

LOPEZ

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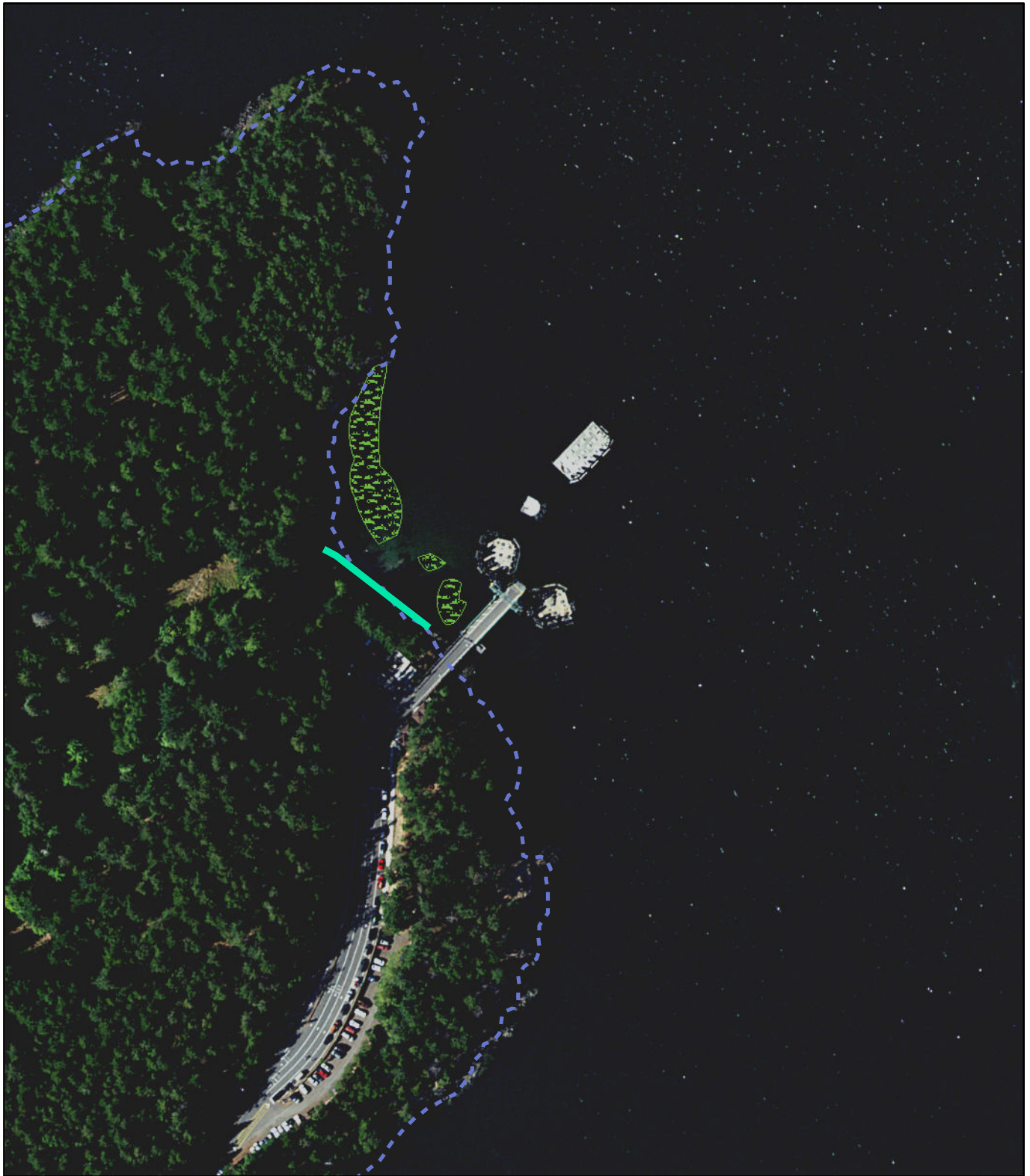
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NOTE: Base map prepared from Terrain Navigator Pro
USGS 7.5 minute quadrangle map(s) of Blakely Island and Shaw Island, Washington.

Section	Township	Range	Lat	Long	County
36	36N	2W	48° 34' 13" N	122° 51' 35" W	San Juan
HUC 171100030801			WRIA 2		



Figure LO-1
Lopez Island Ferry Terminal Vicinity Map
WSF Biological Assessment Reference
Lopez Island, Washington



Lopez Island Ferry Terminal: WSF Biological Assessment Reference

- Smelt Spawning
- ▨ Eel Grass
- Approximate Mean High Water (MHW)

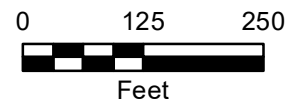
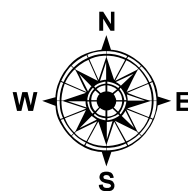


Figure LO-2
Aerial Photo of Lopez Ferry Terminal
WSF Biological Assessment Reference
Lopez Island, Washington

4.11 Lopez Island Ferry Terminal

The Lopez Island Ferry Terminal is located near the northern tip of Lopez Island, at the confluence of Upright and Harney Channels (see Figures LO-1 and LO-2).

The Lopez Island Ferry Terminal provides service to the Anacortes and San Juan inter-island terminals (Lopez, Shaw, Orcas, and Friday Harbor).

Features of the terminal include a terminal building, four vehicle holding lanes that accommodate up to 88 vehicles, and roadside vehicle handling. The terminal has one slip with a floating concrete wingwall. Two dolphins are associated with the terminal, one steel and one concrete floating dolphin. One small parking lot is associated with the terminal. No overhead passenger loading facilities exist at the terminal.

4.11.1 Lopez Environmental Baseline

4.11.1.1 Physical Indicators

Substrate and Slope

The substrate layer is thin and overlays a foundation of bedrock. Substrate consists of fine to coarse sand close to shore, giving way to mud overlying bare bedrock and boulders within the ferry slip. The bottom drops off quickly to deep water, with depths up to 90 feet at the outer dolphins. Offshore depths (feet MLLW) of terminal structures are: head of slip (-35.5). Maximum depth (feet MLLW) for fixed dolphins is -46.5 and for the floating dolphin -77.0. See Figure LO-3 for a picture of the shoreline area at the ferry terminal.



Figure LO-3
Shoreline Area at the Lopez Island Ferry Terminal

Salt/Freshwater Mixing

There are no significant freshwater drainages near the Lopez Island Ferry Terminal. A small stream drains into Shoal Bay, 1.25 miles southeast of the ferry terminal.

Flows and Currents

Strong currents, deep channels, and tidal mixing influence the open marine waters of the San Juan Islands.

4.11.1.2 Chemical Indicators

Water Quality

The marine waters of Harney Channel are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include dissolved oxygen (water) and 4-methylphenol (sediment) (Ecology 2018).

Sediment Quality

The area surrounding the Lopez Island Ferry Terminal is rural in character. There are no known sources of industrial contamination or other sources of hazardous waste.

Impaired waters listings in the terminal area include 4-methylphenol (sediment) (Ecology 2018).

4.11.1.3 *Biological Indicators*

Shoreline Vegetation

The shoreline is steep and rocky with a small, sandy stretch of beach adjacent to the terminal. The area is heavily forested and dominated by Douglas fir.

Macroalgae and Eelgrass

An eelgrass and macroalgae survey was conducted in August 2004 (Anchor 2004b). No eelgrass was found in the area, which was expected given the deep water and rocky substrate conditions at the site. The macroalgae in depths from -20 feet MLLW to -58 feet MLLW (see Figure LO-2) was generally sparse and very short, growing to lengths of 6 inches or less. *Palmaria* spp. was the most widespread macroalgae identified in the area, although the percent coverage was typically less than 25 percent. Approximately 25 feet from the existing inner dolphin was the only location where *Palmaria* spp. coverage was as high as 50 percent. At this inshore margin, one stipe of *Nereocystis leutkeana* and small percentages of *Alaria marginata* (10 percent) and *Sarcodiotheca* spp. (5 percent) were found. Coralline red algae, a fine red algae, and bryozoans were also commonly found in small percentages (less than 10 percent) near the floating dolphins. *Laminaria saccharina* was infrequently observed in this area and only in small percentages (less than 10 percent).

Epibenthos, Macrofauna, Fish, and Marine Mammals

Portions of the nearshore environment (e.g., sandy stretch adjacent to the terminal) contain substrates likely to support epibenthic production. Macrofauna in the area include numerous sea star and fish species. The sunflower star, mottled star (*Evasterias troschellii*), and ochre star (*Pisaster ochraceous*) are the most abundant sea stars. Small sculpins, red Irish lords (*Hemilepidotus hemilepidotus*), and juvenile lingcod were the most commonly observed fish. Additional species include horse clams, cockles, Dungeness crab, coonstripe shrimp (*Pandalus danae*), and California sea cucumber (*Parastichopus californicus*) (Anchor 2004b). A geoduck clam bed lies 0.75 mile east of the ferry terminal.

Marine mammals likely to occur in the area include killer whale, harbor seal, Steller sea lion, California sea lion, harbor porpoise, and Dall's porpoise. During a

preservation project in fall 2006, harbor seals were regularly sighted off Upright Head and on Shag Rock approximately 1.5 miles northeast of the terminal.

Forage Fish

Documented surf smelt spawning is present (see Figure LO-2), extending approximately 110 feet to the northwest (WSDOT 2018a). A large herring holding area exists about 0.25 mile northeast of the ferry terminal in open water.



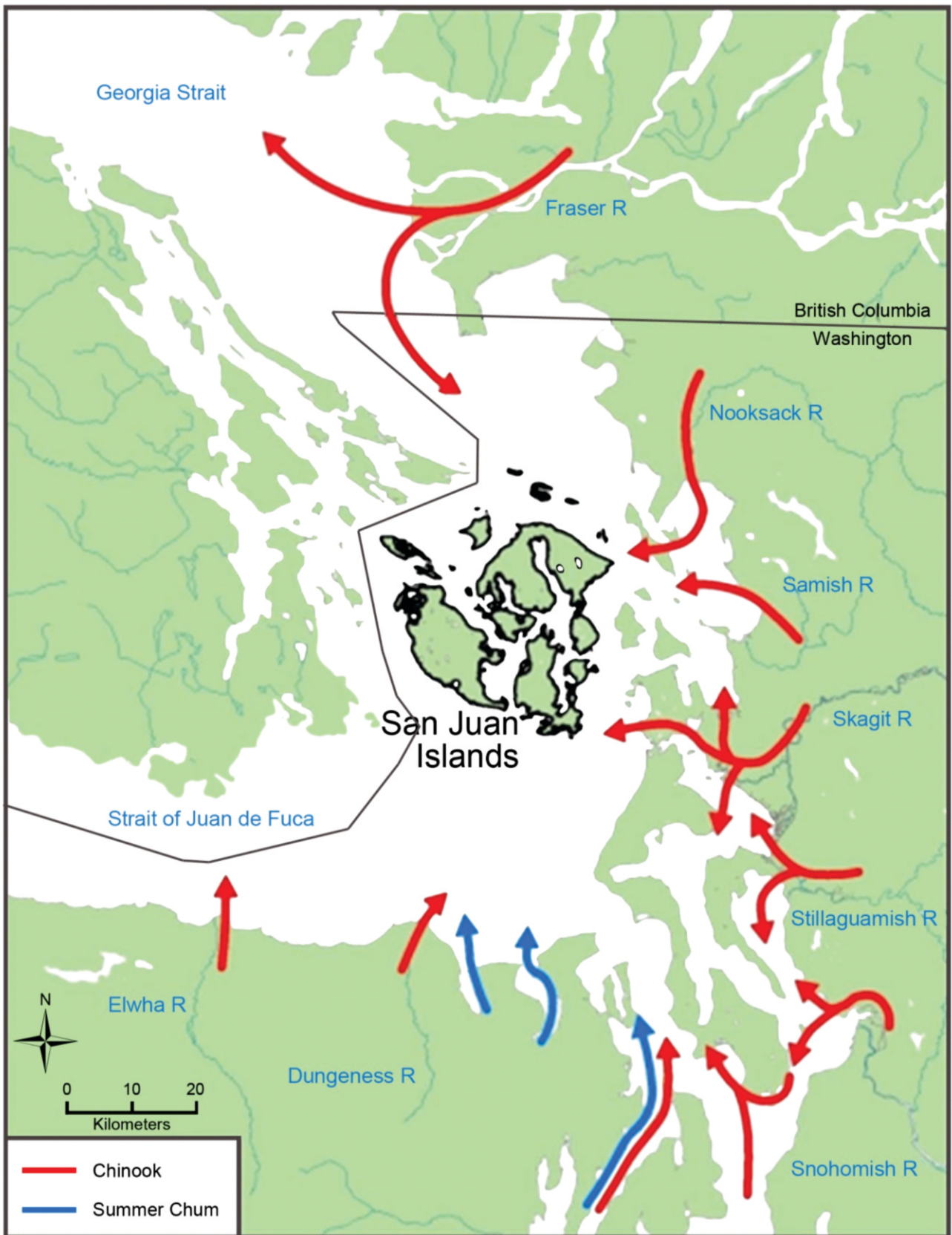
Figure LO-4
Surf Smelt Spawning Beach just Northwest of the
Lopez Island Ferry Terminal

4.11.2 Lopez Species Distributions

4.11.2.1 Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)

No Chinook salmon-bearing streams are located near the Lopez Island Ferry Terminal (WDFW 2007a). However, several major river systems that support Chinook salmon, including the Nooksack River (approximately 23 miles northeast), Samish River (approximately 24 miles east), Skagit River (approximately 25 miles southeast), and Stillaguamish River (approximately 34 miles southeast) occur in this area of the Puget Sound. Chinook may also be present from rivers and streams in central and southern Puget Sound (WDFW 2007a). The results of beach seine sampling completed from March to October in 2008 and 2009 indicate that juvenile Chinook salmon arrive in the San Juan Islands by April, peak in the month of June,

remain relatively high in shoreline areas during summer months, and are present through October. Chinook may be present from numerous river systems, as shown in Figure LO-5 (SRSC and NOAA 2012).



SOURCE: SRSC/NOAA Fisheries 2012.

Figure LO-5
Migratory Pathways for Juvenile Salmon from
Source Population Rivers to the San Juan Islands Area
WSF Biological Assessment Reference
Lopez Island, Washington

Adult and Sub-adult Chinook

The watersheds of the San Juan Islands are not large enough to support sustainable wild Chinook salmon populations (Sanford, personal communication 2002). A hatchery exists on Orcas Island. However, the marine environment of northern Puget Sound is a migratory corridor for adults. Adult Chinook salmon collected in the waters around the San Juan archipelago are usually Puget Sound or Fraser River populations (Sanford, personal communication 2002). WDFW micro-tag data analyzed from 1985 showed five Chinook salmon stocks have been identified in the San Juan region (Moulton, personal communication 2001).

Sub-adults have spent a winter in the marine environment and are not closely oriented to the shoreline like juveniles. The marine waters of the San Juan Islands provide habitat for outmigrating sub-yearling Chinook salmon from rivers into Puget Sound before their eventual oceanic phase as adults.

Juvenile Chinook

Chinook salmon do not spawn in the San Juan archipelago (Otis, personal communication 2000). Juveniles that could occur near the ferry terminal are likely of hatchery origin or have crossed open water to reach the San Juan Islands. Juvenile Chinook salmon habitat in the ferry terminal area includes the open water (pelagic zones) of the San Juan Islands and the nearshore and intertidal zones in the San Juan Islands, particularly areas supporting eelgrass and macroalgae.

4.11.2.2 Puget Sound Chinook Salmon Critical Habitat

The Lopez Island Ferry Terminal lies within Chinook Zone 2 (FR 5263070 FR 52630). While there are no streams that support Chinook salmon near the ferry terminal, there are eelgrass beds in close proximity to the ferry terminal that may be used by juvenile Chinook for rearing.

The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table LO-1. PCEs relevant to the terminal area are numbered per FR 5263070 FR 52630.

Table LO-1
Existing Conditions of Chinook Salmon PCEs at the Lopez Island Ferry Terminal

PCEs	Existing Conditions
5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	<p>Obstructions In-water structures include the trestle, the slip, and dolphins. The ferry terminal may affect fish passage in the nearshore.</p> <p>Water Quality and Forage The marine waters of Harney Channel are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include dissolved oxygen (water) and 4-methylphenol (sediment) (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Upright Channel. None of the runoff is treated.</p> <p>The first drainage area drains the forested wetland slope above the terminal area, and consists of a pond and a French drain that flows to a catch basin that is connected to the second drainage area.</p> <p>The second drainage area drains the upper and lower drop-off and holding area, and consists of seven catch basins and a swale that discharge through one of two outfalls on either side of the trestle.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. The substrates in the area are thin, overlying bedrock. A sandy area near the terminal contains substrates likely to support epibenthos.</p> <p>Documented surf smelt spawning is present (see Figure LO-2), extending approximately 110 feet to the northwest (WSDOT 2018a). A large herring holding area exists about 0.25 mile northeast of the ferry terminal in open water.</p> <p>Natural Cover The area is heavily forested above a steep and rocky shoreline. No eelgrass beds are present near the ferry terminal. Macroalgae growing in the area is generally sparse and dominated by <i>Palmaria</i> spp, with smaller patches of <i>Nereocystis leutkeana</i>, <i>Alaria marginata</i>, <i>Sarcodiotheca</i> spp. Coralline red algae, and <i>Laminaria saccharina</i> (Anchor 2004b).</p> <p>There is some large overhanging wood vegetation. The shoreline is steep and rocky with a small sandy stretch of beach adjacent to the ferry terminal. The area is heavily forested and dominated by Douglas fir. The existing conditions within the defined area of critical habitat consist of a thin substrate layer that overlays a foundation of bedrock. Substrate consists of fine to coarse sand close to shore, giving way to mud overlying bare bedrock and boulders within the ferry slip (Anchor 2005b). Side channels do not occur in the ferry terminal area.</p>
6) Offshore areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	<p>The marine waters of Harney Channel are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include dissolved oxygen (water) and 4-methylphenol (sediment) (Ecology 2018).</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Offshore areas provide habitat for forage fish.</p>

4.11.2.3 *Puget Sound Steelhead (Oncorhynchus mykiss)*

There are no natal streams in the area of the Lopez Island Ferry Terminal that support Puget Sound steelhead. However, major river systems that support winter and summer steelhead include the Nooksack River (approximately 23 miles northeast), Skagit River (approximately 25 miles southeast), and Stillaguamish River (approximately 34 miles southeast). The Samish River (approximately 24 miles southeast) supports winter steelhead only. Steelhead may also be present from rivers and streams in central and southern Puget Sound (WDFW 2007a).

Available data from tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) efforts around Puget Sound have reported the capture of few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). The total sampling effort data was not available, but the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

Beach seine sampling in Bellingham Bay (north Puget Sound) also captured few steelhead (Lummi Nation, unpublished data). The Bellingham Bay research reported the capture of two juvenile steelhead salmon in 336 sets between February 14 and December 1, 2003. The steelhead were captured in the eastern portion of Bellingham Bay near the Taylor Avenue Dock on June 12 and June 25, 2003.

4.11.2.4 *Puget Sound Steelhead Critical Habitat*

The Lopez Island Ferry Terminal does not fall within designated steelhead critical habitat (Federal Register 2016a).

4.11.2.5 *Humpback Whale (Megaptera novaeangliae)*

Humpback whale may be present near the Lopez ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.11.2.6 *Southern Resident Killer Whale (Orcinus orca)*

Southern Resident Killer Whale (SRKW) may be present near the Lopez ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.11.2.7 *Southern Resident Killer Whale Critical Habitat*

The Lopez Island Ferry Terminal area lies within designated critical habitat (Area 1 – Core Summer Area). Areas with water less than 20 feet deep relative to the extreme high water mark are not included in the critical habitat designation (Federal Register 2006).

The PCEs provided in the terminal area, and their existing conditions are listed in Table LO-2. PCEs relevant to the terminal area are numbered per Federal Register 2006.

Table LO-2
Existing Conditions of Southern Resident Killer Whale PCEs at the Lopez Island Ferry Terminal

PCEs	Existing Conditions
1) Water quality to support growth and development	<p>The marine waters of Harney Channel are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include dissolved oxygen (water) and 4-methylphenol (sediment) (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Upright Channel. None of the runoff is treated.</p> <p>The first drainage area drains the forested wetland slope above the terminal area, and consists of a pond and a French drain that flows to a catch basin that is connected to the second drainage area.</p> <p>The second drainage area drains the upper and lower drop-off and holding area, and consists of seven catch basins and a swale that discharge through one of two outfalls on either side of the trestle.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>
2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	<p>Salmonids are the primary prey of SRKW, and may be present near the terminal. Further information on prey can be found in the Puget Sound Chinook section, and Appendix B – Species Biology.</p>
3) Passage conditions to allow for migration, resting, and foraging	<p>Existing structures that occur below -20 feet in critical habitat include the trestle, the slip, and dolphins.</p>

4.11.2.8 Bull Trout (*Salvelinus confluentus*)

There are no natal streams in the area of the Lopez Island Ferry Terminal that support bull trout (WDFW 2007a).

The aquatic portions of the ferry terminal are within marine FMO habitat. While bull trout have not been documented in the ferry terminal area, suitable FMO habitat is present, and bull trout are thought to occur throughout south, central, and northern Puget Sound. Therefore, it is expected that the ferry terminal area would be used by anadromous adult and sub-adult bull trout for foraging, migration, and overwintering (USFWS 2004b). Within the ferry terminal area, it is expected that individual bull trout from the Nooksack River (approximately 23 miles northeast), Samish River (approximately 24 miles southeast), Skagit River (approximately 25 miles southeast), and Stillaguamish River (approximately 34 miles southeast) may be

present. Bull trout may also be present from rivers and streams in central and southern Puget Sound (WDFW 2007a).

4.11.2.9 *Bull Trout Critical Habitat*

The Lopez Island Ferry Terminal does not fall within designated bull trout critical habitat per Federal Register 2010a.

4.11.2.10 *Green Sturgeon (Acipenser medirostris)*

There are no natal streams in the area of the Lopez Island Ferry Terminal that support green sturgeon.

Two confirmed Southern DPS green sturgeon were detected in Puget Sound in 2006, but the extent to which green sturgeon from the Southern DPS use Puget Sound is uncertain (Federal Register 2018). Observations of green sturgeon in Puget Sound are much less common compared to the coastal Washington estuaries and bays such as Willapa Bay, Grays Harbor, and the Lower Columbia River estuary (Federal Register 2018). In addition, Puget Sound does not appear to be part of the coastal migratory corridor that Southern DPS fish use to reach overwintering grounds north of Vancouver Island (Federal Register 2018).

4.11.2.11 *Green Sturgeon Critical Habitat*

The Lopez Island Ferry Terminal does not fall within designated green sturgeon critical habitat (Federal Register 2009).

4.11.2.12 *Marbled Murrelet (Brachyramphus marmoratus)*

The Lopez terminal area provides suitable marbled murrelet marine foraging habitat.

Documented surf smelt (prey species) spawning is present (see Figure LO-2), extending approximately 110 ft. NW of the terminal (WSDOT 2018a). A large herring holding area exists about 0.25 mile northeast of the terminal in open water.

WDFW surveys conducted from 2001 to 2012 show a density of less than 1 bird per square kilometer in the terminal area (WDFW 2016). The nearest documented marbled murrelet nesting site is located 42 miles SW of the terminal (WSDOT 2018b).

The Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program (2012) identified habitat suitability throughout the range of the species, and ranked it as Zero, Low, Marginal, Moderately High and Highest. The Lopez murrelet habitat suitability within the pile driving/heavy equipment zone of potential effect (0.25 miles), ranges from Zero to High (WSDOT 2019b).

Five acres of contiguous coniferous forest that may offer nesting opportunity is present within the pile driving/heavy equipment zone of potential effect (0.25 miles) (WSDOT 2014/2018c). The 0.25 mile Zone of potential effect is discussed in Section 3.4.

Ferry traffic creates regular disturbance in the immediate terminal area. From July 2017 to June 2018, there were approximately 5,980 scheduled arrivals and departures from the terminal. During the nesting season (April 1-September 23), when foraging murrelet are more active, there were approximately 2,910 scheduled arrivals and departures (WSDOT 2018d).

The marbled murrelet population in the San Juan Islands increases in late July. This increase may be the result of British Columbia birds migrating after the breeding season. In late fall/early winter, up to 26 percent of the total marbled murrelets observed in the San Juan Islands are found northwest of Shaw Island near Crane Island, the Wasp Island complex, and the southwestern shoreline of Orcas Island (approximately 1 mile from the Lopez Island Ferry Terminal). (Evans Mack 2002).

4.11.2.13 *Marbled Murrelet Critical Habitat*

No marbled murrelet critical habitat has been designated near the terminal (USFW 1996).

4.11.2.14 *Rockfish Species*

Bocaccio

Bocaccio are rarely caught in north Puget Sound and only sparse records exist for the Strait of Georgia (Federal Register 2010b). The water around Lopez Island is shallow (generally less than 30 feet deep), and remains fairly shallow through all the surrounding channels between islands (NMFS 2009). Substrates are rocky throughout the area. This area may be occupied by all life stages of bocaccio.

Yelloweye Rockfish

Yelloweye rockfish are more closely aligned with rocky, high-relief substrates than with very deep water (Federal Register 2010b). The area surrounding the San Juan Islands offers this rocky substrate. Yelloweye larvae and juveniles could be present at Lopez Island; adults would be found in the channels beyond the harbor.

4.11.2.15 *Rockfish Species Critical Habitat*

The Lopez Island Ferry Terminal is within rockfish nearshore critical habitat (less than or equal to 98 feet in depth) (Federal Register 2014). The physical and biological features (PBFs) (Federal Register 2014) essential to the conservation of juvenile Bocaccio rockfish are listed in Table LO-3. PBFs relevant to the terminal area are numbered per the CFR (Federal Register 2014). These PBFs are specific to nearshore environments, where only juvenile Bocaccio rockfish could be found. Deepwater (> 98 feet in depth) PBFs exist for adult Bocaccio, and adult and juvenile yelloweye rockfish; however, this habitat is not present at the Lopez Island Ferry Terminal and will not be discussed here.

Table LO-3
Existing Conditions of Rockfish PBFs at the Lopez Island Ferry Terminal

PBFs	Existing Conditions
1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities.	<p>The marine waters of Harney Channel are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include dissolved oxygen (water) and 4-methylphenol (sediment) (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Upright Channel. None of the runoff is treated.</p> <p>The first drainage area drains the forested wetland slope above the terminal area, and consists of a pond and a French drain that flows to a catch basin that is connected to the second drainage area.</p> <p>The second drainage area drains the upper and lower drop-off and holding area, and consists of seven catch basins and a swale that discharge through one of two outfalls on either side of the trestle.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. The substrates in the area are thin, overlying bedrock. A sandy area near the terminal contains substrates likely to support epibenthos.</p> <p>Documented surf smelt spawning is present (see Figure LO-2), extending approximately 110 feet to the northwest (WSDOT 2018a). A large herring holding area exists about 0.25 mile northeast of the ferry terminal in open water.</p>
2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.	<p>The area is heavily forested above a steep and rocky shoreline. No eelgrass beds are present near the ferry terminal. Macroalgae growing in the area is generally sparse and dominated by <i>Palmaria</i> spp, with smaller patches of <i>Nereocystis leutkeana</i>, <i>Alaria marginata</i>, <i>Sarcodiotheca</i> spp. Coralline red algae, and <i>Laminaria saccharina</i> (Anchor 2004b).</p> <p>There is some large overhanging wood vegetation. The shoreline is steep and rocky with a small sandy stretch of beach adjacent to the ferry terminal. The area is heavily forested and dominated by Douglas fir. The existing conditions within the defined area of critical habitat consist of a thin substrate layer that overlays a foundation of bedrock. Substrate consists of fine to coarse sand close to shore, giving way to mud overlying bare bedrock and boulders within the ferry slip (Anchor 2005b). Side channels do not occur in the ferry terminal area.</p>

4.11.2.16 *Pacific Eulachon*

Adult eulachon could be present at the Lopez Island Ferry Terminal. The terminal is within 50 miles of the mouths of the Elwha and Fraser Rivers, where spawning is known to occur; therefore, larger juveniles could also be present at this terminal.

4.11.2.17 *Pacific Eulachon Critical Habitat*

No Pacific eulachon critical habitat has been designated near the Lopez Island Ferry Terminal (FEDERAL REGISTER 2011).

MUKILTEO

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NOTE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Maxwelton and Mukilteo, Washington.

Section	Township	Range	Lat	Long	County
4	21N	4W	47° 57' 00" N	122° 18' 12" W	Snohomish
HUC 171100190202			WRIA 7		



Figure MU-1
Mukilteo Ferry Terminal Vicinity Map
WSF Biological Assessment Reference
Mukilteo, Washington



Mukilteo Ferry Terminal: WSF Biological Assessment Reference

- SandLance
- - - Approximate Mean High Water (MHW)

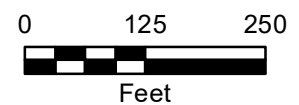
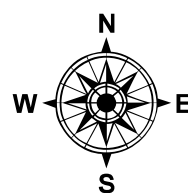


Figure MU-2
Aerial Photo of Mukilteo Ferry Terminal
WSF Biological Assessment Reference
Mukilteo, Washington

4.12 Mukilteo Ferry Terminal

The Mukilteo Ferry Terminal is located in the city of Mukilteo, approximately 30 miles north of Seattle and just south of Everett, on Possession Sound (see Figures MU-1 and MU-2).

