palustrine Wetland habitat included mallard (*Anas platyrhynchos*), hooded merganser (*Lophodytes cucullatus*), belted kingfisher (*Ceryle alcyon*), and pileated woodpecker. Numerous other species would be expected to use this habitat, including raccoon, northwestern garter snake, ensatina (*Ensatina eschscholtzii*), Pacific chorus frog (*Hyla regilla*), yellow warbler (*Dendroica petechia*), common yellowthroat (*Geothlypis trichas*), goldfinch (*Carduelis tristis*), orange-crowned warbler (*Vermivora celata*), violet-green swallow (*Tachycineta thalassina*), tree swallow (*Tachycineta bicolor*), bushtit (*Psaltriparus minimus*), bufflehead (*Bucephala albeola*), and downy woodpecker (Attachment B).

3.4.2 On-Site Habitats

Urban and Mixed Environs

The predominant terrestrial habitat type found in the project area is Urban and Mixed Environs. It is characterized by a high level (more than 60 percent cover) of impervious surfaces, such as pavement and buildings. Vegetation is limited to lawn and landscape strips as well as isolated patches of unmaintained scrub vegetation (Attachment C, Photograph 4).

Non-native plants dominate the sparse vegetation in the project area. These non-native species include Himalayan blackberry, butterfly bush (*Buddleia japonica*), shrub roses (*Rosa* spp.), common St. Johns wort (*Hypericum perforatum*), scotch broom (*Cytisus scoparius*), English plantain (*Plantago lanceolata*), and numerous species of grasses. A few native species are also present, such as red alder, Douglas fir, Pacific madrone, red elderberry, bentgrass (*Agrostis* spp), Canada thistle (*Cirsium arvense*), and fireweed (*Epilobium angustifolium*). This vegetation community is present in strips between paved areas, adjacent to the railway and roads, and on the Tank Farm Pier. This habitat contains no structural elements such as snags, downed logs, or rock piles. Human-made structures, such as buildings, provide nesting opportunities for some species of birds and mammals.

Wildlife species that were observed in Urban and Mixed Environs habitat during site investigations included crow, house sparrow (*Passer domesticus*), Canada goose (*Branta canadensis*), European starling, several gull species (*Larus* sp.), and rock pigeon (*Columbia livia*). These species are all tolerant of a high level of disturbance and reproduce readily in urbanized environments. At the Tank Farm Pier, great blue herons, a belted kingfisher, and a bald eagle were observed feeding and/or perching. These species are somewhat tolerant of human disturbance while feeding and perching.

Other wildlife species likely to use this habitat type in the project area include song sparrow, white-crowned sparrow, Bewick's wren, Brewer's blackbird (*Euphagus cyanocephalus*), cottontail rabbit, eastern gray squirrel (*Sciurus carolinensis*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*) and black rat (*Rattus rattus*), raccoon, and Virginia opossum.

Marine Nearshore

Marine Nearshore habitat extends from the high tide line to approximately 30 feet in depth (Attachment C, Photograph 5). The shoreline within most of the project area has been modified with the addition of riprap. Discussion of this habitat is confined to its use by marine birds, several of which are found here. Species that were observed in Marine Nearshore habitat on the project site included bald eagle, great blue heron, surf scoter (*Melanitta perspicillata*), Barrow's goldeneye (*Bucephala islandica*), common goldeneye (*Bucephala clangula*), common murre (*Uria aalge*), Canada goose, horned grebe (*Podiceps auritus*), red-breasted merganser (*Mergus serrator*), double-crested cormorant (*Phalacrocorax auritus*), pelagic cormorant (*Phalacrocorax pelagicus*), pigeon guillemot (*Cephus columba*), red-necked grebe (*Podiceps nigricollis*), European starling, rock dove, and numerous gull species. Waterfowl were observed feeding on the mussels attached to the pier structures.

Other species that are likely to use the nearshore habitat of the project site include mallard, marbled murrelet (*Brachyramphus marmoratus*), western grebe (*Aechmophorus occidentalis*), black scoter (*Melanitta nigra*), American coot (*Fulica americana*), American widgeon (*Anas americana*), mew gull (*Larus canus*), ring-billed gull (*Larus delawarensis*), glaucous-winged gull (*Larus glaucescens*), killdeer (*Charadrius vociferous*), common loon (*Gavia immer*), long-tailed duck (*Clangula hyemalis*), and harlequin duck (*Histrionicus histrionicus*).

3.4.3 Aquatic Marine Environment

Existing Physical and Chemical Conditions

Physical Characteristics

The shoreline in the project area has been substantially modified in ways typical of many urbanized shorelines of Puget Sound. The entire shoreline is armored by riprap revetment and bulkheads, through which multiple storm drains and culvert outfalls discharge into the Sound from the south (Attachment C, Photographs 5 and 6).

In the 1940s the area inshore of the Tank Farm Pier was dredged to a depth of approximately -40 feet mean lower low water (MLLW) to allow deep draft ships to dock at the pier. Minor dredging was also performed to the west of the pier. Biological surveys performed for the project found mixed sand and silt within the deep dredged basin. The fine substrate sizes, modest accumulations of natural wood pieces, and widespread accumulations of whole clam and mussel shells within the basin all indicate a low energy depositional area. The deep basin is mostly devoid of macroalgae vegetation, and is a generally unproductive area.

East of the dredged area below the riprap, substrates consist of mixed sand and gravel. Also, there is a mixed sand and gravel delta east of the dredged area that was apparently nourished by Japanese Creek in the past. The delta elevations are mostly in the lower intertidal area. The delta shows evidence of reworking by waves and tides.

Substrates in the western portion of project area consist of medium sand with an admixture of coarse gravel. The beach slope varies between 6H:1V and 8H:1V (horizontal:vertical). Below about -5 feet MLLW, the nearshore slope is much steeper (1.5H:1V and 2H:1V). Substrates at the top of the beach (at +10 feet MLLW or higher) are either bulkhead or a riprap revetment. At the base of the Tank Farm Pier, the riprap revetment extends approximately 20 feet down to about MLLW. Underneath the Tank Farm Pier, the riprap revetment is composed mostly of concrete slabs and other concrete rubble. The concrete rubble extends down to about +2 feet MLLW. The beach fronting the Tank Farm Pier is littered with rubble and pile stubs (Attachment C, Photograph 7).

There is a small pocket beach immediately east of the Tank Farm Pier. This is bounded on the west by the concrete rubble under the Tank Farm Pier and on the east by the riprap revetment protecting the shoreline. Between the shoreline and the Tank Farm Pier, substrates consist of riprap that extends from above mean higher high water (MHHW) to below MLLW (out to -30 feet MLLW in places). The slope of the riprap south of the dredged area is about 1.5H:1V. East of the dredged area below the riprap, the beach slope is gentle (as much as 50H:1V). Below about -5 feet MLLW, the slope drops to between 2.5H:1V to 3H:1V (Moffatt & Nichol 2006).

Brewery Creek enters Possession Sound through a culvert east of the existing terminal (Attachment C, Photograph 8). Japanese Creek enters Possession Sound through two culverts: one beneath the former containment area for Tank 7 (Attachment C, Photograph 9), and the other located along the Possession Sound shoreline to the east of the Mukilteo Tank Farm in the vicinity of the new Port of Everett rail/barge transfer facility. Japanese Creek flow may enter the Sound through one or both of these outfall pipes, depending on the extent of shoreline sediment present at each outfall. Sediment accumulations at each outfall vary. Numerous other outfalls occur between Brewery Creek and Japanese Creek within the project area (Herrera 2006).

Water Quality

Possession Sound is classified by Ecology as having "extraordinary water quality" (WAC 173-201A-612). This designation means that the area is suitable for salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; and crustacean and other shellfish (crabs, shrimp, scallops, etc.) rearing and spawning. This designation imposes certain restrictions on activities affecting water quality in the project area as they relate to aquatic life, shellfish, recreation, and miscellaneous uses. For aquatic life, the following criteria must be met:

1. Waters must not exceed 13°Celsius (55.4°Fahrenheit) in any one day.
2. The lowest dissolved oxygen level allowed in any one day is 7.0 milligrams per liter (mg/L).

3. Turbidity must not exceed 5 nephelometric turbidity units (NTUs) over background when the background is 50 NTUs or less, or must not exceed a 10 percent increase in turbidity when the background turbidity is more than 50 NTUs.
4. The range of pH must be within 7.0 to 8.5.
5. A human-caused variation must be within the above range of less than 0.2 units.

In 1996, 1997, and 1998, Possession Sound was identified as having dissolved oxygen concentrations below the state standard for marine waters with excellent quality for aquatic life use. Ecology has included Possession Sound on the 2008 Clean Water Act Section 303(d) list for threatened and impaired water bodies. Possession Sound is listed as Category 2 for exceedance of dissolved oxygen and fecal coliform bacteria standards. A Category 2 water body of concern is defined as having some evidence of a water quality problem, but not enough to require production of a total maximum daily load (TMDL) pollution control plan. Other water quality parameters monitored in Possession Sound but found to be within water quality standards include ammonia, temperature, and pH (Ecology 2008).

The Washington State surface water quality standards defined by Ecology identify Japanese Creek as protected for the designated uses of salmon and trout spawning, non-core rearing and migration; primary contact recreation; domestic, industrial, and agricultural water supply; stock watering; wildlife habitat; harvesting; commerce and navigation; boating; and aesthetic values (WAC 173-201A). Water quality data for Japanese Creek indicate that the stream occasionally exceeds the state water quality criteria for fecal coliform bacteria, lead, and turbidity. The creek water quality has also exhibited sporadic exceedances of the state water quality criteria for pH, dissolved oxygen, cadmium, and copper (Herrera 2006).

Brewery Creek is protected for the designated uses of salmon and trout spawning, non-core rearing and migration; primary contact recreation; domestic, industrial, and agricultural water supply; stock watering; wildlife habitat; harvesting; commerce and navigation; boating; and aesthetic values, according to the current Washington State surface water quality standards (WAC 173-201A). No water quality data were found for Brewery Creek (Herrera 2006).

The *City of Mukilteo Comprehensive Surface Water Management Plan* (Tetra Tech/KCM et al. 2001) identifies water quality problems within the Brewery Creek drainage basin. These problems include untreated runoff with oil content resulting from the existing holding area for ferry traffic, and generally degraded stormwater quality as a result of the types of land use in the drainage basin (Herrera 2006).

Piles associated with the Tank Farm Pier have been treated with creosote (Attachment C, Photographs 10 and 11). Over the years that these piles have been in place, some creosote-related hydrocarbons may have leached into the surrounding marine sediments resulting in localized contamination (Herrera 2006). The existing Mukilteo ferry terminal is also constructed of creosote-treated timber piles and decking (Attachment C, Photograph 12).

Sediment Quality

In 2003, sediment samples were collected from Possession Sound along the shoreline at the Mukilteo Tank Farm. All samples were analyzed for volatile and semivolatile organic compounds, pesticides, polychlorinated biphenyls (PCBs), metals, and nitro-aromatic compounds (for the presence of ammunition constituents). The results of those samples indicate that contaminants of concern either were not detected above laboratory reporting limits or were detected at concentrations below Ecology's sediment quality standards (as described at WAC 173-204-320). Based on these results, marine sediments in the immediate vicinity of the Mukilteo Tank Farm shoreline are in compliance with regulatory cleanup criteria; no further assessment or remedial cleanup action is required at the site.

Additional sediment sampling took place underneath and adjacent to the Tank Farm Pier in March and April of 2012. Results indicated levels of chlordane (an organochlorine pesticide) and petroleum hydrocarbons slightly above regulatory criteria. Further sampling will take place prior to construction to more accurately characterize the extent and nature of sediment contamination within the project footprint.

Existing Biological Characteristics

Aquatic Plants

The nearly two dozen aquatic plant species identified in the project area (Table 1) serve a number of functions in the aquatic environment. Aquatic plants provide a surface for herring to spawn, provide oxygen and take up carbon dioxide during the day, and provide refuge from predators for juvenile fish. Aquatic plants and the small organisms that live on their surfaces also provide food for many aquatic species.

Although some kelp is present in the project area, no major kelp beds (ribbon or bull kelp) occur there. The most common of the larger aquatic plants are sugar wrack (*Laminaria saccharina*), iridescent seaweed (*Sarcodiotheca* sp.), and sea lettuce (*Ulva* spp.) (Figures 9, 10, and 11).

An eelgrass survey carried out in 2011 did not identify eelgrass in most of the project area. Only one small patch (less than 1 square foot) was found just north of the Existing Site Improvements Alternative footprint (Confluence Environmental 2011) (Figure 9). Previous surveys in 2005 found small patches of eelgrass west and east of the Tank Farm Pier (Figures 12 and 13).

Table 1. List of Aquatic Plant Species Identified in the Project Area

Common Name	Scientific Name
Broad-rib kelp	*Pleurophycus gardneri*
Bull kelp	*Nereocystis leutkeana*
Eelgrass	*Zostera marina*
Enteromorpha	*Entermorpha linza*
False kelp	*Petalonia fascia*
Flattened acid leaf	*Desmarestia* spp.
Iridescent seaweed	*Iridea* sp. or *Sarcodiotheca* spp.
Japanese wireweed	*Sargassum muticum*
Polly pacific	*Polysiphonia* spp.
Purple laver	*Porphyra* spp.
Red algae	*Gracilaria sjoestedtii*
Red ribbon	*Palmaria* spp.
Red spaghetti seaweed	*Sarcodiotheca gaudichaudii*
Ribbon kelp	*Costaria costata*
Sargassum	*Sargassum muticum*
Sea hair	*Enteromorpha* spp.
Sea lace	*Microcladia* spp.
Sea lettuce	*Ulva* spp.
Soda straws	*Scytosiphon* spp.
String acid hair	*Desmarestia* spp.
Sugar kelp	*Laminaria* spp.
Sugar wrack	*Laminaria saccharina*
Turkish towel	*Gigartina corymbiferus*

Sources: PI Engineering 2002; Pentec Environmental 1995; Anchor 2005a; and Confluence Environmental 2011

Mukilteo Multimodal Project
Eelgrass Survey
Snohomish County, WA
for WSDOT

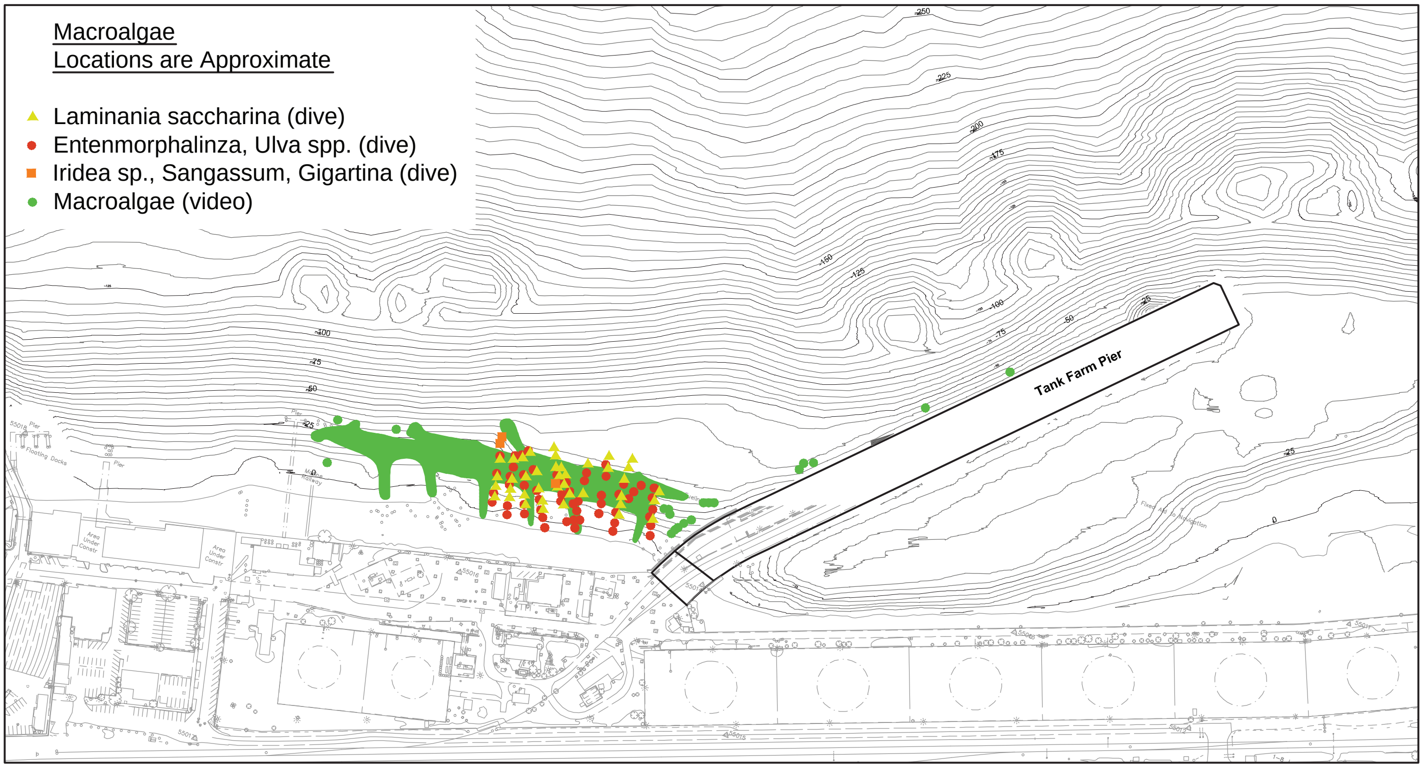
Figure 9. Existing Site Macroalgae Distribution