The Mukilteo Ferry Terminal provides service to the Clinton Ferry Terminal.

Features of the terminal include a terminal building, 12 vehicle holding lanes that accommodate up to 103 vehicles, and additional roadside handling. The terminal has one slip with steel wingwalls. Three dolphins are associated with the terminal: one timber, one steel, and one floating concrete dolphin. No paid parking is available at the terminal.

4.12.1 Mukilteo Environmental Baseline

4.12.1.1 Physical Indicators

Substrate and Slope

Substrates generally consist of coarse grained sand to cobble. Riprap occurs in the high intertidal area. The beach is gently sloped. See Figures MU-3 and MU-4 for pictures of the shoreline areas west and east of the ferry terminal. Offshore depths of terminal structures are: head of slip (-32.3 feet MLLW). Maximum depth for fixed dolphins is -46.8 feet MLLW and the floating dolphin is -91.7 feet MLLW.



Figure MU-3
Shoreline Area to the West of the Mukilteo Ferry Terminal



Figure MU-4
Shoreline Area to the East of the Mukilteo Ferry Terminal

Salt/Freshwater Mixing

Within the terminal vicinity, there are a number of small intermittent and perennial streams that drain into Possession Sound. Brewery Creek enters Possession Sound through a culvert east of the terminal. Japanese Creek enter Puget Sound through two culverts near the terminal. Numerous other outfalls occur between Brewery Creek and Japanese Creek within the terminal area and several storm drain systems maintained by the City of Mukilteo discharge into Possession Sound.

Flows and Currents

Strong current flows and tidal mixing in the area is influenced by the open waters of Possession Sound. Current flow is predominately from the east during an ebb tide. The flood current is generally stronger than the ebb current.

4.12.1.2 *Chemical Indicators*

Water Quality

The marine waters of Possession Sound are designated “Extraordinary” for aquatic life use. No impaired waters listings data is available for the current terminal location (Ecology 2018).

Sediment Quality

No sediment quality data is available in the immediate terminal area (Ecology 2018).

4.12.1.3 *Biological Indicators*

Shoreline Vegetation

There is no shoreline vegetation in the vicinity of the ferry terminal. The facility is characterized by steep retaining walls and riprap.

Macroalgae and Eelgrass

Dominant macroalgae in the vicinity of the terminal includes sea lettuce and sugar kelp. Three single eelgrass shoots (see Figure MU-2) were identified in a 1999 survey (MRC 2000). The closest was west and inshore of the left wingwall. The other two were located east of the terminal.

Epibenthos, Macrofauna, Fish, and Marine Mammals

Substrate characteristics in the intertidal zone are likely to support epibenthic production. Macrofauna and fisheries resources in the area include salmon, Dungeness crab, red rock crab, sand lance, perch, rockfish, unidentified flat fish, and others common to nearshore areas of Puget Sound.

Marine mammals likely to occur in the area include harbor porpoise, resident and transient killer whale, Dall's porpoise, and harbor seal. Steller sea lion may occur in the area, and California sea lions have been observed near the terminal on numerous occasions.

Forage Fish

Documented sand lance spawning is present at the terminal extending approximately 55 feet to the east. Another sand lance spawning beach section begins approximately 325 feet to the east and extends another 145 feet east (see Figure MU-2)(WSDOT 2018a).

4.12.2 *Mukilteo Species Distributions*

4.12.2.1 *Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)*

The Snohomish River, a Chinook salmon bearing stream, is located about 7 miles north of the Mukilteo Multimodal Ferry Terminal site. Additional major river

systems that support Chinook salmon in this area of Puget Sound include the Skagit River (about 23 miles north) and Stillaguamish River (about 15 miles north). Chinook may also be present from rivers and streams in southern Puget Sound (WDFW 2007a).

Adult and Sub-adult Chinook

Summer-run Chinook migrate to freshwater in June and July and spawn in September. Summer/fall run (the most common in Puget Sound) begin freshwater migration in August and spawn from late September through January (Myers et al. 1998). Migrating sub-adult and adult Chinook salmon have free access to the entire marine portion of the terminal area. These fish could be present near the area year-round, but are likely to be more abundant in mid- to late summer as they prepare to migrate to their natal rivers to spawn. For the purpose of this analysis, sub-adults are fish that have spent a winter in the marine environment and are no longer closely oriented to the shoreline.

Juvenile Chinook

Juvenile Chinook salmon could use the area as they migrate out of their natal streams and rivers. In 1986 and 1987, a beach seine station within the action area near Mukilteo was sampled weekly from April through July. Juvenile Puget Sound Chinook salmon were more abundant and sampled more frequently than other salmonid species. The Puget Sound Chinook salmon entered the area in low numbers beginning in late April, peaked in mid-May to early June and continued in moderate to high numbers through mid-July (NOAA Fisheries 2005).

Data collected in Northern Puget Sound (Skagit Bay and Bellingham Bay) on juvenile Chinook utilization in nearshore habitats provide some additional data on the timing of juvenile Chinook occurrence in the nearshore. Skagit Bay and Bellingham Bay are more than 20 miles north of the Mukilteo Ferry Terminal and are in close proximity to major river systems that support Puget Sound Chinook salmon. They provide the most recent data on use of nearshore areas by Puget Sound Chinook salmon. Eight years of beach seine data in Skagit Bay indicates that wild sub-yearling Chinook are most abundant along the shoreline between May and July, then decrease in August.

Wild sub-yearling Chinook were captured infrequently in Skagit Bay during beach seining efforts in September and October.

A nearly identical pattern was observed in Bellingham Bay where monthly sampling continued through December (Rice 2004). The Bellingham Bay research captured two juvenile Chinook in 14 sets in September, and no juvenile Chinook were captured between October and December. Similarly, townet sampling in deeper portions of the nearshore reveal a consistent downward trend in Chinook abundance in Skagit Bay between June and October (Rice et al. 2001). Townet sampling in Bellingham Bay also documented a summer peak and few juvenile Chinook captured in October (Beamer et al. 2003). No townet sampling was conducted in Bellingham Bay during September. In comparison to the beach seine results, juvenile Chinook presence in the Skagit Bay townet samples persisted later in the year (Rice et al. 2001). This observation supports the assumption that juvenile Chinook captured in the townet are fish that have moved offshore from the immediate shoreline area and are getting closer to beginning their marine migrations. Given the close proximity of these research areas to major salmon producing rivers (Skagit and Nooksack Rivers), and the proximity of the Snohomish River to the project site, juvenile Chinook densities in the research areas are likely to be similar to those anticipated at the Mukilteo Ferry Terminal.

The Skagit Bay and Bellingham Bay research suggests that most juvenile Chinook would be moving offshore into deeper waters in August and September, and few (if any) juvenile Chinook will be in the shallow nearshore areas during late summer/early fall.

4.12.2.2 *Puget Sound Chinook Salmon Critical Habitat*

The Mukilteo Ferry Terminal lies within Chinook Zone 6 (70 FR 52630). While there are no streams that support Chinook salmon near the ferry terminal, eelgrass in close proximity to the ferry terminal may be used by juvenile Chinook for rearing.

The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table MU-1. PCEs relevant to the terminal area are numbered per 70 FR 52630.

Table MU-1
Existing Conditions of Chinook Salmon PCEs at the Mukilteo Ferry Terminal

PCEs	Existing Conditions
<p>5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.</p>	<p>Obstructions In-water structures include the trestle, the slip, and dolphins. The existing ferry terminal may affect fish passage in the nearshore.</p> <p>Water Quality and Forage The marine waters of Possession Sound are designated “Extraordinary” for aquatic life use. No impaired waters listing data is available for the current terminal location (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Possession Sound. None of the runoff is treated.</p> <p>The first drainage area drains the holding lanes, and consists of a catch basin in the upper holding lane area and two trench drains: one on the northeast side of the holding lanes and one on the east side. The catch basin and trench drains all connect to the City of Mukilteo stormwater system that discharges through an outfall to the east of the terminal area.</p> <p>The second drainage area drains the trestle approach and Front Street, and consists of four catch basins that discharge through an outfall to the west of the trestle.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. Substrate characteristics indicate that the nearshore is likely to support epibenthos.</p> <p>Documented sand lance spawning is present at the terminal extending approximately 55 feet to the east. Another sand lance spawning beach section begins approximately 325 feet to the east and extends another 145 feet east (see Figure MU-2)(WSDOT 2018a).</p> <p>Natural Cover There is no shoreline vegetation in the vicinity of the terminal. Eelgrass is not abundant at or near the terminal. There is little macroalgae. A patch of eelgrass, measuring less than 5 square meters, was observed 420 feet east of the ferry terminal, approximately 135 feet off-shore at a depth of -3 MLLW (MRC 2000).</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of mostly large and small cobble to the west of the ferry terminal, and large and small cobble inshore of the MLLW line and sand/mud with some wood debris to the east of the ferry terminal (MRC 2000). Riprap and seawalls are adjacent to the ferry terminal. Side channels do not occur in the ferry terminal area.</p>
<p>6) Offshore areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.</p>	<p>The marine waters of Possession Sound are designated “Extraordinary” for aquatic life use. No impaired waters listing data is available for the current terminal location (Ecology 2018).</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Offshore areas provide habitat for forage fish.</p>

4.12.2.3 *Puget Sound Steelhead (Oncorhynchus mykiss)*

There are no natal streams in the area of the Mukilteo Ferry Terminal that support Puget Sound steelhead. However, major river systems that support winter and summer steelhead include the Snohomish River (approximately 7 miles north), Stillaguamish River (approximately 15 shoreline miles north), Skagit River (approximately 20 shoreline miles north), and the Duwamish/Green River (approximately 30 shoreline miles south). The Lake Washington/Cedar River (approximately 20 shoreline miles south) supports winter steelhead only. In addition, numerous small streams in the Sinclair/Dyes Inlets (see Section 4.2 for more information) and southern Puget Sound rivers and streams support winter steelhead (WDFW 2007a).

Available data from tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) efforts around Puget Sound have reported the capture of few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). The total sampling effort data was not available, but the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

During 2001 and 2002, beach seining conducted in central Puget Sound by King County Department of Natural Resources captured only nine steelhead out of a total of approximately 34,000 juvenile salmonids. All the steelhead were caught between May and August and ranged in size from 141 to 462 mm with a mean size of 258 mm (Brennan et al. 2004). Beach seine sampling in Bellingham Bay (north Puget Sound) also captured few steelhead (Lummi Nation, unpublished data). The Bellingham Bay research reported the capture of two juvenile steelhead salmon in 336 sets between February 14 and December 1, 2003. The steelhead were captured in the eastern portion of Bellingham Bay near the Taylor Avenue Dock on June 12 and June 25, 2003.

4.12.2.4 *Puget Sound Steelhead Critical Habitat*

The Mukilteo Ferry Terminal does not fall within designated steelhead critical habitat (Federal Register 2016a).

4.12.2.5 *Humpback Whale (Megaptera novaeangliae)*

Humpback whale may be present near the Mukilteo ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.12.2.6 *Southern Resident Killer Whale (Orcinus orca)*

Southern Resident Killer Whale (SRKW) may be present near the Mukilteo ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.12.2.7 *Southern Resident Killer Whale Critical Habitat*

The Mukilteo Ferry Terminal lies within designated critical habitat (Area 2 – Puget Sound). Areas with water less than 20 feet deep relative to the extreme high water mark are not included in the critical habitat designation (Federal Register 2006).

The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table MU-2. PCEs relevant to the terminal area are numbered per 71 FR 69504.

Table MU-2
Existing Conditions of Southern Resident Killer Whale PCEs at the Mukilteo Ferry Terminal

PCEs	Existing Conditions
1) Water quality to support growth and development	<p>The marine waters of Possession Sound are designated “Extraordinary” for aquatic life use. No impaired waters listing data is available for the current terminal location (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Possession Sound. None of the runoff is treated.</p> <p>The first drainage area drains the holding lanes, and consists of a catch basin in the upper holding lane area and two trench drains: one on the northeast side of the holding lanes and one on the east side. The catch basin and trench drains all connect to the City of Mukilteo stormwater system that discharges through an outfall to the east of the terminal area.</p> <p>The second drainage area drains the trestle approach and Front Street, and consists of four catch basins that discharge through an outfall to the west of the trestle.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>
2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	<p>Salmonids are the primary prey of SRKW, and may be present near the terminal. Further information on prey can be found in the Puget Sound Chinook section, and Appendix B – Species Biology.</p>
3) Passage conditions to allow for migration, resting, and foraging	<p>Existing structures that occur below -20 feet in critical habitat include the head of the trestle, the slip, and dolphins.</p>

4.12.2.8 Bull Trout (*Salvelinus confluentus*)

There are no natal streams in the area of the Mukilteo Ferry Terminal that support bull trout (WDFW 2007a).

The aquatic portions of the ferry terminal are within marine FMO habitat. Therefore, it is expected that the ferry terminal area would be used by anadromous adult and sub-adult bull trout for foraging, migration, and overwintering (USFWS 2004b).

Within the ferry terminal area, it is expected that individual bull trout from the Skagit River (approximately 20 shoreline miles north), Stillaguamish River (approximately 15 shoreline miles north), Snohomish River (approximately 7 shoreline miles north), Lake Washington/Cedar River (approximately 20 shoreline

miles south), and the Duwamish/Green River (approximately 30 shoreline miles south) are most likely to be present (WDFW 2007a). Bull trout may also be present from rivers and streams in southern Puget Sound (WDFW 2007a).

Juvenile and sub-adult bull trout generally exit rivers and migrate downstream between mid-February to early September, with peak migration periods between April and July. Upon entry into saltwater, juveniles may rear in tidal delta marshes or distributary channels, or may pass through into nearshore marine areas (Goetz et al. 2004).

Preliminary study results indicate that subadult and adult bull trout first enter the lower Snohomish estuary and marine nearshore by early to mid-April. Presence in the estuary occurs through mid-summer, after which the bull trout begin moving back to freshwater (Goetz 2004). Bull trout were observed in the lower estuary or marine nearshore the first week of August 2003 (Pentec 2004). This is consistent with bull trout monitoring conducted from late summer through winter 2001 in the Snohomish River. Sampling weekly, no bull trout were collected at stations located at north Jetty Island and Priest Point when the study began in mid-August, through the following winter (Pentec 2004). Two instances of tagged bull trout detections have occurred in the Mukilteo area in the tagging program, both in early summer (Goetz, personal communication 2007).

4.12.2.9 Bull Trout Critical Habitat

The shoreline of the Mukilteo Ferry Terminal is within designated bull trout critical habitat (Federal Register 2010a). The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table MU-3. PCEs relevant to the terminal area are numbered per Federal Register 2010a.

Table MU-3
Existing Conditions of Bull Trout PCEs at the Mukilteo Ferry Terminal

PCEs	Existing Conditions
2) Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	In-water structures include the trestle, the slip, and dolphins. The existing ferry terminal may affect fish passage in the nearshore, and may reduce the production of aquatic invertebrates that are prey species to bull trout.
3) An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	<p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of mostly large and small cobble to the west of the ferry terminal, large and small cobble inshore of the MLLW line, and sand/mud with some wood debris to the east of the ferry terminal (MRC 2000). Riprap and seawalls are adjacent to the ferry terminal.</p> <p>Macroalgae occurs in the vicinity; eelgrass is sparse to absent.</p> <p>WDFW has documented sand lance spawning beaches between the existing terminal and just west of the Mukilteo Tank Farm pier, as well as east of the Port of Everett Mount Baker Terminal.</p>
4) Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	<p>In-water structures include the trestle, the slip, and dolphins. The existing ferry terminal may affect fish passage in the nearshore, and may reduce the production of aquatic invertebrates that are prey species to bull trout.</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of mostly large and small cobble to the west of the ferry terminal, large and small cobble inshore of the MLLW line, and sand/mud with some wood debris to the east of the ferry terminal (MRC 2000). Riprap and seawalls are adjacent to the ferry terminal.</p> <p>Macroalgae occurs in the vicinity; eelgrass is sparse to absent.</p>
5) Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	East Puget Sound water temperatures can range from 41.4 to 75.7 °F (5.2 to 24.3 °C) with an average of 51 °F (10.58 °C) (Ecology 2007). Water temperature data for specific ferry terminals is not available. The over-water components of the ferry terminal provide some shade, which may cause slight localized reductions in water temperatures.
8) Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	<p>The marine waters of Possession Sound are designated "Extraordinary" for aquatic life use. No impaired waters listing data is available for the current terminal location (Ecology 2018). The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Possession Sound. None of the runoff is treated.</p> <p>The first drainage area drains the holding lanes, and consists of a catch basin in the upper holding lane area and two trench drains: one on the northeast side of the holding lanes and one on the east side. The catch basin and trench drains all connect to the City of Mukilteo stormwater system that discharges through an outfall to the east of the terminal area.</p>

PCEs	Existing Conditions
	<p>The second drainage area drains the trestle approach and Front Street, and consists of four catch basins that discharge through an outfall to the west of the trestle.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>

4.12.2.10 *Green Sturgeon (Acipenser medirostris)*

There are no natal streams in the area of the Mukilteo Ferry Terminal that support green sturgeon.

Two confirmed Southern DPS green sturgeon were detected in Puget Sound in 2006, but the extent to which green sturgeon from the Southern DPS use Puget Sound is uncertain (Federal Register 2018). Observations of green sturgeon in Puget Sound are much less common compared to the coastal Washington estuaries and bays such as Willapa Bay, Grays Harbor, and the Lower Columbia River estuary (Federal Register 2018). In addition, Puget Sound does not appear to be part of the coastal migratory corridor that Southern DPS fish use to reach overwintering grounds north of Vancouver Island (Federal Register 2018).

4.12.2.11 *Green Sturgeon Critical Habitat*

The Mukilteo Ferry Terminal does not fall within designated green sturgeon critical habitat (Federal Register 2018).

4.12.2.12 *Marbled Murrelet (Brachyramphus marmoratus)*

The Mukilteo terminal area provides suitable marbled murrelet marine foraging habitat.

Documented sand lance (prey species) spawning is present at the terminal extending approximately 55 ft. E. Another sand lance spawning beach section begins approximately 325 ft. E and extends another 145 ft. E (see Figure MU-2). There is no documented herring or smelt spawning at the terminal (WSDOT 2018a).

WDFW surveys conducted from 2001 to 2012 show a density of 1-3 birds per square kilometer in the terminal area (WDFW 2016). The nearest documented marbled murrelet nesting site is located 27 miles NE of the terminal (WSDOT 2018b).

The Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program (2012) identified habitat suitability throughout the range of the species, and ranked it as Zero, Low, Marginal, Moderately High and Highest. The Mukilteo murrelet habitat suitability within the pile driving/heavy equipment zone of potential effect (0.25 miles), is Zero (WSDOT 2019b).

Murrelets are known to forage in the terminal area. Murrelets are regularly found near the terminal and the lighthouse during the summer months (April through August) approximately 1,300 feet W of the terminal. They are also found intermittently at other times of the year (ESA Adolfson 2006). During the November 2017- March 2018 construction season of the new Mukilteo terminal (approximately 0.4 miles NE of the current terminal), 219 marbled murrelet were observed between 55 and 600+ m from the new terminal location. These are likely multiple observations of individual birds, rather than 219 individuals observed, though on one day, 3 foraging pairs (6 individuals) were confirmed (WSDOT 2018e).

There are no coniferous forest near the terminal that may offer nesting opportunity (WSDOT 2018c).

Ferry traffic creates regular disturbance in the immediate terminal area. From July 2017 to June 2018, there were approximately 26,800 scheduled arrivals and departures from the terminal. During the nesting season (April 1-September 23), when foraging murrelet are more active, there were approximately 13,595 scheduled arrivals and departures (WSF 2018d).

4.12.2.13 *Marbled Murrelet Critical Habitat*

No marbled murrelet critical habitat has been designated near the terminal (USFWS 1996).

4.12.2.14 *Rockfish Species*

Bocaccio

Bocaccio are rarely caught in north Puget Sound and only sparse records exist for the Strait of Georgia (Federal Register 2010b). Because larvae are widely dispersed, it is possible that bocaccio juveniles could be found near the Mukilteo Ferry Terminal at any time of year. Adult bocaccio generally move to very deep water. The water in Possession Sound reaches depths over 100 feet at the midpoint between Whidbey Island and the mainland (NMFS 2009). This is still shallower than ideal for bocaccio.

Yelloweye Rockfish

Yelloweye rockfish are more closely aligned with rocky, high-relief substrates than with very deep water (Federal Register 2010b). Possession Sound reaches depths of over 100 feet; however, it does not have the rocky substrata preferred by yelloweye.

4.12.2.15 *Rockfish Species Critical Habitat*

The Mukilteo Ferry Terminal is within designated rockfish nearshore critical habitat (less than or equal to 98 feet in depth) (Federal Register 2014). The physical and biological features (PBFs) (Federal Register 2014) essential to the conservation of juvenile Bocaccio rockfish are listed in Table MU-4. PBFs relevant to the terminal area are numbered per the CFR (Federal Register 2014). These PBFs are specific to nearshore environments, where only juvenile Bocaccio rockfish could be found. Deepwater (> 98 feet in depth) PBFs exist for adult Bocaccio, and adult and juvenile yelloweye rockfish; however, this habitat is not present at the Mukilteo Ferry Terminal and will not be discussed here.

Table MU-4
Existing Conditions of Rockfish PBFs at the Mukilteo Ferry Terminal

PBFs	Existing Conditions
1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities.	<p>The marine waters of Possession Sound are designated “Extraordinary” for aquatic life use. No impaired waters listing data is available for the current terminal location (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Possession Sound. None of the runoff is treated.</p> <p>The first drainage area drains the holding lanes, and consists of a catch basin in the upper holding lane area and two trench drains: one on the northeast side of the holding lanes and one on the east side. The catch basin and trench drains all connect to the City of Mukilteo stormwater system that discharges through an outfall to the east of the terminal area.</p> <p>The second drainage area drains the trestle approach and Front Street, and consists of four catch basins that discharge through an outfall to the west of the trestle.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. Substrate characteristics indicate that the nearshore is likely to support epibenthos.</p> <p>Documented sand lance spawning is present at the terminal extending approximately 55 feet to the east. Another sand lance spawning beach section begins approximately 325 feet to the east and extends another 145 feet east (see Figure MU-2)(WSDOT 2018a).</p>
2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.	<p>There is no shoreline vegetation in the vicinity of the terminal. Eelgrass is not abundant at or near the terminal. There is little macroalgae. A patch of eelgrass, measuring less than 5 square meters, was observed 420 feet east of the ferry terminal, approximately 135 feet off-shore at a depth of -3 MLLW (MRC 2000).</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of mostly large and small cobble to the west of the ferry terminal, and large and small cobble inshore of the MLLW line and sand/mud with some wood debris to the east of the ferry terminal (MRC 2000). Riprap and seawalls are adjacent to the ferry terminal. Side channels do not occur in the ferry terminal area.</p>

4.12.2.16 *Pacific Eulachon*

Adult eulachon could be present at the Mukilteo Ferry Terminal. The terminal is over 100 miles distant from the river mouths where spawning is known to occur.

Any eulachon found at this terminal would likely be adults.

4.12.2.17 *Pacific Eulachon Critical Habitat*

No Pacific eulachon critical habitat has been designated near the Mukilteo Ferry Terminal (FEDERAL REGISTER 2011).

ORCAS

K:\Jobs\100016-WSF\10001603\10001603-BA-038-OR-1.dwg FIG OR-1



Jan 11, 2012 2:52pm heriksen

NOTE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Blakely Island and Shaw Island, Washington.


Section	Township	Range	Lat	Long	County
22	30N	2W	48° 35' 51" N	122° 56' 33" W	San Juan
HUC 171100030201			WRIA 2		



Figure OR-1
Orcas Island Ferry Terminal Vicinity Map
WSF Biological Assessment Reference
Orcas Island, Washington



Orcas Island Ferry Terminal: WSF Biological Assessment Reference

— — — — — Approximate Mean High Water (MHW)  Eel Grass

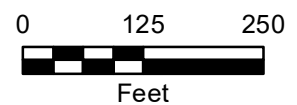
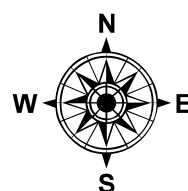


Figure OR-2
Aerial Photo of Orcas Ferry Terminal
WSF Biological Assessment Reference
Orcas Island, Washington

4.13 Orcas Ferry Terminal

The Orcas Ferry Terminal is located on the southeast shoreline of Orcas Island, with the West Sound to the west and northwest, and the Harney Channel to the east (see Figures OR-1 and OR-2).

The Orcas Ferry Terminal provides service to the Anacortes and San Juan inter-island terminals (Lopez, Shaw, Orcas, and Friday Harbor).

Features of the terminal include a passenger shelter and eight vehicle holding lanes that accommodate up to 75 vehicles. The terminal has one slip with steel wingwalls. Three dolphins are associated with the terminal, one steel and two floating concrete dolphins. One parking lot is present at the facility. No overhead passenger loading facilities are present at the terminal.

4.13.1 Orcas Environmental Baseline

4.13.1.1 Physical Indicators

Substrate and Slope

Substrates are composed primarily of sand with gravel and shell. Beach slopes appear to be gradual. See Figures OR-3 and OR-4 for pictures of the shoreline areas west and east of the ferry terminal. Offshore depths of terminal structures are: head of slip (-30.5 feet MLLW). Maximum depth for the floating dolphins is -46.5 feet MLLW.



Figure OR-3
Shoreline Area to the West of the Orcas Ferry Terminal



Figure OR-4
Shoreline Area to the East of the Orcas Ferry Terminal

Salt/Freshwater Mixing

There are two streams about 0.25 mile east of the terminal that contribute freshwater to West Sound.

Flows and Currents

There is no specific data on flows and currents in the vicinity of the ferry terminal. Based on current data from NOAA, in Harney Channel it appears that current flows are relatively weak in the vicinity of the ferry terminal.

4.13.1.2 *Chemical Indicators*

Water Quality

The marine waters of West Sound are designated “Extraordinary” for aquatic life use. No impaired waters listing data is available for the current terminal location (Ecology 2018).

Sediment Quality

There is no data available on sediment quality in the vicinity of the ferry terminal (Ecology 2018).

4.13.1.3 *Biological Indicators*

Shoreline Vegetation

Herbaceous, shrub, and forested shoreline vegetation occurs east and west of the terminal with more forested shoreline vegetation occurring east of the terminal.

Macroalgae and Eelgrass

An eelgrass survey was conducted in 2002 to gather preliminary eelgrass and biological resources information for the proposed use of a private fuel dock (105 feet west of the ferry terminal) for passenger-only operations. The survey found an eelgrass bed that extends about 150 feet west of the private dock. Based on 21 quadrat counts, the mean shoot density within the eelgrass bed ranges between 1 to 32 shoots per 0.25 square meters and 2 to 127 shoots per square meter between about -5 and -25 feet MLLW. The highest densities of eelgrass occur between about -6 and -8 feet MLLW (inshore of the private dock) (PIE 2002b). A larger eelgrass bed is located approximately 100 feet to the east of the ferry terminal. See Figure OR-2.

Macroalgae and colonial diatomaceous mats occur in the vicinity of the fuel dock and float. Dominant macroalgae species include *Ulva* sp. and unidentified algal mats. Other species observed during the dive survey include: *Iridaea cordata*, *Sparlingia pertusa*, *Palmaria mollis*, *Palmaria callophylloides*, *Laminaria saccharina*, *Chondracanthus exasperatus*, *Petalonia fascia*, *Cryptosiphonia woodii*, *Sargassum muticum*,

Ulva spp., *Gracilaria pacifica*, *Ulvaria obscura*, *Nereocystis luetkeana*, and *Costaria costata* (PIE 2002b). Though this survey was focused on the private dock, similar species can be expected to occur in the ferry terminal area.

Epibenthos, Macrofauna, Fish, and Marine Mammals

Substrate characteristics are likely to support epibenthic production. Macrofauna in the area includes horse clams, Dungeness crab, shrimp, anemones, and sunflower stars. Finfish in the area include rockfish, greenling, and flatfish. Marine mammals expected to be in the area include killer whale, Dall's porpoise, harbor porpoise, harbor seal, Steller sea lion, and California sea lion.

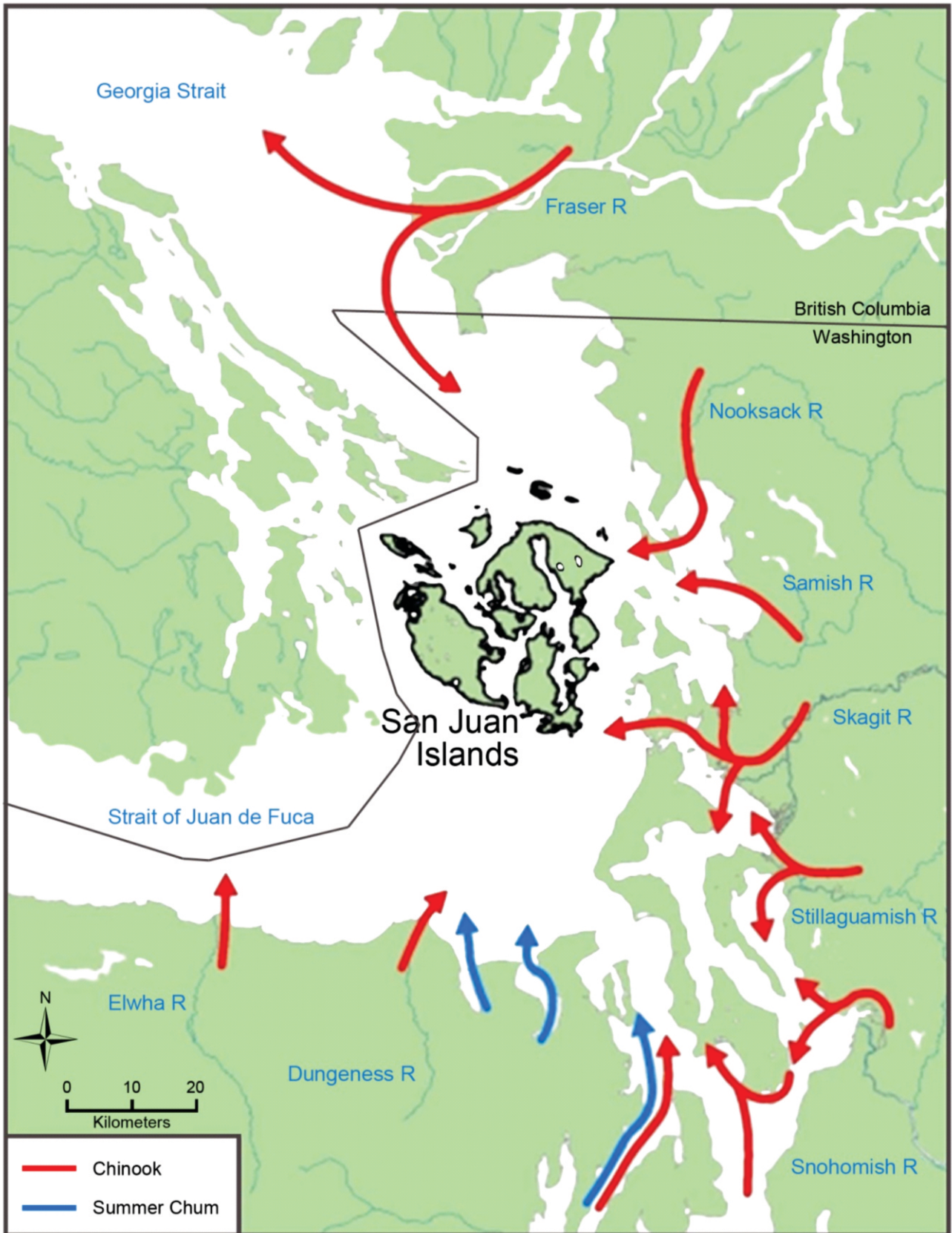
Forage Fish

There is no documented forage fish spawning present at the terminal. Documented sand lance spawning is present approximately 1,000 feet east of the terminal (WSDOT 2018a).

4.13.2 Orcas Species Distributions

4.13.2.1 Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)

No Chinook salmon bearing streams are located near the Orcas Island Ferry Terminal (WDFW 2007a). However, several major river systems that support Chinook salmon, including the Nooksack River (approximately 28 miles northeast), Samish River (approximately 25 miles east), Skagit River (approximately 30 miles southeast), and Stillaguamish River (approximately 40 miles southeast), occur in this area of the Puget Sound. Chinook may also be present from rivers and streams in central and southern Puget Sound (WDFW 2007a). Orcas Island's Crow Valley stream supports coho, and the Orcas Island Glenwood Springs Salmon Hatchery produces Chinook and coho runs (WDFW 2007b). The results of beach seine sampling completed from March to October in 2008 and 2009 indicate that juvenile Chinook salmon arrive in the San Juan Islands by April, peak in the month of June, remain relatively high in shoreline areas during summer months, and are present through October. Chinook may be present from numerous river systems, as shown in Figure OR-5 (SRSC and NOAA 2012).



SOURCE: SRSC/NOAA Fisheries 2012.

Figure OR-5
Migratory Pathways for Juvenile Salmon from
Source Population Rivers to the San Juan Islands Area
WSF Biological Assessment Reference
Orcas Island, Washington

Adult and Sub-adult Chinook

The marine environment of northern Puget Sound is a migratory corridor for adults. Adult Chinook salmon collected in the waters around the San Juan archipelago are usually Puget Sound or Fraser River populations (Sanford, personal communication 2002). WDFW micro-tag data analyzed from 1985 showed five Chinook salmon stocks have been identified in the San Juan region (Moulton, personal communication 2001).

Migrating adult and sub-adult Chinook salmon have free access to the entire marine portion of the ferry terminal area. Sub-adults have spent a winter in the marine environment and are not closely oriented to the shoreline like juveniles. Adults and sub-adults could be present near the ferry terminal area year-round, but are likely to be more abundant in summer as they prepare to migrate to their natal rivers to spawn (Anchor 2002).

Juvenile and Sub-adult Chinook

Chinook salmon do not spawn in the San Juan archipelago (Otis, personal communication 2000). Juveniles that could occur near the ferry terminal are likely of hatchery origin or have crossed open water to reach the San Juan Islands. The watersheds of this region are not large enough to support sustainable wild Chinook salmon populations (Sanford, personal communication 2002). A hatchery exists on Orcas Island but the hatchery origin Chinook are not part of the ESU.

The marine waters of the San Juan Islands provide habitat for outmigrating sub-yearling Chinook salmon from rivers into Puget Sound before their eventual oceanic phase as adults. Juvenile Chinook salmon habitat in the ferry terminal area includes the open water (pelagic zones) of the San Juan Islands and the nearshore and intertidal zones in the San Juan Islands, particularly areas supporting eelgrass and macroalgae.

4.13.2.2 *Puget Sound Chinook Salmon Critical Habitat*

The Orcas Ferry Terminal lies within Chinook Zone 2 (70 FR 52630). While there are no streams that support Chinook salmon near the ferry terminal, there are eelgrass

beds in close proximity to the ferry terminal that may be used by juvenile Chinook for rearing.

The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table OR-1. PCEs relevant to the terminal area are numbered per the CFR (70 FR 52630).

Table OR-1
Existing Conditions of Chinook Salmon PCEs at the Orcas Ferry Terminal

PCEs	Existing Conditions
5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	<p>Obstructions In-water structures include the trestle, the slip, and dolphins. The existing ferry terminal may affect fish passage in the nearshore.</p> <p>Water Quality and Forage The marine waters of West Sound are designated “Extraordinary” for aquatic life use. No impaired waters listing data is available for the current terminal location (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to West Sound. Two of the areas include treatment.</p> <p>The first drainage area drains the toll booth area, the holding lanes, and long-term parking and consists of 12 catch basins that flow through an oil/water separator (inspected annually), and discharge through an outfall to the east of the trestle.</p> <p>The second drainage area drains the immediate area in front of the waiting shelter, and consists of two catch basins. Input from four Island County catch basins connects upgradient to this area. All stormwater flows through an oil/water separator (inspected annually), and discharges through an outfall to the east of the trestle.</p> <p>The third drainage area consists of the trestle and transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. Substrate characteristics indicate that the area is likely to support epibenthic production.</p> <p>There is no documented forage fish spawning present at the terminal. Documented sand lance spawning is present approximately 1,000 feet east of the terminal (WSDOT 2018a).</p> <p>Natural Cover Herbaceous, shrub, and forested shoreline vegetation occurs east and west of the terminal with more forested shoreline vegetation occurring east of the terminal.</p> <p>Macroalgae in vicinity of the vicinity of the terminal includes bleached brunette, sea lettuce, Turkish towel, and red algae. Eelgrass does not occur immediately at the terminal; rather, two eelgrass beds have been identified east of the terminal and west in the vicinity of the private dock. The eelgrass extends out to a depth of approximately -24 feet MLLW.</p>

PCEs	Existing Conditions
	There is no large overhanging woody vegetation. A small gently sloping sandy beach exists to the east of the ferry terminal. Large diameter riprap is present under the ferry terminal dock and extends to the west. The existing conditions within the defined area of critical habitat consist of sand, gravel, and shell (PIE 2002b). Side channels do not occur in the ferry terminal area.
6) Offshore areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	<p>The marine waters of West Sound are designated "Extraordinary" for aquatic life use. West Sound is rated extraordinary for aquatic life. No impaired waters listing data is available for the current terminal location (Ecology 2018).</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Offshore areas provide habitat for forage fish.</p>

4.13.2.3 Puget Sound Steelhead (*Oncorhynchus mykiss*)

There are no natal streams in the area of the Orcas Ferry Terminal that support Puget Sound steelhead. However, major river systems that support winter and summer steelhead include the Nooksack River (approximately 28 miles northeast), Skagit River (approximately 30 miles southeast), and Stillaguamish River (approximately 40 miles southeast). The Samish River (approximately 25 miles east) supports winter steelhead only. Steelhead may also be present from rivers and streams in central and southern Puget Sound (WDFW 2007a).

Available data from tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) efforts around Puget Sound have reported the capture of few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). The total sampling effort data was not available, but the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

Beach seine sampling in Bellingham Bay (north Puget Sound) also captured few steelhead (Lummi Nation, unpublished data). The Bellingham Bay research reported the capture of two juvenile steelhead salmon in 336 sets between February 14 and December 1, 2003. The steelhead were captured in the eastern portion of Bellingham Bay near the Taylor Avenue Dock on June 12 and June 25, 2003.

4.13.2.4 *Puget Sound Steelhead Critical Habitat*

The Orcas Ferry Terminal does not fall within designated steelhead critical habitat (Federal Register 2016a).

4.13.2.5 *Humpback Whale (Megaptera novaeangliae)*

Humpback whale may be present near the Orcas ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.13.2.6 *Southern Resident Killer Whale (Orcinus orca)*

Southern Resident Killer Whale (SRKW) may be present near the Orcas ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.13.2.7 *Southern Resident Killer Whale Critical Habitat*

The Orcas Ferry Terminal area lies within designated critical habitat (Area 1 – Core Summer Area). Areas with water less than 20 feet deep relative to the extreme high water mark are not included in the critical habitat designation (Federal Register 2006).

The PCEs provided in the terminal area, and their existing conditions are listed in Table OR-2. PCEs relevant to the terminal area are numbered per Federal Register 2006 .

Table OR-2
Existing Conditions of Southern Resident Killer Whale PCEs at the Orcas Ferry Terminal

PCEs	Existing Conditions
1) Water quality to support growth and development	<p>The marine waters of West Sound are designated “Extraordinary” for aquatic life use. No impaired waters listing data is available for the current terminal location (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to West Sound. Two of the areas include treatment.</p> <p>The first drainage area drains the toll booth area, the holding lanes, and long-term parking and consists of 12 catch basins that flow through an oil/water separator (inspected annually), and discharge through an outfall to the east of the trestle.</p> <p>The second drainage area drains the immediate area in front of the waiting shelter, and consists of two catch basins. Input from four Island County catch basins connects upgradient to this area. All stormwater flows through an oil/water separator (inspected annually), and discharges through an outfall to the east of the trestle.</p> <p>The third drainage area consists of the trestle and transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p>
2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	Salmonids are the primary prey of SRKW, and may be present near the terminal. Further information on prey can be found in the Puget Sound Chinook section, and Appendix B – Species Biology.
3) Passage conditions to allow for migration, resting, and foraging	Existing structures that occur below -20 feet in critical habitat include the head of the trestle, the slip, and dolphins.

4.13.2.8 Bull Trout (*Salvelinus confluentus*)

There are no natal streams in the area of the Orcas Ferry Terminal that support bull trout (WDFW 2007a).

The aquatic portions of the ferry terminal are within marine FMO habitat. While bull trout have not been documented in the ferry terminal area, suitable FMO habitat is present, and bull trout are thought to occur throughout south, central, and northern Puget Sound. Therefore, it is expected that the ferry terminal area would be used by anadromous adult and sub-adult bull trout for foraging, migration, and overwintering (USFWS 2004b). Within the ferry terminal area, it is expected that individual bull trout from the Nooksack River (approximately 28 miles northeast), Samish River (approximately 25 miles east), Skagit River (approximately 30 miles southeast), and Stillaguamish River (approximately 40 miles southeast) may be

present. Bull trout may also be present from rivers and streams in central and southern Puget Sound (WDFW 2007a).

4.13.2.9 *Bull Trout Critical Habitat*

The Orcas Ferry Terminal does not fall within designated bull trout critical habitat (Federal Register 2010a).

4.13.2.10 *Green Sturgeon (Acipenser medirostris)*

There are no natal streams in the area of the Orcas Ferry Terminal that support green sturgeon.

Two confirmed Southern DPS green sturgeon were detected in Puget Sound in 2006, but the extent to which green sturgeon from the Southern DPS use Puget Sound is uncertain (Federal Register 2018). Observations of green sturgeon in Puget Sound are much less common compared to the coastal Washington estuaries and bays such as Willapa Bay, Grays Harbor, and the Lower Columbia River estuary (Federal Register 2018). In addition, Puget Sound does not appear to be part of the coastal migratory corridor that Southern DPS fish use to reach overwintering grounds north of Vancouver Island (Federal Register 2018).

4.13.2.11 *Green Sturgeon Critical Habitat*

The Orcas Ferry Terminal does not fall within designated green sturgeon critical habitat (Federal Register 2009).

4.13.2.12 *Marbled Murrelet (Brachyramphus marmoratus)*

The Orcas terminal area provides suitable marbled murrelet marine foraging habitat.

There is no documented forage fish spawning present at the terminal. Documented sand lance spawning is present approximately 1,000 ft. E of the terminal (WSDOT 2018a).

WDFW surveys conducted from 2001 to 2012 show a density of less than 1 bird per square kilometer in the terminal area (WDFW 2016). The nearest documented marbled murrelet nesting site is located 42 miles SW of the terminal (WSDOT 2018b).

The Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program (2012) identified habitat suitability throughout the range of the species, and ranked it as Zero, Low, Marginal, Moderately High and Highest. The Orcas murrelet habitat suitability within the pile driving/heavy equipment zone of potential effect (0.25 miles), ranges from Zero to Marginal (WSDOT 2019b).

There are no coniferous forest that may offer nesting opportunity within the pile driving/heavy equipment zone of potential effect (0.25 miles) (WSDOT 2014/2018c).

The marbled murrelet population in the San Juan Islands increases in late July. This increase may be the result of British Columbia birds immigrating after the breeding season. In late fall/early winter, up to 26 percent of the total marbled murrelets observed in the San Juan Islands are found northwest of Shaw Island near Crane Island, the Wasp Island complex, and the southwestern shoreline of Orcas Island (approximately 3.8 miles from the Orcas Ferry Terminal, and 4.8 miles from the Shaw Island Ferry Terminal). This region represents an important concentration area during the molting period (Evans Mack 2002).

Ferry traffic creates regular disturbance in the immediate terminal area. From July 2017 to June 2018, there were approximately 4,990 scheduled arrivals and departures from the terminal. During the nesting season (April 1-September 23), when foraging murrelet are more active, there were approximately 2,650 scheduled arrivals and departures (WSDOT 2018d).

4.13.2.13 *Marbled Murrelet Critical Habitat*

No marbled murrelet critical habitat has been designated near the terminal (USFWS 1996).

4.13.2.14 *Rockfish Species*

Bocaccio

Bocaccio are rarely caught in north Puget Sound and only sparse records exist for the Strait of Georgia (Federal Register 2010b). West Sound and the Harney Channel is

shallow (less than 40 feet deep). The water is generally shallow throughout the central area between the islands (NMFS 2009). Substrates are rocky throughout the area. This area may be occupied by all life stages of bocaccio.

Yelloweye Rockfish

Yelloweye rockfish are more closely aligned with rocky, high-relief substrates than with very deep water (Federal Register 2010b). The San Juan and Upright Channels offer this rocky substrate. Yelloweye larvae and juveniles could be present in the harbor area; adults would be found in the channels and open-water areas beyond the harbor.

4.13.2.15 *Rockfish Species Critical Habitat*

The Orcas Ferry Terminal is within rockfish nearshore critical habitat (less than or equal to 98 feet in depth) (Federal Register 2014). The physical and biological features (PBFs) (Federal Register 2014) essential to the conservation of juvenile Bocaccio rockfish are listed in Table OR-3. PBFs relevant to the terminal area are numbered per the CFR (Federal Register 2014). These PBFs are specific to nearshore environments, where only juvenile Bocaccio rockfish could be found. Deepwater (> 98 feet in depth) PBFs exist for adult Bocaccio, and adult and juvenile yelloweye rockfish; however, this habitat is not present at the Orcas Island Ferry Terminal and will not be discussed here.

Table OR-3
Existing Conditions of Rockfish PBFs at the Orcas Island Ferry Terminal

PBFs	Existing Conditions
1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities.	<p>The marine waters of West Sound are designated “Extraordinary” for aquatic life use. No impaired waters listing data is available for the current terminal location (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to West Sound. Two of the areas include treatment.</p> <p>The first drainage area drains the toll booth area, the holding lanes, and long-term parking and consists of 12 catch basins that flow through an oil/water separator (inspected annually), and discharge through an outfall to the east of the trestle.</p> <p>The second drainage area drains the immediate area in front of the waiting shelter, and consists of two catch basins. Input from four Island County catch basins connects upgradient to this area. All stormwater flows through an oil/water separator (inspected annually), and discharges through an outfall to the east of the trestle.</p> <p>The third drainage area consists of the trestle and transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. Substrate characteristics indicate that the area is likely to support epibenthic production.</p> <p>There is no documented forage fish spawning present at the terminal. Documented sand lance spawning is present approximately 1,000 feet east of the terminal (WSDOT 2018a).</p>
2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.	<p>Herbaceous, shrub, and forested shoreline vegetation occurs east and west of the terminal with more forested shoreline vegetation occurring east of the terminal.</p> <p>Macroalgae in vicinity of the vicinity of the terminal includes bleached brunette, sea lettuce, Turkish towel, and red algae. Eelgrass does not occur immediately at the terminal; rather, two eelgrass beds have been identified east of the terminal and west in the vicinity of the private dock. The eelgrass extends out to a depth of approximately - 24 feet MLLW.</p> <p>There is no large overhanging woody vegetation. A small gently sloping sandy beach exists to the east of the ferry terminal. Large diameter riprap is present under the ferry terminal dock and extends to the west. The existing conditions within the defined area of critical habitat consist of sand, gravel, and shell (PIE 2002b). Side channels do not occur in the ferry terminal area.</p>

4.13.2.16 *Pacific Eulachon*

Adult eulachon could be present at the Orcas Ferry Terminal. The terminal is within 50 miles of the mouths of the Elwha and Fraser Rivers, where spawning is known to occur; therefore, larger juveniles could also be present at this terminal.

4.13.2.17 *Pacific Eulachon Critical Habitat*

No Pacific eulachon critical habitat has been designated near the Orcas Ferry Terminal (FEDERAL REGISTER 2011).

POINT DEFIANCE

K:\Jobs\100016-WSF\10001603\10001603-BA-041-PD1.dwg FIG PD-1



Jan 11, 2012 3:00pm heriksen

NOTE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Gig Harbor and Tacoma North, Washington.

Section	Township	Range	Lat	Long	County
14	24N	2E	47° 18' 22" N	122° 30' 46" W	Pierce
HUC 171100190601			WRIA 12		

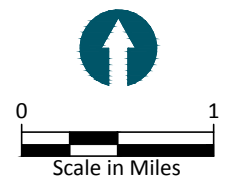
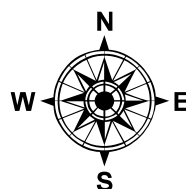


Figure PD-1
Point Defiance Ferry Terminal Vicinity Map
WSF Biological Assessment Reference
Tacoma, Washington



Point Defiance Ferry Terminal: WSF Biological Assessment Reference

- - - Approximate Mean High Water (MHW)
 - - - Macroalgae



0 125 250
 Feet

Figure PD-2

Aerial Photo of Point Defiance Ferry Terminal
 WSF Biological Assessment Reference
 Tacoma, Washington



4.14 Point Defiance Ferry Terminal

The Point Defiance Ferry Terminal is located on Point Defiance, in north Tacoma and just northeast of the Tacoma Narrows. Point Defiance is on the Dalco Passage, which leads into Commencement Bay (see Figures PD-1 and PD-2).

The Point Defiance Ferry Terminal provides service to the Talequah Ferry Terminal.

Features of the terminal include a terminal building, two vehicle holding lanes that accommodate up to 50 vehicles, and a private paid parking lot. The terminal has one slip with steel wingwalls. Two dolphins are associated with the terminal, one steel and one floating steel dolphin. No overhead loading facilities exist at the terminal.

4.14.1 Point Defiance Environmental Baseline

4.14.1.1 Physical Indicators

Substrate and Slope

The substrate is composed of medium dense silty fines to sand and gravel with riprap and bulkheads in the high intertidal. Based on aerial photographs, it appears that the aquatic bed slopes off steeply a short distance from the riprap bulkhead. Offshore depths of terminal structures are: head of slip (-18.5 feet MLLW). Maximum depth for fixed dolphin is -32.7 feet MLLW and for the floating dolphin -30.2 feet MLLW. See Figures PD-3 and PD-4 for pictures of the shoreline areas south and north of the ferry terminal.



Figure PD-3
Shoreline South of the Point Defiance Ferry Terminal



Figure PD-4
Shoreline North of the Point Defiance Ferry Terminal

Salt/Freshwater Mixing

The closest stream appears to drain into Dalco Passage about 0.5 mile east of the ferry terminal.

Flows and Currents

No specific information is available to characterize flow and current patterns.

4.14.1.2 Chemical Indicators

Water Quality

The marine waters of Dalco Passage are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include metals in sediment (Ecology 2018).

Sediment Quality

The ferry terminal is located within the Asarco Tacoma Sediment Superfund Site. Impaired waters listings in the terminal area include metals in sediment (Ecology 2018).

4.14.1.3 Biological Indicators

Shoreline Vegetation

There is no shoreline vegetation in the immediate vicinity of the ferry terminal. Shoreline vegetation consisting of shrubs and trees occurs east of the terminal.

Macroalgae and Eelgrass

Patches of eelgrass were observed during a 2013 dive survey. Macroalgae was abundant on both sides of the trestle, and included rockweed, sea lettuce, red ribbon, red filamentous algae (*Gracillaria* spp.), black tassel (*Pterosiphonia* spp.), Turkish towel, and low densities of sugar kelp in several places (CH2MHILL 2005). See Figure PD-2 for locations of eelgrass and macroalgae.

Epibenthos, Macrofauna, Fish, and Marine Mammals

Given the characteristics of the intertidal area in the vicinity of the ferry terminal, the substrates are expected to support epibenthic production. There is no site-specific information on macrofauna or fisheries resources in the vicinity of the terminal.

Given the amount of rocky habitat in the general area, fisheries resources common to Puget Sound rocky shorelines are expected.

Given the proximity of the ferry terminal to the Yacht Club, and the somewhat enclosed area where the terminal occurs, marine mammals that could occur in the vicinity include harbor seal, Steller sea lion, and California sea lion. It is unlikely that cetaceans occur in the vicinity of the ferry terminal; however, they are likely to occur in Dalco Passage.

Forage Fish

There is no documented forage fish spawning present at the terminal. Documented sand lance spawning is present approximately 4,000 feet NW of the terminal (WSDOT 2018a).

4.14.2 Point Defiance Species Distributions

4.14.2.1 Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)

No Chinook salmon bearing streams are located near the Point Defiance Ferry Terminal. However, major rivers that support Chinook salmon include the Puyallup River (approximately 5 miles southeast, shoreline distance) and the Nisqually River (approximately 25 miles southwest, shoreline distance). Chinook may also be present from rivers and streams in southern Puget Sound (WDFW 2007a).

Adult and Sub-adult Chinook

Adults may be found near the terminal at any time of year, but are most abundant during late summer and fall when returning from the ocean to their natal streams.

Sub-adult Chinook have access to the terminal area and may be found there at any time of year. Sub-adults have spent a winter in the marine environment and are not closely oriented to the shoreline like juveniles.

Juvenile Chinook

While there are no streams that support Chinook salmon near the ferry terminal, nearshore waters may be used by juvenile Chinook for rearing. Juveniles would likely be most abundant during late spring/early summer.

4.14.2.2 Puget Sound Chinook Salmon Critical Habitat

The Point Defiance Ferry Terminal lies within Chinook Zone 11 (70 FR 52630). The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table PD-1. PCEs relevant to the terminal area are numbered per the CFR (70 FR 52630).

Table PD-1
Existing Conditions of Chinook Salmon PCEs at the Point Defiance Ferry Terminal

PCEs	Existing Conditions
5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	<p>Obstructions In-water structures include the trestle, the slip, and dolphins. The existing ferry terminal may affect fish passage in the nearshore.</p> <p>Water Quality and Forage The marine waters of Dalco Passage are designated “Extraordinary” for aquatic life. Impaired waters listings in the terminal area include metals in sediment (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Dalco Passage. Two of the areas include treatment.</p> <p>The first drainage area drains the holding and exit lanes, and consists of two catch basins that flow through an oil/water separator (inspected annually) before connecting to the second drainage area. Input from the WSDOT system connects upgradient to this area.</p> <p>The second drainage area drains the trestle approach, exit lanes, and the parking area, and consists of five catch basins that flow through an oil/water separator maintained by the City of Tacoma. Both areas discharge through a City of Tacoma outfall to the west of the pier.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. The ferry terminal lies within the Asarco Tacoma Sediments Superfund Site. Substrates in the area are expected to support epibenthic production.</p> <p>There is no documented forage fish spawning present at the terminal. Documented sand lance spawning is present approximately 4,000 feet NW of the terminal (WSDOT 2018a).</p> <p>Natural Cover Shoreline vegetation consisting of shrubs and trees occurs east of the terminal. Macroalgae species at the Point Defiance Ferry Terminal include kelp, rockweed, sea lettuce, and other red and brown algae. Two very small patches of eelgrass were observed during a 2003 dive survey.</p> <p>There is no large overhanging woody vegetation. The existing conditions within the defined area of critical habitat consist of gravel with areas of sand. Clam shells and shell hash were commonly mixed with gravel, sand, and gravel/sand substrates. The area between the transfer span towers was cobble. The shoreline adjacent to the terminal is entirely riprap (CH2MHILL 2005). Side channels do not occur in the ferry terminal area.</p>

PCEs	Existing Conditions
6) Offshore areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	<p>The marine waters of Dalco Passage near the ferry terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include metals in sediment (Ecology 2018).</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Offshore areas provide habitat for forage fish.</p>

4.14.2.3 *Puget Sound Steelhead (Oncorhynchus mykiss)*

There are no natal streams in the area of the Point Defiance Ferry Terminal that support Puget Sound steelhead. However, major river systems and streams that support winter steelhead include the Puyallup River (approximately 5 miles southeast, shoreline distance), Chambers Creek (approximately 12 miles southwest, shoreline distance), Red Salmon Creek (approximately 24 miles southwest, shoreline distance), the Nisqually River (approximately 25 miles southwest, shoreline distance), and McAllister Creek (approximately 26 miles southwest, shoreline distance). In addition, the Deschutes River and smaller drainages in southern Puget Sound also support winter steelhead (WDFW 2007a).

Available data from tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) efforts around Puget Sound have reported the capture of few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). The total sampling effort data was not available, but the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

During 2001 and 2002, beach seining conducted in central Puget Sound by King County Department of Natural Resources captured only nine steelhead out of a total of approximately 34,000 juvenile salmonids. All the steelhead were caught between May and August and ranged in size from 141 to 462 mm with a mean size of 258 mm (Brennan et al. 2004).

4.14.2.4 *Puget Sound Steelhead Critical Habitat*

The Point Defiance Ferry Terminal does not fall within designated steelhead critical habitat (Federal Register 2016a).

4.14.2.5 *Humpback Whale (Megaptera novaeangliae)*

Humpback whale may be present near the Point Defiance ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.14.2.6 *Southern Resident Killer Whale (Orcinus orca)*

Southern Resident Killer Whale (SRKW) may be present near the Point Defiance ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.14.2.7 *Southern Resident Killer Whale Critical Habitat*

The Point Defiance Ferry Terminal area lies within designated critical habitat (Area 2 – Puget Sound). Areas with water less than 20 feet deep relative to the extreme high water mark are not included in the critical habitat designation (Federal Register 2006).

The PCEs provided in the terminal area, and their existing conditions are listed in Table PD-2. PCEs relevant to the terminal area are numbered per Federal Register 2006.

Table PD-2
Existing Conditions of Southern Resident Killer Whale PCEs at the Point Defiance Ferry Terminal

PCEs	Existing Conditions
1) Water quality to support growth and development	<p>The marine waters of Dalco Passage are designated "Extraordinary" for aquatic life use. Impaired waters listings in the terminal area include metals in sediment (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Dalco Passage. Two of the areas include treatment.</p> <p>The first drainage area drains the holding and exit lanes, and consists of two catch basins that flow through an oil/water separator (inspected annually) before connecting to the second drainage area. Input from the WSDOT system connects upgradient to this area.</p> <p>The second drainage area drains the trestle approach, exit lanes, and the parking area, and consists of five catch basins that flow through an oil/water separator maintained by the City of Tacoma. Both areas discharge through a City of Tacoma outfall to the west of the pier.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>
2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	Salmonids are the primary prey of SRKW, and may be present near the terminal. Further information on prey can be found in the Puget Sound Chinook section, and Appendix B – Species Biology.
3) Passage conditions to allow for migration, resting, and foraging	Existing structures that occur below -20 feet in critical habitat include the dolphins.