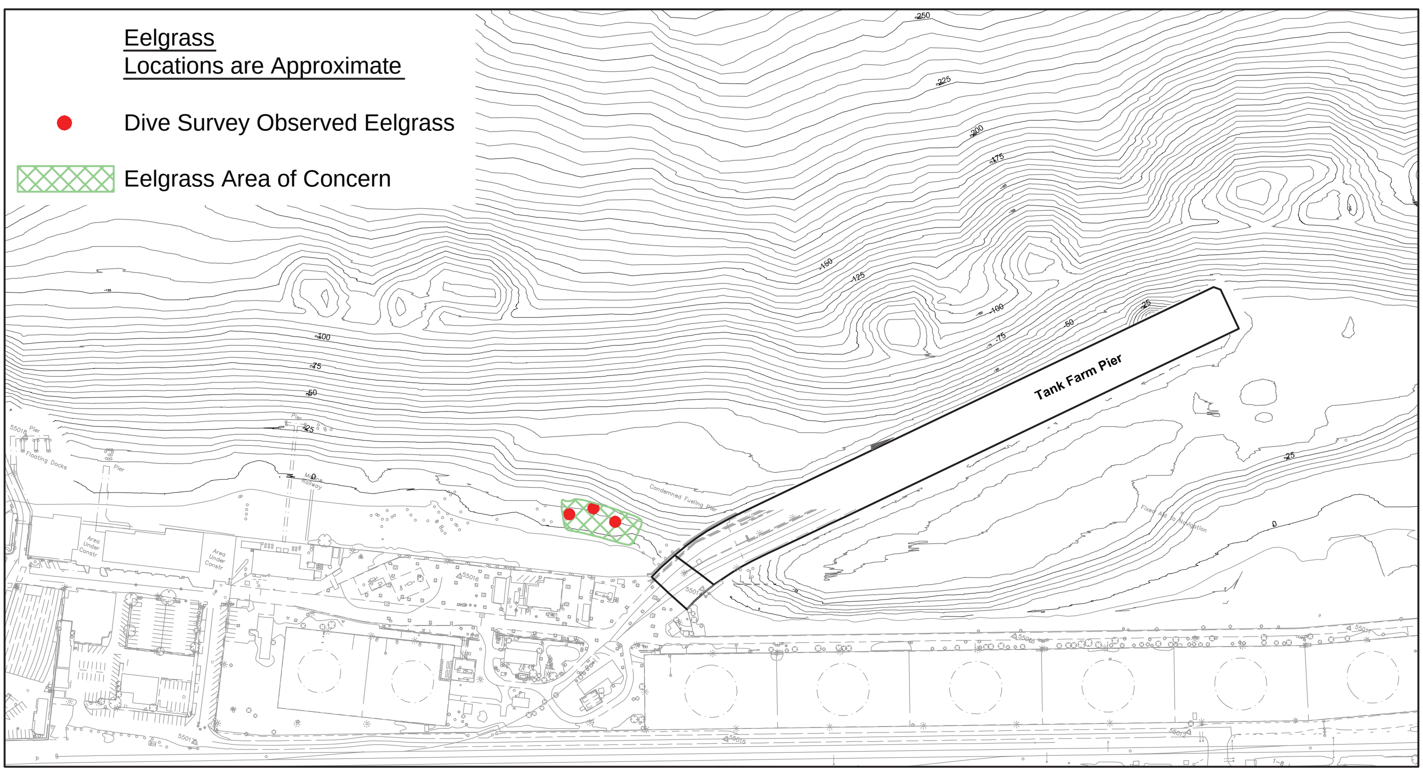
Mukilteo Multimodal Project
Eelgrass Survey
Snohomish County, WA
for WSDOT

Figure 10. Elliot Point 1 Macroalgae Distribution

Mukilteo Multimodal Project
Eelgrass Survey
Snohomish County, WA
for WSDOT

Figure 11. Elliot Point2 Macroalgae Distribution





Parametrix 554-1631-088/01(4A) 5/11

Horizontal Datum: NAD 83 WA SP North

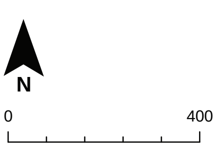
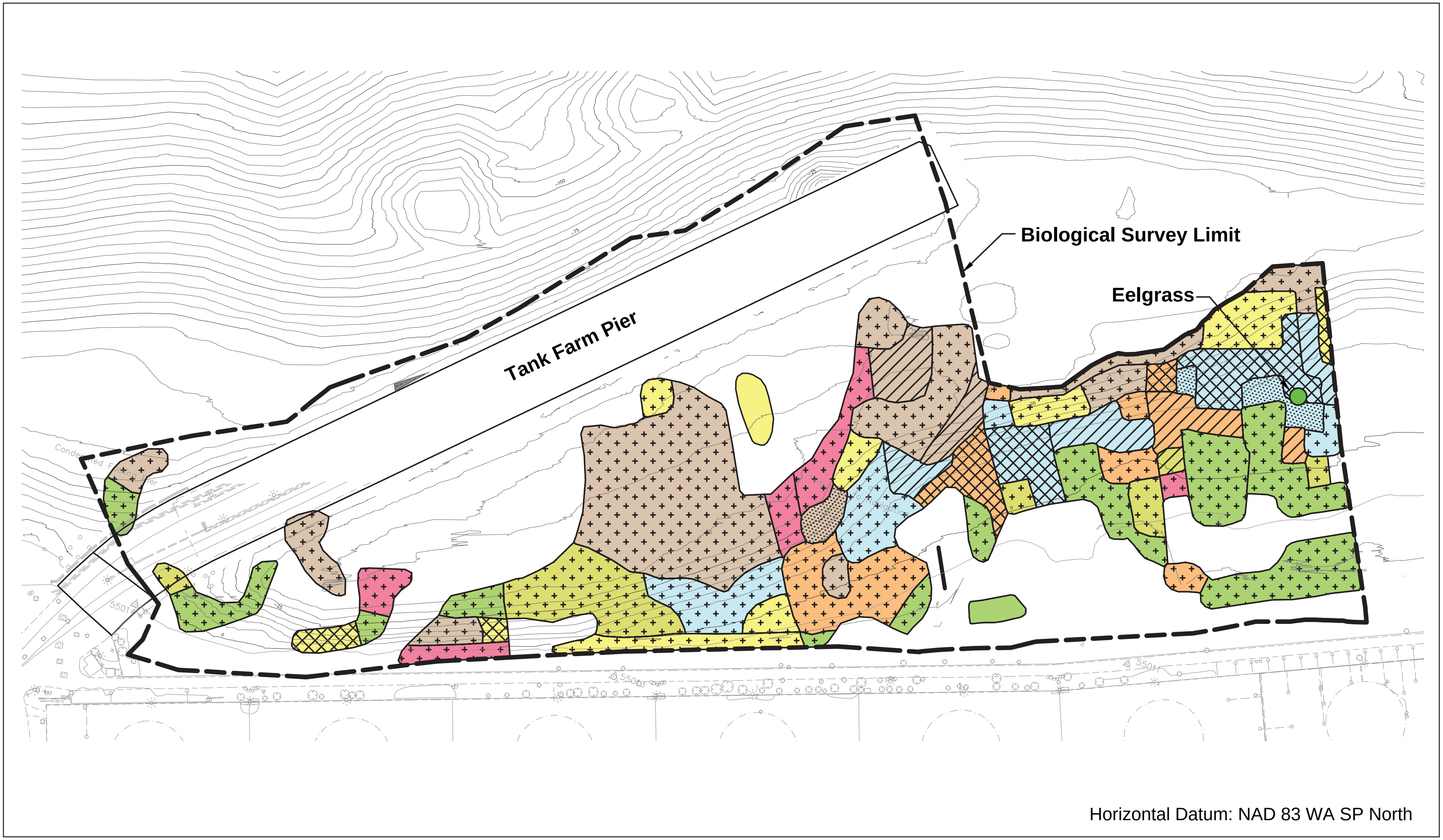


Figure 12. **Macroalgae and Eelgrass Distribution West of the Tank Farm Pier**



Parametrix 554-1631-088/01(4A) 5/11 (B)

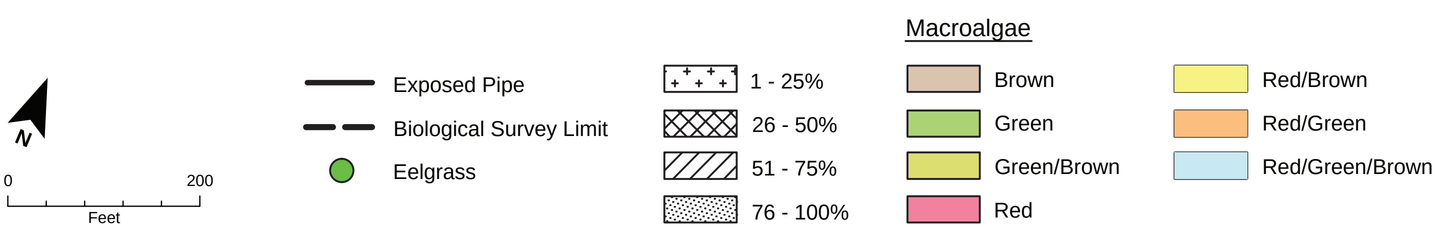


Figure 13. **Macroalgae and Eelgrass Distribution East and South of the Tank Farm Pier**

Mukilteo Multimodal Project

Crabs and Shellfish

Suitable habitat for geoduck (*Panopea abrupta*) and hardshell clams was found in and near the project area. Surveys in 2005 found that Dungeness crabs (*Cancer magister*) are common in the project area, and they were most abundant along the west side of the Tank Farm Pier where they were found burrowing into the sand (Anchor 2005b, 2005c) (Figure 14). Surveys found the crabs to be more abundant at depths shallower than -80 feet MLLW. A survey of the Tank Farm Pier also found substantial numbers of crabs under the pier (Anchor 2005b) (Figure 15). Similar numbers of crabs were observed during eelgrass surveys in 2011 (Cziesla, pers. comm. 2011).

Geoduck surveys showed very low numbers throughout the project area (Table 2). Few or no geoducks were observed along survey transects west of the Tank Farm Pier. More geoducks were found in transects located farther east along the pier and beyond (Figure 16).

Table 2. Adjusted Geoduck Counts on Transects between -18 feet and -70 feet MLLW

Transect Distance from -70 feet MLLW	Adjusted Geoduck Count					
	A	B	C	D	E	F
0 to 150	0	2	0	0	1	50
150 to 300			0	4	0	3
300 to 450				0	17	
450 to 600				0	3	

Note: Empty cells indicate that the grid line did not extend to that distance because the -18 feet MLLW elevation had been reached.

Other Invertebrates

Other commonly observed invertebrate species included sunflower stars (*Pycnopodia helianthoides*) and plumose anemone (*Metridium senile*). Project surveys identified over 50 invertebrate species, including crabs, shrimp, barnacles, anemones, urchins, sea stars, clams, nudibranch, and octopus (Table 3). Sunflower stars and spotted shrimp (*Pandalus platyceros*) were found only at depths of -180 feet MLLW or deeper.

Parametrix 554-1631-088/01(4A) 5/11 (B)

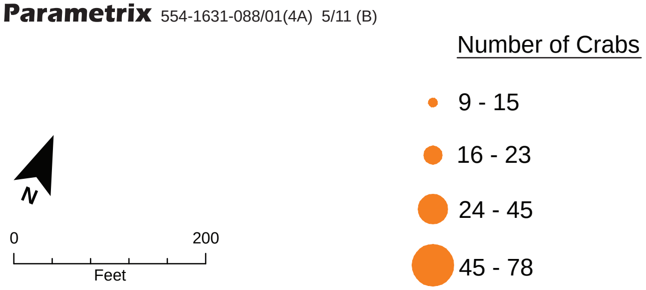
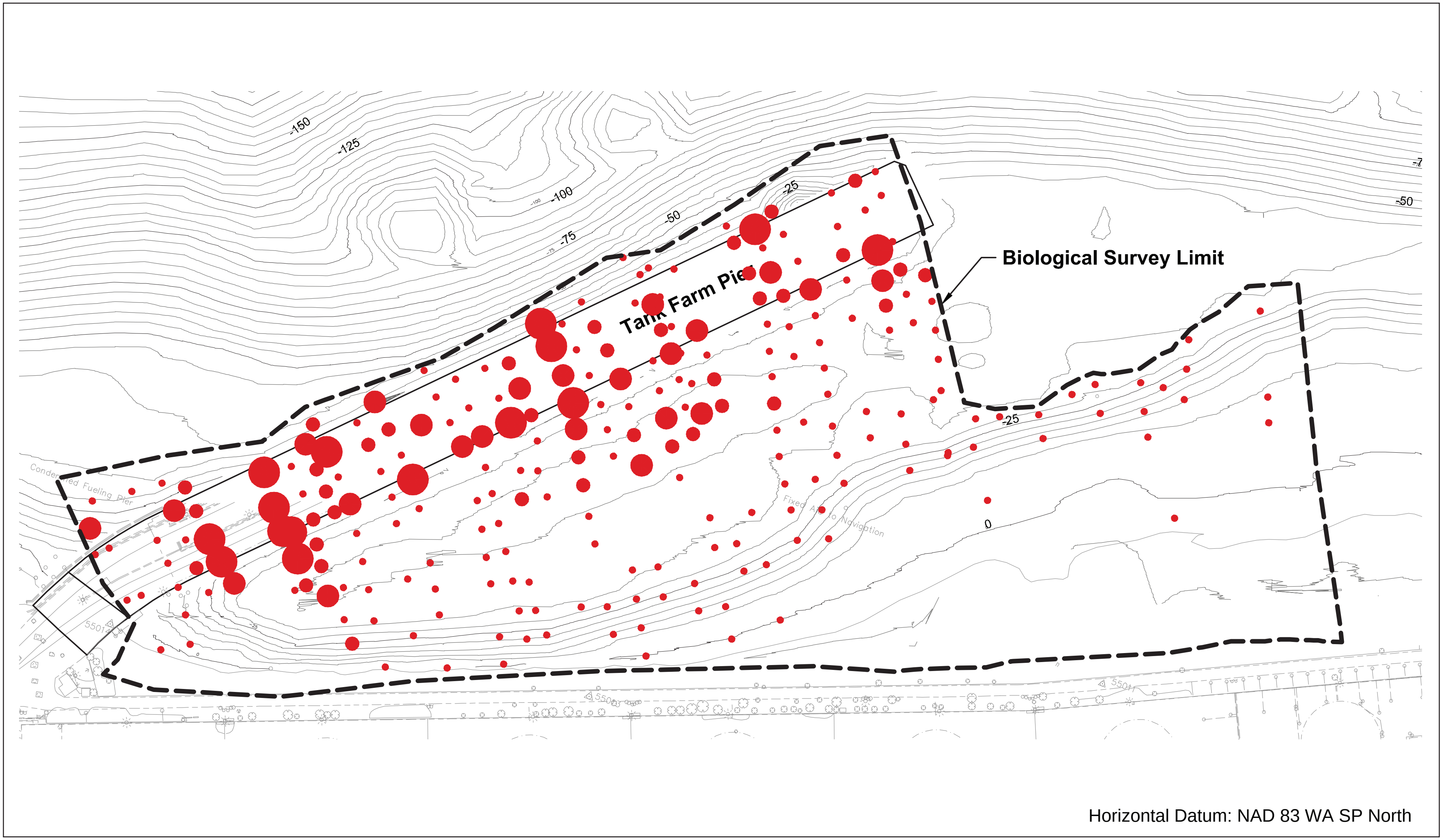


Figure 14. **Adult Dungeness Crab Observations West of the Tank Farm Pier**

Mukilteo Multimodal Project



Parametrix 554-1631-088/01(4A) 5/11 (B)