4.14.2.8 Bull Trout (*Salvelinus confluentus*)

There are no natal streams in the area of the Point Defiance Ferry Terminal that support bull trout (WDFW 2007a). However, bull trout are documented in the Puyallup River and Commencement Bay, which are both near the Point Defiance Terminal (Goetz et al. 2004). The aquatic portions of the terminal are within marine FMO habitat. While bull trout have not been documented in the terminal area, suitable FMO habitat is present, and bull trout are thought to occur throughout south, central, and northern Puget Sound. Therefore, it is expected that the terminal area would be used by anadromous adult and sub-adult bull trout for foraging, migration, and overwintering (USFWS 2004b). Within the terminal area, it is

expected that individual bull trout from the Puyallup River (approximately 5 miles southeast, shoreline distance) core area are most likely to be present (WDFW 2007a).

4.14.2.9 Bull Trout Critical Habitat

The shoreline of the Point Defiance Ferry Terminal is within designated bull trout critical habitat. The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table PD-3. PCEs relevant to the terminal area are numbered per Federal Register 2010a.

Table PD-3
Existing Conditions of Bull Trout PCEs at the Point Defiance Ferry Terminal

PCEs	Existing Conditions
2) Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	In-water structures include the trestle, the slip, and dolphins. The existing ferry terminal may affect fish passage in the nearshore, and may reduce the production of aquatic invertebrates that are prey species to bull trout.
3) An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	<p>Macroalgae species at the Point Defiance Ferry Terminal include kelp, rockweed, sea lettuce, and other red and brown algae. Two very small patches of eelgrass were observed during a 2003 dive survey.</p> <p>There is no large overhanging woody vegetation. The existing conditions within the defined area of critical habitat consist of gravel with areas of sand. Clam shells and shell hash were commonly mixed with gravel, sand, and gravel/sand substrates. The area between the transfer span towers was cobble. The shoreline adjacent to the ferry terminal is entirely riprap (CH2MHILL 2005).</p> <p>The ferry terminal lies within the Asarco Tacoma Sediments Superfund Site. Substrates in the area are expected to marginally support epibenthic production.</p> <p>Sand lance spawning occurs about 0.5 miles west of the terminal.</p>
4) Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	<p>In-water structures include the trestle, the slip, and dolphins. The existing ferry terminal may affect fish passage in the nearshore, and may reduce the production of aquatic invertebrates that are prey species to salmon.</p> <p>There is no large overhanging woody vegetation. The existing conditions within the defined area of critical habitat consist of gravel with areas of sand. Clam shells and shell hash were commonly mixed with gravel, sand, and gravel/sand substrates. The area between the transfer span towers was cobble. The shoreline adjacent to the ferry terminal is entirely riprap (CH2MHILL 2005).</p> <p>Macroalgae species at the Point Defiance Ferry Terminal include kelp, rockweed, sea lettuce, and other red and brown algae. Two very small patches of eelgrass were observed during a 2003 dive survey.</p>

PCEs	Existing Conditions
5) Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	East Puget Sound water temperatures can range from 41.4 to 75.7 °F (5.2 to 24.3 °C) with an average of 51 °F (10.58 °C) (Ecology 2007). Water temperature data for specific ferry terminals is not available. The over-water components of the ferry terminal provide some shade, which may cause slight localized reductions in water temperatures.
8) Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	<p>The marine waters of Dalco Passage are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include metals in sediment (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Dalco Passage. Two of the areas include treatment.</p> <p>The first drainage area drains the holding and exit lanes, and consists of two catch basins that flow through an oil/water separator (inspected annually) before connecting to the second drainage area. Input from the WSDOT system connects upgradient to this area.</p> <p>The second drainage area drains the trestle approach, exit lanes, and the parking area, and consists of five catch basins that flow through an oil/water separator maintained by the City of Tacoma. Both areas discharge through a City of Tacoma outfall to the west of the pier.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>

4.14.2.10 *Green Sturgeon (Acipenser medirostris)*

There are no natal streams in the area of the Point Defiance Ferry Terminal that support green sturgeon.

Two confirmed Southern DPS green sturgeon were detected in Puget Sound in 2006, but the extent to which green sturgeon from the Southern DPS use Puget Sound is uncertain (Federal Register 2018). Observations of green sturgeon in Puget Sound are much less common compared to the coastal Washington estuaries and bays such as Willapa Bay, Grays Harbor, and the Lower Columbia River estuary (Federal Register 2018). In addition, Puget Sound does not appear to be part of the coastal migratory corridor that Southern DPS fish use to reach overwintering grounds north of Vancouver Island (Federal Register 2018).

4.14.2.11 *Green Sturgeon Critical Habitat*

The Point Defiance Ferry Terminal does not fall within designated green sturgeon critical habitat (Federal Register 2009).

4.14.2.12 *Marbled Murrelet (Brachyramphus marmoratus)*

The Point Defiance terminal area provides suitable marbled murrelet marine foraging habitat.

There is no documented forage fish spawning present at the terminal. Documented sand lance spawning is present approximately 4,000 ft. NW of the terminal (WSDOT 2018a).

WDFW surveys conducted from 2001 to 2012 show a density of less than 1 bird per square kilometer in the terminal area (WDFW 2016). The nearest documented marbled murrelet nesting site is located 37 NW miles of the terminal (WSDOT 2018b).

The Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program (2012) identified habitat suitability throughout the range of the species, and ranked it as Zero, Low, Marginal, Moderately High and Highest. The Point Defiance murrelet habitat suitability within the pile driving/heavy equipment zone of potential effect (0.25 miles), is Zero (WSDOT 2019b).

There are no coniferous forest that may offer nesting opportunity within the pile driving/heavy equipment zone of potential effect (0.25 miles) (WSDOT 2014/2018c).

Ferry traffic creates regular disturbance in the immediate terminal area. From July 2017 to June 2018, there were approximately 13,970 scheduled arrivals and departures from the terminal. During the nesting season (April 1-September 23), when foraging murrelet are more active, there were approximately 7,010 scheduled arrivals and departures (WSDOT 2018d).

4.14.2.13 *Marbled Murrelet Critical Habitat*

No marbled murrelet critical habitat has been designated near the terminal (USFWS 1996).

4.14.2.14 *Rockfish Species*

Bocaccio

Bocaccio are rarely caught in north Puget Sound and only sparse records exist for the Strait of Georgia (Federal Register 2010b). Because larvae are widely dispersed, it is possible that bocaccio juveniles could be found near the Point Defiance Ferry Terminal at any time of year. Adult bocaccio generally move to very deep water. The waters of Dalco Passage range from about 40 to 90 feet deep and are subject to strong currents (NMFS 2009). This is still shallower than ideal for bocaccio, but rockfish-suitable substrates exist in the Tacoma Narrows and rockfish populations exist there (NMFS 2009).

Yelloweye Rockfish

Yelloweye rockfish are more closely aligned with rocky, high-relief substrates than with very deep water (Federal Register 2010b). The waters near Point Defiance offer both rocky substrates and deep water. It is likely that yelloweye rockfish are in the vicinity.

4.14.2.15 *Rockfish Species Critical Habitat*

The Point Defiance Ferry Terminal is within rockfish nearshore critical habitat (less than or equal to 98 feet in depth) (Federal Register 2014). The physical and biological features (PBFs) (Federal Register 2014) essential to the conservation of juvenile Bocaccio rockfish are listed in Table PD-4. PBFs relevant to the terminal area are numbered per the CFR (Federal Register 2014). These PBFs are specific to nearshore environments, where only juvenile Bocaccio rockfish could be found. Deepwater (> 98 feet in depth) PBFs exist for adult Bocaccio, and adult and juvenile yelloweye rockfish; however, this habitat is not present at the Point Defiance Ferry Terminal and will not be discussed here.

Table PD-4
Existing Conditions of Rockfish PBFs at the Point Defiance Ferry Terminal

PBFs	Existing Conditions
1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities.	<p>The marine waters of Dalco Passage are designated "Extraordinary" for aquatic life. Impaired waters listings in the terminal area include metals in sediment (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of three drainage areas that drain to Dalco Passage. Two of the areas include treatment.</p> <p>The first drainage area drains the holding and exit lanes, and consists of two catch basins that flow through an oil/water separator (inspected annually) before connecting to the second drainage area. Input from the WSDOT system connects upgradient to this area.</p> <p>The second drainage area drains the trestle approach, exit lanes, and the parking area, and consists of five catch basins that flow through an oil/water separator maintained by the City of Tacoma. Both areas discharge through a City of Tacoma outfall to the west of the pier.</p> <p>The third drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. The ferry terminal lies within the Asarco Tacoma Sediments Superfund Site. Substrates in the area are expected to support epibenthic production.</p> <p>There is no documented forage fish spawning present at the terminal. Documented sand lance spawning is present approximately 4,000 feet NW of the terminal (WSDOT 2018a).</p>
2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.	<p>Shoreline vegetation consisting of shrubs and trees occurs east of the terminal. Macroalgae species at the Point Defiance Ferry Terminal include kelp, rockweed, sea lettuce, and other red and brown algae. Two very small patches of eelgrass were observed during a 2003 dive survey.</p> <p>There is no large overhanging woody vegetation. The existing conditions within the defined area of critical habitat consist of gravel with areas of sand. Clam shells and shell hash were commonly mixed with gravel, sand, and gravel/sand substrates. The area between the transfer span towers was cobble. The shoreline adjacent to the terminal is entirely riprap (CH2MHILL 2005). Side channels do not occur in the ferry terminal area.</p>

4.14.2.16 *Pacific Eulachon*

The Point Defiance Ferry Terminal is very close to the Puyallup River, where eulachon spawning is known to occur sporadically. According to NMFS, eulachon are rare/absent in mid and south Puget Sound, and do not need to be consulted on for this terminal (Carey, personal communication, 2013).

4.14.2.17 *Pacific Eulachon Critical Habitat*

No Pacific eulachon critical habitat has been designated near the Point Defiance Ferry Terminal (FEDERAL REGISTER 2011).

PORT TOWNSEND

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Jan 11, 2012 3:10pm heriksen

NOTE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Coupeville, Nordland, and Port Townsend North and South, Washington.

Section	Township	Range	Lat	Long	County
11	36N	1W	48° 06' 50" N	122° 45' 62" W	Jefferson
HUC 171100190803			WRIA 17		

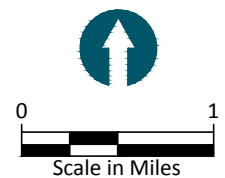
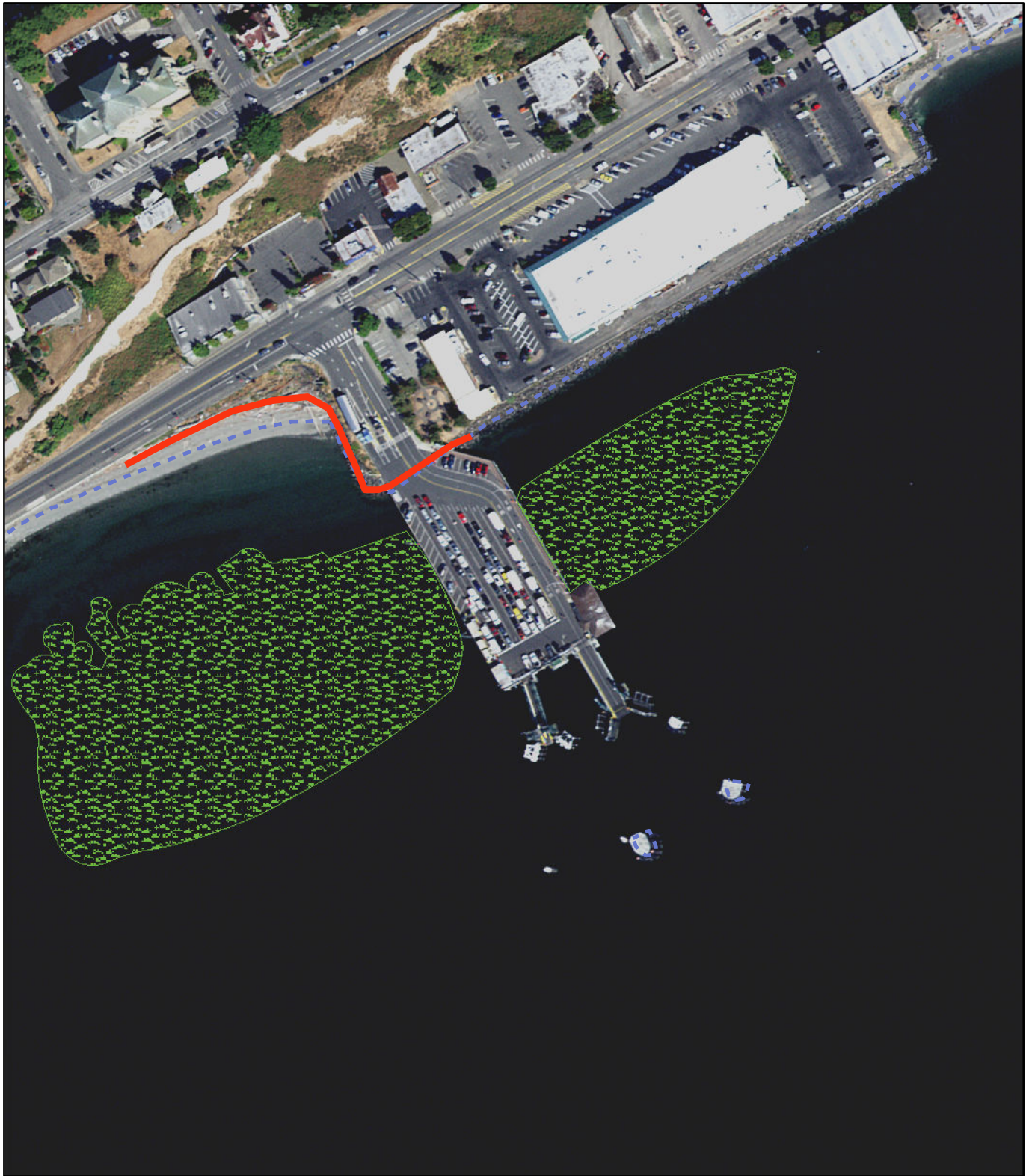


Figure PT-1
Port Townsend Ferry Terminal Vicinity Map
WSF Biological Assessment Reference
Port Townsend, Washington



Port Townsend Ferry Terminal: WSF Biological Assessment Reference

- SandLance
- - - Approximate Mean High Water (MHW)
-  Eel Grass

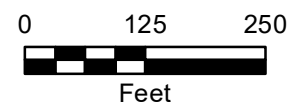
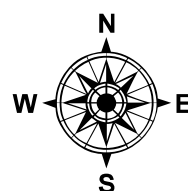


Figure PT-2

Aerial Photo of Port Townsend Ferry Terminal
WSF Biological Assessment Reference
Port Townsend, Washington



4.15 Port Townsend Ferry Terminal

The Port Townsend Ferry Terminal is located in the city of Port Townsend, on Port Townsend Bay, tributary to Admiralty Inlet (see Figures PT-1 and PT-2).

The Port Townsend Ferry Terminal provides service to the Coupeville Terminal.

Features of the terminal include a terminal building, 10 vehicle holding lanes that accommodate up to 100 vehicles, and overhead passenger loading facilities. The terminal has main and auxiliary slips. Steel wingwalls are present in the main slip and nine-pile steel wingwalls are present in the auxiliary slip. Five dolphins are associated with the terminal, three steel in the main slip and two timber dolphins in the auxiliary slip. No paid parking or passenger overhead loading facilities exist at the terminal.

4.15.1 Port Townsend Environmental Baseline

4.15.1.1 Physical Indicators

Substrate and Slope

Substrate conditions in Port Townsend Bay are generally soft bottom types. The northern portion of the bay tends to be more coarse and the inner bay is more muddy. Littoral drift has an influence on the substrate character along shorelines. Within Port Townsend Bay, the pattern of littoral drift is north along the northwest shoreline, south along the southwest shoreline, and south along nearly the entire east shoreline of the bay. The drift cell along the city waterfront has been cut off from its feeder bluffs by fill and shoreline armoring.

A sill (a shallow vertical constriction) in Admiralty Inlet adjacent to Port Townsend Bay is less than 200 feet deep. This sill separates waterbodies with depths of over 600 feet on either side of the sill. Admiralty Inlet is also a horizontal constriction. This underwater topography results in very high tidal velocities and subsequent mixing over the rocky irregular bottom (Strickland 1983).

On shoreline areas where constructed seawalls exist at intertidal elevations, gravel pocket beaches are present. These gravel pocket beaches transition to sandy substrates at subtidal depths. Sand and gravel recruitment from the feeder bluffs

adjacent to the ferry terminal have been cut off from shoreline erosional processes due to fill and seawalls associated with the construction of SR 20 and other shoreline development. See Figures PT-3 and PT-4 for pictures of the shoreline areas north and south of the ferry terminal.

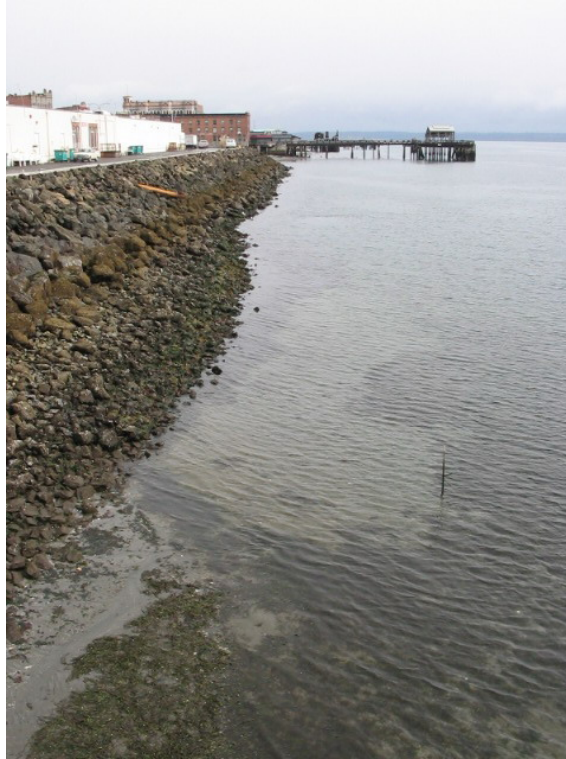


Figure PT-3
Shoreline Area North of the Port Townsend
Ferry Terminal



Figure PT-4
Shoreline Area South of the Port Townsend Ferry
Terminal

During May 2005, Marine Resources Consultants (MRC) and the project fisheries discipline team biologist used underwater videography to examine subtidal substrate conditions in the immediate vicinity of the ferry terminal and the area between the terminal and the Union Wharf pier to the east (Norris and Fraser 2005). The predominant subtidal substrate type in the project area is sand mixed with clam shells or clam shell fragments. The shell fraction within 8 feet of the ferry terminal perimeter and the riprap seawall is composed of barnacle shell fragments. Pure sand substrates are only found in a few patches in the borrow pit located to the east of the ferry terminal. Sand mixed with gravel substrate is present in patches offshore of the ferry slips where propeller wash has blown away some of the finer particles. Gravel bottom conditions are present offshore of the main ferry slip. A small amount of cobble substrate is present well offshore of the main ferry slip.

The walls of the borrow pit are relatively steep just offshore of the Port Townsend Plaza. The pit was excavated when the Port Townsend Plaza was built to provide fill behind the riprap seawall (Nightengale 2002). Although the dominant substrate observed in the pit was sand with shells or pure sand, most of the bottom was unobservable due to the very thick growth of macroalgae.

Offshore depths of terminal structures are: head of main slip (-24.8 feet MLLW), and auxiliary slip (-22.5 feet MLLW). Maximum depth for fixed dolphins is -23.0 feet MLLW and for the floating dolphin -20.5 feet MLLW.

Salt/Freshwater Mixing

The only freshwater body in the immediate vicinity of the ferry terminal is Kah Tai Lagoon. This waterbody is brackish due to inflow of marine water from Port Townsend Bay. Stormwater from a sizable portion of the city of Port Townsend drains to this lagoon before discharging into the bay. Stormwater runoff from the city enters Port Townsend Bay through several outfalls, five of which are within 1 mile of the Port Townsend Ferry Terminal.

A high degree of mixing occurs in the adjacent waterbody of Admiralty Inlet. As stated in the previous Substrate and Slope section, a sill (a shallow vertical constriction) in Admiralty Inlet adjacent to Port Townsend Bay is less than 200 feet deep. This sill separates waterbodies with depths of over 600 feet on either side of the sill. Admiralty Inlet is also a horizontal constriction. This underwater topography results in very high tidal velocities and subsequent mixing over the rocky irregular bottom (Strickland 1983).

Turbulence caused by strong currents in the eastern Strait of Juan de Fuca and high seasonal winds increases mixing.

Flows and Currents

Weak currents travel parallel to the shoreline, controlled primarily by tidal conditions. During ebb tide, the current moves westerly at about 1 foot per second. The current moves easterly, generally less than 0.5 foot per second, during the flood tide. Along the shoreline, the current is even slower.

4.15.1.2 Chemical Indicators

Water Quality

The marine waters of Port Townsend Bay are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include inorganic nitrogen loading resulting in human-caused eutrophication of eelgrass beds (Ecology 2018). Ecology’s 2012 303(d) list identified no water quality parameters of concern for Port Townsend Bay.

Major water uses designated by the State of Washington include salmon rearing, shellfish rearing and harvesting, primary contact recreation, and commerce and navigation. The water temperature standard for marine water is 55°F. Temperature in the south Port Townsend Bay has been found to exceed 55°F on many occasions. These higher temperatures have been attributed to warmer weather conditions during the summer, which promote temporary water stratification (City of Port Townsend 2002).

DO generally stays above 7.0 mg/L (the state standard) in most years (PTMSC 2001). This is partly due to the general lack of water column stratification that is common in other similar embayments such as nearby Discovery Bay (Nightingale 2000). The weak water column stratification in Port Townsend Bay is due to the high degree of mixing that occurs in the adjacent waterbody of Admiralty Inlet. The occasional low DO conditions in Port Townsend Bay are due to deep bottom water, with naturally low DO from the Strait of Juan De Fuca, upwelling at the entrance of Admiralty Inlet adjacent to Port Townsend Bay.

There are five untreated stormwater outfalls along the southern shoreline of Port Townsend Bay where the ferry terminal is located. Since the majority of the surfaces generating runoff along this shoreline consist of large commercial parking lots and roadways, these stormwater outfalls most likely introduce pollutants to marine waters such as total suspended solids (TSS) and oil.

Inorganic nitrogen, usually nitrate, is the leading cause of plankton blooms in marine waters. According to Ecology analysis, Port Townsend Bay has detectable levels of inorganic nitrogen (primarily nitrate), which tend to drop to scarcely detectable levels in summer. This drop during the summer months is attributed to uptake by the phytoplankton.

Sediment Quality

Sediment samples collected southwest of the terminal in 1998 indicate no exceedences of Sediment Management Standards (Ecology 2018).

4.15.1.3 *Biological Indicators*

Shoreline Vegetation

The shoreline of the city of Port Townsend is approximately 3 miles long. Many overwater structures, armored walls, and artificial fills are present on the city's waterfront. The southern shoreline, from Point Hudson to Indian Point, is approximately 1 mile long and contains the ferry terminal. About 98 percent of the downtown Port Townsend shoreline is armored by riprap, overwater structures, bulkheads, or jetties (Nightingale 2003).

The shoreline east of the Port Townsend Ferry Terminal was formerly dominated by tidal marshes, whereas the shoreline to the west has steep bluffs that likely provided sediments to the adjacent intertidal beaches. A long history of human activity, which includes artificial fills, dredging, and construction of overwater structures, has re-shaped this shoreline completely. SR 20 runs along the shoreline. The majority of land use along the shore is commercial, and only 15 percent is residential—mainly condominiums and apartments.

Riprap and vertical concrete seawalls extend down to subtidal depths including the shoreline immediately to the east of the ferry terminal. There are areas where seawalls only exist at the extreme high tidal elevation, such as the beach immediately to the west of the ferry terminal. Feeder bluffs along the city waterfront have been cut off from the shore by fill and shoreline armoring.

Macroalgae and Eelgrass

Macroalgae is present and is interlaced with eelgrass growth where eelgrass is present and is thicker in areas where eelgrass is absent. Rockweed occurs in the higher intertidal area on riprap. Sea lettuce is abundant at depths less than -15 feet MLLW. At depths greater than about -10 feet MLLW, the macroalgae community shifts towards brown and red algae species, and at depth greater than about -30 feet MLLW, the community shifts to red algae species.

Eelgrass is present throughout Port Townsend Bay. The eelgrass bed west of the ferry terminal extends to the Boat Haven (0.75 miles southwest), then from the Boat Haven to the pulp mill (2 miles southwest). Eelgrass east of the terminal occurs in more discreet beds. See Figure PT-2. There are long, continuous eelgrass beds along the western shoreline and the south end of the bay. Eelgrass exists in patchy beds along the eastern shoreline of the bay. Eelgrass beds line almost all of the shorelines of Kilisut Harbor, which lies between Indian Island and Marrowstone Island (harbor entrance 2 miles southeast).

Epibenthos, Macrofauna, Fish, and Marine Mammals

The substrate composition and presence of eelgrass would support epibenthic production. Dungeness crab occur in the bay, and are more abundant farther

offshore than in the vicinity of the waterfront or in the center of the bay.

Concentrations of spot shrimp are present on the east side of the bay. Geoduck are abundant in several areas of the bay, and hardshell clams, such as littleneck clams (*Protothaca staminea*) and butter clams (*Saxidomus giganteus*), are likely found wherever habitat is suitable in the bay.

Port Townsend Bay supports a wide variety of demersal fish. Otter trawls were conducted in June of each year over a 10 year period. A total of 73 species were caught and the most abundant species in the bay was Pacific tomcod (*Microgadus proximus*). Other relatively abundant species included snake pricklyback (*Lumpenus sagitta*), Pacific herring, walleye Pollock (*Theragra chalcogramma*), English sole, ribbed sculpin (*Triglops pingelii*), flathead sole (*Hippoglossoides elassodon*), blackbelly eelpout (*Lycodes pacificus*), Pacific sand dab (*Citharichthys sordidus*), and spotted ratfish (*Hydrolagus colliei*) (CH2MHILL 2006a). Other species observed in the vicinity of the ferry terminal included sand lance; perch; gunnel (*Pholis ornata*); starry flounder; chum, pink, and Chinook salmon; and coastal cutthroat trout.

Marine mammals that might use marine habitat in Port Townsend Bay include harbor seal, California sea lion, Steller sea lion, harbor porpoise, Dall's porpoise, gray whale, minke whale, and killer whale.

Harbor seal, Steller sea lion, and California sea lion are common, year-round residents. A seal and sea lion haul-out is located at Fort Flagler State Park, approximately 2 miles southeast of the ferry terminal.

Forage Fish

Documented surf smelt (prey species) spawning is present at the terminal (see Figure PT-2), and extends approximately 270 feet to the southwest of the terminal (WSDOT 2018a).

Port Townsend Bay and Kilisut Harbor are important spawning areas for three species of forage fish: Pacific herring, sand lance, and surf smelt. Herring spawning in the vicinity is referred to as the Kilisut Harbor stock. In recent years, all spawning has occurred within Kilisut Harbor (Stick 2005). This spawning stock is small

relative to others in Puget Sound, averaging about 400 tons. Stock abundance fluctuates widely from year to year, with 2004 spawning biomass estimated at about 200 tons (Stick 2005). The pre-spawning holding area is in the deep central portion of Port Townsend Bay. Spawning starts in February and ends in mid-April.

Surf smelt are known to use a number of beaches for spawning within Port Townsend Bay. These areas are scattered throughout the bay, with a large concentration of spawning beaches in Kilisut Harbor. Surf smelt spawning can occur during summer, fall, and winter.

Sand lance are known to use a number of beaches for spawning in Port Townsend Bay and Kilisut Harbor. Spawning in Puget Sound occurs annually from the beginning of November through mid-February. Sand lance spawn on sand or sand mixed with small gravel between tide elevations of +5 feet MLLW to MHHW (+8.45 feet MLLW in Port Townsend Bay) in the upper intertidal zone.

4.15.2 Port Townsend Species Distributions

4.15.2.1 Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)

No Chinook salmon-bearing streams are located near the Port Townsend Ferry Terminal (WDFW 2007a).

Chinook bearing rivers in Hood Canal include the Big and Little Quilcene Rivers (approximately 48 miles southeast, shoreline distance), the Dosewallips River (approximately 38 miles southeast, shoreline distance), the Duckabush River (approximately 44 miles southeast, shoreline distance), and other Hood Canal rivers and streams farther south. Chinook bearing rivers in central and south Puget Sound include the Stillaguamish River (approximately 57 miles south then northeast, shoreline distance), Skagit River (approximately 65 miles south then northeast, shoreline distance), the Snohomish River (approximately 48 miles south then northeast, shoreline distance), the Lake Washington/Cedar River (approximately 40 miles southeast), and Duwamish/Green River (approximately 47 miles southeast). Chinook may also be present from rivers and streams in southern Hood Canal and Puget Sound (WDFW 2007a).

Adult and Sub-adult Chinook

Adults could be present in deeper offshore waters year-round. The greatest abundance of adults would occur between early summer and early fall as they return from the ocean to their natal streams and rivers. Resident Chinook salmon can be found in the bay all year long. Mid Channel Bank at the mouth of the bay is a very popular sport fishing location for Chinook.

Sub-adult Chinook have access to the terminal area and may be found there at any time of year. Sub-adults have spent a winter in the marine environment and are not closely oriented to the shoreline like juveniles.

Juvenile Chinook

Puget Sound Chinook salmon are expected to be found seasonally as migrant juveniles. Their origin could be any of the rivers in south and central Puget Sound, but most likely they come from rivers in Hood Canal that are closer to Port Townsend. These fish would be smaller in size and more shoreline-oriented than fish with more distant origins (CH2MHILL 2006a).

4.15.2.2 Hood Canal Summer-Run Chum Salmon (*Oncorhynchus keta*)

No chum salmon-bearing streams are located near the Port Townsend Ferry Terminal (WDFW 2007a). Hood Canal summer chum salmon are expected to be present seasonally as migrant juveniles and adults. The greatest abundance of adults is expected to occur in late summer and early fall as they return to their natal streams and rivers to spawn. Spawning occurs in September and October. Eggs incubate for about 4 months and hatch in February and March. Juveniles begin their migration toward the ocean immediately (WDFW 2008). Juveniles could be found near the terminal in spring and early summer. There is a run of Hood Canal summer chum in Chimacum Creek at the south end of Port Townsend Bay. Other rivers in Hood Canal may produce summer chum that could enter and spend some time in the bay during their migration out to sea (CH2MHILL 2006a).

Chum bearing streams in the area include Chimacum Creek (Port Townsend Bay, approximately 5 miles south, shoreline distance), Salmon and Snow Creeks (Discovery Bay, approximately 20 miles southwest, shoreline distance), and

Jimmycomelately Creek (Sequim Bay, approximately 22 miles west, shoreline distance). Chum bearing rivers in the area include Dungeness River (approximately 38 miles north then west, shoreline distance), the Little Quilcene and Big Quilcene Rivers (approximately 48 miles southeast, shoreline distance), the Dosewallips River (approximately 38 miles southeast, shoreline distance), the Duckabush River (approximately 44 miles southeast, shoreline distance), and other Hood Canal rivers and streams.

Hood Canal summer chum salmon are expected to be present seasonally as migrant juveniles and adults (CH2MHILL 2006a). Hood Canal summer run chum are known to migrate on the west side of Admiralty Inlet and Port Townsend Bay (Brewer, personal communication 2007).

4.15.2.3 *Puget Sound Chinook and Hood Canal Summer-Run Chum Salmon Critical Habitat*

The Port Townsend Ferry Terminal lies within Chinook Zone 8 and within the designated critical habitat nearshore zone for chum (70 FR 52630). While there are no streams that support Chinook and Hood Canal summer-run chum salmon near the ferry terminal, there are eelgrass beds in close proximity to the ferry terminal that may be used by juvenile Chinook and chum for rearing.

The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table PT-1. PCEs relevant to the terminal area are numbered per the CFR (70 FR 52630).

Table PT-1
Existing Conditions of Chinook and Hood Canal Summer-Run Chum Salmon PCEs at the Port Townsend Ferry Terminal

PCEs	Existing Conditions
5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	<p>Obstructions In-water structures include the two trestles, the main and auxiliary slips, and dolphins. The existing ferry terminal may affect fish passage in the nearshore.</p> <p>Water Quality and Forage The marine waters of Port Townsend Bay are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include inorganic nitrogen loading resulting in human-caused eutrophication of eelgrass beds (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of two drainage areas that drain to Port Townsend Bay. None of the runoff is treated.</p> <p>The first drainage area drains the holding lanes, and consists of 30 deck drains that all connect to the WSDOT SR 20 system, which discharges through an outfall to the west of the trestle.</p> <p>The second drainage area consists of the transfer spans (typically 90 feet long by 24 feet wide that carry traffic between the trestle and ferry), which discharge by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. The composition of substrate and presence of eelgrass indicate epibenthic production.</p> <p>Documented surf smelt (prey species) spawning is present at the terminal (see Figure PT-2), and extends approximately 270 feet to the southwest of the terminal (WSDOT 2018a).</p> <p>Natural Cover There is no shoreline vegetation in the vicinity of the terminal. There is a small area of shoreline vegetation west of the Port Townsend Marina. Eelgrass near the ferry terminal includes a relatively large bed to the west of the ferry dock, and a small bed to the east.</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of sand in the shoreward half of the former underwater borrow pit to the northeast. Sand with shell hash was observed everywhere except in the deep channel off the northeast transfer span, which was dominated by gravel. Shell with gravel was located mostly in the channel off the southwest transfer span. A small amount of cobble was observed in the deepest portion of the channel off the northeast transfer span (CH2MHILL 2006b). Riprap and hardened shoreline are adjacent to the ferry terminal. Side channels do not occur in the ferry terminal area.</p>
6) Offshore areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	<p>The marine waters of Port Townsend Bay are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include inorganic nitrogen loading resulting in human-caused eutrophication of eelgrass beds (Ecology 2018).</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Offshore areas provide habitat for forage fish.</p>

4.15.2.4 *Puget Sound Steelhead (Oncorhynchus mykiss)*

The closest natal stream in the area of the Port Townsend Ferry Terminal that supports Puget Sound steelhead is Chimacum Creek (approximately 5 miles south shoreline distance, a tributary to Port Townsend Bay). Other steelhead bearing Hood Canal rivers and streams include Thorndyke Creek (approximately 32 miles south, shoreline distance), the Big and Little Quilcene Rivers (approximately 48 miles southeast, shoreline distance), and Tarboo Creek (approximately 51 miles southeast, shoreline distance) (WDFW 2007a).

Major rivers that support winter and summer steelhead include the Skagit River (approximately 65 miles south then northeast, shoreline distance), Stillaguamish (approximately 57 miles south then northeast, shoreline distance), Snohomish River (approximately 48 miles south then northeast, shoreline distance), and the Duwamish/Green (approximately 47 shoreline miles southeast). The Lake Washington/Cedar River system (approximately 40 shoreline miles southeast) supports winter steelhead. Steelhead may also be present from southern Puget Sound and other Hood Canal rivers and streams (WDFW 2007a).

Available data from tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) efforts around Puget Sound have reported the capture of few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). The total sampling effort data was not available, but the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

Beach seine sampling in Bellingham Bay (north Puget Sound) also captured few steelhead (Lummi Nation, unpublished data). The Bellingham Bay research reported the capture of two juvenile steelhead salmon in 336 sets between February 14 and December 1, 2003. The steelhead were captured in the eastern portion of Bellingham Bay near the Taylor Avenue Dock on June 12 and June 25, 2003.

4.15.2.5 *Puget Sound Steelhead Critical Habitat*

The Port Townsend Ferry Terminal does not fall within designated steelhead critical habitat (Federal Register 2016a).

4.15.2.6 *Humpback Whale (Megaptera novaeangliae)*

Humpback whale may be present near the Port Townsend ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.15.2.7 *Southern Resident Killer Whale (Orcinus orca)*

Southern Resident Killer Whale (SRKW) may be present near the Port Townsend ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.15.2.8 *Southern Resident Killer Whale Critical Habitat*

The Port Townsend ferry terminal area lies within designated critical habitat (Area 2 – Puget Sound). Areas with water less than 20 feet deep relative to the extreme high water mark are not included in the critical habitat designation (Federal Register 2006).

The PCEs provided in the terminal area, and their existing conditions are listed in Table PT-2. PCEs relevant to the terminal area are numbered per Federal Register 2006.

Table PT-2
Existing Conditions of Southern Resident Killer Whale PCEs at the Port Townsend Ferry Terminal

PCEs	Existing Conditions
1) Water quality to support growth and development	<p>The marine waters of Port Townsend Bay are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include inorganic nitrogen loading resulting in human-caused eutrophication of eelgrass beds (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of two drainage areas that drain to Port Townsend Bay. None of the runoff is treated.</p> <p>The first drainage area drains the holding lanes, and consists of 30 deck drains that all connect to the WSDOT SR 20 system, which discharges through an outfall to the west of the trestle.</p> <p>The second drainage area consists of the transfer spans (typically 90 feet long by 24 feet wide that carry traffic between the trestle and ferry), which discharge by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>
2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	Salmonids are the primary prey of SRKW, and may be present near the terminal. Further information on prey can be found in the Puget Sound Chinook section, and Appendix B – Species Biology.
3) Passage conditions to allow for migration, resting, and foraging	Existing structures that occur below -20 feet in critical habitat include the heads of the trestles, the main and auxiliary slip, and dolphins.

4.15.2.9 Bull Trout (*Salvelinus confluentus*)

There are no natal streams in the area of the Port Townsend Ferry Terminal that support bull trout (WDFW 2007a). The aquatic portions of the ferry terminal are within marine FMO habitat. While bull trout have not been documented in the ferry terminal area, suitable FMO habitat is present, and bull trout are thought to occur throughout south, central, and northern Puget Sound. Therefore, it is expected that the ferry terminal area would be used by anadromous adult and sub-adult bull trout for foraging, migration, and overwintering (USFWS 2004b). Within the ferry terminal area, it is expected that individual bull trout from the Skokomish River (approximately 65 miles southwest, shoreline distance), Skagit River (approximately 65 miles south then northeast, shoreline distance), Stillaguamish (approximately 57 miles south then northeast, shoreline distance), Snohomish River (approximately 48 miles south then northeast, shoreline distance), Lake Washington/Cedar River (approximately 40 shoreline miles southeast), the Duwamish/Green River

(approximately 47 shoreline miles southeast), and Puyallup River (approximately 65 miles southwest, shoreline distance) core areas are most likely to be present.

4.15.2.10 *Bull Trout Critical Habitat*

The shoreline of the Port Townsend Ferry Terminal is not within designated bull trout critical habitat per Federal Register 2010a.

4.15.2.11 *Green Sturgeon (Acipenser medirostris)*

There are no natal streams in the area of the Port Townsend Ferry Terminal that support green sturgeon.

Two confirmed Southern DPS green sturgeon were detected in Puget Sound in 2006, but the extent to which green sturgeon from the Southern DPS use Puget Sound is uncertain (Federal Register 2018). Observations of green sturgeon in Puget Sound are much less common compared to the coastal Washington estuaries and bays such as Willapa Bay, Grays Harbor, and the Lower Columbia River estuary (Federal Register 2018). In addition, Puget Sound does not appear to be part of the coastal migratory corridor that Southern DPS fish use to reach overwintering grounds north of Vancouver Island (Federal Register 2018).

4.15.2.12 *Green Sturgeon Critical Habitat*

The Port Townsend Ferry Terminal does not fall within designated green sturgeon critical habitat (Federal Register 2009).

4.15.2.13 *Marbled Murrelet (Brachyramphus marmoratus)*

The Port Townsend terminal area provides suitable marbled murrelet marine foraging habitat.

Documented surf smelt (prey species) spawning is present at the terminal (see Figure PT-2), and extends approximately 270 ft. SW of the terminal. A large herring holding area exists about 0.7 miles S of the terminal in open water (WSDOT 2018a).

WDFW surveys conducted from 2001 to 2012 show a density of 3-5 birds per square kilometer in the terminal area (WDFW 2016).

Marbled murrelet density in Port Townsend Bay has been surveyed by the PSAMP and the Pacific Northwest Forest Plan Research and Monitoring between 1993 and 2005. Results from their spring and winter density surveys are provided in Table PT-3.

Table PT-3
Marbled Murrelet Density Estimates in Port Townsend Bay¹

Jan	Feb	Mar	May through July	Aug	Sept	Oct	Dec
9.7 ¹	8.37	7.03	5.7 ¹	6.7	7.7	8.7	9.7 ¹

Source: Deanna Lynch of the USFWS (Lynch 2007)

Note:

- 1 Interpolation is based on the assumption of immigration in the fall and emigration in the spring months of Zone 2 and Canada marbled murrelets.

The nearest documented marbled murrelet nesting site is located 15 miles SW of the terminal (WSDOT 2018b).

The Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program (2012) identified habitat suitability throughout the range of the species, and ranked it as Zero, Low, Marginal, Moderately High and Highest. The Port Townsend murrelet habitat suitability within the pile driving/heavy equipment zone of potential effect (0.25 miles), is Zero (WSDOT 2019b).

There are no coniferous forest that may offer nesting opportunity within the pile driving/heavy equipment zone of potential effect (0.25 miles) (WSDOT 2014/2018c).

Ferry traffic creates regular disturbance in the immediate terminal area. From July 2017 to June 2018, there were approximately 8,930 scheduled arrivals and departures from the terminal. During the nesting season (April 1-September 23), when foraging murrelet are more active, there were approximately 5,192 scheduled arrivals and departures (WSDOT 2018d).

4.15.2.14 *Marbled Murrelet Critical Habitat*

No marbled murrelet critical habitat has been designated near the terminal (USFWS 1996).

4.15.2.15 *Rockfish Species*

Bocaccio

Bocaccio are rarely caught in north Puget Sound and only sparse records exist for the Strait of Georgia (Federal Register 2010b). Because larvae are widely dispersed, it is possible that bocaccio juveniles could be found near the Port Townsend Ferry Terminal at any time of year. Adult bocaccio generally move to very deep water. The waters at the mouth of Admiralty Inlet are relatively shallow, generally less than 50 feet deep (NMFS 2009). North of the terminal, the Strait of Juan de Fuca and the San Juan Islands offer the rocky substrates preferred by bocaccio.

Yelloweye Rockfish

Yelloweye rockfish are more closely aligned with rocky, high-relief substrates than with very deep water (Federal Register 2010b). The waters surrounding the Port Townsend Ferry Terminal do not have the rocky substrates preferred by yelloweye. These substrates are found approximately 25 miles north in the San Juan Islands.

4.15.2.16 *Rockfish Species Critical Habitat*

The Port Townsend Ferry Terminal is within rockfish nearshore critical habitat (less than or equal to 98 feet in depth) (Federal Register 2014). The physical and biological features (PBFs) (Federal Register 2014) essential to the conservation of juvenile Bocaccio rockfish are listed in Table PT-4. PBFs relevant to the terminal area are numbered per the CFR (Federal Register 2014). These PBFs are specific to nearshore environments, where only juvenile Bocaccio rockfish could be found. Deepwater (> 98 feet in depth) PBFs exist for adult Bocaccio, and adult and juvenile yelloweye rockfish; however, this habitat is not present at the Port Townsend Ferry Terminal and will not be discussed here.

Table PT-4
Existing Conditions of Rockfish PBFs at the Port Townsend Ferry Terminal

PBFs	Existing Conditions
1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities.	<p>The marine waters of Port Townsend Bay are designated "Extraordinary" for aquatic life use. Impaired waters listings in the terminal area include inorganic nitrogen loading resulting in human-caused eutrophication of eelgrass beds (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of two drainage areas that drain to Port Townsend Bay. None of the runoff is treated.</p> <p>The first drainage area drains the holding lanes, and consists of 30 deck drains that all connect to the WSDOT SR 20 system, which discharges through an outfall to the west of the trestle.</p> <p>The second drainage area consists of the transfer spans (typically 90 feet long by 24 feet wide that carry traffic between the trestle and ferry), which discharge by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. The composition of substrate and presence of eelgrass indicate epibenthic production.</p> <p>Documented surf smelt (prey species) spawning is present at the terminal (see Figure PT-2), and extends approximately 270 feet to the southwest of the terminal (WSDOT 2018a).</p>
2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.	<p>There is no shoreline vegetation in the vicinity of the terminal. There is a small area of shoreline vegetation west of the Port Townsend Marina. Eelgrass near the ferry terminal includes a relatively large bed to the west of the ferry dock, and a small bed to the east.</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of sand in the shoreward half of the former underwater borrow pit to the northeast. Sand with shell hash was observed everywhere except in the deep channel off the northeast transfer span, which was dominated by gravel. Shell with gravel was located mostly in the channel off the southwest transfer span. A small amount of cobble was observed in the deepest portion of the channel off the northeast transfer span (CH2MHILL 2006b). Riprap and hardened shoreline are adjacent to the ferry terminal. Side channels do not occur in the ferry terminal area.</p>

4.15.2.17 *Pacific Eulachon*

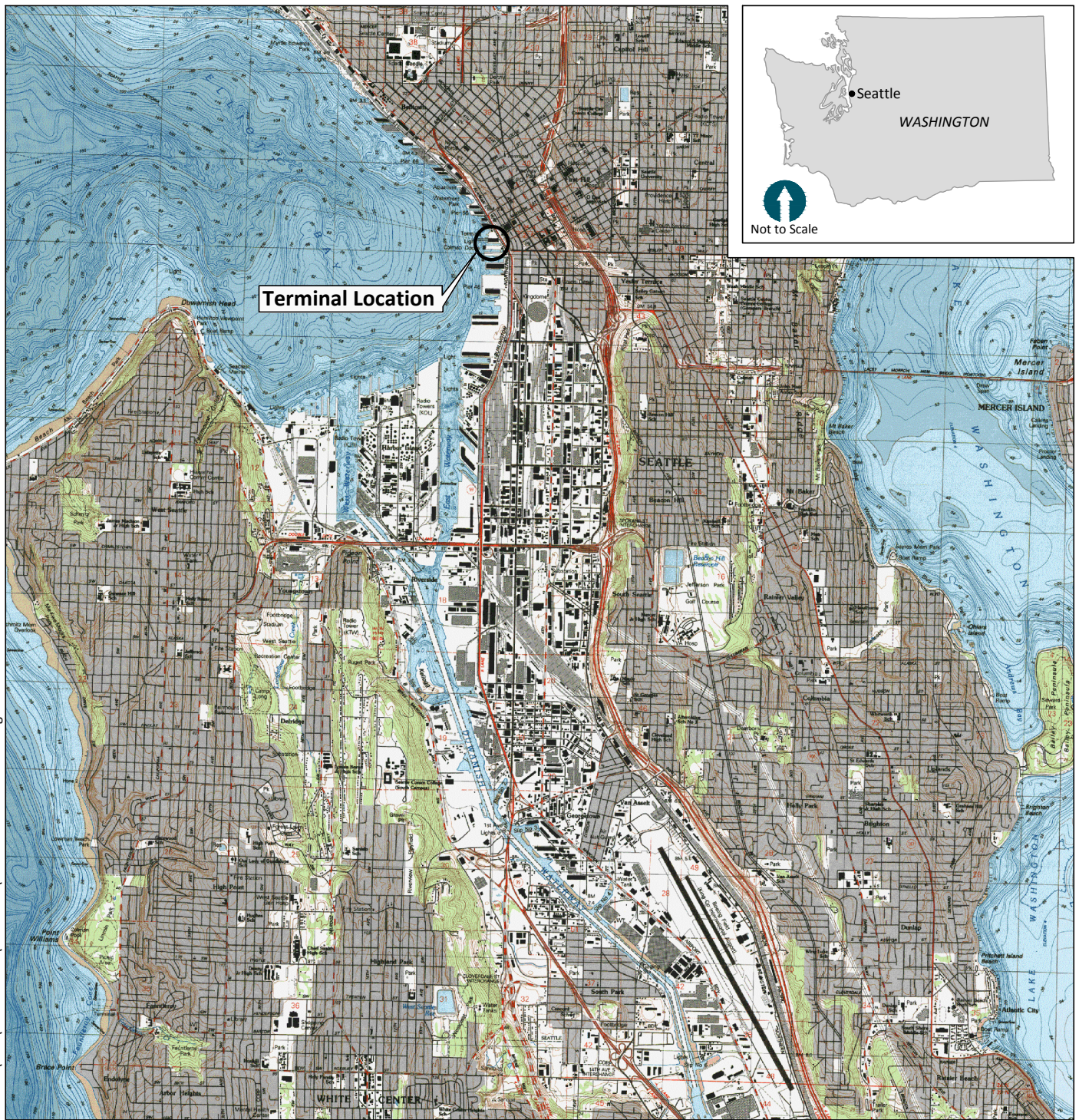
Adult eulachon could be present at the Port Townsend Ferry Terminal. The terminal is within 50 miles of the mouth of the Elwha River, where spawning is known to occur; therefore, larger juveniles could be present at this terminal as well.

4.15.2.18 *Pacific Eulachon Critical Habitat*

No Pacific eulachon critical habitat has been designated near the Port Townsend Ferry Terminal (FEDERAL REGISTER 2011).

SEATTLE

K:\Jobs\100016-WSF\10001603\10001603-BA-047-SE1.dwg FIG SE-1



NOTE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Seattle South, Washington.

Section	Township	Range	Lat	Long	County
6	24N	4E	47°, 36' 6.1" N	122° 20' 18.2" W	King
HUC 171100131303			WRIA 8		

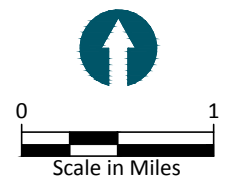
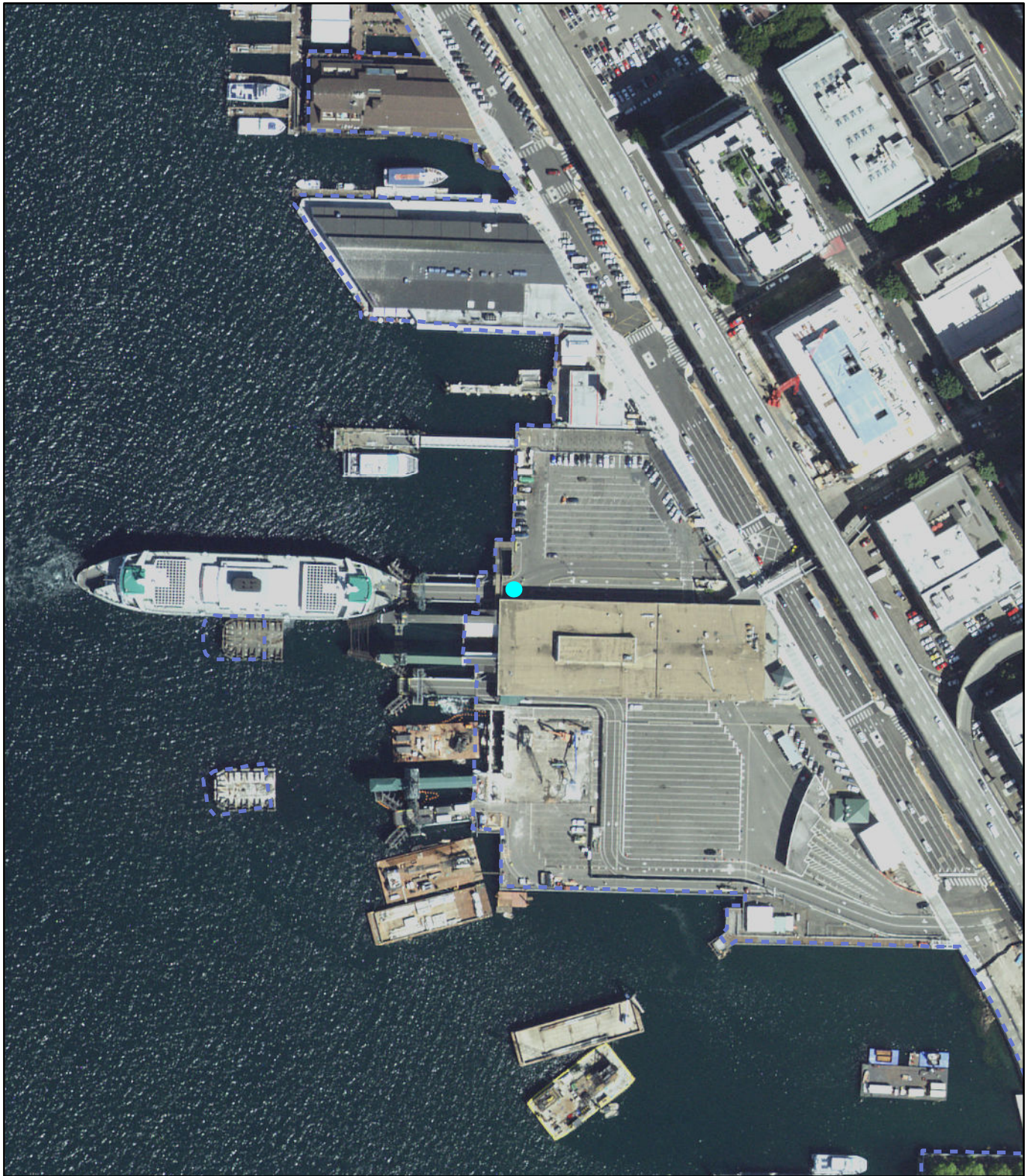
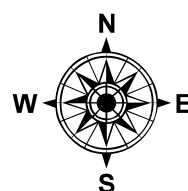


Figure SE-1
Seattle Ferry Terminal Vicinity Map
WSF Biological Assessment Reference
Seattle, Washington



Colman Dock Ferry Terminal: WSF Biological Assessment Reference

— — — — — Approximate Mean High Water (MHW)



0 125 250
Feet

Figure SE-2
Aerial Photo of Seattle Ferry Terminal
WSF Biological Assessment Reference
Seattle, Washington

4.16 Seattle Ferry Terminal

The Seattle Ferry Terminal is located on the downtown Seattle waterfront, on Elliott Bay (see Figures SE-1 and SE-2).

The Seattle Ferry Terminal, also known as Colman Dock, provides service to the Provides service to Bainbridge and Bremerton Terminals. King County also uses the Seattle Ferry terminal to provide passenger-only ferry service to West Seattle and Vashon Island. Features of the terminal include WSF's largest terminal building, 40 vehicle holding lanes that accommodate up to 650 vehicles, and overhead passenger loading facilities. No parking is available at the terminal. The terminal has three primary slips and a passenger-only slip, all of which have steel wingwalls. The terminal has five dolphins, two concrete floating and three timber dolphins.

4.16.1 Seattle Environmental Baseline

4.16.1.1 Physical Indicators

Substrate and Slope

Much of the shoreline along the Seattle waterfront contains riprap and seawalls. Common shoreline features within the area include constructed bulkheads, with manmade structures such as piers, wharves, and buildings extending over the water, and steeply sloped banks armored with riprap or other fill materials (e.g., concrete slabs and miscellaneous debris). See Figures SE-3 and SE-4 for pictures of the shoreline areas north and south of the ferry terminal. There are very few intertidal habitats within the area (e.g., near Pier 48 south of the Seattle Ferry Terminal, and these are less than 0.5 acre in size).



Figure SE-3
Shoreline Area North of the Seattle Ferry Terminal



Figure SE-4
Shoreline Area South of the Seattle Ferry Terminal

Very soft, black, organic-clayed silt with shell hash and wood debris exists subtidally. In the operating ferry slips, propeller wash has washed away fine particles, leaving coarser sand. At the ferry terminal, the nearshore intertidal habitat extends gradually from MHHW to about -10 feet MLLW. The habitat transitions quickly to deeper subtidal habitat beyond about -14 feet MLLW. The slope is

approximately 13 percent along the east and west sides of the site. Steep slopes (greater than 25 percent) exist upland of the site. The subtidal slope is approximately 8 percent. Offshore depths of terminal structures are: head of Slip 1 (-44.3 feet MLLW), Slip 2 (-41.2 feet MLLW), and Slip 3 (-47.5 feet MLLW). The head of the passenger only ferry landing is approximately -40.0 feet MLLW. Maximum depth for the floating dolphins is -66.0 feet MLLW.

Salt/Freshwater Mixing

The Duwamish River is approximately 1 mile south of the ferry terminal and delivers freshwater to Elliott Bay.

Flows and Currents

Water currents are influenced primarily by tides with some influence from the Duwamish River. The Duwamish River discharges from 250 cfs of water in summer to 6,000 cfs in winter. In Elliott Bay, the river flows north along the Seattle waterfront, splitting at Smith Cove, with some flow turning south, and some following the Magnolia bluff north. Ebb tides tend to enhance this flow, while flood tides stall or reverse the flow pattern.

4.16.1.2 Chemical Indicators

Water Quality

The marine waters of Elliott Bay are designated “Excellent” for aquatic life use. Impaired waters listings in the terminal area include bacteria, and PCBs and Dioxin in sediment (Ecology 2018).

Sediment Quality

Exceedance of the State of Washington SMS has been identified for the sediments of Elliott Bay over a wide range of constituents. Impaired waters listings in the terminal area include PCBs and Dioxin in sediment (Ecology 2018). Additional sediment contaminants in the terminal area include PAHs, metals and organics (Herrera 2015). Sampling at Pier 48 (south of the Colman Dock) indicates sediment quality exceedances for metals, PAHs, organics, and PCBs (Shannon and Wilson 2017). In 1989, WSF placed a 3.4 acre sediment cap at the southern portion of the ferry

terminal to contain contaminated sediments. Post-cleanup monitoring of the cap indicates that it continues to be effective in its role of containing contaminants.

Beginning in 2017, WSF began placement of an extension of the 1989 cap as an element of the Seattle Multimodal Project at Colman Dock. The approximately 4 acre extension cap will be placed in phases over 4 years. These two caps address the majority of contaminated sediments within the WSF terminal right of way, but additional future actions will be needed to complete sediment cleanup.

4.16.1.3 Biological Indicators

Shoreline Vegetation

The shoreline is heavily urbanized and virtually no shoreline vegetation occurs at or near the terminal. The shoreline along the majority of the Duwamish Waterway has been developed for industrial and commercial operations; the waterway serves as a major shipping route for containerized and bulk cargo. Common shoreline features within the area include constructed bulkheads, with manmade structures such as piers, wharves, and buildings extending over the water, and steeply sloped banks armored with riprap or other fill materials (e.g., concrete slabs and miscellaneous debris).

Macroalgae and Eelgrass

No eelgrass or kelp occurs in the area near the terminal. *Ulva*, *Enteromorpha*, and *Fucus* have been observed under the terminal. The site contains poor substrate conditions and existing overwater structures, which preclude colonization by eelgrass.