Number of Crabs

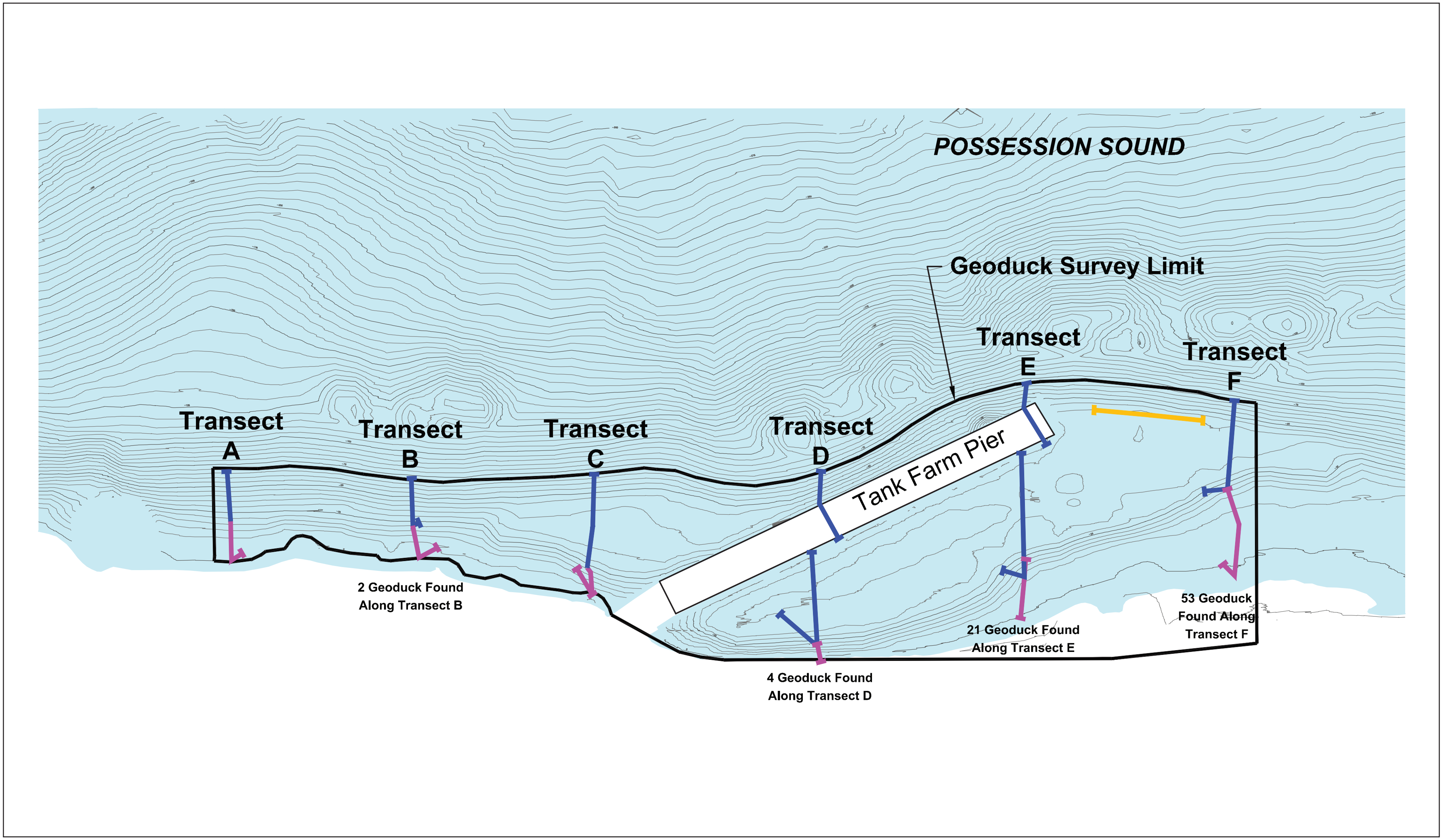
- 1 - 5
- 6 - 10
- 11 - 20
- >20

N

0 200
Feet

Figure 15. **Adult Dungeness Crab Observations East and South of the Tank Farm Pier**

Mukilteo Multimodal Project



Parametrix 554-1631-088/01(4A) 5/11 (B)

Figure 16. **Geoduck Transect Locations**

N

0 400
Feet

0 to -18 feet MLLW Transect Unit

-18 to -70 feet MLLW Transect Unit (Commercial Harvest Area)

Show Factor Plot

Mukilteo Multimodal Project

Table 3. Invertebrate Species Observed in the Project Area

Common Name	Scientific Name
Arthropods	
Acorn barnacle	*Balanus glandula*
Coonstripe shrimp	*Pandalus danae*
Dungeness crab	*Cancer magister*
Graceful cancer crab	*Cancer gracilis*
Hermit crab	*Pagarus* sp.
Kelp crab	*Pugettia* sp.
Northern kelp crab	*Pugettia producta*
Red rock crab	*Cancer productus*
Spotted shrimp	*Pandalus platyceros*
Thatched barnacle	*Balanus cariosus*
Cnidarians	
Moonglow anemone	*Anthopleura artemisia*
Aggregate anemone	*Anthopleura elegentissima*
Sand-rose anemone	*Urticina columbiana*
Painted urticina	*Urticina crassicornis*
Stubby-rose anemone	*Urticina coriacea*
Plumose anemone	*Metridium senile*
Small metridium	*Metridium* sp.
Echinoderms	
California sea cucumber	*Parastichopus californicus*
Green urchin	*Strongylocentrotus droebachiensis*
Leather star	*Dermasterias imbricate*
Morning sun star	*Solaster dawsoni*
Mottled star	*Evasterias troschelii*
Ochre star	*Pisaster ochraceus*
Orange sea cucumber	*Cucumaria miniata*
Short-spined star	*Pisaster brevispinus*
Six-arm sea star	*Lepasterias hexactis*
Stimpson’s sun star	*Solaster stimpsoni*
Sunflower star	*Pycnopodia helianthoides*
Mollusks	
Bent-nose macoma	*Macoma nasuta*
Blue mussel	*Mytilus edulis*
Butter clam	*Saxidomus giganteus*
California armina	*Armina californica*
Cockle clam	*Clinocardium* spp.
Dogwinkle	*Nucella* sp.
Fat gaper (Horse clam)	*Tresus capax*

Table 3. Invertebrate Species Observed in the Project Area

Common Name	Scientific Name
Geoduck	*Panopea abrupta*
Horse clam	*Tresus* sp.
Lemon peel nudibranch	*Tochuina tetraquetra*
Lewis' moon snail	*Polinices lewisii*
Macoma clam	*Macoma* spp.
Pacific gaper (Horse clam)	*Tresus nuttalli*
Pacific littleneck clam	*Protothaca staminea*
Sea lemon nudibranch	*Archidoris montereyensis*
Softshell clam	*Mya* spp.
Truncated mya	*Mya truncate*
White lined nudibranch	*Dirona albolineata*
White lined triton	*Tritonia festiva*
Other Invertebrates	
Giant Pacific octopus	*Octopus dofleini*
Giant Western nassa	*Nassarius fossatus*
Odhner's dorid	*Archidoris odhneri*

Sources: PI Engineering 2002; Pentec Environmental 1995; and Anchor 2005c

Fisheries Resources

Possession Sound is in the migratory path of several anadromous salmonid species and supports many resident fish species. Dive and video surveys identified over 40 fish species in the project area (Table 4). The most abundant fish species observed during the 2004 underwater video survey were surfperch (Anchor 2005d). These were found primarily to the west of the future Elliot Point ferry terminals and in depths of -30 to 50 feet MLLW. All surfperch species were found exclusively in areas shallower than 70 feet MLLW.

Sand lance (*Ammodytes hexapterus*) is an important forage fish for salmonids and several other species. WDFW PHS data (WDFW 2011) show sand lance spawning beaches in the project area. Spawning is known to occur approximately 100 feet to the west and more than 800 feet to the east of the Tank Farm Pier. Sand lance have been observed spawning in the vicinity from late November to late February, with peak spawning in mid-January. The distribution of eggs is between +6 feet and +8 feet MLLW, but some eggs were seen at approximately +4 feet MLLW (Port of Everett 2004).

Table 4. List of Fish Species Identified in the Project Area

Common Name	Scientific Name
Big skate	*Raja binoculata*
Black rockfish	*Sebastes melanops*
Blackeye goby	*Coryphopterus nicholsi*
Brown rockfish	*Sebastes auriculatus*
Buffalo sculpin	*Enophrys bison*
Cabezon	*Scorpaenichthys marmoratus*
C-O sole	*Pleuronichthys coenosus*
Copper rockfish	*Sebastes caurinus*
English sole	*Pleuronectes vetulus*
Great sculpin	*Myoxocephalus polyacanthocephalus*
Gunnel	*Pholididae*
Kelp greenling	*Hexagrammos decagrammus*
Lingcod	*Opyiodon elongates*
Northern ronquil	*Ronquilus jordani*
Northern spearnose poacher	*Agonopsis vulsa*
Pacific herring	*Clupea pallasi*
Pacific sandlance	*Ammodytes hexapterus*
Padded sculpin	*Artedius fenestralis*
Painted greenling	*Oxylebius pictus*
Penpoint gunnel	*Apodichthys flavidus*
Petrale sole	*Eopsetta jordani*
Pile perch	*Rhacochilus vacca*
Pile surfperch	*Damalichthys vacca*
Plainfin midshipman	*Porichthys notatus*
Prickleback spp.	*Stichaeidae*
Chinook salmon	*Oncorhynchus tshawytscha*
Quillback rockfish	*Sebastes maliger*
Ratfish	*Hydrolagus colliei*
Red irish lord	*Hemilepidotus hemilepidotus*
Rock sole/Turbot	*Pleuronichthys spp.*
Saddleback gunnel	*Pholis ornate*
Sailfin sculpin	*Nautichthys oculofasciatus*
Sand sole	*Psettichthys melanostictus*
Sanddab	*Citharichthys spp.*
Shiner perch	*Cymatogaster aggregate*
Snake prickleback	*Lumpenus sagitta*
Staghorn sculpin	*Leptocottus armatus*
Starry flounder	*Platichthys stellatus*
Striped seaperch	*Embiotaca lateralis*
Sturgeon poacher	*Agonus acipenserinus*
Threadfin sculpin	*Icelinus filamentosus*
Tidepool sculpin	*Oligocottus maculosus*
Tubesnout	*Aulorhynchus flavidus*
Unidentified flatfish	*Bothidae or Pleuronectidae*
Unidentified sculpin spp.	*Cottidae spp.*
Whitespotted greenling	*Hexagrammos stelleri*

Sources: Williams et al. 2003; PI Engineering 2002; and Anchor 2005b

3.5 Special Status Species

Special status species are rare species or species of interest that are protected or listed at the federal or state level. A number of special status species have been documented, or could occur, in the project area (Table 5). Three non-listed marine mammal species, which are protected under the MMPA, have also been observed in the project area.

Table 5. Special Status Species in the Project Area

Common Name	Scientific Name	Status[1]	Critical Habitat[2]	Occurrence in Project Area
Federally Listed Species				
Marbled murrelet	*Brachyramphus marmoratus*	FT, ST	Designated, none in project area	Documented
Puget Sound Chinook salmon	*Oncorhynchus tshawytscha*	FT, SC	Designated, occurs in project area	Documented
Puget Sound steelhead	*Oncorhynchus keta*	FT	None designated	Documented
Coastal-Puget Sound bull trout	*Salvelinus confluentus*	FT, SC	Designated, occurs in project area	Documented
Southern green sturgeon	*Acipenser medirostris*	FT	Designated, none in project area	Unlikely
Pacific eulachon	*Thaleichthys pacificus*	FT, SC	Designated, none in project area	Unlikely
Canary rockfish	*Sebastes pinniger*	FT, SC	None designated	Likely
Yelloweye rockfish	*Sebastes ruberrimus*	FT, SC	None designated	Likely
Bocaccio	*Sebastes paucispinus*	FE, SC	None designated	Documented
Southern resident killer whale	*Orca orcinus*	FE, SE	Designated, occurs in project area	Documented
Humpback whale	*Megaptera novaeangliae*	FE, SE	None in project area	Documented
Steller's sea lion	*Eumetopias jubatus*	FT, ST	None in project area	Documented
Coho salmon	*Oncorhynchus kisutch*	FCo		Documented
Bald eagle	*Haliaeetus leucocephalus*	SS, FCo	None	Documented
State-Listed Species				
Common loon	*Gavia immer*	SS		Documented
Clark's grebe	*Aechmophorus clarkii*	SC		Likely
Horned grebe	*Podiceps auritus*	SM		Documented
Red-necked grebe	*Podiceps grisegena*	SM		Documented
Western grebe	*Aechmophorus occidentalis*	SC		Likely
Great blue heron	*Ardea herodias*	SM		Documented
Green heron	*Butorides virescens*	SM		Likely

Table 5. Special Status Species in the Project Area

Common Name	Scientific Name	Status[1]	Critical Habitat[2]	Occurrence in Project Area
Federally Listed Species				
Osprey	*Pandion haliaetus*	SM		Likely
Caspian tern	*Sterna caspia*	SM		Likely
Common murre	*Uria aalge*	SC		Likely
Gray whale	*Eschrichtius robustus*	SS		Documented
Dall's porpoise	*Phocoenoides dalli*	SM		Documented
Pacific harbor porpoise	*Phocoena phocoena*	SC		Documented
Harbor seal	*Phoca vitulina*	SM		Documented
Other Marine Mammals				
Minke whale	*Balaenoptera acutorostrata*	None		Documented
California sea lion	*Zalophus californianus*	None		Documented
Elephant seal	*Mirounga angustirostris*	None		Documented

1 Only applies to federally listed species
2 FE = Federal Endangered; FT= Federal threatened; FCo = Federal Species of Concern; SE = State Endangered; ST = State Threatened; SC = State Candidate; SS = State Sensitive; SM = State Monitored

3.5.1 Federally Listed Species

The ESA of 1973, as amended, provides for the conservation of species that are endangered or threatened with extinction throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend. Twelve threatened or endangered species and one species of concern have been documented or could occur in the project area; critical habitat (areas containing the physical and biological habitat features essential to supporting one or more life stages of the species) has been designated for two of those species (Table 5). A BA is currently being developed for the project and will contain a detailed description of the life history of species listed under the ESA, their occurrence in the project area, and potential impacts associated with the project.

Marbled Murrelet

Marbled murrelets were listed as threatened under the ESA in 1992 (57 Federal Register [FR] 45328). They forage in marine waters of Puget Sound and nest in old-growth forests. Marbled murrelets are regularly seen foraging and resting near the existing ferry terminal and the lighthouse during spring and summer months (April through August) and intermittently at other times of the year (Wahl et al. 2005).

The species is unlikely to nest in the project vicinity. The closest recorded murrelet nest is more than 25 miles from the site (WDFW 2011), and suitable nest trees do not exist in forested areas within 1 mile or more of the project location.

The USFWS designated critical habitat for marbled murrelets in 1996 (61 FR 26256) but critical habitat does not occur in the project area.

Puget Sound Chinook Salmon

The Chinook salmon found in Puget Sound are part of the Puget Sound evolutionarily significant unit (ESU) of Chinook salmon, listed as threatened under the ESA (64 FR 41836). This ESU encompasses all of Puget Sound, Strait of Georgia, and associated drainages. Chinook salmon use the project area primarily for migration, foraging, and rearing. There is no spawning habitat in or near the vicinity of the project area. The closest river for Chinook spawning is the Snohomish River, approximately 7 miles to the north of the project area.

Chinook salmon were the most abundant species of salmon observed during weekly beach seine sampling near Mukilteo in 1986 and 1987, from April through July. Chinook salmon entered the area in low numbers beginning in late April, peaking by mid-May to early June, and continuing in moderate to high numbers through mid-July (Beauchamp 1986; Northwest Enviro-Metric Sciences 1987). In more recent studies south of Mukilteo, Brennan et al. (2004) found juvenile Chinook salmon in nearshore beach seines into the fall season, although they confirmed a general trend for movement into deeper water as fish sizes increased. One juvenile Chinook was recently observed in Japanese Creek (McDowell, pers. comm., 2011).

Critical Habitat

NMFS designated certain areas of Puget Sound where Chinook salmon have been documented as critical to the recovery of the species (70 FR 52630). Critical habitat was designated for nearshore marine areas of Puget Sound (which extend from extreme high water to -98 feet MLLW).

Steelhead Trout

The Puget Sound distinct population segment (DPS) of steelhead trout (*Oncorhynchus mykiss*) was listed as threatened under the ESA in May 2007 (72 FR 26722). The DPS includes steelhead from river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington. They exhibit a complex suite of life history traits, and can be anadromous or freshwater residents. The species spawns in freshwater, and may spawn more than once. Those that are anadromous can spend up to 7 years in freshwater prior to undergoing the physiological and biological changes required to transition to saltwater, and then spend up to 3 years in saltwater prior to first spawning. Spawning occurs in the mainstem of the Upper Snohomish River and major tributaries to the Snohomish River basin. No steelhead were observed during dive surveys for the project, but the species is present in Possession Sound and likely to be found in the project vicinity. Critical habitat has not been proposed for steelhead.

Bull Trout

An acoustic tagging and tracking study within the Snohomish estuary and adjacent nearshore areas indicates that subadult and adult bull trout enter the lower estuary and marine nearshore area by early to mid-April. Bull trout presence in the estuary occurs through mid-summer, after which the fish begin moving back to freshwater (Port of Everett 2004), including the entire shoreline within the project area.