Epibenthos, Macrofauna, Fish, and Marine Mammals

Epibenthic productivity is expected to be very low due to the condition and type of substrates, intense vessel traffic along the waterfront and at the ferry terminal, and dominance of an altered shoreline. Barnacles, anemones, mussels, and sea stars have been observed at the terminal. The closest salmon-bearing river system is the Duwamish River, located approximately 1 mile south of the Seattle Ferry Terminal, which is used by several runs of salmonids, including Puget Sound Chinook, coho, and chum salmon; steelhead; and sea-run cutthroat trout. Other organisms observed

at the terminal include tube worms, tunicates, pile and shiner perch, red rock crab, and shrimp. Marine mammals that may occur in Elliott Bay include resident and transient killer whale, Steller sea lion, California sea lion, and harbor seal.

Forage Fish

There is no documented forage fish spawning present at the terminal (WSDOT 2018a).

4.16.2 Seattle Species Distributions

4.16.2.1 Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)

No Chinook salmon bearing streams are located near the current Seattle Ferry Terminal (Colman Dock) (WDFW 2007a). However, major rivers that support Chinook salmon in this area of Puget Sound include the Duwamish/Green River (approximately 1 shoreline mile southwest), and the Puyallup River (approximately 32 shoreline miles southwest). Chinook may also be present from rivers and streams in southern Puget Sound (WDFW 2007a).

Adult and Sub-adult Chinook

Adults could be present in deeper offshore waters year-round. The greatest abundance of adults would occur between early summer and early fall as they return from the ocean to the Duwamish/Green River (Anchor 2003d).

Sub-adult Chinook have access to the terminal area and may be found there at any time of year. Sub-adults have spent a winter in the marine environment and are not closely oriented to the shoreline like juveniles.

Juvenile Chinook

Brennan et al. (2004) used beach seines to sample the nearshore of King County, Washington, and they caught Chinook salmon in October of 2001 and 2002. Brennan et al. (2004) captured five Chinook salmon in December of 2002. These fish were captured at three locations that were north and southwest of the terminal: Golden Gardens (north), Lincoln Park (southwest), and Seahurst Park (southwest). Golden Gardens is located just north of Shilshole Bay and the Lake Washington Ship Canal. One Chinook salmon was captured at this site. One Chinook salmon was caught at

Lincoln Park, which is located in the City of Seattle south of Elliott Bay. Three Chinook salmon were caught farther south at Seahurst Park, which is located in Burien, Washington. Beach seines conducted from April through September of 2001 and 2002 along the mainland of central Puget Sound from Golden Gardens to Picnic Point showed juvenile Puget Sound Chinook salmon first entered the area in mid-May with numbers peaking in mid-June and tapered off through August and September. The average fork length was approximately 85 mm for those juvenile Chinook caught in May and 130 mm for those caught in September (Duffy et al. 2005).

Little information is available on Chinook salmon use within Elliott Bay itself, as most of the sampling occurs outside of Elliott Bay. An assessment by Taylor and Associates of juvenile salmonid use of Elliott Bay in 1999 found the greatest numbers of juvenile Chinook salmon at Terminal 5, located on the southwest side of Elliott Bay, in mid-May, and at Pier 91, located along the north shore of Elliott Bay, in early June (NMFS and USFWS 2005).

4.16.2.2 Puget Sound Chinook Salmon Critical Habitat

The Seattle Ferry Terminal lies within Chinook Zone 7 (70 FR 52630). The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table SE-2. PCEs relevant to the terminal area are numbered per the CFR (70 FR 52630).

Table SE-1
Existing Conditions of Chinook Salmon PCEs at the Seattle Ferry Terminal

PCEs	Existing Conditions
5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	<p>Obstructions In-water structures include two piers, the passenger only ferry landing, overhead loading, three trestles, three slips, and dolphins. The existing ferry terminal may affect fish passage in the nearshore.</p> <p>Water Quality and Forage The marine waters of Elliott Bay are designated “Excellent” for aquatic life use. . Impaired waters listings in the terminal area include bacteria (water), organics and metals (tissue) and bioassay (sediment) (Ecology 2018).The terminal area is an Ecology listed contaminated sediment site that is being remediated.</p> <p>The existing stormwater system at the ferry terminal is divided between Pier 52, Pier 50, and the trestles and transfer spans.</p>

PCEs	Existing Conditions
	<p>The Pier 52 system consists of two drainage areas that drain to Elliott Bay. None of these areas includes treatment.</p> <p>The first drainage area drains the holding lanes on the northeast side of Pier 52, and consists of six catch basins that discharge through four outfalls directly to surface water.</p> <p>The second drainage area drains the holding lanes on the northwest side of Pier 52, and consists of many through-drains that discharge directly under the pier to surface water.</p> <p>The Pier 50 system consists of one drainage area that drains the toll booth area and holding lanes. Most of this area includes treatment. The drainage area consists of three catch basins that flow through simple oil/water separators then discharge directly to surface water, and two through-drains.</p> <p>All trestles and transfer spans (typically 90 feet long by 24 feet wide that carry traffic between the trestle and ferry) discharge by sheet-flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. Substrates in the area are degraded, but may support some epibenthic production.</p> <p>Contaminated sediments are capped in the southern portion of the terminal area. Exceedances of state SMS have been identified in Elliott Bay for a wide range of constituents.</p> <p>There is no documented forage fish spawning present at the terminal (WSDOT 2018a).</p> <p>Natural Cover</p> <p>The shoreline is heavily urbanized and virtually no vegetation occurs along the shoreline. No eelgrass, kelp, or macroalgae occurs in the area near the terminal. The site contains poor substrate conditions, many existing in-water structures, and sufficient water depth to preclude colonization by eelgrass. Macroalgae may occur sporadically along the Elliott Bay shoreline, but does not occur at or near the ferry terminal.</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of very soft, black, organic-clayed silt with shell hash and wood debris subtidally. In the operating ferry slips, propeller wash has washed away fine particles, leaving coarser sand. Riprap and seawalls are adjacent to the terminal (Anchor 2003d). Side channels do not occur in the ferry terminal area.</p>
6) Offshore areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	<p>The marine waters of Elliott Bay are designated "Extraordinary" for aquatic life use. Impaired waters listings in the terminal area include bacteria (water), organics and metals (tissue) and bioassay (sediment) (Ecology 2018). The terminal area is an Ecology listed contaminated sediment site that is being remediated.</p>

4.16.2.3 Puget Sound Steelhead (*Oncorhynchus mykiss*)

Within the Seattle Ferry Terminal area, it is expected that steelhead from the Duwamish/Green River (approximately 1.7 miles southeast shoreline distance) may be present. The Duwamish/Green supports both winter and summer steelhead. In

addition, the Puyallup River (approximately 32 shoreline miles southwest) and numerous rivers and streams in central and southern Puget Sound support winter steelhead (WDFW 2007a).

Available data from tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) efforts around Puget Sound have reported the capture of few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). The total sampling effort data was not available, but the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

During 2001 and 2002, beach seining conducted in central Puget Sound by King County Department of Natural Resources captured only nine steelhead out of a total of approximately 34,000 juvenile salmonids. All of the steelhead were caught between May and August and ranged in size from 141 to 462 mm with a mean size of 258 mm (Brennan et al. 2004).

4.16.2.4 *Puget Sound Steelhead Critical Habitat*

The Seattle Ferry Terminal does not fall within designated steelhead critical habitat (Federal Register 2016a).

4.16.2.5 *Humpback Whale (Megaptera novaeangliae)*

Humpback whale may be present near the Seattle ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.16.2.6 *Southern Resident Killer Whale (Orcinus orca)*

Southern Resident Killer Whale (SRKW) may be present near the Seattle ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.16.2.7 *Southern Resident Killer Whale Critical Habitat*

The Seattle ferry terminal area lies within designated critical habitat (Area 2 – Puget Sound). Areas with water less than 20 feet deep relative to the extreme high water mark are not included in the critical habitat designation (Federal Register 2006).

The PCEs provided in the terminal area, and their existing conditions are listed in Table SE-2. PCEs relevant to the terminal area are numbered per Federal Register 2006.

Table SE-2
Existing Conditions of Southern Resident Killer Whale PCEs at the Seattle Ferry Terminal

PCEs	Existing Conditions
1) Water quality to support growth and development	<p>The marine waters of Elliott Bay near the terminal are designated “Excellent” for aquatic life use. Impaired waters listings in the terminal area include bacteria (water), organics and metals (tissue) and bioassay (sediment) (Ecology 2018). The terminal area is an Ecology listed contaminated sediment site that is being remediated.</p> <p>The existing stormwater system at the ferry terminal is divided between Pier 52, Pier 50, and the trestles and transfer spans.</p> <p>The Pier 52 system consists of two drainage areas that drain to Elliott Bay. None of these areas includes treatment.</p> <p>The first drainage area drains the holding lanes on the northeast side of Pier 52, and consists of six catch basins that discharge through four outfalls directly to surface water.</p> <p>The second drainage area drains the holding lanes on the northwest side of Pier 52, and consists of many through-drains that discharge directly under the pier to surface water.</p> <p>The Pier 50 system consists of one drainage area that drains the toll booth area and holding lanes. Most of this area includes treatment. The drainage area consists of three catch basins that flow through simple oil/water separators then discharge directly to surface water, and two through-drains.</p> <p>All trestles and transfer spans (typically 90 feet long by 24 feet wide that carry traffic between the trestle and ferry) discharge by sheet-flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>
2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	<p>Salmonids are the primary prey of SRKW, and may be present near the terminal. Further information on prey can be found in the Puget Sound Chinook section, and Appendix B – Species Biology.</p>
3) Passage conditions to allow for migration, resting, and foraging	<p>Existing structures occur below -20 feet in critical habitat include the trestle, the passenger only ferry landing, overhead loading, three trestles, three slips, and dolphins. The shoreline is heavily urbanized. The entire eastern shore of Elliott Bay has been developed with piers, docks, marinas, and bulkheads. Almost no natural shoreline habitat remains.</p>

4.16.2.8 Bull Trout (*Salvelinus confluentus*)

Within the Seattle Ferry Terminal area, it is expected that individual bull trout from the Duwamish/Green River (approximately 1 shoreline mile southwest) core area are most likely to be present (WDFW 2007a). Bull trout may also be present from the Puyallup River (approximately 32 shoreline miles southwest).

The aquatic portions of the terminal are within marine FMO habitat. While bull trout have not been documented in the ferry terminal area, suitable FMO habitat is present, and bull trout are thought to occur throughout south, central, and northern Puget Sound. Therefore, it is expected that the ferry terminal area would be used by anadromous adult and sub-adult bull trout for foraging, migration, and overwintering (USFWS 2004b). Due to extensive habitat degradation, including filling of wetland and subtidal areas, shoreline armoring, presence of overwater piers, and sediment contamination, the number of bull trout in Elliot Bay is believed to be small. However, captures in the Duwamish River indicate that bull trout do migrate through the area (NMFS and USFWS 2005). They are likely to be present in Elliot Bay as juveniles from March to June and as adults from July to October (Tetra Tech 2012).

In April 1978, anglers caught four fish that were identified as adult char by the Muckleshoot Tribe Hatchery Manager (Brunner 1999a *Cited in*: NMFS and USFWS 2005). Another adult bull trout was captured in a net near Pier 91 (Brunner 1999b *Cited in*: NMFS and USFWS 2005). In August and September of 2000, eight subadult bull trout averaging 299 mm in length were captured near river mile 5.3 of the Duwamish River and in September 2002 a single char was caught at that same location (Shannon, personal communication 2002 *Cited in*: NMFS and USFWS 2005). In May 2003, an adult char (582 mm) was captured and released at Kellogg Island (Shannon, personal communication 2003 *Cited in*: NMFS and USFWS 2005).

4.16.2.9 Bull Trout Critical Habitat

The shoreline of the Seattle Ferry Terminal is within designated bull trout critical habitat. The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table SE-4. PCEs relevant to the terminal area are numbered per Federal Register 2010a.

Table SE-3
Existing Conditions of Bull Trout PCEs at the Seattle Ferry Terminal

PCEs	Existing Conditions
2) Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	In-water structures include two piers, the passenger only ferry landing, overhead loading, three trestles, three slips, and dolphins. The existing ferry terminal may affect fish passage in the nearshore.
3) An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	<p>No eelgrass, kelp, or macroalgae occurs in the area near the terminal. The site contains poor substrate conditions, many existing in-water structures, and sufficient water depth to preclude colonization by eelgrass. Macroalgae may occur sporadically along the Elliott Bay shoreline, but does not occur at or near the ferry terminal.</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of very soft, black, organic-clayed silt with shell hash and wood debris subtidally. In the operating ferry slips, propeller wash has washed away fine particles, leaving coarser sand. Riprap and seawalls are adjacent to the terminal (Anchor 2003d).</p> <p>Contaminated sediments are capped in the southern portion of the terminal area. Exceedances of state SMS have been identified in Elliott Bay for a wide range of constituents.</p> <p>There are no known forage fish spawning areas near the Seattle Ferry Terminal.</p>
4) Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	<p>In-water structures include the trestle, the passenger only ferry landing, overhead loading, three trestles, three slips, and dolphins. The existing ferry terminal may affect fish passage in the nearshore, and may reduce the production of aquatic invertebrates that are prey species to bull trout.</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of very soft, black, organic-clayed silt with shell hash and wood debris subtidally. In the operating ferry slips, propeller wash has washed away fine particles, leaving coarser sand. Riprap and seawalls are adjacent to the terminal (Anchor 2003d).</p> <p>No eelgrass, kelp, or macroalgae occurs in the area near the terminal. The site contains poor substrate conditions, many existing in-water structures, and sufficient water depth to preclude colonization by eelgrass. Macroalgae may occur sporadically along the Elliott Bay shoreline, but does not occur at or near the ferry terminal.</p>
5) Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	East Puget Sound water temperatures can range from 41.4 to 75.7 °F (5.2 to 24.3 °C) with an average of 51 °F (10.58 °C) (Ecology 2007). Water temperature data for specific terminals is not available. The in-water components of the ferry terminal provide some shade, which may cause slight localized reductions in water temperatures.

PCEs	Existing Conditions
8) Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	<p>The marine waters of Elliott Bay near the terminal are designated “Excellent” for aquatic life use. Impaired waters listings in the terminal area include bacteria (water), organics and metals (tissue) and bioassay (sediment) (Ecology 2018).The terminal area is an Ecology listed contaminated sediment site that is being remediated.</p> <p>The existing stormwater system at the ferry terminal is divided between Pier 52, Pier 50, and the trestles and transfer spans.</p> <p>The Pier 52 system consists of two drainage areas that drain to Elliott Bay. None of these areas includes treatment.</p> <p>The first drainage area drains the holding lanes on the northeast side of Pier 52, and consists of six catch basins that discharge through four outfalls directly to surface water.</p> <p>The second drainage area drains the holding lanes on the northwest side of Pier 52, and consists of many through-drains that discharge directly under the pier to surface water.</p> <p>The Pier 50 system consists of one drainage area that drains the toll booth area and holding lanes. Most of this area includes treatment. The drainage area consists of three catch basins that flow through simple oil/water separators then discharge directly to surface water, and two through-drains.</p> <p>All trestles and transfer spans (typically 90 feet long by 24 feet wide that carry traffic between the trestle and ferry) discharge by sheet-flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>

4.16.2.10 *Green Sturgeon (Acipenser medirostris)*

There are no natal streams in the area of the Seattle Ferry Terminal that support green sturgeon.

Two confirmed Southern DPS green sturgeon were detected in Puget Sound in 2006, but the extent to which green sturgeon from the Southern DPS use Puget Sound is uncertain (Federal Register 2018). Observations of green sturgeon in Puget Sound are much less common compared to the coastal Washington estuaries and bays such as Willapa Bay, Grays Harbor, and the Lower Columbia River estuary (Federal Register 2018). In addition, Puget Sound does not appear to be part of the coastal migratory corridor that Southern DPS fish use to reach overwintering grounds north of Vancouver Island (Federal Register 2018).

4.16.2.11 *Green Sturgeon Critical Habitat*

The Seattle Ferry Terminal does not fall within designated green sturgeon critical habitat per Federal Register 2018.

4.16.2.12 *Marbled Murrelet (Brachyramphus marmoratus)*

The Seattle terminal area provides limited marbled murrelet marine foraging habitat, due to the density of ferry and other marine traffic in the area.

There is no documented forage fish (prey species) spawning present at the terminal area (WSDOT 2018a).

WDFW surveys conducted from 2001 to 2012 show a density of less than 1 bird per square kilometer in the terminal area (WDFW 2016). The nearest documented marbled murrelet nesting site is located 35 miles NW of the terminal (WDFW 2015).

The Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program (2012) identified habitat suitability throughout the range of the species, and ranked it as Zero, Low, Marginal, Moderately High and Highest. The Seattle murrelet habitat suitability within the pile driving/heavy equipment zone of potential effect (0.25 miles), is Zero (WSDOT 2019b).

There are no coniferous forest that may offer nesting opportunity within the pile driving/heavy equipment zone of potential effect (0.25 miles) (WSDOT 2014/2018c).

Marbled murrelet summer foraging has been observed off West Point, over 6.5 miles northwest of the ferry terminal (Anchor 2003d). In July 2012, on two occasions, a single foraging marbled murrelet was observed near the Myrtle Edwards Park grain elevator (2.1 miles north of the terminal), and the fishing pier (2.3 miles north of the terminal) (Miller, personal communication, 2012). During the 2017-18 construction season of the Seattle Multimodal Project at Colman Dock, 2 murrelet were observed. One was approximately 110 m from the terminal, and the other was observed from a ferry vessel mid-channel between the Seattle terminal and Bainbridge Island (WSF 2018e).

Ferry traffic creates regular disturbance in the immediate terminal area. From July 2017 to June 2018, there were approximately 27,420 scheduled arrivals and departures from the Seattle terminal. During the nesting season (April 1-September 23), when foraging murrelet are more active, there were approximately 13,755 scheduled arrivals and departures (WSF 2018d). In addition, the Seattle terminal experiences regular passenger only ferry vessel arrivals and departures, and Elliott Bay is heavily trafficked by large commercial and tourist tour vessels.

4.16.2.13 *Marbled Murrelet Critical Habitat*

No marbled murrelet critical habitat has been designated near the terminal (USFWS 1996).

4.16.2.14 *Rockfish Species*

Bocaccio

Bocaccio are rarely caught in north Puget Sound and only sparse records exist for the Strait of Georgia (Federal Register 2010b). Because larvae are widely dispersed, it is possible that bocaccio juveniles could be found near the Seattle Ferry Terminal at any time of year. Adult bocaccio generally move to very deep water. The waters within Elliott Bay are 80 feet deep in some places. Outside the bay to the north, the water reaches depths of 110 feet (NMFS 2009). Rockfish presence has been documented in Elliott Bay (WDFW 2009c).

Yelloweye Rockfish

Yelloweye rockfish are more closely aligned with rocky, high-relief substrates than with very deep water (Federal Register 2010b). The waters of Elliott Bay are neither very deep nor underlain with rocky substrates.

4.16.2.15 *Rockfish Species Critical Habitat*

The Seattle Ferry Terminal does not fall within rockfish critical habitat (Federal Register 2014).

4.16.2.16 *Pacific Eulachon*

Adult eulachon are unlikely to be present at the Seattle Ferry Terminal. According to NMFS, eulachon are rare/absent in mid and south Puget Sound, and do not need to be consulted on for this terminal (Carey, personal communication, 2013).

4.16.2.17 *Pacific Eulachon Critical Habitat*

No Pacific eulachon critical habitat has been designated near the Seattle Ferry Terminal (FEDERAL REGISTER 2011).

SHAW

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Jan 12, 2012 9:36am heriksen

NOTE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Blakley Island and Shaw Island, Washington.

Section	Township	Range	Lat	Long	County
27	36N	2W	48° 35' 87" N	122° 55' 40" W	San Juan
HUC 171100030601			WRIA 2		



Figure SH-1
Shaw Island Ferry Terminal Vicinity Map
WSF Biological Assessment Reference
Shaw Island, Washington



Shaw Island Ferry Terminal: WSF Biological Assessment Reference

- Smelt Spawning
- - - Approximate Mean High Water (MHW)
- Eel Grass

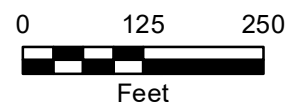
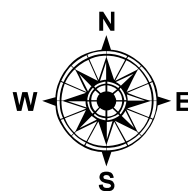


Figure SH-2
Aerial Photo of Shaw Ferry Terminal
WSF Biological Assessment Reference
Shaw Island, Washington

4.17 Shaw Ferry Terminal

The Shaw Ferry Terminal is located on Shaw Island in the San Juan Islands. Shaw Island is west of Lopez Island and south of Orcas Island. (See Figures SH-1 and SH-2.)

The Shaw Ferry Terminal provides service to the Anacortes and San Juan inter-island terminals (Lopez, Shaw, Orcas, and Friday Harbor).

Features of the terminal include a small waiting shelter, two vehicle holding lanes that accommodate up to 22 vehicles, and a small parking lot. The terminal has one slip with steel wingwalls. Three steel dolphins are associated with the terminal. No overhead passenger loading facilities exist at the terminal.

4.17.1 Shaw Environmental Baseline

4.17.1.1 Physical Indicators

Substrate and Slope

Substrate conditions adjacent to the terminal are a mixture of sand, shell, gravel, cobble, and bedrock. Areas of coarser grained sediments and bedrock occur within the areas subject to vessel operations. Offshore depths of terminal structures are: slip (-34.5 feet MLLW). Maximum depth for fixed dolphins is -39.5 feet MLLW.

With the exception of the Shaw Island Ferry Terminal, general store, chapel, music studio, and a private marina, the shoreline in the area is generally undeveloped. A small, gently sloping sandy beach exists to the southeast of the terminal, and another to the southwest. However, much of the shoreline area is steep and rocky (see Figures SH-3 and SH-4).



Figure SH-3
Shoreline Area West of the Shaw Ferry Terminal



Figure SH-4
Shoreline Area East of the Shaw Ferry Terminal

Salt/Freshwater Mixing

Shaw Island is drained by a number of small, mostly unnamed streams. Most streams are seasonal, and are typically dry in the summer months. There are no significant freshwater drainages near the Shaw Island Ferry Terminal.

Flows and Currents

Strong currents, deep channels, and tidal mixing influence the open marine waters of the San Juan Islands.

4.17.1.2 Chemical Indicators

Water Quality

The marine waters of Harney Channel near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include bacteria (water), and phenol (sediment) (Ecology 2018).

Sediment Quality

Impaired waters listings in the terminal area include phenol in sediment (Ecology 2018).

4.17.1.3 Biological Indicators

Shoreline Vegetation

Forested shoreline vegetation predominately occurs west and east of the ferry terminal.

Macroalgae and Eelgrass

PIE completed an eelgrass and biological resources survey in March 2002 (PIE 2002a). Battelle Marine Sciences Laboratory conducted a previous survey at the Shaw Island Ferry Terminal in March 1997 (Thom et al. 1997a). Both surveys were conducted to determine the spatial extent and density of eelgrass and the percent cover of macroalgae near the Shaw Ferry Terminal and the adjacent private marina.

The presence of a large eelgrass bed was confirmed within the private marina, approximately 150 feet east of the ferry terminal (see Figure SH-2). A second small patch of eelgrass (approximately 16 square feet) has been documented as occurring southwest of the ferry terminal, but the exact location is unknown. Based on 45 quadrat counts collected, the mean shoot density of the larger eelgrass bed ranges between four and 48 shoots per 0.25 square meter. The densest eelgrass occurs between about -4 and -6 feet MLLW in the marina. The mean density of the smaller eelgrass area identified southwest of the ferry terminal is two shoots per 0.25 square meter and nine shoots per square meter. This eelgrass patch occurs between -15 and

-20 feet MLLW. Reconnaissance dives along the seaward edge of the larger eelgrass bed revealed a similar distribution pattern to that of the investigation conducted by Battelle (Thom et al. 1997a). The westernmost edge of the larger eelgrass bed does not extend beyond the west side of the private marina.

Macroalgae was frequently observed in the intertidal zone. Macroalgae density and diversity was greatest in the intertidal area on the north side of the trestle. Fastened macroalgae was typically attached to large pieces of substrate and bedrock.

Observed macroalgae includes Turkish towel, seersucker (*Costaria costata*), rockweed, sugar kelp, bull kelp, red ribbon, false kelp (*Petalonia fascia*), diatoms, and sea lettuce.

Epibenthos, Macrofauna, Fish, and Marine Mammals

The presence of bedrock is likely to limit epibenthic production; however, areas within the intertidal zone consisting of sand, cobble, and gravel are likely to support epibenthic production.

Cnidarians, echinoderms, mollusks, and arthropods were frequently observed including nudibranchs, red rock crab, Dungeness crab, decorator crab, piddock, rock oyster, sunflower star, horse clams, anemones, limpets, and shrimp.

Fish species in the area include unidentified flatfish, sculpins, perch, lingcod, and greenling, and as well as other fish typically found in shallow marine unconsolidated substrate habitats.

Marine mammals likely to occur in the area are resident and transient killer whale, harbor porpoise, harbor seal, Californian sea lion, and Dall's porpoise.

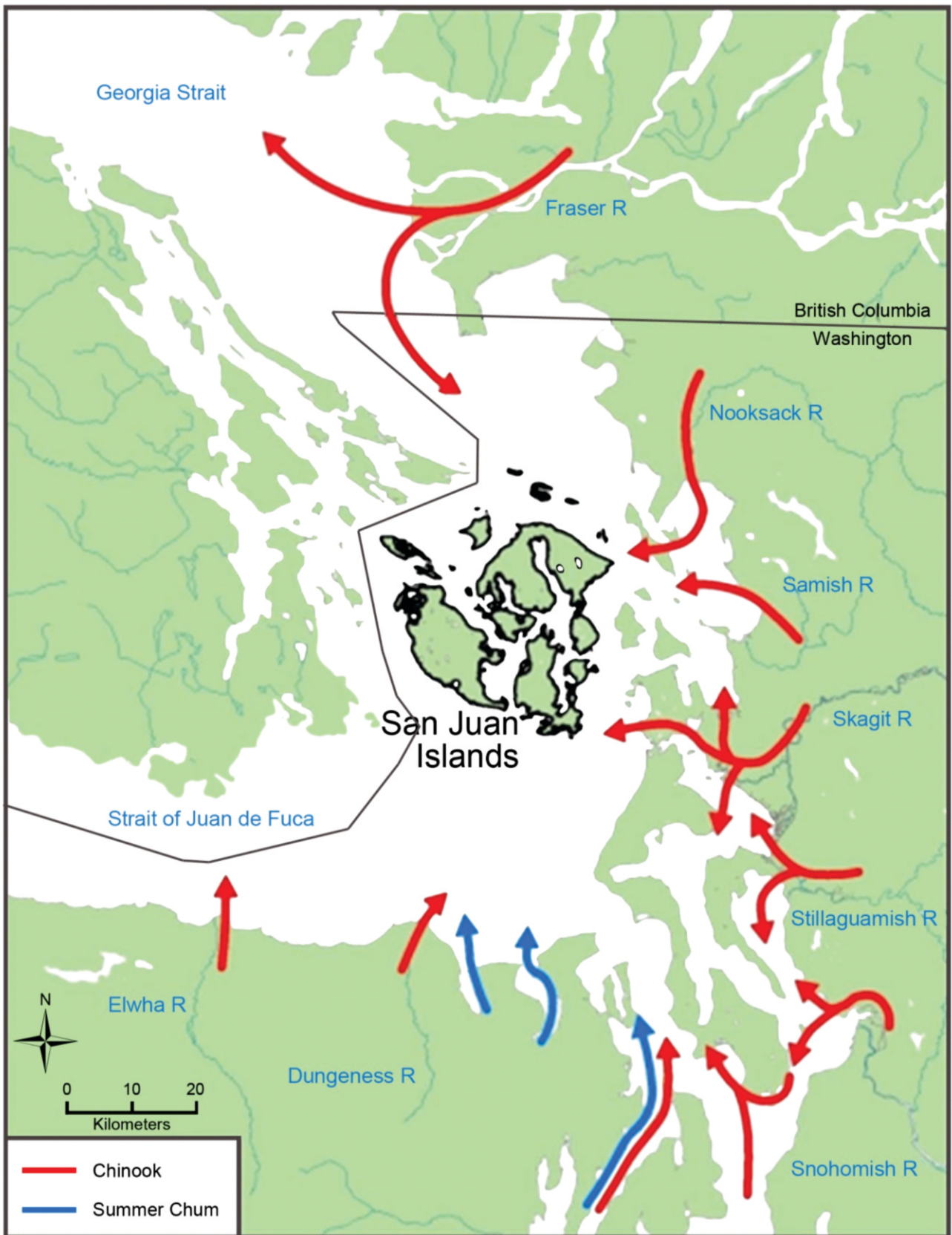
Forage Fish

There is no documented forage fish spawning present at the terminal (WSDOT 2018a). Herring spawning ground is present 450 ft. SW of the terminal.

4.17.2 Shaw Species Distributions

4.17.2.1 Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)

No Chinook salmon-bearing streams are located near the Shaw Island Ferry Terminal (WDFW 2007a). However, several major river systems that support Chinook salmon, including the Nooksack River (approximately 27 miles northeast, shoreline distance), Samish River (approximately 24 miles east), Skagit (approximately 29 miles southeast), and Stillaguamish (approximately 39 miles southeast) occur in this area of Puget Sound. Chinook may also be present from rivers and streams in central and southern Puget Sound (WDFW 2007a). The results of beach seine sampling completed from March to October in 2008 and 2009 indicate that juvenile Chinook salmon arrive in the San Juan Islands by April, peak in the month of June, remain relatively high in shoreline areas during summer months, and are present through October. Chinook may be present from numerous river systems, as shown in Figure SH-5 (SRSC and NOAA 2012).