The Coastal-Puget Sound DPS of bull trout was listed as threatened under the ESA in 1999 (64 FR 58910). The Puget Sound DPS encompasses all of Puget Sound and extends north to the Canadian border. Bull trout use the project area primarily for migration and foraging. The closest natal river for bull trout is the Snohomish River, approximately 7 miles to the north of the project area. Bull trout are likely to be found along shorelines in the project area.

Critical Habitat

USFWS designated bull trout critical habitat in 2005 (75 FR 63898) and redesignated it in September 2010 (75 FR 63898). In marine nearshore areas of Puget Sound, which includes shorelines in the project area, critical habitat extends from the MHHW line to -33 feet MLLW.

Green Sturgeon

The Southern DPS of green sturgeon was listed as threatened under the ESA on April 7, 2006. The listing was based on limited and decreasing spawning habitat and negative population trends (71 FR 17757). Green sturgeon are not frequently observed in the project area, though the extent to which they use Puget Sound is unknown (NMFS 2008a). A few adults and subadults have been incidentally captured in fisheries harvests, and two Southern DPS green sturgeon were observed south of Whidbey Island in 2006 (Adams et al. 2002; NMFS 2008a), not far from the project area.

NMFS has designated critical habitat for Southern DPS green sturgeon but that designation does not include Puget Sound or any portion of the project area.

Pacific Eulachon

The southern DPS of Pacific eulachon was listed as threatened under the ESA in 2010 due to historically low numbers (75 FR 13012). Eulachon spend 3 to 5 years in saltwater before returning to freshwater to spawn from late winter through early summer. Spawning grounds are typically in the lower reaches of larger rivers fed by snowmelt (Hay and McCarter 2000). Juveniles rear in nearshore marine areas at moderate or shallow depths (Barraclough 1964) and migrate out to deeper water (up to 2,050 feet) as they mature (Allen and Smith 1988).

Eulachon are not common in Puget Sound and there is little information about them within the project area. The Puyallup River is the only Puget Sound system in which eulachon are known to spawn; spawning regularity in that river is classified as rare (Gustafson et al. 2008). The species was not observed during dive surveys, and is unlikely to occur in the project area.

NMFS has proposed critical habitat for the southern DPS of Pacific eulachon but that proposal does not include Puget Sound.

Canary Rockfish

Canary rockfish were listed as threatened under the ESA on April 27, 2010 (75 FR 22276). The species is found from the western Gulf of Alaska to northern Baja California and is most common in outer coastal waters between British Columbia and California (NMFS 2008b).

Canary rockfish were once considered fairly common in Puget Sound and were found most often in south Puget Sound (NMFS 2009). NMFS estimates that there are approximately 300 individual canary rockfish in Puget Sound proper (south of Admiralty Inlet), while northern Puget Sound (north of Admiralty Inlet) has slightly higher numbers (NMFS 2009). Surveys between 1996 and 2009 suggest that canary rockfish are most consistently observed in northern waters of Puget Sound, Strait of Juan de Fuca, and the outer coast. Catch surveys have reported declines since 1965 (NMFS 2008b). Canary rockfish have historically been observed in Possession Sound in the project area (Miller and Borton 1980) and have been caught by recreational anglers in the Whidbey Basin (Dan Tonnes, pers. comm., 2011).

Critical habitat has not been proposed for canary rockfish.

Yelloweye Rockfish

Yelloweye rockfish were listed as threatened under the ESA on April 27, 2010 (75 FR 22276). This species is rare in Puget Sound south of Admiralty Inlet (NMFS 2008b; Love et al. 2002), and little is known about their presence in the project area. According to surveys, the farther south in Puget Sound the lower the potential for yelloweye rockfish presence or use (REEF 2009). This is likely due to fewer areas of rocky habitat in southern Puget Sound (Miller and Borton 1980). Yelloweye rockfish have historically been observed in Possession Sound (Miller and Borton 1980) and have been caught by fishermen in the Whidbey Basin (Dan Tonnes, pers. comm., 2011).

Critical habitat has not been proposed for yelloweye rockfish.

Bocaccio

Bocaccio are large piscivorous rockfish in eastern Pacific coastal waters ranging from Alaska to Baja California (NMFS 2008b; COSEWIC 2002). They were listed as endangered on April 27, 2010 (75 FR 22276). Most commonly, bocaccio are found from Oregon to California and were once common on steep walls of Puget Sound (Love et al. 2002).

In the Puget Sound region, adult bocaccio seem to be limited to areas around Tacoma Narrows and Point Defiance (NMFS 2009). There is little information about their use of the project area. The project area has appropriate depths, steepness, and substrate complexity for adults (Dan Tonnes, pers. comm., 2011); historically, bocaccio have been documented in the project vicinity (Miller and Borton 1980).

Critical habitat has not been proposed for bocaccio.

Southern Resident Killer Whales

NMFS listed the Southern Resident DPS as endangered under the ESA in November 2005 (70 FR 69903). This group of killer whales preys on fish of many species, but predominantly feeds on salmon (Wiles 2004). Transient killer whales, which are not listed or proposed for listing under the ESA, occasionally enter Puget Sound and prey primarily on marine mammals, mostly harbor seals (Wiles 2004). Distribution of resident whales while in the inland waters of Washington and British Columbia correlates strongly with areas of greater salmon abundance. No killer whales were observed during project site investigations, but members of the Southern Resident DPS have been observed in the vicinity of the Mukilteo ferry terminal, primarily between October and April (Osborne 2008; The Whale Museum 2011).

Critical Habitat

On November 29, 2006, NMFS designated critical habitat in Washington for Southern Resident killer whales (71 FR 69054). The designation covers approximately 2,560 square miles (6,630 square kilometers) of the inland waterways of Washington State more than 20 feet deep relative to extreme high water, and encompasses all of Possession Sound.

Humpback Whales

Humpback whales were listed as endangered in 1973 (NMFS 1991). Humpback whales are common off the Washington coast but rarely observed in the inland waters of Puget Sound (Norberg, pers. comm., 2000). Historically, one to two individual humpback whales are sighted in Puget Sound in an average year. None were observed during site investigations for the proposed project but they are occasionally seen in the project area; one humpback whale was photographed off the southern tip of Whidbey Island in April 2011 (The Whale Museum 2011; Orca Network 2011).

Steller Sea Lions

Sightings of Steller sea lions in Puget Sound number 50 or fewer per year (Jeffries, pers. comm., 2005). They are most abundant from late fall to early spring (NOAA and EPA 1980). Steller sea lions are often observed with California sea lions and use their haul-outs. No haul-outs are located on the project site or in the vicinity of the proposed project. Steller sea lions have been documented in the project area (The Whale Museum 2011) but none were observed during project site investigations.

Coho Salmon

NMFS classified Puget Sound/Strait of Georgia ESU coho salmon as a species of concern in April 2004. The ESU encompasses all of Puget Sound and associated drainages. Coho salmon typically spend 1 to 2 years rearing in streams and rivers before beginning their migration to sea. Because of their larger size when entering saltwater, coho are generally considered less dependent on estuarine rearing than Chinook salmon. Coho salmon travel through estuaries more rapidly, using deeper waters along shorelines (Simenstad et al. 1982).

Coho smolts tend to move through the marine nearshore later in the spring than do other salmon, and are not observed in high numbers. In 1986 and 1987 beach seine surveys near Mukilteo, juvenile coho salmon began to show in late April and early May, peaking by mid-May. Numbers dropped to near zero after the first week of June (Beauchamp 1986; Northwest Enviro-Metric Sciences 1987). Coho have been documented to use the lower reach of Japanese Creek east of the Tank Farm Pier (McDowell, pers. comm., 2011; WDFW 2011).

3.5.2 State-Listed Species

The State of Washington maintains a species of concern list for any species native to Washington State that is threatened with extinction (endangered), likely to become endangered within the foreseeable future (threatened), vulnerable or declining in numbers (sensitive), or species under review for possible listing in any of those categories (candidate). WDFW also lists State Monitor species that are monitored for status and distribution, and managed as needed to prevent them from becoming endangered, threatened, or sensitive (WDFW 2011). Twenty-five state-listed species have been documented or could occur in the project vicinity, several of which are also federally listed (Table 5).

3.5.3 Other Marine Mammal Species

California sea lions are a common species in Puget Sound and several have been observed during site visits to the project area. They often haul out on buoys in Everett Harbor (Jeffries, pers. comm. 2005). Elephant seals are less common, but frequent visitors to Puget Sound, and have been observed in the project area (The

Whale Museum 2011). Minke whales are also fairly common in Puget Sound and have been documented in the project area (The Whale Museum 2011).

3.6 Essential Fish Habitat

Public Law 104-267, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act (MSA) to establish new requirements for essential fish habitat (EFH) descriptions in federal fishery management plans and to require federal agencies to consult with NMFS on activities that may adversely affect EFH. EFH has been defined for the purposes of the MSA as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (U.S. Dept of Commerce 2007). The Pacific Fishery Management Council (PFMC) has designated EFH for Pacific salmon, Pacific coast groundfish, and coastal pelagic species. EFH for all three groups is found in the project area.

The Pacific salmon fishery EFH includes all streams, lakes, ponds, wetlands, and other waterbodies currently or historically accessible to salmon in Washington, except above the impassable barriers identified by PFMC. In the estuarine and marine areas, salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (EEZ), 200 miles (370 kilometers) offshore of Washington. EFH for Pacific coast groundfish and coastal pelagic species includes all waters from the mean high water line along the coasts of Washington, upstream to the extent of saltwater intrusion, and seaward to the boundary of the United States EEZ at 200 miles (370 kilometers).

The BA for the project will provide a detailed discussion of EFH species that could occur in the project area and effects of the proposed project on EFH.

3.7 Commercial, Recreational, and Tribal Fisheries

The proposed project is entirely within WDFW Fishery Management Area 8-2, which supports a number of tribal, commercial, and recreational fisheries. Tribal members have historically harvested marine organisms from the project vicinity and many continue to do so today. Tribal harvest focuses on salmon (primarily coho and chum, with lesser catches of pink [*Oncorhynchus gorbuscha*] and Chinook salmon) and Dungeness crab. The primary mode of salmon harvest in this area is via anchored or drifting gill nets (Port of Everett 2004). Tribal fishers move into the area in the lee of Elliot Point during periods when strong southerly winds make fishing in more exposed areas difficult. They often tie their nets off to the outer edge of the Tank Farm Pier or begin a drift east of the end of the Tank Farm Pier and allow the current to carry the net east. Pink and coho salmon sport catches were higher than the Chinook sport catch between 2003 and 2004, with the majority of fish caught in August and September (WDFW 2010).

Non-tribal commercial gill netting for salmon is limited in the Fishery Management Area. Like the tribal fishery, sport troll fishing does not focus on the shoreline, except when casting from the shore for cutthroat trout (*Oncorhynchus clarki*) or char species (Port of Everett 2004). WDFW fishing records indicate salmonids (Chinook, coho, chum, pink, and sockeye [*Oncorhynchus nerka*]) are the most frequently caught fish in the project area. Other species include flatfish (Family Pleuronectidae), lingcod (*Ophidon elongates*), cabezon (*Scopaenichthys* spp.), greenling (*Hexagrammos decagrammus*), shiner (*Cymatogaster aggregata*), and various rockfish (Family Scorpaenidae).

Tribal, commercial, and recreational crab fishing is accomplished mostly with pot gear. A common recreational crabbing practice is to set out pots and then fish for salmon or bottom fish in the vicinity while pots are fishing. Another method of recreational crabbing during summer low tides is to wade in and place pots near the eelgrass east of the Tank Farm Pier during extreme low tides (Port of Everett 2004).

The most consistent marine harvest activities in the vicinity of the project area are littleneck clams (*Protothaca staminea*), butter clams (*Saxidomus gigantean*), and horse clams (*Tresus* spp.). These are concentrated west of the Port of Everett rail/barge transfer facility in gravelly sands (Port of Everett 2004). While the edible clam populations in that area are not high, the ghost shrimp (*Callianassa californiensis*) are harvested year round from the clean sandy areas in the immediate vicinity of the Port of Everett rail/barge transfer facility for use as bait. An extensive geoduck survey conducted in 2005 found that the geoduck densities in the commercial harvest area were extremely low (Anchor 2005c).

4 ENVIRONMENTAL EFFECTS AND MITIGATION

4.1 Long-Term Environmental Impacts

Each of the project alternatives could result in long-term environmental impacts. Impacts could be caused by changes in the amount and location of overwater cover, effects to benthic habitat, increased pollutant loads in stormwater runoff, and erosion of potentially contaminated sediments underneath the Tank Farm pier. The project could also have beneficial effects by removing creosote-treated structures, remediating contaminated sediments, decreasing overwater cover, or restoring a portion of Japanese Creek to an open channel. The type and extent of impacts varies according to the different alternatives.

4.1.1 All Alternatives

Some impacts are common to all alternatives, such as changes in overwater cover, impacts to benthic habitat, and effects from propeller scour. All alternatives will result in removal of creosote-treated timber piles and decking from demolition of the existing terminal, or its replacement with the No-Build Alternative.

Ferry and Vehicle Traffic

WSDOT plans to replace the current 124-vehicle vessels operating on this route with 144-vehicle vessels. Increased traffic in the vicinity of the ferry terminal could cause additional disturbance to terrestrial wildlife that would result in reduced use of the project area and the surrounding vicinity by wildlife for nesting, foraging, or loafing. However, because the area is already heavily developed with high levels of disturbance, and species present are habituated to human use of the site, any effects would likely be minor.

No freshwater wetlands would be affected by any of the alternatives for this project.

Effects of Overwater Structures on Fish and Aquatic Resources

Each of the proposed alternatives would result in a change in overwater cover due to replacement or construction of wingwalls, towers, dolphins, transfer spans, and passenger and maintenance facilities. In all scenarios the existing trestle and transfer span would be demolished, removing approximately 10,218 square feet (SF) of overwater cover.

Under the No-Build Alternative, the existing piers, trestle, and transfer span would be replaced. Construction of the replacement structures would create approximately 13,159 SF of overwater cover, for a net gain of 2,941 SF (Table 6).

Table 6. Overwater Cover Estimates for Each Alternative

Alternative	Removal of Existing Overwater Cover (SF)	Creation of Overwater Cover (SF)	Net Change (SF)
No-Build	10,218	13,159	2,941
Preferred Alternative (Elliot Point 2)	150,238	21,106	-129,132
Existing Site Improvements	12,140	24,154	12,014
Elliot Point 1	150,238	33,925	-116,313

The Preferred Alternative would add 21,106 SF and Elliot Point 1 Alternative would add 33,925 SF of overwater cover. Both would result in a large reduction of overwater cover due to the removal of 138,080 SF of the Tank Farm Pier.

The Existing Site Improvements Alternative would add approximately 24,154 SF of new cover, for a net gain of 12,014 SF. This alternative may also include replacing the Port of Everett's public fishing pier and seasonal day moorage with a new freestanding pier, which would add another 1,000 SF of overwater cover. However, a final site for replacing the pier has not been determined.

Reduced Light Availability for Macroalgae

Surveys revealed that the project area does not have extensive macroalgae or eelgrass beds in the vicinity of the No-Build and Existing Site Improvements alternatives; more macroalgae are found near the Tank Farm Pier in the vicinity of the Preferred and Elliot Point 1 alternatives (Anchor 2005a; Figures 2 and 3). Throughout the project area, in depths less than -30 feet MLLW (where most aquatic vegetation would be found), macroalgae coverage ranges from sparse (less than 25 percent) to moderate (25 to 75 percent coverage). Direct overwater cover may reduce the amount of ambient light, which could reduce the amount of photosynthetically active radiation (PAR) available to macroalgae. A reduction in PAR could result in a die back and/or mortality of macroalgae and fish species associated with aquatic vegetation such as lingcod and greenling.

Loss of Eelgrass

Eelgrass is not present throughout most of the project area. Only one small patch was found on the east side of the Existing Site Improvements Alternative footprint during dive surveys in 2011. The patch is likely transient and will not persist in the coming years, given that it was not observed during previous dive surveys. If eelgrass does become established within the project footprint prior to construction, any loss of eelgrass would affect species associated with that habitat, such as salmonids.

Epibenthos

Epibenthos refers to organisms that live on or just below the surface of the seabed. Epibenthos are most abundant between about +4 feet MLLW and -4 feet MLLW; however, they generally occur between about +10 feet MLLW and -10 feet MLLW.

Haas et al. (2002) studied the epibenthic assemblages at three ferry terminals and found that significant differences in epibenthic assemblages do exist around ferry terminals. Those differences are a result of vessel disturbance, reduced vegetation due to shading, and physical and biological habitat alterations. The magnitude of under-terminal shading effects was greatest at the two ferry terminals with wider decks (114 and 157 feet wide, respectively). At those terminals, no vegetation was found under or within 16.5 feet of the overwater structures, likely due to shading impacts as well as propeller wash. Conversely, the narrowest dock studied (51 feet wide) did have benthic vegetation extending underneath the terminal decking by 16.5 feet on both sides. Because of shading, epibenthic organisms most closely affiliated with macroalgae demonstrated the greatest effects from overwater structures, even when other organisms were less affected.

The substrate conditions at the project site are heavily altered and generally do not consist of substrates that support epibenthic production because bulkhead and riprap currently occur over the majority of elevations that support epibenthic production (at +10 feet MLLW or higher to about +2 feet MLLW). However, epibenthos and macroalgae have been observed in the project area and would be affected by any of the alternatives. Epibenthos that occur in the immediate footprint of the new trestles would likely be affected, and epibenthic production within about 20 feet of the terminal for any of the alternatives could be affected.

The No-Build Alternative would have the least impact on epibenthos because the project would replace existing structures in the same location. This alternative may result in a slight increase in overwater cover, which could reduce aquatic vegetation and the epibenthic organisms associated with that vegetation. Existing levels of disturbance from ferry propeller wash would remain the same.

The Existing Site Improvements Alternative would create a new dock immediately adjacent to the existing facility, thereby shading and disturbing epibenthos in the immediate vicinity. Removal of the existing terminal would help offset impacts on epibenthic assemblages in the vicinity, but this alternative would increase total overwater coverage by approximately 12,104 SF (Table 6).

Elliot Point 1 would have the largest impact on epibenthos due to the size of overwater structures associated with the new terminal (33,925 SF). Shading and disturbance from ferry propeller wash would decrease epibenthic communities in the immediate vicinity of the terminal. The Preferred Alternative would have similar impacts, but on a smaller scale, because the overwater coverage would be less than half that of Elliot Point 1 (Table 6). Removal of the Tank Farm Pier would help minimize impacts on epibenthic communities for the two Elliot Point alternatives; however, the pier is in deeper water that likely does not support as much epibenthic production.

Effects on Salmonids

Behavioral Effects

Juvenile salmonids depend on nearshore habitats for food and refuge. The movement of migrating juvenile salmonids may be affected by dark-edge and light-edge overwater structures, such as docks and piers (Southard et al. 2006). Overwater structures, such as ferry terminals, bridges, and temporary work trestles, may affect juvenile salmon, especially Chinook and chum (*O. keta*), directly, by disrupting migratory behavior along the shallow-water nearshore zone. The response of fish to overwater structures is complex; individuals of some species readily pass under overwater structures, some pause and go around, schools may disband upon encountering overwater structures, and some schools pause and eventually go under such structures en masse (Nightingale and Simenstad 2001a).

Observations discussed by Southard et al. (2006) demonstrate that the shading caused by ferry terminals and other characteristics of overwater structures can deter or delay juvenile salmonid movement. This effect may be decreased at low tides when ambient light can better filter beneath the terminal structure. Delays in migration could lead to increased energy expenditure.

The width of the overwater structures associated with the No-Build, Existing Site Improvements, and Elliot Point alternatives are all similar. The Elliot Point 1 Alternative would have the largest overwater footprint, and could have a greater impact on juvenile salmonid migration.

Potential for Increased Predation

Researchers have hypothesized that overwater cover could increase predation on juvenile salmonids by:

- Providing predator habitat near refugia,
- Reducing aquatic vegetation that provides refugia, or
- Diverting juveniles into deeper water, where they become more susceptible to predation (Nightingale and Simenstad 2001a).

However, there is little evidence that a significant increase in predation is associated with docks or other overwater cover (Simenstad et al. 1999; Nightingale and Simenstad 2001a). As summarized in Nightingale and Simenstad (2001a), a study for the Port of Tacoma indicated that the most abundant fish underneath docks were sea perch (Embiotocidae) and pile perch (*Rhacochilus vacca*), neither of which prey on juvenile salmonids (Ratte and Salo 1985); an analysis of predator stomach contents showed no juvenile salmonids. No fish were observed preying on juvenile salmon at Pier 91 in Seattle (Weitkamp 1982). A study of predator stomach contents in Hood Canal revealed that less than 4 percent of predators contained juvenile salmon remains (Salo et al. 1980). Moreover, no evidence of predation was found at marina floats in Birch Bay in Whatcom County (Pentila and Aquero 1978 as cited in Nightingale and Simenstad 2001a).

Battelle Marine Sciences Laboratory conducted bird/mammal surveys at six north-central Puget Sound ferry terminals and paired reference sites between April 1 and May 10, 2002 (Williams et al. 2003) to investigate whether or not overwater structures increase predation on juvenile salmon. In addition, intensive surveys for potential predators of juvenile salmonids were conducted at the Mukilteo ferry terminal and reference sites. The studies included SCUBA transects (benthic predatory fishes), snorkel transects (pelagic fishes), predatory bird and marine mammal surveys, salmon fry abundance surveys, documentation of nearshore fish assemblages during all diel phases using boat-deployed beach seines, collection of live potential fish predators and stomach content analysis, documentation of light measurements, and the use of sonar to document potential predators associated with the water column and terminals at night.

The Battelle study concluded that potential salmon predators were slightly more abundant at WSF terminals as compared with unmodified shorelines, although large aggregations were not observed on any occasion. However, the spatial distribution patterns of both bird and fish predators rarely overlapped with juvenile salmon oriented in surface waters close to shore. No evidence was found that avian, marine mammal, or fish predators consumed more juvenile salmon near WSF terminals than along shorelines without overwater structures. Also, juvenile salmon were not a major dietary component of predatory fish species during the study. (Only two juvenile salmon were observed in the diet of a single staghorn sculpin collected at the reference site; these salmon were undigested and likely consumed in the bag of the beach seine.) The study suggests that juvenile salmon do not experience significant levels of predation near the Mukilteo ferry terminal. Although the proposed alternatives may reduce primary productivity under the new terminals, or interfere with juvenile salmonid migration as discussed above, none of the proposed alternatives is likely to increase predation rates on juvenile salmon.

Effects of Habitat Displacement by New Piles and Dolphin Anchor System

The anchoring system for the floating dolphins would be one of two types of anchors: direct embedment plate anchors or drag embedment anchors. A combination of the anchor types may also be used with direct embedment anchors in shallower water and drag embedment anchors in deeper water. New piles and dolphin anchor chain movement would permanently displace benthic habitats and eliminate benthic plants and animals at those locations, including macroalgae, clams, worms, anemones, urchins, and flatfish. Removal of piles associated with the existing ferry terminal and the Tank Farm Pier would offset benthic habitat losses from new piles associated with the Build alternatives. With the removal of these existing piles, benthic communities and vertical pile communities similar to those eliminated by new piles likely would develop at those locations. The new piles would become new habitat for a variety of benthic species.

Once the anchors are set and the dolphins are placed in the water, the chains would be brought to the floating dolphin with a lead line. A portion of each chain would rest on the seabed and would move as the tide level changes and the ferries dock. The anchor chain and sinker movements would cause an ongoing disturbance to benthic organisms.

Effects from Propeller Scour

Ferry propellers create currents that can disturb bottom sediments, resulting in the creation of scour holes that displace benthic organisms and reduce available habitat. Propeller wash modeling was conducted for each of the four alternatives. Under the No-Build Alternative, a scour hole approximately 2.9 feet deep would form at a depth of 20 to 25 feet below MLLW. The Existing Site Improvements Alternative would result in a scour hole of about 4.5 feet at a depth of 15 to 20 feet below MLLW. Elliot Point 1 Alternative would also create a scour hole of about 4.5 feet, but at a shallower depth (15 to 20 feet below MLLW). The Preferred Alternative would have the smallest scour hole (1.4 feet), at a depth of approximately 20-25 feet below MLLW. Bottom scour could be minimized by placing coarser sediment on the bottom that would resist movement.

Beneficial Effects

Sediment and Water Quality Improvement from the Removal of Creosote-Treated Structures

Creosote is a mixture of compounds, primarily polyaromatic hydrocarbons (PAHs) used to protect wood from degradation by aquatic organisms in aquatic environments (EPA 2008; NOAA Fisheries 2009). Creosote is harmful to fish, shellfish, and other marine organisms, particularly those species that use the creosote piles for spawning habitat or that eat the eggs of the species that have laid spawn on the timber (Stratus Consulting Inc. 2006). PAHs are released from creosote-treated wood and can cause cancer, reproductive and immune system problems, and impair growth and development in fish exposed to even low concentrations (NOAA

Fisheries 2009). PAHs that leach from creosote-treated wood can accumulate in sediments, resulting in chronic and dietary exposure of marine organisms, primarily benthic species (NOAA Fisheries 2009; Stratus Consulting Inc. 2006). Detectable leaching can occur for years and perhaps much longer (Stratus Consulting Inc. 2006). A study conducted in British Columbia found elevated PAH concentrations within 24.6 feet of creosote-treated piles within the first year after installation. After 10 years, that distance declined to 8.2 feet. Both in-water structures, such as timber piles, and overwater structures such as docks, can be a source of creosote in aquatic environments (NOAA Fisheries 2009).

All of the Build alternatives would replace or remove the existing terminal, eliminating about 248 creosote-treated piles that support the timber trestle and transfer span. This action has the potential for these structures to leach PAHs into the water column and nearby sediments.

4.1.2 All Build Alternatives

Stormwater Treatment

All three Build alternatives would provide enhanced stormwater treatment to treat pollutants in stormwater runoff from parking lots and bus terminals created by the project. Stormwater treatment would minimize pollutant loads to receiving water bodies; however, the creation of additional pollution-generating impervious surface would increase pollutant loads discharged to Possession Sound.

Impacts on Marine Nearshore Habitat

Some Marine Nearshore habitat would also be lost under all of the Build alternatives, due to the new ferry slip configurations. Wildlife use of this habitat by species such as Barrow's goldeneye, horned grebe, surf scoter, American coot, double-crested cormorant, pigeon guillemot, mew gull, ring-billed gull, common loon, and glaucous-winged gull could shift to adjacent Marine Nearshore habitats to the east and west. Impacts on Marine Nearshore habitat would be offset to some extent by the removal of the existing ferry terminal.

4.1.3 Elliot Point Alternatives

Impacts on Terrestrial Habitat

Under the Elliot Point alternatives, a portion of the Mukilteo Tank Farm would be developed. The sparse herbaceous and scrub vegetation that is present would likely be replaced by areas of landscaping. Thus, the area would remain as Urban and Mixed Environs habitat, but the level of human activity on the site would increase. Avian use of this habitat for nesting and feeding would be reduced; however, species such as house finch, house sparrow, European starling, glaucous-winged gull, and rock dove would continue to use the site. Other species such as song sparrow, Bewick's wren, and crow would nest and forage elsewhere; their populations in the project vicinity would be somewhat reduced but not eliminated. Similarly, mammals adapted to urban environments such as squirrels, mice, rats, raccoons, and opossums would continue to use the site, but in smaller numbers.

This alternative would result in the loss of Urban and Mixed Environs habitat due to the removal of the Tank Farm Pier. Bird use of this habitat for nesting, foraging, and perching would be reduced; however, species such as Barrow's goldeneye, horned grebe, surf scoter, American coot, Canada goose, and double-crested cormorant would continue to use the site for foraging. Other species such as bald eagle, great blue heron, and belted kingfisher would nest and forage elsewhere; their populations in the project vicinity would be somewhat reduced but not eliminated. The Tank Farm Pier likely supports habitat for rats, mice, and raccoons; this habitat would be eliminated by removal of the pier.

Effects on Crab and Crab Habitat

Dungeness crab abundance is relatively high east of the Tank Farm Pier in the area where the Elliot Point alternatives would be located. Dungeness crabs feed on bivalves and marine worms and are likely attracted to the mussels and other organisms that grow on and around the pier. Pier removal would eliminate that habitat, as well as change seabed elevations and sediment composition. Crabs would likely recolonize areas around the new ferry terminal, but the new terminal would be much smaller (33,925 SF under the Elliot Point 1 Alternative and 21,106 SF under the Preferred Alternative, compared with 138,080 SF for the Tank Farm Pier).

Crabs occurring in the immediate project area could be affected during construction activities, particularly dredging of the channel where the Tank Farm Pier is currently located. Dungeness crabs are susceptible to entrainment (uptake of aquatic organisms by the suction field generated by hydraulic machinery) by dredges; the degree of entrainment depends on the type of dredge used (Nightingale and Simenstad 2001b). Crabs could also be disturbed, injured, or killed during pile removal if they are unable to leave the area during construction. Additional timing restrictions would be considered to minimize impacts to Dungeness crab.

Erosion of the Sediment Mound Underneath the Tank Farm Pier

Dissipation of wave energy by the Tank Farm Pier has trapped sediments moving along the shoreline, resulting in a mound of sediment underneath the pier several feet higher than the surrounding seabed. Most of the mound is below the level at which sediments could become part of the littoral system; however, if the pier is removed the increase in wave energy could increase the potential distance for longshore sediment transport by as much as 1,800 feet over current conditions

(Coast & Harbor 2013). Erosion of the sediment mound has the potential to smother aquatic plants and animals as well as spread contaminated sediments.

The maximum volume of sediment that would be eroded from the mound is about 1,050 cubic yards. The erosion rate would be relatively slow, and would only occur during larger (5- to 10-year return period) storms. Even if the maximum volume of material were mobilized during a single storm event, it would form a layer about 0.08 inches thick, which would not affect aquatic plants or macroinvertebrates in the project vicinity.

Sediment sampling underneath the Tank Farm Pier revealed low levels of organochlorine pesticides and petroleum hydrocarbons at various layers. Most samples were near or below the Dredged Material Management Program (DMMP) screening level criteria (SCL) for open-water disposal, but some samples did exceed the DMMP SCL. Transport of sediments could spread contaminated material detrimental to aquatic organisms; however, the amount of material that would be transported is fairly small, and levels of contamination are low within the upper layer of sediment that would be mobilized.

Beneficial Effects

Sediment and Water Quality Improvement

Both of the Elliot Point alternatives would demolish the Tank Farm Pier, which contains approximately 3,900 creosote-treated timber piles. Removal of those piles would eliminate the potential for creosote to leach into the water column and sediments in the immediate vicinity of the pier, potentially improving water and sediment quality.

Sediment sampling underneath the Tank Farm Pier in March and April 2012 revealed low levels of organochlorine pesticides and petroleum hydrocarbons at various layers, and some samples were above DMMP screening levels. Additional testing will take place prior to construction to determine whether sediments within the project footprint meet the DMMP criteria. Dredged sediments that do not meet the criteria would be disposed of at appropriate upland locations; in any case, dredging would remove some sources of contamination in the aquatic environment.

Removal of Overwater Structures

Demolition of the Tank Farm Pier would remove approximately 138,080 square feet of overwater cover. Pier removal would increase lighting, allowing for the potential for increased macroalgae and eelgrass growth, increased macroinvertebrate production, and improved habitat for salmonids and other fish.

Daylighting of Japanese Creek

Under the Elliot Point 1 Alternative, a portion of Japanese Creek between Mukilteo Boulevard and Possession Sound would be restored to an open stream with a 50-foot vegetated buffer on each side. The vegetated buffer would provide nesting and foraging habitat for wildlife such as cottontail rabbit, raccoon, eastern gray squirrel, house mouse, song sparrow, chestnut-backed chickadee, black-capped chickadee, European starling, common crow, Bewick's wren, Hutton's vireo, and Wilson's warbler. An open stream channel would also improve habitat for coho and Chinook salmon and other fish species that use the creek.

4.2 Construction Impacts

4.2.1 All Alternatives

Construction impacts common to all alternatives include disturbance from construction activities, temporary impacts from grading and staging, impaired water quality, and effects on aquatic species from underwater noise. Underwater noise will be generated primarily by the installation of in-water piles, which will be required for each alternative. Piles may be installed by drilled shafts, vibratory hammer, or impact pile driving.

Disturbance, Grading, and Staging

Under all alternatives, including No-Build, construction would occur in both the Urban and Mixed Environs habitat and the Marine Nearshore habitat. The number of wildlife species that currently use the Urban and Mixed Environs habitat would be reduced during construction as a result of increased traffic, human activity, and noise. Species such as house finch, house sparrow, European starling, gull species, and rock dove would continue to use the site but in reduced numbers. Other species such as song sparrow, Bewick's wren, and Canada goose would nest and forage elsewhere; their populations in the project vicinity would be reduced but not eliminated. However, because this area is already developed with residential and commercial uses, effects on wildlife using the Urban and Mixed Environs habitat would be minimal.

Temporary impacts on non-aquatic vegetation may result from grading, staging, and other project-related activities. No effects on sensitive non-aquatic plant species are expected because none are known to occur within the project area.

Effects on Water Quality

Construction activities such as pile driving and removal, construction of stone columns, dredging, and placement of anchoring systems could result in temporary effects on fish and aquatic resources from decreased water quality. The extent and duration of in-water work of each alternative and the specific construction methods and materials would affect the magnitude of the temporary effects.