SOURCE: SRSC/NOAA Fisheries 2012.

Figure SH-5
Migratory Pathways for Juvenile Salmon from
Source Population Rivers to the San Juan Islands Area
WSF Biological Assessment Reference
Shaw Island, Washington

Adult and Sub-adult Chinook

The marine environment of northern Puget Sound is a migratory corridor for adults. Adult Chinook salmon collected in the waters around the San Juan archipelago are usually Puget Sound or Fraser River populations (Sanford, personal communication 2002). WDFW micro-tag data analyzed from 1985 showed five Chinook salmon stocks have been identified in the San Juan region (Moulton, personal communication 2001).

The marine waters of the San Juan Islands provide habitat for outmigrating sub-adult Chinook salmon from rivers into Puget Sound before their eventual oceanic phase as adults. Sub-adults have spent a winter in the marine environment and are not closely oriented to the shoreline like juveniles.

Juvenile Chinook

Chinook salmon do not spawn in the San Juan archipelago (Otis, personal communication 2000). Juveniles that could occur near the ferry terminal are likely of hatchery origin or have crossed open water to reach the San Juan Islands. These hatchery fish are not part of the ESU. The watersheds of this region are not large enough to support sustainable wild Chinook salmon populations (Sanford, personal communication 2002). A hatchery exists on Orcas Island. Juvenile Chinook salmon habitat in the ferry terminal area includes the open water (pelagic zones) of the San Juan Islands and the nearshore and intertidal zones in the San Juan Islands, particularly areas supporting eelgrass and macroalgae.

4.17.2.2 Puget Sound Chinook Salmon Critical Habitat

The Shaw Island Ferry Terminal lies within Chinook Zone 2 (70 FR 52630). While there are no streams that support Chinook salmon near the ferry terminal, there are eelgrass beds in close proximity to the ferry terminal that may be used by juvenile Chinook for rearing.

The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table SH-1. PCEs relevant to the terminal area are numbered per the CFR (70 FR 52630).

Table SH-1
Existing Conditions of Chinook Salmon PCEs at the Shaw Ferry Terminal

PCEs	Existing Conditions
5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	<p>Obstructions In-water structures include the trestle, the slip, and dolphins. The ferry terminal may affect fish passage in the nearshore.</p> <p>Water Quality and Forage The marine waters of Harney Channel near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include bacteria (water), and phenol (sediment) (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of two drainage areas that drain to Harney Channel. None of the runoff is treated.</p> <p>The first drainage area drains the holding lanes, and consists of one catch basin that discharges through an outfall to the southeast of the terminal building.</p> <p>The second drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. The presence of bedrock is likely to limit epibenthic production; however, areas within the intertidal zone consisting of sand, cobble, and gravel are likely to support epibenthic production.</p> <p>There is no documented forage fish spawning present at the terminal (WSDOT 2018a).). Herring spawning ground is present 450 ft. SW of the terminal.</p> <p>Natural Cover Forested vegetation occurs west and east of the ferry terminal. The presence of a large eelgrass bed was confirmed within the private marina, approximately 150 feet east of the ferry terminal. A second small patch of eelgrass (approximately 16 square feet) has been documented as occurring southwest of the ferry terminal, but the exact location is unknown. Macroalgae was frequently observed in the intertidal zone. Macroalgae density and diversity was greatest in the intertidal area on the north side of the trestle. Fastened macroalgae was typically attached to large pieces of substrate and bedrock. Observed macroalgae includes: Turkish towel, seersucker, rockweed, sugar kelp, bull kelp, red ribbon, false kelp, diatoms, and sea lettuce (PIE 2002a).</p> <p>The beach area is gently sloping, with sand, shell debris, gravel, and cobble near shore and bare bedrock offshore (PIE 2002a). Side channels do not occur in the ferry terminal area.</p>
6) Offshore areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	<p>The marine waters of Harney Channel near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include bacteria (water), and phenol (sediment) (Ecology 2018).</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Offshore areas provide habitat for forage fish.</p>

4.17.2.3 *Puget Sound Steelhead (Oncorhynchus mykiss)*

There are no natal streams in the area of the Shaw Island Ferry Terminal that support Puget Sound steelhead. However, major river systems that support winter and summer steelhead include the Nooksack River (approximately 28 miles northeast), Skagit River (approximately 30 miles southeast), and Stillaguamish River (approximately 40 miles southeast). The Samish River (approximately 25 miles east) supports winter steelhead only. Steelhead may also be present from rivers and streams in central and southern Puget Sound (WDFW 2007a).

Available data from tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) efforts around Puget Sound have reported the capture of few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). The total sampling effort data was not available, but the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

Beach seine sampling in Bellingham Bay (north Puget Sound) also captured few steelhead (Lummi Nation, unpublished data). The Bellingham Bay research reported the capture of two juvenile steelhead salmon in 336 sets between February 14 and December 1, 2003. The steelhead were captured in the eastern portion of Bellingham Bay near the Taylor Avenue Dock on June 12 and June 25, 2003.

4.17.2.4 *Puget Sound Steelhead Critical Habitat*

The Shaw Ferry Terminal does not fall within designated steelhead critical habitat (Federal Register 2016a).

4.17.2.5 *Humpback Whale (Megaptera novaeangliae)*

Humpback whale may be present near the Shaw ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.17.2.6 *Southern Resident Killer Whale (Orcinus orca)*

Southern Resident Killer Whale (SRKW) may be present near the Shaw ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.17.2.7 *Southern Resident Killer Whale Critical Habitat*

The Shaw ferry terminal area lies within designated critical habitat (Area 1 – Core Summer Area). Areas with water less than 20 feet deep relative to the extreme high water mark are not included in the critical habitat designation (Federal Register 2006).

The PCEs provided in the terminal area, and their existing conditions are listed in Table SH-2. PCEs relevant to the terminal area are numbered per Federal Register 2006.

The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table SH-2. PCEs relevant to the terminal area are numbered per the CFR (Federal Register 2006).

Table SH-2
Existing Conditions of Southern Resident Killer Whale PCEs at the Shaw Island Ferry Terminal

PCEs	Existing Conditions
1) Water quality to support growth and development	<p>The marine waters of Harney Channel near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include bacteria (water), and phenol (sediment) (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of two drainage areas that drain to Harney Channel. None of the runoff is treated.</p> <p>The first drainage area drains the holding lanes, and consists of one catch basin that discharges through an outfall to the southeast of the terminal building.</p> <p>The second drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>
2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	Salmonids are the primary prey of SRKW, and may be present near the terminal. Further information on prey can be found in the Puget Sound Chinook section, and Appendix B – Species Biology.
3) Passage conditions to allow for migration, resting, and foraging	Existing structures that occur below -20 feet in critical habitat include the trestle, the slip, and dolphins.

4.17.2.8 Bull Trout (*Salvelinus confluentus*)

There are no natal streams in the area of the Shaw Ferry Terminal that support bull trout (WDFW 2007a).

The aquatic portions of the ferry terminal are within marine FMO habitat. While bull trout have not been documented in the ferry terminal area, suitable FMO habitat is present, and bull trout are thought to occur throughout south, central, and northern Puget Sound. Therefore, it is expected that the ferry terminal area would be used by anadromous adult and sub-adult bull trout for foraging, migration, and overwintering (USFWS 2004b). Within the ferry terminal area, it is expected that individual bull trout may be present from the Nooksack River (approximately 27 miles northeast), Samish River (approximately 24 miles east), Skagit River (approximately 29 miles southeast), and Stillaguamish River (approximately 39 miles

southeast). Bull trout may also be present from rivers and streams in central and southern Puget Sound (WDFW 2007a).

4.17.2.9 *Bull Trout Critical Habitat*

The Shaw Island Ferry Terminal does not fall within designated bull trout critical habitat (Federal Register 2010a).

4.17.2.10 *Green Sturgeon (Acipenser medirostris)*

There are no natal streams in the area of the Shaw Island Ferry Terminal that support green sturgeon.

Two confirmed Southern DPS green sturgeon were detected in Puget Sound in 2006, but the extent to which green sturgeon from the Southern DPS use Puget Sound is uncertain (Federal Register 2018). Observations of green sturgeon in Puget Sound are much less common compared to the coastal Washington estuaries and bays such as Willapa Bay, Grays Harbor, and the Lower Columbia River estuary (Federal Register 2018). In addition, Puget Sound does not appear to be part of the coastal migratory corridor that Southern DPS fish use to reach overwintering grounds north of Vancouver Island (Federal Register 2018).

4.17.2.11 *Green Sturgeon Critical Habitat*

The Shaw Island Ferry Terminal does not fall within designated green sturgeon critical habitat (Federal Register 2009).

4.17.2.12 *Marbled Murrelet (Brachyramphus marmoratus)*

The Shaw terminal area provides suitable marbled murrelet marine foraging habitat.

There is no documented forage fish spawning present at the terminal (WSDOT 2018a).

WDFW surveys conducted from 2001 to 2012 show a density of less than 1 bird per square kilometer in the terminal area (WDFW 2016). The nearest documented marbled murrelet nesting site is located 42 miles SW of the terminal (WSDOT 2018b).

The Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program (2012) identified habitat suitability throughout the range of the species, and ranked it as Zero, Low, Marginal, Moderately High and Highest. The Shaw murrelet habitat suitability within the pile driving/heavy equipment zone of potential effect (0.25 miles), ranges from Zero to High (WSDOT 2019b).

Five acres of contiguous coniferous forest that may offer nesting opportunity is present within the pile driving/heavy equipment zone of potential effect (0.25 miles) (WSDOT 2014/2018c). The 0.25 mile Zone of potential effect is discussed in Section 3.4.

Ferry traffic creates regular disturbance in the immediate terminal area. From July 2017 to June 2018, there were approximately 4,900 scheduled arrivals and departures from the terminal. During the nesting season (April 1-September 23), when foraging murrelet are more active, there were approximately 2,540 scheduled arrivals and departures (WSDOT 2018d).

The marbled murrelet population in the San Juan Islands increases in late July. This increase may be the result of British Columbia birds immigrating after the breeding season. In late fall/early winter, up to 26 percent of the total marbled murrelets observed in the San Juans are found northwest of Shaw Island near Crane Island, the Wasp Island complex, and the southwestern shoreline of Orcas Island (approximately 3.8 miles from the Orcas Island Ferry Terminal, and 4.8 miles from the Shaw Island Ferry Terminal). This region represents an important concentration area during the molting period (Evans Mack 2002).

4.17.2.13 Marbled Murrelet Critical Habitat

No marbled murrelet critical habitat has been designated near the terminal (USFWS 1996).

4.17.2.14 *Rockfish Species*

Bocaccio

Bocaccio are rarely caught in north Puget Sound and only sparse records exist for the Strait of Georgia (Federal Register 2010b). The water surrounding the Shaw Ferry Terminal is shallow (less than 30 feet deep), and subject to very strong currents (NMFS 2009). Substrates are rocky throughout the area. This area may be occupied by all life stages of bocaccio.

Yelloweye Rockfish

Yelloweye rockfish are more closely aligned with rocky, high-relief substrates than with very deep water (Federal Register 2010b). The waters surrounding the San Juan Islands offer this rocky substrate. This area may be occupied by all life stages of yelloweye.

4.17.2.15 *Rockfish Species Critical Habitat*

The Shaw Ferry Terminal is within rockfish nearshore critical habitat (less than or equal to 98 feet in depth) (Federal Register 2014). The physical and biological features (PBFs) (Federal Register 2014) essential to the conservation of juvenile Bocaccio rockfish are listed in Table SH-4. PBFs relevant to the terminal area are numbered per the CFR (Federal Register 2014). These PBFs are specific to nearshore environments, where only juvenile Bocaccio rockfish could be found. Deepwater (> 98 feet in depth) PBFs exist for adult Bocaccio, and adult and juvenile yelloweye rockfish; however, this habitat is not present at the Shaw Ferry Terminal and will not be discussed here.

Table SH-4
Existing Conditions of Rockfish PBFs at the Shaw Ferry Terminal

PBFs	Existing Conditions
1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities.	<p>The marine waters of Harney Channel near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include bacteria (water), and phenol (sediment) (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of two drainage areas that drain to Harney Channel. None of the runoff is treated.</p> <p>The first drainage area drains the holding lanes, and consists of one catch basin that discharges through an outfall to the southeast of the terminal building.</p> <p>The second drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. The presence of bedrock is likely to limit epibenthic production; however, areas within the intertidal zone consisting of sand, cobble, and gravel are likely to support epibenthic production.</p> <p>There is no documented forage fish spawning present at the terminal (WSDOT 2018a).). Herring spawning ground is present 450 ft. SW of the terminal.</p>
2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.	<p>Forested vegetation occurs west and east of the ferry terminal. The presence of a large eelgrass bed was confirmed within the private marina, approximately 150 feet east of the ferry terminal. A second small patch of eelgrass (approximately 16 square feet) has been documented as occurring southwest of the ferry terminal, but the exact location is unknown. Macroalgae was frequently observed in the intertidal zone. Macroalgae density and diversity was greatest in the intertidal area on the north side of the trestle. Fastened macroalgae was typically attached to large pieces of substrate and bedrock. Observed macroalgae includes: Turkish towel, seersucker, rockweed, sugar kelp, bull kelp, red ribbon, false kelp, diatoms, and sea lettuce (PIE 2002a).</p> <p>The beach area is gently sloping, with sand, shell debris, gravel, and cobble near shore and bare bedrock offshore (PIE 2002a). Side channels do not occur in the ferry terminal area.</p>

4.17.2.16 *Pacific Eulachon*

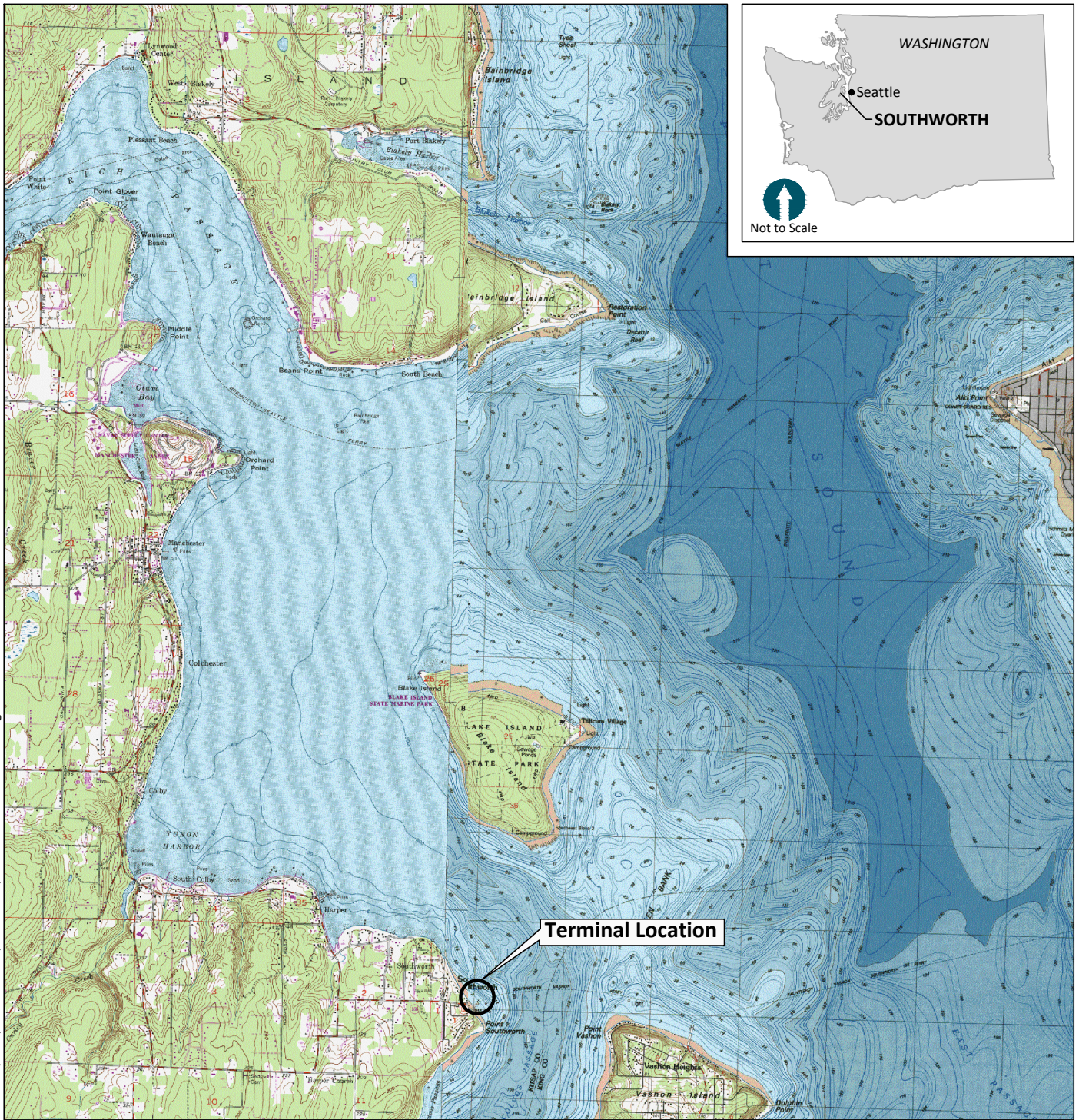
Adult eulachon could be present at the Shaw Ferry Terminal. The terminal is within 50 miles of the mouths of the Elwha and Fraser Rivers, where spawning is known to occur; therefore, larger juveniles could be present at this terminal as well.

4.17.2.17 *Pacific Eulachon Critical Habitat*

No Pacific eulachon critical habitat has been designated near the Shaw Ferry Terminal (FEDERAL REGISTER 2011).

SOUTHWORTH

K:\Jobs\100016-WSF\10001603\10001603-BA-053-SO1.dwg FIG SO-1



Jan 12, 2012 9:47am heriksen

NOTE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Bremerton East and Seattle South, Washington.

Section	Township	Range	Lat	Long	County
1	23N	2E	47°30'46" N	122° 29' 42" W	Kitsap
HUC 171100190106			WRIA 15		

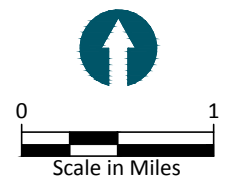


Figure SO-1
Southworth Ferry Terminal Vicinity Map
WSF Biological Assessment Reference
Southworth, Washington



Southworth Ferry Terminal: WSF Biological Assessment Reference

- Smelt Spawning
- - - Approximate Mean High Water (MHW)
- ▨ Eel Grass

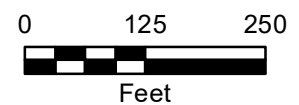
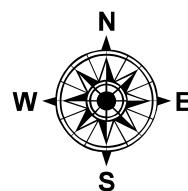


Figure SO-2
Aerial Photo of Southworth Ferry Terminal
WSF Biological Assessment Reference
Southworth, Washington

4.18 Southworth Ferry Terminal

The Southworth Ferry Terminal is located on the Colvos Passage shoreline, linking the Key Peninsula with Vashon Island and Seattle (see Figures SO-1 and SO-2).

The Southworth Ferry Terminal provides service to the Vashon Island and Fauntleroy Terminals.

Features of the terminal include a terminal building, two vehicle holding lanes that accommodate up to 22 vehicles, and two parking lots. The terminal has one slip with steel wingwalls. Six steel dolphins are associated with the terminal. No overhead passenger loading facilities exist at the terminal.

4.18.1 Southworth Environmental Baseline

4.18.1.1 Physical Indicators

Substrate and Slope

The intertidal and shallow subtidal habitat areas within the area are characterized by a mixture of sand, coarse sand, and gravel material. The Southworth Ferry Terminal currently exists within a portion of intertidal habitat. The nearshore intertidal habitat extends gradually from MHHW (+11.53 feet) to about -4 feet. A transition occurs in the shallow subtidal zone from approximately -4 feet to the -10 feet boundary of the shallow subtidal zone. Habitat transitions quickly to deeper subtidal habitat beyond about -14 feet with a slope of about 15:1. Offshore depths of terminal structures are: slip (-29.0 feet MLLW). Maximum depth for fixed dolphins is -39.5 feet MLLW.

Beach material to the south of the terminal is sand and clay; to the north is sand and cobble with sections of beach-stabilizing riprap or other constructed shore protection material (see Figures SO-3 and SO-4). Silt, sand, dense clay, and coarse sand are found in the intertidal and subtidal marine portions of the area.

On the south side of the ferry terminal, there is a very steep bluff composed of clay and sands where sloughing is common (Figure SO-4). Erosion from the bluff ranges between 2 and 5 feet per year and is a significant source of sediments to the beach.



Figure SO-3
Beach and Intertidal Area North of the Southworth Ferry Terminal



Figure SO-4
Beach and Bluff South of the Southworth Ferry Terminal

Salt/Freshwater Mixing

There are no freshwater inputs in the vicinity of the ferry terminal. The closest stream is located about 1 mile northwest of the terminal.

Flows and Currents

The prevailing currents at the Southworth Ferry Terminal move along the shoreline from south to north. Ferry captains have identified an eddy, or sudden reversal in water flow direction, that complicates landing at this terminal. The eddy is caused by ebb current shear, a condition occurring when a section of water with a strong current exists next to a section of relatively still water. Wind fetch from the north, northwest, northeast, east, and south are also likely to affect localized current patterns.

4.18.1.2 Chemical Indicators

Water Quality

The marine waters of Colvos Passage near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include eelgrass eutrophication due to inorganic nitrogen loading, dissolved oxygen and bacteria (water), (Ecology 2018).

Sediment Quality

No impaired waters listing data is available for the current terminal location (Ecology 2018).

4.18.1.3 Biological Indicators

Shoreline Vegetation

Uplands in the area have been altered by the development of the rural community of Southworth. Most of the forests have been removed and replaced by landscaped lawns, gardens, and young forest trees. Some larger trees have been preserved, but they are typically single trees or clustered in small numbers.

The topography of the area consists of rolling hills, sandy beaches, and a seaside bluff just south of the terminal near Point Southworth. Seawalls and bulkheads exist along the shore to protect single-family homes that exist in the high intertidal area in portions of the area and on top of the bluff.

Macroalgae and Eelgrass

Sandy substrates with low, medium, and high densities of eelgrass occur from approximately 0 feet to -8 feet on the northwest side of the ferry terminal and from 0 feet to about -20 feet on the southeast side of the ferry terminal. A band of eelgrass occurs under the southern edge of the trestle. Subtidal macroflora occurs in portions of this habitat with a low to moderate density. The dominant macrophytes in the intertidal areas are free-floating sea lettuce, red algae, rock weed, and sugar wrack. *Ulva* is found throughout the site, red algae is generally located beneath the dock attached to pilings, rock weed inhabits the larger cobble and riprap shoreline, and sugar wrack was observed in areas of cobble approximately 100 feet from the north side of the ferry terminal. In general, the distribution of macroflora is determined by the availability of appropriate attachment sites.

Epibenthos, Macrofauna, Fish, and Marine Mammals

Substrate characteristics likely support epibenthic production. Diver surveys completed in October 1996, November 1998, and January 1999 identified species in the area and their spatial distribution (Thom et al. 1997b; PIE 1999). These species were distributed over the intertidal, shallow subtidal, and subtidal zones of the area. Dominant macrofauna include red crab (*Pleuroncodes planipes*), horse clam, shiner surf perch, tube snout fish (*Aulorhynchus flavidus*), and some piddock clams. Marine mammals likely to occur in the area include killer whale, harbor seal, Steller sea lion, California sea lion, harbor porpoise, and Dall's porpoise.

Forage Fish

Documented surf smelt spawning is present (see Figures SW-2), extending approximately 550 ft. NW and 415 ft. SE of the terminal (WSDOT 2018a).

4.18.2 Southworth Species Distributions

4.18.2.1 Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)

Near Colvos Passage and in the Sinclair Inlet drainages, there are several small streams that support Chinook salmon. Curley Creek, which drains Long Lake and is a tributary to Yukon Harbor, is the nearest stream with Chinook salmon (approximately 3 miles northwest, shoreline distance). Tributaries to Sinclair Inlet, Blackjack Creek (approximately 15 miles shoreline distance), and Gorst Creek

(approximately 17 miles shoreline distance) also support Chinook salmon (WDFW 2007a).

Chinook salmon have been documented by WDFW as present in Judd Creek (Vashon Island), but there is no documented spawning or juvenile rearing in the creek. Judd Creek is a tributary to Quartermaster Harbor (approximately 23 miles southeast shoreline distance) (WDFW 2007a).

The closest major rivers that support Chinook salmon are the Duwamish/Green River (approximately 9 miles northeast, shoreline distance) and the Puyallup River (approximately 18 miles southeast, shoreline distance). Chinook may also be present from rivers and streams in southern Puget Sound (WDFW 2007a).

Adult and Sub-adult Chinook

Adult Chinook salmon may be found near the terminal at any time of year, but are most abundant in the late summer and fall when returning from the ocean to their natal streams.

Sub-adult Chinook have access to the terminal area and may be found there at any time of year. Sub-adults have spent a winter in the marine environment and are not closely oriented to the shoreline like juveniles.

Juvenile Chinook

Near Colvos Passage and in the Sinclair Inlet drainages, there are several small streams that support Chinook salmon. Curley Creek, which drains Long Lake and is a tributary to Yukon Harbor, is the nearest stream with Chinook (approximately 3 miles northwest, shoreline distance). Tributaries to Sinclair Inlet, Blackjack Creek (approximately 15.0 miles shoreline distance) and Gorst Creek (approximately 17 miles shoreline distance), also support Chinook salmon (WDFW 2007a).

Chinook salmon spawning in Gorst Creek has increased in recent years, due in part to a reduction in the fishing effort in the area. Most of these fish are believed to be returns from hatchery Chinook salmon released from the Gorst Creek rearing ponds. An escapement of over 17,000 Chinook salmon to the Inlet (fishery harvests plus

stream escapement) in 2002 was the largest on record, with over 10,000 adult Chinook salmon in Gorst Creek. Returns to the stream in the previous 3 years averaged about 2,400 adult Chinook salmon. An out-migrant trap recently installed at River Kilometer 1.4 on Gorst Creek (upstream of the hatchery) captured 1,352 juvenile Chinook salmon in 2001 and 324 juvenile Chinook salmon in 2002 (Fresh et al. 2006).

4.18.2.2 *Puget Sound Chinook Salmon Critical Habitat*

The Southworth Ferry Terminal lies within Chinook Zone 14 (70 FR 52630). Eelgrass in close proximity to the facility may be used by juvenile Chinook for rearing.

The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table SO-1. PCEs relevant to the terminal area are numbered per the CFR (70 FR 52630).

Table SO-1
Existing Conditions of Chinook Salmon PCEs at the Southworth Ferry Terminal

PCEs	Existing Conditions
5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	<p>Obstructions In-water structures include the trestle, the slip, and dolphins. The existing ferry terminal may affect fish passage in the nearshore.</p> <p>Water Quality and Forage The marine waters of Colvos Passage near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include eelgrass eutrophication due to inorganic nitrogen loading, dissolved oxygen and bacteria (water), (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of four drainage areas that drain to Colvos Passage. One of the areas includes treatment.</p> <p>The first drainage area drains the holding lanes and the commuter park and ride lot, and consists of 18 catch basins and a short trench drain that all discharge through an outfall to the southeast of the trestle.</p> <p>The second drainage area drains the trestle, and consists of 18 drains that discharge directly to surface water.</p> <p>The third drainage area drains the end of the trestle near the terminal building, and consists of two Gullywasher® catch basins (inspected annually) that treat sediment and oily runoff before discharging to surface water.</p> <p>The fourth drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. Substrate characteristics support epibenthic production.</p> <p>Documented surf smelt spawning is present (see Figures SW-2), extending approximately 550 ft. NW and 415 ft. SE of the terminal (WSDOT 2018a).</p> <p>Natural Cover Forested shoreline vegetation has been replaced in many areas by residential landscaping.</p> <p>A band of eelgrass occurs under the southern edge of the existing trestle. Subtidal macroflora occurs in portions of this habitat with a low to moderate density. The dominant macrophytes in the intertidal areas are free floating sea lettuce, red algae, rock weed, and sugar wrack. <i>Ulva</i> is found throughout the site, red algae is generally located beneath the dock attached to pilings, rock weed inhabits the larger cobble and riprap shoreline, and sugar wrack was observed in areas of cobble approximately 100 feet from the north side of the ferry terminal (Anchor 2001).</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of sandy substrates with low, medium, and high densities of eelgrass occurring from approximately 0 feet to -8 feet on the northwest side of the existing ferry terminal and from 0 feet to about -20 feet on the southeast side of the existing facility (Anchor 2001). Some riprap and hardened</p>

PCEs	Existing Conditions
	shoreline are adjacent to the ferry terminal. Side channels do not occur in the ferry terminal area.
6) Offshore areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	<p>The marine waters of Colvos Passage near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include eelgrass eutrophication due to inorganic nitrogen loading, dissolved oxygen and bacteria (water), (Ecology 2018).</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Offshore areas provide habitat for forage fish.</p>

4.18.2.3 *Puget Sound Steelhead (Oncorhynchus mykiss)*

The nearest natal streams in the area of the Southworth Ferry Terminal that support Puget Sound steelhead are Curley Creek (tributary to Yukon Harbor approximately 3 shoreline miles northwest) and Shingle Mill Creek on Vashon Island (approximately 3 shoreline miles southwest). Major river systems in this area of Puget Sound that support winter steelhead include the Lake Washington/Cedar River (approximately 13 miles northeast shoreline distance), Duwamish/Green River (approximately 9 miles northeast shoreline distance), and the Puyallup River (approximately 18 miles southeast shoreline distance). The Duwamish/Green River also supports a run of summer steelhead.