Impacts on aquatic resources due to elevated turbidity include:

- Mortality, gill tissue damage, and physiological stress on fish, including juvenile salmonids
- Burial, abrasion of body parts, and clogging of filtration systems of crustaceans and other marine invertebrates
- Reduced light levels affecting behavior and feeding of aquatic animal species
- Indirect effects due to reduced photosynthesis by burial of aquatic plants or reduced light levels

Under each alternative, steel and creosote-treated timber piles would be removed from demolition of the existing terminal. Temporary turbidity is the principal impact associated with pile removal. Factors affecting the amount of turbidity generated during pile removal include the type and number of piles removed, the removal technique used, and the characteristics of the bottom sediments. Pile installation also can generate turbidity. However, turbidity is less of an issue with pile installation because the impact is highly localized. Additionally, hollow steel or concrete piles confine much of the sediment during installation.

Piles may be removed with a vibratory hammer or clamshell bucket, pulled directly, or cut at the mudline. Turbidity associated with pile removal by clamshell bucket can be greater than using the vibratory hammer method. The bucket may pick up bottom sediments along with the pile or miss the underwater pile and pick up only bottom sediments. Sediments may cling to timber piles during pile removal and would need to be contained. Turbidity associated with cutting piles below the mudline would be low because excavation around the pile would likely involve using a suction dredge rather than jetting with high pressure water.

Turbidity measurements during pile removal and installation using a vibratory hammer at the WSF Friday Harbor ferry terminal did not exceed water quality standards (Anchor 2006). Other research supports this finding. Roni and Weitkamp (1996) measured water quality parameters, including turbidity, during a pier replacement in Manchester, Washington. Their study measured water quality before, during, and after pile removal; dredging; and pile replacement. They found that turbidity at all depths nearest the construction activities was typically less than 1 NTU, higher than stations farther from the construction activities. Washington State turbidity standards require that the turbidity does not exceed 5 NTUs over background.

Sediments at the existing Mukilteo ferry terminal are principally sand and gravel. When disturbed, such sediments tend to remain suspended in the water column for only a short time and distance from the construction activity. Based on the physical attributes of the sediments, and the turbidity measurements taken at Friday Harbor and Manchester discussed above, WSF expects that increases in turbidity resulting from pile removal and installation would be localized and temporary, and would not exceed water quality standards. Turbidity would be monitored to ensure water quality standards are met. Sediments near the Tank Farm Pier are finer, and could remain suspended longer if removal of the pier and dredging of the ferry channel occur under either of the Elliot Point alternatives.

Other potential water quality effects during construction include oil or concrete spills. Largely, implementation of best management practices (BMPs) discussed in *Section 4.5.2* can effectively avoid and minimize these impacts.

Effects of Underwater Noise

New in-water piles will be required for all the alternatives. Piles may be installed using drilled shafts, vibratory hammers, or impact pile driving. Pile driving produces intense sound pressure waves in the water column that can adversely affect fish, marine mammals, and other aquatic species. Installing piles creates two types of sound: impulsive noise from the percussive driving of the piles and continuous noise from support vessels and other machinery. The level of sound produced during pile driving depends on several variables including the type of hammer used and the type and size of piles being used. The distance that the sound travels under water and in air also depends on several variables.

One common type of pile driving is impact hammer pile installation, employed mainly for large piles. This method uses a detonation in a cylinder to lift the heavy hammer, which then drops several feet onto the pile, driving it into the ground. It is mainly the noise caused by the impact of the hammer on the pile that is of concern regarding aquatic species. A second type of pile driving is vibratory hammer pile installation. The use of a vibratory hammer is possible in places where sediments are comparatively soft. Vibratory hammers are quieter than most other types of hammers, produce sound at different frequencies with lower impulse energy, and are less harmful to fish and wildlife.

The project may use hollow steel or concrete piles to construct the new terminal. Hollow steel piles can be installed using a vibratory hammer; however, they often need to be “proofed” using an impact hammer to bring them to the prescribed load-bearing level. Concrete piles require the use of an impact hammer for installation.

High levels of underwater sound can injure and kill fish, and cause alterations in behavior (Turnpenny et al. 1994; Turnpenny and Nedwell 1994; Popper 2003; Hastings and Popper 2005; Popper and Schilt 2007; Popper and Hastings 2009). Fish with swim bladders, such as salmonids, are more susceptible to barotraumas (injuries such as hemorrhage and rupture of internal organs caused by pressure waves) from impulsive sounds. Death from barotrauma can be instantaneous or delayed up to several days after exposure.

Elevated noise levels can also cause sublethal injuries, such as a reduced ability to detect predators and prey or damage to hearing (Turnpenny and Nedwell 1994; Hastings et al. 1996; Popper and Schilt 2007). Exposure to high noise levels can cause a temporary shift in hearing sensitivity for periods lasting from hours to days, which can reduce the survival, growth, and reproduction of fish by increasing the risk of predation and reducing foraging or spawning success.

Responses of fish to sound may affect behavior, resulting in fish avoiding foraging or spawning grounds (Engås et al. 1996). The effect of these avoidance responses may range from insignificant to permanent long-term effects if feeding or reproduction is impeded. Feist et al. (1992) found that impact pile driving of concrete piles affected juvenile pink and chum salmon distribution, school size, and schooling behavior.

For marine mammals, whales in particular, sound is one of the most critical sensory pathways of information. Whales communicate with each other over short and long distances with a variety of clicks, chips, squeaks, and whistles. They also use echolocation to find prey and navigate. Underwater noise may reduce the audibility of signals (Southall et al. 2007). Effects on marine mammals from underwater noise can also include impaired foraging efficiency, increased energetic expenditures, reduced hearing sensitivity, behavioral changes, and non-auditory physiological changes such as alterations in cardiac rates and respiratory patterns (Krahn et al. 2004; Southall et al. 2007). Changes in behavior can range from minor changes in orientation or breathing to interrupted feeding or avoidance of an area (Richardson et al. 1995; Moore and Clarke 2002). Very loud noises at close range may cause hearing damage, other physical damage, or even death of marine mammals (Richardson et al. 1995).

Underwater noise from pile driving may affect marine birds that commonly use the Possession Sound waters in the vicinity of the site (e.g., grebes, marbled murrelets, and scoters). Although limited data are available for diving birds, studies have found that diving birds are harmed by sound pressure levels in the range of those levels that harm fish and mammals (Fitch and Young 1948; Yelverton et al. 1973; Yelverton and Richmond 1981). Noise in the marine environment could also reduce marbled murrelet foraging efficiency (USFWS 2009).

Timing restrictions, the use of noise attenuation devices, monitoring for the presence of birds and marine mammals in the project area, and other measures could all help reduce impacts of pile-driving noise on aquatic species.

4.2.2 Impacts Common to Elliot Point Alternatives

Both Elliot Point alternatives would remove the Tank Farm Pier. Pier removal would likely mobilize sediments under the pier, which could be contaminated by PAHs leaching from creosote-treated wood in the pier. Pile removal would also generate turbidity, as would dredging an area underneath the pier to create a channel deep enough for the ferry.

Mobilization of Contaminated Sediments

Initial sampling of sediments underneath the Tank Farm Pier indicates low levels of organochlorine pesticide and petroleum hydrocarbon contamination. Dredging a navigation channel underneath the Tank Farm Pier has the potential to disturb contaminated sediments. Additional testing of sediments underneath the pier would occur prior to project construction. Any sediments to be dredged with concentrations of contamination greater than DMMP criteria would be disposed in an appropriate upland disposal facility.

Turbidity and Sedimentation

Removal of the Tank Farm Pier piles would generate turbidity as described above for demolition of the existing terminal. However, removal of the pier would generate higher levels of turbidity for a longer period of time than removal of the existing terminal, largely due to the number of piles involved; the existing terminal consists of several dozen piles, as opposed to the approximately 3,900 piles that comprise the Tank Farm Pier.

Removal of the Tank Farm Pier would mobilize approximately 1,050 cubic yards of sediments underneath the pier. The rate of transport will be slow, and likely not detectable for as long as 10 years due to the depth of the mound. Even if all available sediment were mobilized at once, it would form a layer only 0.08 inches thick across the sea floor in the project area. Sedimentation due to pier removal is therefore not likely to affect macroalgae or other aquatic life in the project vicinity.

Both Elliot Point alternatives also involve dredging a channel underneath the area currently occupied by the pier. Dredging would temporarily increase turbidity in the construction zone. Levels of turbidity depend on substrate types, currents, and the type of dredge used (Nightingale and Simenstad 2001a). Turbidity can directly harm marine organisms as well as cause indirect effects on primary production, as described previously. BMPs would be implemented during construction to minimize the extent of turbidity.

Stone columns would be used to construct either Elliot Point alternative to stabilize soils underneath the trestle. Stone columns are a ground improvement technique in which a vibratory probe feeds crushed gravel or quarry spall into potentially liquefiable soils. The stones create a column that densifies surrounding soils. Approximately 200 three-foot diameter columns will be installed in a grid pattern, with row spacing ranging from five to 10 feet. Columns will extend 60 feet below ground surface. Construction of the columns would generate turbidity within the project footprint for the duration of the activity.

4.3 Indirect and Secondary Effects

Indirect effects are those impacts that are caused by the action and occur later in time, but are reasonably certain to occur. Examples of indirect effects are changes to ecological systems resulting in altered predator/prey relationships or long-term habitat alteration, or any anticipated changes in human activities, including changes in land use.

The project would alter habitat through the creation of new overwater cover under the Build alternatives. Overwater cover can reduce light for aquatic vegetation, change the composition of epibenthic communities, and pose a migration barrier to salmonids migrating along the shoreline. Under the Elliot Point alternatives, the project would remove the creosote-treated boards and piles of the Tank Farm Pier, potentially improving water quality over the long term but eliminating habitat for species that use the pier, such as crabs and mussels. Stormwater quality treatment provided by any of the Build alternatives would improve the quality of stormwater discharged to receiving water bodies. These impacts are described in detail in *Section 4.1*.

There are no land use changes tied to the project by permit conditions; however, the design of other actions is dependent on the Mukilteo Multimodal Project. A portion of the Mukilteo Tank Farm may be redeveloped once the property is transferred from the U.S. Air Force to the Port of Everett; how the property is developed depends on the final alternative chosen for the project. As described in the Cumulative Effects section below, redevelopment of the Mukilteo Tank Farm would increase levels of traffic and disturbance, reducing wildlife use of the site. However, the wildlife species that use the site are species adapted to urban environments and would likely become habituated to additional disturbance.

The City of Mukilteo plans to relocate the boat launch from the Mukilteo Lighthouse Park to the Mukilteo Tank Farm. The project is unfunded and still in the conceptual phase (Love, pers. comm. 2011). Creation of a new boat launch would eliminate some Marine Nearshore habitat; however, removal of the existing boat launch would likely restore an equivalent area of Marine Nearshore habitat.

4.4 Cumulative Effects

The Council on Environmental Quality defines cumulative impacts as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7)." Cumulative effects measure the incremental impact of all effects of the project including past and present actions in the study area, and the effects of reasonably foreseeable, planned projects in the study area.

4.4.1 Historical Land Use Changes and Trends

The population of Puget Sound has increased from approximately 1.29 million people in 1950 to 4.22 million in 2005; by 2025 the population is expected to reach 5.36 million (Puget Sound Regional Council 2010). The population of Snohomish County has increased an average of 3 percent per year since 1960, from 172,199 to 711,100 inhabitants. The city of Mukilteo has even higher growth rates and has expanded from a population of 775 at its incorporation in 1947 to 20,150 today (City of Mukilteo 2011; OFM 2011). This trend is likely to continue for the foreseeable future: 2030 population projections for Snohomish County range from 790,930 to 1,109,202 (OFM 2011).

Population growth and resource use has contributed to environmental impacts in the region. Historically, the project area landscape was dominated by western lowland mixed conifer and hardwood forest. During European settlement of the region, farming and logging changed the landscape, reducing forest cover and replacing many native species with introduced species. In recent times continuing habitat conversion for urban and industrial development has led to further habitat fragmentation and filling of wetlands.

Aquatic habitat has also been reduced due to development since the area was settled by Europeans. Approximately one-third of the Puget Sound shoreline has been modified by seawalls, docks, and other structures (Berry 2000). Riprap, bulkheads, docks, and other structures line the entire shoreline in the project study area.

Water pollution is another threat to aquatic ecosystems; urban runoff contributes to nonpoint source pollution, degrading water quality and threatening aquatic species. Between 2002 and 2006, the number of marine species of concern in the Salish Sea ecosystem (extending from Canada to Puget Sound) increased from 60 to 64 (Brown and Gaydos 2007). Green sturgeon, Pacific eulachon, Southern Resident killer whales, and several species of salmonids and rockfish have been recently listed as threatened or endangered under the ESA.

4.4.2 Direct and Indirect Project Impacts

Effects of the alternatives are described in detail in *Section 4.1*. Construction of the No-Build and Existing Site Improvements alternatives could further degrade aquatic resources by increasing overwater cover in the project area. The Elliot Point alternatives would benefit aquatic resources through removal of the Tank Farm Pier and a net reduction of overwater cover.

Each of the alternatives would remove creosote-treated timbers of the existing terminal, potentially improving water quality. This potential is greatly increased under the Elliot Point alternatives, which would also remove the creosote-treated timbers of the Tank Farm Pier. Water quality could also be improved under any of the Build alternatives by implementing treatment of runoff from parking lots and bus terminals created by the project, which would minimize pollutant loads discharged to Possession Sound.

Terrestrial habitat would be further degraded under either of the Elliot Point alternatives, which would redevelop portions of the Mukilteo Tank Farm and remove some areas of shrubby vegetation that have become established on the property.

4.4.3 Other Current and Reasonably Foreseeable Actions

The following actions are planned or have been recently completed in the Mukilteo Multimodal Project area. While WSF is coordinating with the sponsors of these other projects, they involve separate actions that could be taken even if the Mukilteo Multimodal Project is not developed.

4.4.4 Mukilteo Tank Farm Transfer, U.S. Air Force

The U.S. Air Force is proposing to convey 18.85 acres of the Mukilteo Tank Farm (formerly known as the Defense Fuel Support Point Mukilteo) to the Port of Everett, as directed by federal law. The U.S. Air Force also proposes to transfer jurisdiction over the remaining 1.1 acres of the site to the U.S. Department of Commerce for continuing operation of the NOAA Fisheries Service Mukilteo Research Station. All of the Mukilteo Tank Farm's 19.95 acres of property would be either conveyed or transferred from the U.S. Air Force. The property to be conveyed includes the lands, structures, and other facilities, including the pier, buildings, structures, roadways, and other features. In July 2010, the U.S. Air Force released a Draft Environmental Assessment for the proposed transaction, and received public comments. The U.S. Air Force is currently preparing the Final Environmental Assessment and would then make an environmental determination prior to conveying the property.

The conveyance would transfer the property without other demolition or development actions, and any other party seeking to develop the property would be subject to environmental review and permitting requirements under applicable federal, state, and local regulations. This site had releases of hazardous materials that required remediation; therefore, the U.S. Air Force is proposing to provide a warranty to the transferee stating that all remedial actions have been taken that are necessary to protect human health and the environment regarding any contaminated materials remaining on the property. The Draft Environmental Assessment stated that any additional remedial action found to be necessary after the date of the transfer would be conducted by the United States.

Transfer of the Mukilteo Tank Farm is not likely to result in any impacts on ecosystems.

4.4.5 Mukilteo Tank Farm Master Plan, Port of Everett

The Port of Everett is currently preparing a Master Plan for the Mukilteo Tank Farm, working in collaboration with WSF, the City of Everett, the City of Mukilteo, NOAA, Sound Transit, and others. Concepts for a draft Master Plan have been developed for discussion; however, the timeline for implementation of the Master Plan has not been determined because it depends upon the completion of the U.S. Air Force's Environmental Assessment to transfer the Mukilteo Tank Farm to the Port of Everett. Under both Elliot Point alternatives, a portion of the Mukilteo Tank Farm would be used for the new terminal. The Master Plan is focusing on the portions of the Mukilteo Tank Farm that would not be occupied by WSF or NOAA Fisheries Service. These areas could be developed by the Port of Everett, or they could be developed by others who could lease the property from the Port. Increased development in the Mukilteo downtown area and waterfront is already considered as general background growth through 2040 for the study area. For instance, growth is already assumed in the forecasts used for traffic and related population and employment growth. Depending on which alternative is chosen for the Mukilteo Multimodal Project, portions of the Mukilteo Tank Farm could be redeveloped with commercial, residential, or open space.

The Tank Farm Pier would be removed by WSDOT under either the Preferred Alternative or Elliot Point 1 Alternative. Removal of the Tank Farm Pier is not part of the project for either the No-Build or the Existing Site Improvements Alternative. There are no specific plans for the removal of the pier if the Mukilteo Multimodal Project does not remove it.

If the Mukilteo Tank Farm were developed, development would result in the loss of some wildlife habitat as well as increased traffic, human activity, and noise. However, this area is already developed with residential and commercial uses, and wildlife found in these areas is already habituated to high levels of disturbance.

4.4.6 Sounder Mukilteo Station, Sound Transit

Sound Transit's Mukilteo Station is being developed in phases. A second phase of the project is now underway to add a platform on the south side of the tracks, and provide a pedestrian bridge to connect the two platforms.

Sound Transit and the City of Mukilteo are continuing to study potential options for expanding parking, a specific site and layout designs have not yet been confirmed.

More commuter parking for the Mukilteo Station would improve access to commuter rail service, which could increase local vehicle trips during the peak period.

Development of the Mukilteo Station is not likely to result in impacts on ecosystems.

4.4.7 NOAA Fisheries Service Facility Expansion

NOAA Fisheries Service operates a laboratory immediately west of the Mukilteo Tank Farm and plans to redevelop this facility, subject to a property transfer from the U.S. Air Force. NOAA is coordinating its planning with WSF, the Port of Everett, the City of Mukilteo, and others, but has not yet formalized its plans.

Expansion of the NOAA facility could result in impacts on Urban Mixed and Marine Nearshore environments, depending on the facility design. Impacts on those environments are discussed in *Section 4.1*.

4.4.8 Rail/Barge Transfer Facility, Port of Everett

The Port of Everett constructed a rail/barge transfer facility along the waterfront to allow oversize containers to be delivered to the Everett Boeing plant at Paine Field. This facility is located on the shoreline immediately east of the Mukilteo Tank Farm, on property owned by WSDOT, and it lies within the city of Everett. Construction of the rail/barge transfer facility was completed in 2006. The facility included the construction of a pier and a rail spur to allow trains to directly off-load large parts and materials that are shipped in for assembly at Boeing's plant.

The facility also has a public shoreline access area, which includes parking, benches, and a paved walkway, although this area has not yet been opened to the public because there is no public roadway for accessing the site. (For operations and employee access, the Port uses a gated road that runs through the Mukilteo Tank Farm.) To mitigate for potential shading impacts from the new pier, the Port transplanted eelgrass shoots from existing beds on site to adjacent areas with no eelgrass (Pentec Environmental 2010). These areas are approximately 1,500 feet east of head of the Tank Farm Pier. Elliot Point 1 Alternative provides a new roadway serving the facility, but the other alternatives do not.

This project is not likely to result in any cumulative effects on ecosystems.

4.4.9 Restoration of Japanese Creek

The City of Mukilteo plans to restore a section of Japanese Creek to its previous channel, increasing the amount of stream bed and riparian habitat along the creek. The City also plans to add weirs to a section of the creek to allow fish access to a wetland east of the creek, increasing rearing and foraging habitat.

The City of Mukilteo's Shoreline Plan calls for removing a culvert that carries Japanese Creek to an outfall into Possession Sound. The culvert crosses under

BNSF tracks and the Mukilteo Tank Farm. This would allow Japanese Creek to be free-flowing as it meets the shoreline. Elliot Point 1 includes this action as part of the alternative, but the other alternatives would not affect the areas above the culvert. If this area is not developed by the Mukilteo Multimodal Project, Japanese Creek could be daylighted as part of development plans by the Port or others. However, no specific proposal or timeline has been identified for daylighting the creek.

Daylighting Japanese Creek and other creek restoration activities would increase riparian and aquatic habitat as described in *Section 4.1.3*.

4.4.10 Mukilteo Lighthouse Park

The City of Mukilteo Lighthouse Park Master Plan is a four-phased plan to renovate Lighthouse Park west of the existing ferry terminal. Phases I and II of the project, which included construction of a promenade and path, shoreline restoration, and parking and road improvements, were completed in 2010. Phases III and IV will complete the pathway system, add a pedestrian pier, create additional parking, and relocate the boat launch. The latter two phases are dependent on future funding as well as coordination with the Mukilteo Multimodal Project, which will determine the final location of the park's boat launch.

Shoreline restoration efforts added beach sand to a wide zone of beach just above MHHW, planted native vegetation along the beach, and installed drift logs for erosion control, improving Marine Nearshore habitat within the park. Installation of a pedestrian pier would create a small amount of overwater cover, the effects of which are described in *Section 4.1.1*.

4.5 Mitigation Measures

The project would provide mitigation to avoid or reduce environmental impacts. Some mitigation measures have been incorporated into the project design; other impacts will be minimized by implementing standard construction best management practices (BMPs) or BMPs that have been developed specifically for this project.

4.5.1 Mitigation for Long-Term Impacts

Common to All Alternatives

Long-term impacts on terrestrial and marine resources would be addressed through avoidance and minimization measures and replanting vegetation. Avoidance and minimization include reducing the project footprint to the extent possible and using materials that require the least amount of maintenance and replacement.

Common to All Build Alternatives

The inclusion of landscaping elements in the proposed project would compensate for some of the lost Urban and Mixed Environs habitats. Loss of Marine Nearshore habitat would be offset by removal of the existing terminal.

Some potential effects on fish, marine mammals, and other aquatic species could be avoided or minimized by incorporating a number of mitigation measures into the project design:

- Lighting of the terminal facilities could be directed away from the water to reduce potentially increased juvenile fish predation during the night.
- Stormwater generated by the dock could be collected and conveyed to onshore water quality treatment facilities to avoid the potential for water quality effects to Possession Sound. Overall, the proposed onshore stormwater treatment facilities would improve water quality compared to existing conditions. Substantial stormwater improvement under the No-Build Alternative is not expected.
- Concrete piles could be used rather than steel piles where possible. Concrete piles, which are not prone to rust and corrosion and which are not as susceptible to damage from impact as steel piles, may need to be replaced less frequently, thereby reducing long-term environmental effects. Noise effects on aquatic species from the use of an impact hammer on concrete piles are expected to be substantially less than those on steel piles.

Preferred Alternative and Elliot Point 1Alternative

Both the Preferred and Elliot Point 1 alternatives would result in an increase of overwater structures compared to the footprint of the existing ferry terminal. Removal of 138,080 SF (3.17 acres) of the Tank Farm Pier would help offset that increase, resulting in a net reduction over overwater cover of 2.6 acres (Elliot Point 1 Alternative) or 3.0 acres (Preferred Alternative) (Table 6). Demolition of the pier would also remove about 3,900 creosote-treated piles from the marine environment, potentially improving water quality.

Removal of the Tank Farm Pier has the potential to mobilize any contaminated sediments underneath the pier. Sediments would be tested prior to project construction and any contaminated sediments remediated appropriately.

4.5.2 Mitigation for Construction Impacts

Mitigation for construction impacts would include BMPs, conservation measures, and avoidance and minimization measures. Standard construction BMPs would be implemented in all alternatives to avoid or minimize impacts on ecosystem resources from construction activities.

Noise impacts from all alternatives may affect wildlife species such as fish, birds, and marine mammals. Impact avoidance may be addressed through redesigning project components with adverse impacts to the extent possible. The primary conservation measure to minimize effects on fish species is compliance with the in-water work windows for wildlife as specified by WDFW. Additional measures to minimize the effects of pile driving on other species may include more timing restrictions, use of bubble curtains or other noise attenuation devices, monitoring for marine mammal and bird presence before and during construction, use of cofferdams, use of lower level warning sounds, and ramping up noise to warn marine species of impending pile driving.

All Build alternatives may affect migratory birds through noise impacts and removal or degradation of habitat. Impact avoidance may be addressed by timing vegetation and structure removal to occur outside of the nesting season to avoid direct impacts on active nests. To address temporary loss of riparian vegetation resulting from construction impacts, mitigation measures may include removal of noxious weeds in certain areas and revegetation of disturbed areas with native species.

Measures to minimize construction effects could include the actions described below.

- In-water work should be limited to work windows approved by NMFS, USFWS, and WDFW.
- The use of a vibratory hammer on steel piles should be used to the extent possible. Noise-attenuating measures should be used to reduce noise effects on fish and other aquatic species during installation of steel piles with an impact hammer.
- The contractor should be required to follow an approved Spill Prevention, Control and Countermeasures Plan, including maintaining spill response materials on site.
- The contractor should be required to follow an approved concrete containment plan to ensure no wet cement falls or spills into the water.
- The contractor should be required to follow an approved plan to ensure a clean construction site is maintained and to reduce the potential for debris entering surface waters. Any debris that enters the water should be contained, removed, and disposed of at an upland location.
- Turbidity should be monitored to ensure water quality standards are met.
- Construction equipment and vehicles should be maintained to prevent them from leaking fuel or lubricants. For equipment used in and over water, lubricants that are not petroleum-based should be used to the extent feasible.
- Excavated sediments, if any, or sediments clinging to removed piles should be contained and disposed of at an upland location.

- Timber piles that break or are already broken below the waterline should be removed with a vibratory puller or clamshell bucket. To minimize disturbance to bottom sediments and splintering of piles, the minimum size bucket required to pull piles should be used.
- Whenever activities generate sawdust, drill tailings, or wood chips from treated timbers, tarps or other containment methods should be used to prevent debris from entering the water.
- Silt curtains or a similar containment method should be used during removal of piers to contain disturbed sediments.
- Any soil plugs and slurry from driven hollow piles should be contained and not allowed to enter the marine environment to minimize water quality effects.
- Tank Farm Pier removal should occur outside the nesting season (generally February to July) if active nests are observed on the pier.

4.5.3 Mitigation for Cumulative Effects

The development of the Mukilteo Tank Farm may result in the loss of Urban and Mixed Environs and Marine Nearshore habitats. The inclusion of landscaping elements in the proposed project vicinity would compensate for some of the lost Urban and Mixed Environs habitats. Compliance with existing federal, state, and local regulations would also reduce environmental impacts.

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ATTACHMENT A

Common and Scientific Names of Plants Observed in the Project Vicinity

Table A-1. Plant Species List for the Mukilteo Multimodal Project

Common Name	Scientific Name	Observed On-Site	Observed in Adjacent Habitats
Trees			
big-leaf maple	*Acer macrophyllum*	X	X
black cottonwood	*Populus balsamifera*		X
Douglas fir	*Pseudotsuga menziesii*	X	X
Pacific madrona (madrone)	*Arbutus menzeisii*	X	X
red alder	*Alnus rubra*	X	X
western hemlock	*Tsuga heterophylla*		
western red cedar	*Thuja plicata*	X	X
Shrubs			
butterfly-bush	*Buddleja japonica*	X	
English holly	*Ilex aquifolium*	X	X
English ivy	*Hedera helix*	X	X
Himalayan blackberry	*Rubus armenicus*	X	X
Rose sp.	*Rosa* sp.	X	
Red elderberry	*Sambucus racemosa*		X
Salmonberry	*Rubus spectabalis*		X
scotch broom	*Cytisus scoparius*	X	
Western sword fern	*Polystichum munitum*		X
willow	*Salix* sp.		X
Herbs			
bluegrass sp.	*Poa* spp.		X
Bentgrass sp.	*Agrostis* sp.		X
Canadian thistle	*Cirsium arvense*	X	
common St. John's wort	*Hypericum perforatum*	X	
creeping buttercup	*Ranunculus repens*		X
English ivy	*Hedera helix*	X	X
English plantain	*Plantago lanceolata*	X	
fireweed	*Epilobium angustifolium*	X	
giant horsetail	*Equisetum telmateia*		X
hairy cats-ear	*Hypochaeris radicata*	X	
lady fern	*Athyrium filix-femina*		X
Lesser periwinkle	*Vinca minor*		X
pearly everlasting	*Anaphalis margaritacea*	X	
piggyback plant	*Tolmiea menziesii*		X
reed canarygrass	*Phalaris arundinacea*	X	X

Table A-1. Plant Species List for the Mukilteo Multimodal Project

Common Name	Scientific Name	Observed On-Site	Observed in Adjacent Habitats
Robert geranium	*Geranium robertianum*		X
Skunk cabbage	*Lysichiton americanus*		X
slough sedge	*Carex obnupta*		X
soft rush	*Juncus effusus*	X	X
tall fescue	*Festuca arundinacea*		

ATTACHMENT B

Common and Scientific Names of Wildlife that May be Found in the Project Vicinity

Table B-1. Common and Scientific Names of Wildlife that May be Found in the Project Vicinity

Vertebrate Species		Association With Habitat Types			
Common Name	**Scientific Name**	**Upland Forest**	**Wetlands**	**Marine Nearshore**	**Urban and Mixed Environs**
Terrestrial Mammals					
American Beaver	*Castor canadensis*	GA/F	CA/B		P/F
Big brown bat	*Eptesicus fuscus*	CA/B	GA/B		CA/B
Black rat	*Rattus rattus*				CA/B
Black-tailed deer	*Odocoileus hemionus col.*	GA/B	GA/B		GA/B
Bushy-tailed woodrat	*Neotoma cinerea*	CA/B	P/B		GA/B
California myotis	*Myotis californicus*	CA/B	GA/B		P/B
Coast mole	*Scapanus orarius*	CA/B	GA/B		GA/B
Coyote	*Canis latrans*	GA/B	GA/B		GA/B
Creeping vole	*Microtus oregoni*	GA/B	GA/B		P/B
Deer mouse	*Peromyscus maniculatus*	CA/B	CA/B		CA/B
Douglas squirrel	*Tamiasciurus douglasi*	CA/B			GA/B
Eastern cottontail	*Sylvilagus floridanus*	GA/B			GA/B
Eastern gray squirrel	*Sciurus carolinensis*				CA/B
European rabbit	*Oryctolagus cuniculus*	P/B			GA/B
Hoary bat	*Lasiurus cinereus*	GA/F	GA/F		GA/F
House mouse	*Mus musculus*				CA/B
Keen's myotis	*Myotis keenii*	CA/B	GA/B		
Little brown bat	*Myotis lucifugus*	GA/B	GA/B		GA/B
Long-eared myotis	*Myotis evotis*	GA/B	GA/B		GA/B
Long-legged myotis	*Myotis volans*	GA/B	GA/B		GA/B
Long-tailed vole	*Microtus longicaudus*	GA/B	CA/B		P/B
Long-tailed weasel	*Mustela frenata*	GA/B	GA/B		P/F
Masked shrew	*Sorex cinereus*	P/B	P/B		
Mink	*Mustela vison*	GA/F	CA/B		P/F
Montane shrew	*Sorex monticolus*	GA/B			
Mountain beaver	*Aplodontia rufa rufa*	CA/B			
Muskrat	*Ondatra zibethica*		CA/B		P/B
Northern flying squirrel	*Glaucomys sabrinus*	CA/B	GA/B		P/B
Norway rat	*Rattus norvegicus*				CA/B
Nutria	*Myocaster coypus*		CA/B		P/F
Pacific jumping mouse	*Zapus trinotatus*	GA/B	CA/B		
Pacific water shrew	*Sorex bendirii*	GA/B	CA/B		
Porcupine	*Erethizon dorsatum*	CA/B	GA/B		P/B
Raccoon	*Procyon lotor*	GA/B	CA/B		CA/B
Red fox	*Vulpes vulpes*	P/B	GA/B		GA/B
River otter	*Lutra canadensis*		CA/B	GA/F	

Table B-1. Common and Scientific Names of Wildlife that May be Found in the Project Vicinity

Vertebrate Species		Association With Habitat Types			
Common Name	**Scientific Name**	**Upland Forest**	**Wetlands**	**Marine Nearshore**	**Urban and Mixed Environs**
Shrew mole	*Neurotrichus gibbsii*	GA/B	GA/B		GA/B
Silver-haired bat	*Lasionycteris noctivagans*	CA/B	GA/B		
Southern red-backed vole	*Clethrionomys gapperi*	GA/B	CA/B		
Striped skunk	*Mephitis mephitis*	GA/B	GA/B		P/B
Townsend’s mole	*Scaparus townsendii*	GA/B	GA/B		GA/B
Townsend's big-eared bat	*Plecotis townsendii*	GA/B	GA/F		P/B
Townsend's chipmunk	*Eutamias townsendii*	CA/B	GA/B		GA/B
Townsend's vole	*Microtus townsedii*	GA/B	GA/B		
Trowbridge's shrew	*Sorex trowbridgei*	CA/B	GA/B		GA/B
Vagrant shrew	*Sorex vagrans*	GA/B	P/B		P/B
Virginia opossum	*Didelphis virginiana*	GA/B	GA/B		CA/B
Water shrew	*Sorex palustris*	GA/B	CA/B		
Western spotted skunk	*Spilogale putorius*	GA/B	GA/B		P/B
Yuma myotis	*Myotis yumanensis*	GA/B	CA/B		GA/B
Marine Mammals					
Northern (Steller) sea lion	*Eumetopias jubatus*			CA/F	
California sea lion	*Zalophus californianus*			CA/F	
Harbor seal	*Phoca vitulina*			CA/F	
Sea otter	*Enhydra lutris*			CA/B	
Gray whale	*Eschrichtius gibbosus*			CA/F	
Killer whale	*Orcinus orca*			GA/B	
Harbor porpoise	*Phocoena phocoena*			CA/B	
Dall’s porpoise	*Phocenoides dalli*			P/B	
California sea lion	*Zalophus californianus*			GA/F	
Harbor seal	*Phoca vitulina*			CA/B	
Gray whale	*Eschrichtius gibbosus*			CA/F	
Killer whale	*Orcinus orca*			P/F	
Birds					
American bittern	*Botaurus lentiginosus*				
American black duck	*Anas rubripes*			GA/F	
American coot	*Fulica americana*				GA/B
American crow	*Corvus brachyrhynchos*	GA/B	GA/B		CA/B
American dipper	*Cinclus mexicanus*		CA/B		
American goldfinch	*Carduelis tristis*	GA/B	GA/B		GA/B
American kestrel	*Falco sparverius*	GA/B	GA/B		GA/B

Table B-1. Common and Scientific Names of Wildlife that May be Found in the Project Vicinity

Vertebrate Species		Association With Habitat Types			
Common Name	**Scientific Name**	**Upland Forest**	**Wetlands**	**Marine Nearshore**	**Urban and Mixed Environs**
American pipit	*Anthus rubescens*				
American robin	*Turdus migratorius*	GA/B	GA/B		GA/B
American widgeon	*Anas americana*		GA/F	GA/F	
Ancient murrelet	*Synthliboramphus antiquus*			CA/F	
Anna's hummingbird	*Calypte anna*	CA/B	P/B		GA/B
Bald eagle	*Haliaeetus leucocephalus*	GA/R	GA/B	GA/F	GA/B
Band-tailed pigeon	*Columba fasicata*	CA/B	CA/B		GA/B
Barn owl	*Tyto alba*		GA/B		GA/B
Barn swallow	*Hirundo rustica*	GA/B	CA/B	GA/F	GA/B
Barred owl	*Strix varia*	CA/B	GA/B		P/B
Barrow's goldeneye	*Bucephala islandica*				
Belted kingfisher	*Ceryle alcyon*		CA/B	GA/F	
Bewick's wren	*Thryomanes bewickii*	GA/B	GA/B		GA/B
Black scoter	*Melanitta nigra*			CA/F	
Black swift	*Cypseloides niger*			GA/F	
Black-capped chickadee	*Parus atricapilus*	GA/B	GA/B		GA/B
Black-headed grosbeak	*Pheucticus melanocephalus*	GA/B	GA/B		P/B
Black-legged kittiwake	*Rissa tridactyla*			P/F	
Black-throated gray warbler	*Dendroica nigrescens*	CA/B	CA/B		P/B
Blue-winged teal	*Anas discors*				
Bonaparte's gull	*Larus philadelphia*			CA/F	GA/F
Brandt's cormorant	*Phalacrocorax penicillaatus*			CA/F	
Brant	*Branta bernicla*			GA/F	
Brewer's blackbird	*Euphagus cyanocephalus*		GA/B		GA/B
Brown creeper	*Certhia americana*	GA/B	GA/B		GA/B
Brown-headed cowbird	*Molothrus ater*	GA/R	GA/B		GA/B
Bufflehead	*Bucephala albeola*		GA/B		
Bullock's oriole	*Icterus bullockii*		CA/B		GA/B
Bushtit	*Psaltriparus minimus*	GA/B	GA/B		GA/B
California gull	*Larus californicus*			GA/F	GA/F
California quail	*Callipepla californica*	GA/B	GA/B		GA/B
Canada goose	*Branta canadensis*		P/B	P/F	
Canvasback	*Aythya valisineria*			GA/F	

Table B-1. Common and Scientific Names of Wildlife that May be Found in the Project Vicinity

Vertebrate Species		Association With Habitat Types			
Common Name	**Scientific Name**	**Upland Forest**	**Wetlands**	**Marine Nearshore**	**Urban and Mixed Environs**
Caspian tern	*Sterna caspia*			CA/F	
Cassin's Vireo	*Vireo cassinii*	GA/B			P/B
Cedar waxwing	*Bombycilla cedrorum*	GA/B	GA/B		GA/B
Chestnut-backed chickadee	*Parus rufescens*	GA/B	GA/B		GA/B
Cinnamon teal	*Anas cyanoptera*				
Clark's grebe	*Aechmophorus clarkii*		CA/F		
Cliff swallow	*Petrochelidon pyrrhonota*	GA/B	CA/B	P/F	GA/B
Common goldeneye	*Bucephala clangula*			GA/F	
Common loon	*Gavia immer*			CA/F	
Common merganser	*Mergus merganser*	CA/R	GA/B	P/F	
Common murre	*Uria aalge*			CA/F	
Common raven	*Corvus corax*	GA/B	GA/B		GA/B
Common snipe	*Gallinago gallinago*				
Common yellowthroat	*Geothlypis trichas*	GA/B	GA/B		P/B
Cooper's hawk	*Accipiter cooperii*	GA/B	GA/B		GA/B
Dark-eyed junco	*Junco hyemalis*	GA/B	GA/B		GA/B
Double-crested cormorant	*Phalacrocorax auritus*		P/B	CA/F	GA/R
Downy woodpecker	*Picoides pubescens*	GA/B	CA/B		GA/B
Eared grebe	*Podiceps nigricollis*			GA/F	
Elegant tern	*Sterna elegans*			CA/F	
European starling	*Sturmus vulgaris*	GA/B	CA/B		CA/B
Evening grosbeak	*Coccothraustes vespertinus*	GA/B	GA/B		GA/F
Fork-tailed storm petrel	*Oceanodroma furcata*			P/F	
Forster's tern	*Sterna fosteri*			GA/F	
Fox sparrow	*Passerella iliaca*	GA/F	GA/F		P/F
Glaucous gull	*Larus hyperboreus*				GA/F
Glaucous-winged gull	*Larus glaucescens*			CA/F	CA/B
Golden-crowned kinglet	*Regulus satrapa*	CA/B	GA/B		GA/B
Golden-crowned sparrow	*Zonotrichia atricapilla*	GA/F	GA/F		GA/F
Great blue heron	*Ardea herodias*	GA/R	CA/B		GA/B
Great horned owl	*Bubo virginianus*		GA/B		GA/B
Greater scaup	*Aythya marila*			GA/F	
Green heron	*Butorides virescens*		CA/B		
Green-winged teal	*Anas crecca*		GA/F		

Table B-1. Common and Scientific Names of Wildlife that May be Found in the Project Vicinity

Vertebrate Species		Association With Habitat Types			
Common Name	**Scientific Name**	**Upland Forest**	**Wetlands**	**Marine Nearshore**	**Urban and Mixed Environs**
Hairy woodpecker	*Picoides villosus*	GA/B	GA/B		GA/B
Hammond's flycatcher	*Empidonax hammondii*	GA/B			
Harlequin duck	*Histrionicus histrionicus*		CA/B	CA/F	
Herring gull	*Larus argentatus*			CA/F	GA/F
Hooded merganser	*Lophodytes cucullatus*	CA/R	CA/B		
Horned grebe	*Podiceps auritus*			GA/F	
House finch	*Carpodacus mexicanus*	P/B	P/B		CA/B
House sparrow	*Passer domesticus*				CA/B
House wren	*Troglodytes aedon*	GA/B	GA/B		GA/B
Hutton's vireo	*Vireo huttoni*	GA/B	GA/B		P/B
Killdeer	*Charadrius vociferous*	P/B	GA/B		GA/B
Long-tailed duck	*Clangula hyemalis*			CA/F	
MacGillivray's warbler	*Oporornis tolmiei*	GA/B	GA/B		
Mallard	*Anas platyrhynchos*		CA/B		GA/B
Marbled murrelet	*Brachyramphus marmoratus*	CA/R		CA/F	
Marsh wren	*Cistothorus palustris*				
Merlin	*Falco columbarius*	GA/B	GA/B	GA/F	GA/F
Mew gull	*Larus canus*			CA/F	
Mourning dove	*Zenaida macroura*	GA/B	CA/B	GA/F	GA/B
Northern flicker	*Colaptes cafer*	GA/B	GA/B		GA/B
Northern goshawk	*Accipiter gentilis*	GA/B	GA/F		
Northern harrier	*Circus cyaneus*		P/B		P/B
Northern pintail	*Anas acuta*			GA/F	
Northern pygmy owl	*Glaucidium gnoma*	CA/B	GA/B		P/F
Northern rough-winged swallow	*Stelgidopteryx serripennis*			GA/F	P/B
Northwestern crow	*Corvus caurinus*				P/F
Olive-sided flycatcher	*Contopus borealis*	CA/B	GA/B		
Orange-crowned warbler	*Vermivora celata*	GA/B	GA/B		P/B
Osprey	*Pandion haliaetus*	GA/R	GA/B	GA/F	GA/R
Pacific loon	*Garvia pacifica*			CA/F	
Pacific wren	*Troglodytes troglodytes*	CA/B	GA/B		P/B
Pelagic cormorant	*Phalacrocorax pelagicus*			CA/F	
Peregrine falcon	*Falco peregrinus*	GA/B	GA/F	GA/F	GA/B
Pied-billed grebe	*Podilymbus podiceps*		GA/B	P/F	

Table B-1. Common and Scientific Names of Wildlife that May be Found in the Project Vicinity

Vertebrate Species		Association With Habitat Types			
Common Name	**Scientific Name**	**Upland Forest**	**Wetlands**	**Marine Nearshore**	**Urban and Mixed Environs**
Pigeon guillemot	*Cephus columba*			CA/F	
Pileated woodpecker	*Dryocopus pileatus*	GA/B	GA/B		GA/B
Pine siskin	*Carduelis pinus*	GA/B	GA/B		GA/B
Purple finch	*Carpodacus purpureus*	GA/B	CA/B		GA/B
Purple martin	*Progne subis*	GA/B	GA/B		GA/B
Red phalarope	*Phalaropus tricolor*				
Red-breasted merganser	*Mergus serrator*			CA/F	
Red-breasted nuthatch	*Sitta canadensis*	GA/B	GA/B		GA/B
Red-breasted sapsucker	*Sphyrapicus ruber*	GA/B	GA/B		P/B
Red-eyed vireo	*Vireo olivaceus*	P/B	CA/B		
Red-necked grebe	*Podiceps nigricollis*			CA/F	
Red-necked phalarope	*Phalaropus lobatus*			GA/F	
Red-tailed hawk	*Buteo jamaicensis*	GA/B	GA/B		P/B
Red-winged blackbird	*Agelaius phoenicens*		GA/B		P/F
Rhinoceros auklet	*Cerorhinca monocerata*			GA/F	
Ring-billed gull	*Larus delawarensis*			GA/F	GA/F
Ring-necked duck	*Aythya collaris*		CA/B		
Ring-necked pheasant	*Phasianus colchicus*	GA/F	GA/B		GA/B
Rock dove	*Columba livia*				CA/B
Rough-legged hawk	*Buteo lagopus*	P/F	P/F		P/F
Ruby-crowned kinglet	*Regulus calendula*	GA/F	GA/F		GA/F
Ruddy duck	*Oxyura jamaicensis*				
Ruffed grouse	*Bonasa umbellus*	CA/B			
Rufous hummingbird	*Selasphorus rufus*	GA/B			GA/B
Savannah sparrow	*Passercullus sanwichensis*		GA/B		GA/B
Sharp-shinned hawk	*Accipeter striatus*	GA/B			P/B
Short-tailed shearwater	*Puffinus tenuirostris*			P/F	
Song sparrow	*Melospiza melodia*	GA/B	GA/B		GA/B
Sooty shearwater	*Puffinus griseus*			GA/F	
South polar skua	*Catharacta maccormicki*			P/F	
Spotted sandpiper	*Actitis macularia*		CA/B		
Spotted towhee	*Pipilo erythrophthalmus*	GA/B	GA/B		GA/B
Steller's jay	*Cyanocitta stelleri*	GA/B	GA/B		GA/B
Surf scoter	*Melanitta perspicillata*			CA/F	

Table B-1. Common and Scientific Names of Wildlife that May be Found in the Project Vicinity

Vertebrate Species		Association With Habitat Types			
Common Name	**Scientific Name**	**Upland Forest**	**Wetlands**	**Marine Nearshore**	**Urban and Mixed Environs**
Swainson's thrush	*Catharus ustulatus*	GA/B	GA/B		P/B
Thayer's gull	*Larus thayeri*			CA/F	GA/F
Townsend's warbler	*Dendroica townsendii*	GA/B	GA/B		GA/F
Tree swallow	*Tachycineta bicolor*	P/B	CA/B		GA/B
Tufted puffin	*Fratercula cirrhata*			GA/F	
Turkey vulture	*Cathartes aura*	GA/B	GA/B		P/B
Varied thrush	*Ixoreus naevius*	CA/B			GA/F
Vaux's swift	*Chaetura vauxi*	GA/B	GA/B		GA/B
Violet-green swallow	*Tachycineta thalassina*	GA/B	GA/B		GA/B
Warbling vireo	*Vireo gilvus*		CA/B		P/B
Western bluebird	*Sialia mexicana*	CA/B			GA/B
Western grebe	*Aechmophorus occidentalis*			CA/F	
Western gull	*Larus occidentalis*			CA/F	
Western screech-owl	*Otus kennicotti*	GA/B	CA/B		GA/B
Western tanager	*Piranga ludoviciana*	CA/B	GA/B		P/B
Western wood pewee	*Contopus sordidulus*	GA/B	GA/B		GA/B
White-crowned sparrow	*Zonotrichia leucophrys*	GA/B	GA/B		GA/B
White-winged scoter	*Melanitta fusca*			CA/F	
Willow flycatcher	*Empidonax trailli*	GA/B	CA/B		P/B
Wilson's warbler	*Wilsonia pusilla*	CA/B	CA/B		P/B
Wood duck	*Aix sponsa*	GA/R	CA/B		
Yellow warbler	*Dendroica petechia*		CA/B		
Yellow-billed loon	*Gavia adamsii*			P/F	
Yellow-rumped warbler	*Dendroica coronata*	GA/B	GA/B		GA/F
Reptiles And Amphibians					
Bullfrog	*Rana catesbeiana*	GA/F		CA/B	GA/F
Common garter snake	*Thamnophis sirtalis*	GA/B		CA/B	GA/B
Ensatina	*Ensatina eschscholtzii*	CA/B		GA/B	P/B
Long-toed salamander	*A. macrodactylum*	GA/B		CA/B	GA/B
Northern alligator lizard	*Gerrhontus coeruleus*	GA/B		GA/B	GA/B
Northern red-legged frog	*Rana aurora aurora*	CA/F		CA/B	P/F
Northwestern garter snake	*T. ordinoides*	GA/B		GA/B	GA/B
Northwestern salamander	*Ambystoma gracile*	GA/F		CA/B	P/F
Pacific chorus frog	*Hyla regilla*	GA/B		CA/B	GA/B

Table B-1. Common and Scientific Names of Wildlife that May be Found in the Project Vicinity

Vertebrate Species		Association With Habitat Types			
Common Name	**Scientific Name**	**Upland Forest**	**Wetlands**	**Marine Nearshore**	**Urban and Mixed Environs**
Pacific giant salamander	*Dicamptodon tenebrosus*	GA/F		CA/B	P/F
Painted turtle	*Chrysemys picta*			GA/B	P/B
Red-eared slider turtle	*Trachemys scripta*			GA/B	GA/R
Rough-skinned newt	*Taricha granulosa*	GA/F		CA/B	P/F
Rubber boa	*Charina bottae*	GA/B		GA/B	GA/B
Snapping turtle	*Chelydra serpentina*			GA/B	GA/R
Western fence lizard	*Sceloporus occidentalis*	GA/B			GA/B
Western pond turtle	*Clemys marmorata*	P/B		CA/B	P/B
Western redbacked salamander	*P. vehiculum*	GA/B		GA/B	
Western terrestrial garter snake	*T. elegans*			GA/B	GA/B
Western toad	*Bufo boreas*	GA/F		CA/B	P/F

ATTACHMENT C

Project Photographs

Photograph 1. Grassland (foreground) and Upland Forest (background), south of Fifth Street

Photograph 2. Japanese Creek and forested wetland, south of Mukilteo Boulevard

Photograph 3. Open water and forested components of wetland, south of Fifth Street

Photograph 4. Urban and Mixed Environs Habitat (Mukilteo Tank Farm).

Photograph 5. Marine Nearshore Environment (near Mukilteo Tank Farm).

Photograph 6. Shoreline between Tank Farm Pier and existing ferry terminal.

Photograph 7. Rubble and pile stubs on beach fronting Mukilteo Tank Farm.

Photograph 8. Brewery Creek outfall near NOAA Fisheries Service facility.

Photograph 9. Japanese Creek outfall underneath Mukilteo Tank Farm.

Photograph 10. Tank Farm Pier.

Photograph 11. Creosote-treated piles supporting the Tank Farm Pier.

Photograph 12. Existing ferry terminal.