In addition, winter steelhead are present in Blackjack Creek (approximately 12 shoreline miles northwest), Ross Creek (approximately 13 shoreline miles northwest), Anderson Creek (approximately 15 shoreline miles northwest), and Gorst Creek (approximately 15.5 shoreline miles northwest)—all tributaries to Sinclair Inlet; and Chico Creek (approximately 17 shoreline miles northwest), Barker Creek (approximately 17 shoreline miles northwest), Strawberry Creek (approximately 18 shoreline miles northwest), and Clear Creek (approximately 18 shoreline miles northwest)—all tributaries to Dyes Inlet (WDFW 2007a).

Available data from tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) efforts around Puget Sound have reported the capture of few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). The total sampling effort data was not

available, but the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

During 2001 and 2002, beach seining conducted in central Puget Sound by King County Department of Natural Resources captured only nine steelhead out of a total of approximately 34,000 juvenile salmonids. All the steelhead were caught between May and August and ranged in size from 141 to 462 mm with a mean size of 258 mm (Brennan et al. 2004). Also during 2001 and 2002, beach seining, tow netting, and purse seining were conducted by WDFW in Sinclair Inlet. This sampling effort focused on beach seining, which occurred monthly from April to October in 2001 and from mid February to September in 2002. Tow-netting was conducted monthly from May to August in 2002 only and purse seining was limited to only 2 days in July of 2002. The sampling effort resulted in the capture of four steelhead out of a total of 21,500 salmonids. Despite the larger effort given to beach seining, of the four steelhead, only one was caught in the beach seine and the remaining three were caught in deeper water with the tow net and purse seine (Fresh et al. 2006).

Steelhead were also infrequently captured in a beach seine study around Bainbridge Island (City of Bainbridge Island, Suquamish Tribe, and WDFW 2005). The study consisted of 271 beach seine sets conducted between April and September 2002 and between April 2003 and December 2004. Three steelhead were captured in the study: one in May and two in September. Lengths were 179, 280, and 300 mm. One had been fin clipped, indicating it was of hatchery origin.

4.18.2.4 *Puget Sound Steelhead Critical Habitat*

The Southworth Ferry Terminal does not fall within designated steelhead critical habitat (Federal Register 2016a).

4.18.2.5 *Humpback Whale (*Megaptera novaeangliae*)*

Humpback whale may be present near the Southworth ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.18.2.6 *Southern Resident Killer Whale (Orcinus orca)*

Southern Resident Killer Whale (SRKW) may be present near the Southworth ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.18.2.7 *Southern Resident Killer Whale Critical Habitat*

The Southworth ferry terminal area lies within designated critical habitat (Area 2 – Puget Sound). Areas with water less than 20 feet deep relative to the extreme high water mark are not included in the critical habitat designation (Federal Register 2006).

The PCEs provided in the terminal area, and their existing conditions are listed in Table SO-2. PCEs relevant to the terminal area are numbered per Federal Register 2006.

Table SO-2
Existing Conditions of Southern Resident Killer Whale PCEs at the Southworth Ferry Terminal

PCEs	Existing Conditions
1) Water quality to support growth and development	<p>The marine waters of Colvos Passage near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include eelgrass eutrophication due to inorganic nitrogen loading, dissolved oxygen and bacteria (water), (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of four drainage areas that drain to Colvos Passage. One of the areas includes treatment.</p> <p>The first drainage area drains the holding lanes and the commuter park and ride lot, and consists of 18 catch basins and a short trench drain that all discharge through an outfall to the southeast of the trestle.</p> <p>The second drainage area drains the trestle, and consists of 18 drains that discharge directly to surface water.</p> <p>The third drainage area drains the end of the trestle near the terminal building, and consists of two Gullywasher® catch basins (inspected annually) that treat sediment and oily runoff before discharging to surface water.</p> <p>The fourth drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>
2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	<p>Salmonids are the primary prey of SRKW, and may be present near the terminal. Further information on prey can be found in the Puget Sound Chinook section, and Appendix B – Species Biology.</p>
3) Passage conditions to allow for migration, resting, and foraging	<p>Existing structures that occur below -20 feet in critical habitat include the head of the trestle, the slip, and dolphins.</p>

4.18.2.8 *Bull Trout (Salvelinus confluentus)*

There are no natal streams in the area of the Southworth Ferry Terminal that support bull trout (WDFW 2007a).

The aquatic portions of the ferry terminal are within marine FMO habitat. While bull trout have not been documented in the ferry terminal area, suitable FMO habitat is present, and bull trout are thought to occur throughout south, central, and northern Puget Sound. Therefore, it is expected that the ferry terminal area would be used by anadromous adult and sub-adult bull trout for foraging, migration, and

overwintering (USFWS 2004b). Within the ferry terminal area, it is expected that individual bull trout from the Duwamish/Green River (approximately 9 miles northeast, shoreline distance) and the Puyallup River (approximately 18 miles southeast, shoreline distance) core areas are most likely to be present (WDFW 2007a).

4.18.2.9 *Bull Trout Critical Habitat*

The shoreline of the Southworth Ferry Terminal is not within designated bull trout critical habitat per Federal Register 2010a.

4.18.2.10 *Green Sturgeon (Acipenser medirostris)*

There are no natal streams in the area of the Southworth Ferry Terminal that support green sturgeon.

Two confirmed Southern DPS green sturgeon were detected in Puget Sound in 2006, but the extent to which green sturgeon from the Southern DPS use Puget Sound is uncertain (Federal Register 2018). Observations of green sturgeon in Puget Sound are much less common compared to the coastal Washington estuaries and bays such as Willapa Bay, Grays Harbor, and the Lower Columbia River estuary (Federal Register 2018). In addition, Puget Sound does not appear to be part of the coastal migratory corridor that Southern DPS fish use to reach overwintering grounds north of Vancouver Island (Federal Register 2018).

4.18.2.11 *Green Sturgeon Critical Habitat*

The Southworth Ferry Terminal does not fall within designated green sturgeon critical habitat (Federal Register 2009).

4.18.2.12 *Marbled Murrelet (Brachyramphus marmoratus)*

The Southworth terminal area provides suitable marbled murrelet marine foraging habitat.

Documented surf smelt spawning (prey species) is present (see Figure SW-2), extending approximately 550 ft. NW and 415 ft. SE of the terminal (WSDOT 2018a).

WDFW surveys conducted from 2001 to 2012 show a density of less than 1 bird per square kilometer in the terminal area (WDFW 2016). The nearest documented marbled murrelet nesting site is located 29 miles NW of the terminal (WSDOT 2018b).

The Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program (2012) identified habitat suitability throughout the range of the species, and ranked it as Zero, Low, Marginal, Moderately High and Highest. The Southworth murrelet habitat suitability within the pile driving/heavy equipment zone of potential effect (0.25 miles), is Zero (WSDOT 2019b).

Five acres of contiguous forest that may offer nesting opportunity is present within the pile driving/heavy equipment zone of potential effect (0.25 miles) (WSDOT 2014/2018c). A WSF Biologist visited the terminal area on 11/26/18. Although there were 5 acres of contiguous forest, it was less than the required 60% coniferous. Therefore, the forest does not offer appropriate nesting opportunity (WSDOT 2018f).

Ferry traffic creates regular disturbance in the immediate terminal area. From July 2017 to June 2018, there were approximately 8,560 scheduled arrivals and departures from the terminal. During the nesting season (April 1-September 23), when foraging murrelet are more active, there were approximately 4,325 scheduled arrivals and departures (WSDOT 2018d).

4.18.2.13 *Marbled Murrelet Critical Habitat*

No marbled murrelet critical habitat has been designated near the terminal (USFWS 1996).

4.18.2.14 *Rockfish Species*

Bocaccio

Bocaccio are rarely caught in north Puget Sound and only sparse records exist for the Strait of Georgia (Federal Register 2010b). Because larvae are widely dispersed, it is possible that bocaccio juveniles could be found near the Southworth Ferry Terminal at any time of year. Adult bocaccio generally move to very deep water. The waters

within Colvos Passage drop off sharply from the shoreline to a depth of over 300 feet at the center (NMFS 2009).

Yelloweye Rockfish

Yelloweye rockfish are more closely aligned with rocky, high-relief substrates than with very deep water (Federal Register 2010b). Yelloweye may potentially be found in Colvos Passage.

4.18.2.15 Rockfish Species Critical Habitat

The Southworth Ferry Terminal is within rockfish nearshore critical habitat (less than or equal to 98 feet in depth) (Federal Register 2014). The physical and biological features (PBFs) (Federal Register 2014) essential to the conservation of juvenile Bocaccio rockfish are listed in Table SO-3. PBFs relevant to the terminal area are numbered per the CFR (Federal Register 2014). These PBFs are specific to nearshore environments, where only juvenile Bocaccio rockfish could be found. Deepwater (> 98 feet in depth) PBFs exist for adult Bocaccio, and adult and juvenile yelloweye rockfish; however, this habitat is not present at the Southworth Ferry Terminal and will not be discussed here.

Table SO-3
Existing Conditions of Rockfish PBFs at the Southworth Ferry Terminal

PBFs	Existing Conditions
1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities.	<p>The marine waters of Colvos Passage near the terminal are designated "Extraordinary" for aquatic life use. Impaired waters listings in the terminal area include eelgrass eutrophication due to inorganic nitrogen loading, dissolved oxygen and bacteria (water), (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of four drainage areas that drain to Colvos Passage. One of the areas includes treatment.</p> <p>The first drainage area drains the holding lanes and the commuter park and ride lot, and consists of 18 catch basins and a short trench drain that all discharge through an outfall to the southeast of the trestle.</p> <p>The second drainage area drains the trestle, and consists of 18 drains that discharge directly to surface water.</p> <p>The third drainage area drains the end of the trestle near the terminal building, and consists of two Gullywasher® catch basins (inspected annually) that treat sediment and oily runoff before discharging to surface water.</p>

PBFs	Existing Conditions
	<p>The fourth drainage area consists of the transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. Substrate characteristics support epibenthic production.</p> <p>Documented surf smelt spawning is present (see Figures SW-2), extending approximately 550 ft. NW and 415 ft. SE of the terminal (WSDOT 2018a).</p>
2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.	<p>Forested shoreline vegetation has been replaced in many areas by residential landscaping.</p> <p>A band of eelgrass occurs under the southern edge of the existing trestle. Subtidal macroflora occurs in portions of this habitat with a low to moderate density. The dominant macrophytes in the intertidal areas are free floating sea lettuce, red algae, rock weed, and sugar wrack. <i>Ulva</i> is found throughout the site, red algae is generally located beneath the dock attached to pilings, rock weed inhabits the larger cobble and riprap shoreline, and sugar wrack was observed in areas of cobble approximately 100 feet from the north side of the ferry terminal (Anchor 2001).</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of sandy substrates with low, medium, and high densities of eelgrass occurring from approximately 0 feet to -8 feet on the northwest side of the existing ferry terminal and from 0 feet to about -20 feet on the southeast side of the existing facility (Anchor 2001). Some riprap and hardened shoreline are adjacent to the ferry terminal. Side channels do not occur in the ferry terminal area.</p>

4.18.2.16 *Pacific Eulachon*

The terminal is within 50 miles of the Puyallup River mouth, where spawning is known to occur; however, this distance is measured across the water rather than along the shoreline. According to NMFS, Pacific eulachon are rare/absent in mid and south Puget Sound, and do not need to be consulted on for this terminal (Carey, personal communication, 2013).

4.18.2.17 *Pacific Eulachon Critical Habitat*

No Pacific eulachon critical habitat has been designated near the Southworth Ferry Terminal (FEDERAL REGISTER 2011).

TAHLEQUAH

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NOTE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Gig Harbor and Tacoma North, Washington.

Section	Township	Range	Lat	Long	County
2	21N	2E	47° 20' 2" N	122° 30' 29" W	King
HUC 171100190403			WRIA 15		

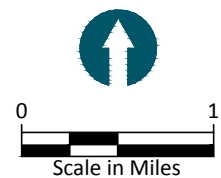


Figure TA-1
Tahlequah Ferry Terminal Vicinity Map
WSF Biological Assessment Reference
Vashon Island, Washington



Tahlequah Ferry Terminal: WSF Biological Assessment Reference

----- Approximate Mean High Water (MHW)
 Eel Grass

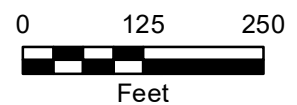
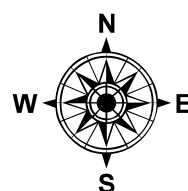


Figure TA-2
 Aerial Photo of Tahlequah Ferry Terminal
 WSF Biological Assessment Reference
 Vashon Island, Washington

4.19 Tahlequah Ferry Terminal

The Tahlequah Ferry Terminal is on the southern tip of Vashon Island, across Dalco Passage from Point Defiance (see Figures TA-1 and TA-2).

The Tahlequah Ferry Terminal provides service to the Point Defiance Terminal.

Features of the terminal include a passenger shelter, and one vehicle holding lane that accommodates up to four vehicles, additional roadside holding, and a parking lot. The terminal has one slip with steel wingwalls. Three steel dolphins are associated with the terminal. No overhead passenger loading facilities exist at the terminal.

4.19.1 Tahlequah Environmental Baseline

4.19.1.1 Physical Indicators

Substrate and Slope

Beach substrate between MHHW and +2 feet MLLW is primarily gravel. A sand-gravel mix exists between +2 feet MLLW and MLLW, and from MLLW to -4 feet MLLW, the substrate is predominantly sand with some shell hash. On either side of the ferry terminal, there is extensive hardening of the shoreline to protect single-family homes. See Figures TA-3 and TA-4 for pictures of the shoreline areas east and west of the ferry terminal.



Figure TA-3
Shoreline East of the Tahlequah Ferry Terminal



Figure TA-4
Shoreline West of the Tahlequah Ferry Terminal

From MHHW to about -10 feet MLLW, the nearshore intertidal habitat extends gradually. The habitat transitions quickly to deeper subtidal habitat beyond about -14 feet MLLW. The slope is approximately 13 percent along the east and west sides of the site. Steep slopes (greater than 25 percent) exist upland of the site. The subtidal slope is approximately 8 percent. Offshore depths of terminal structures are: slip (-20.5 feet MLLW). Maximum depth for fixed dolphins is -25.8 feet MLLW.

Salt/Freshwater Mixing

Tahlequah Creek and stormwater runoff from the surrounding area are the most significant sources of freshwater into the ferry terminal area. Tahlequah Creek enters Puget Sound about 500 feet west of the ferry terminal (see Figure TA-2). Approximately the last 300 feet of the creek is directed through private property via a concrete culvert (see Figure TA-5).



Figure TA-5
Concrete Culvert Carrying Talequah Creek and the Creek as it Flows onto the Beach

Flows and Currents

The prevailing currents at Tahlequah move generally along the shoreline from east to west. However, the ferry captains have identified multiple long-shore currents, or sudden reversal in water flow direction. Wind fetch from multiple directions is also likely to affect localized current patterns.

4.19.1.2 Chemical Indicators

Water Quality

The marine waters of Dalco Passage near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include organics (including PCBs)(tissue), and bacteria (water)(Ecology 2018).

Sediment Quality

No impaired waters listing data is available for the current terminal location (Ecology 2018).

4.19.1.3 *Biological Indicators*

Shoreline Vegetation

There is some forested vegetation on either side of the ferry terminal. The immediate shoreline area is lined with private homes.

Macroalgae and Eelgrass

The east side of the ferry terminal area supports sandy substrates with low, medium, and high densities of eelgrass. Eelgrass (*Zostera marina* L.) along the east side occurs from -2 feet MLLW to approximately -6 feet MLLW and comes within 75 feet of the trestle. Two small (less than 3 square foot) patches of eelgrass also occur between MLLW and -1 feet MLLW on the west side approximately 15 feet from the trestle.

Macroalgae occurs within the nearshore habitats of the area with a low to moderate density. The dominant macrophytes include: sea lettuce (*Ulva* spp.), red algae, Turkish towel, bleached brunette, rock weed, red cellophane (*Porphyra cuneiformis*), long laver (*P. pseudolinearis*), graceful sea hair (*Cladophora sericea*), twisted sea tube (*Melanosiphon intestinalis*), arctic sea moss (*Acrosiphonia arcta*), and wireweed (*Sargassum muticum*). Sugar wrack, seersucker, flattened acid kelp (*Desmarestia ligulata*), and bull kelp were more frequently encountered in the lower intertidal zone. Macroalgae is attached to a variety of hard substrates, such as piling beneath the trestle, rocks, and shells (PIE 2002c).

Epibenthos, Macrofauna, Fish, and Marine Mammals

The sand-gravel substrate in the intertidal zone likely supports epibenthic production. Dominant macrofauna include red crab, moon snails, starfish, mussels, clingfish, and chum salmon. Tahlequah Creek supports resident cutthroat. The WDFW PHS maps show that geoduck utilizes the subtidal areas approximately 0.1 mile from the terminal in Quartermaster Harbor.

Marine mammals that may occur in the area include killer whale, Dall's porpoise, harbor porpoise, harbor seal, Steller sea lion, and California sea lion.

Forage Fish

There is no documented forage fish spawning present at the terminal. Sand lance and herring spawning, and pre-spawn herring holding are present within 0.3 miles of the terminal (WSDOT 2018a).

4.19.2 Tahlequah Species Distributions

4.19.2.1 Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)

No Chinook salmon-bearing streams are located near the Tahlequah Ferry Terminal (WDFW 2007a).

Salmon stocks that may be present in the ferry terminal area for variable lengths of time include runs originating from the Puyallup River (approximately 7 miles southeast shoreline distance), Nisqually River (approximately 21 miles southwest shoreline distance), and the Deschutes River and smaller drainages in southern Puget Sound (WDFW 2007a). Chinook salmon have been documented by WDFW as present in Judd Creek (Vashon Island), but there is no documented spawning or juvenile rearing in the creek. Judd Creek is tributary to Quartermaster Harbor (approximately 8 miles southeast shoreline distance) (WDFW 2007a).

Adult and Sub-adult Chinook

Adult Chinook from the South Sound river systems may be present near Vashon Island at any time of year.

Sub-adult Chinook have access to the terminal area and may be found there at any time of year. Sub-adults have spent a winter in the marine environment and are not closely oriented to the shoreline like juveniles.

Juvenile Chinook

Juvenile salmon from Judd Creek may be found in the nearshore during the spring months. Juveniles from other areas would have to cross open water in order to reach the nearshore; therefore, they would likely be more mature than the local run.

Beach seines were conducted from April through September of 2001 and 2002 on Vashon and Maury Island. Juvenile Chinook salmon first entered the area in mid-

May with numbers peaking in mid-July and steadily tapering off through August and September (Duffy et al. 2005).

4.19.2.2 Puget Sound Chinook Salmon Critical Habitat

The Tahlequah Ferry Terminal lies within Chinook Zone 14 (70 FR 52630). While there are no streams that support Chinook salmon near the ferry terminal, eelgrass in close proximity to the ferry terminal may be used by juvenile Chinook for rearing.

The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table TA-1. PCEs relevant to the terminal area are numbered per the CFR (70 FR 52630).

Table TA-1
Existing Conditions of Chinook Salmon PCEs at the Tahlequah Ferry Terminal

PCEs	Existing Conditions
<p>5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.</p>	<p>Obstructions In-water structures include the trestle, the slip, and dolphins. The existing ferry terminal may affect fish passage in the nearshore.</p> <p>Water Quality and Forage The marine waters of Dalco Passage near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include organics (including PCBs in tissue), and bacteria (water)(Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of four drainage areas that drain to Dalco Passage. One of the areas includes treatment.</p> <p>The first drainage area drains the upper former house lot, the park and ride lot and the hillside above and below the lot, the side street parking, and the road at the east entrance to the pier, and consists of 13 catch basins, two daylight under-drains to quarry spall, and a swale. The under-drains and swale provide some stormwater treatment. This drainage area discharges through an outfall to the east of the trestle.</p> <p>The second drainage area drains the road at the west entrance to the trestle, consists of two catch basins that discharges through an outfall to the west of the trestle.</p> <p>The third drainage area drains the former house lots to the west of the trestle, and consists of infiltration to soil, and discharge directly to the beach or surface water (depending on tide level).</p> <p>The fourth drainage area consists of the trestle and transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. The sand-gravel substrate in the intertidal zone likely supports epibenthic production.</p> <p>There is no documented forage fish spawning present at the terminal. Sand lance and herring spawning, and pre-spawn herring holding are present within 0.3 miles of the terminal (WSDOT 2018a).</p> <p>Natural Cover There is some forested vegetation on either side of the ferry terminal. The immediate shoreline area is residentially landscaped.</p> <p>The east side of the ferry terminal area supports sandy substrates with low, medium, and high densities of eelgrass. Macroalgae occurs within the nearshore habitats of the area with a low to moderate density. The dominant macrophytes include: sea lettuce (<i>Ulva</i> spp.), red algae, Turkish towel, bleached brunette, rock weed, red cellophane, long laver, graceful sea hair, twisted sea tube, arctic sea moss, and wireweed. Sugar wrack, seersucker, flattened acid kelp, and bull kelp were more frequently encountered in the lower intertidal zone (PIE 2002c).</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of gravel between MHHW and +2 feet MLLW, a</p>

PCEs	Existing Conditions
	sand-gravel mix exists between +2 feet MLLW and MLLW, and from MLLW to -4 feet MLLW the substrate is predominantly sand with some shell hash (PIE 2002c). Some hardened shoreline is adjacent to the ferry terminal. Side channels do not occur in the ferry terminal area.
6) Offshore areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.	<p>The marine waters of Dalco Passage near the terminal are designated "Extraordinary" for aquatic life use. Impaired waters listings in the terminal area include organics (including PCBs in tissue), and bacteria (water)(Ecology 2018).</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Offshore areas provide habitat for forage fish.</p>

4.19.2.3 Puget Sound Steelhead (*Oncorhynchus mykiss*)

There are no natal streams in the area of the Tahlequah Ferry Terminal that support Puget Sound steelhead. However, major rivers and streams that support winter steelhead include the Puyallup River (approximately 7 miles southeast shoreline distance), Chambers Creek (approximately 12 miles southwest shoreline distance), Red Salmon Creek (approximately 24 miles southwest shoreline distance), the Nisqually River (approximately 25 miles southwest shoreline distance), and McAllister Creek (approximately 26 miles southwest shoreline distance). In addition, the Deschutes River and smaller drainages in southern Puget Sound also support winter steelhead (WDFW 2007a).

Available data from tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) efforts around Puget Sound have reported the capture of few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). The total sampling effort data was not available, but the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

Beach seine sampling in Bellingham Bay (north Puget Sound) also captured few steelhead (Lummi Nation, unpublished data). The Bellingham Bay research reported the capture of two juvenile steelhead salmon in 336 sets between February 14 and December 1, 2003. The steelhead were captured in the eastern portion of Bellingham Bay near the Taylor Avenue Dock on June 12 and June 25, 2003.

4.19.2.4 *Puget Sound Steelhead Critical Habitat*

The Tahlequah Ferry Terminal does not fall within designated steelhead critical habitat (Federal Register 2016a).

4.19.2.5 *Humpback Whale (Megaptera novaeangliae)*

Humpback whale may be present near the Tahlequah ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.19.2.6 *Southern Resident Killer Whale (Orcinus orca)*

Southern Resident Killer Whale (SRKW) may be present near the Tahlequah ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.19.2.7 *Southern Resident Killer Whale Critical Habitat*

The Tahlequah ferry terminal area lies within designated critical habitat (Area 2 – Puget Sound). Areas with water less than 20 feet deep relative to the extreme high water mark are not included in the critical habitat designation (Federal Register 2006).

The PCEs provided in the terminal area, and their existing conditions are listed in Table TA-2. PCEs relevant to the terminal area are numbered per Federal Register 2006.

Table TA-2
Existing Conditions of Southern Resident Killer Whale PCEs at the Tahlequah Ferry Terminal

PCEs	Existing Conditions
1) Water quality to support growth and development	<p>The marine waters of Dalco Passage near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include organics (including PCBs in tissue), and bacteria (water)(Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of four drainage areas that drain to Dalco Passage. One of the areas includes treatment.</p> <p>The first drainage area drains the upper former house lot, the park and ride lot and the hillside above and below the lot, the side street parking, and the road at the east entrance to the pier, and consists of 13 catch basins, two daylight under-drains to quarry spall, and a swale. The under-drains and swale provide some stormwater treatment. This drainage area discharges through an outfall to the east of the trestle.</p> <p>The second drainage area drains the road at the west entrance to the trestle, and consists of two catch basins that discharge through an outfall to the west of the trestle.</p> <p>The third drainage area drains the former house lots to the west of the trestle, consists of infiltration to soil, and discharges directly to the beach or surface water (depending on tide level).</p> <p>The fourth drainage area consists of the trestle and transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>
2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	<p>Salmonids are the primary prey of SRKW, and may be present near the terminal. Further information on prey can be found in the Puget Sound Chinook section, and Appendix B – Species Biology.</p>
3) Passage conditions to allow for migration, resting, and foraging	<p>Existing structures that occur below -20 feet in critical habitat include a segment of the trestle, the slip, and dolphins.</p>

4.19.2.8 *Bull Trout (Salvelinus confluentus)*

There are no natal streams in the area of the Tahlequah Ferry Terminal that support bull trout (WDFW 2007a).

The aquatic portions of the ferry terminal are within marine FMO habitat. While bull trout have not been documented in the ferry terminal area, suitable FMO habitat is present, and bull trout are thought to occur throughout south, central, and northern Puget Sound. Therefore, it is expected that the ferry terminal area would be used by anadromous adult and sub-adult bull trout for foraging, migration, and

overwintering (USFWS 2004b). Within the ferry terminal area, it is expected that individual bull trout from the Puyallup River (approximately 7 miles southeast shoreline distance) core area are most likely to be present (WDFW 2007a).

4.19.2.9 *Bull Trout Critical Habitat*

The shoreline of the Tahlequah Ferry Terminal is not within designated bull trout critical habitat per Federal Register 2010a.

4.19.2.10 *Green Sturgeon (Acipenser medirostris)*

There are no natal streams in the area of the Tahlequah Ferry Terminal that support green sturgeon.

Two confirmed Southern DPS green sturgeon were detected in Puget Sound in 2006, but the extent to which green sturgeon from the Southern DPS use Puget Sound is uncertain (Federal Register 2018). Observations of green sturgeon in Puget Sound are much less common compared to the coastal Washington estuaries and bays such as Willapa Bay, Grays Harbor, and the Lower Columbia River estuary (Federal Register 2018). In addition, Puget Sound does not appear to be part of the coastal migratory corridor that Southern DPS fish use to reach overwintering grounds north of Vancouver Island (Federal Register 2018). According to NMFS, green sturgeon are rare/absent in mid and south Puget Sound, and do not need to be consulted on for this terminal (Carey, personal communication, 2013).

4.19.2.11 *Green Sturgeon Critical Habitat*

The Tahlequah Ferry Terminal does not fall within designated green sturgeon critical habitat (Federal Register 2009).

4.19.2.12 *Marbled Murrelet (Brachyramphus marmoratus)*

The Tahlequah terminal area provides suitable marbled murrelet marine foraging habitat.

There is no documented forage fish spawning present at the terminal. Documented sand lance spawning is present 1,340 ft. E and 1,640 ft. W of the terminal. Herring

spawning is present 1,760 ft. E, and a pre-spawn herring holding area is present 1,530 ft. S of the terminal (WSDOT 2018a).

WDFW surveys conducted from 2001 to 2012 show a density of less than 1 bird per square kilometer in the terminal area (WDFW 2016). The nearest documented marbled murrelet nesting site is located 35 miles NW of the terminal (WSDOT 2018b).

The Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program (2012) identified habitat suitability throughout the range of the species, and ranked it as Zero, Low, Marginal, Moderately High and Highest. The Tahlequah murrelet habitat suitability within the pile driving/heavy equipment zone of potential effect (0.25 miles), ranges from Zero to Marginal (WSDOT 2019b).

Five acres of contiguous forest that may offer nesting opportunity is present within the pile driving/heavy equipment zone of potential effect (0.25 miles) (WSDOT 2014/2018c). A WSF Biologist visited the terminal area on 12/3/18. Although there were 5 acres of contiguous forest, it was less than the required 60% coniferous. Therefore, the forest does not offer appropriate nesting opportunity (WSDOT 2018f). Ferry traffic creates regular disturbance in the immediate terminal area. From July 2017 to June 2018, there were approximately 13,970 scheduled arrivals and departures from the terminal. During the nesting season (April 1-September 23), when foraging murrelet are more active, there were approximately 7,010 scheduled arrivals and departures (WSDOT 2018d).

4.19.2.13 *Marbled Murrelet Critical Habitat*

No marbled murrelet critical habitat has been designated near the terminal (USFWS 1996).

4.19.2.14 *Rockfish Species*

Bocaccio

Bocaccio are rarely caught in north Puget Sound and only sparse records exist for the Strait of Georgia (Federal Register 2010b). Because larvae are widely dispersed, it is

possible that bocaccio juveniles could be found near the Tahlequah Ferry Terminal at any time of year. Adult bocaccio generally move to very deep water. The waters of Dalco Passage range from about 40 to 90 feet deep and subject to strong currents (NMFS 2009). This is still shallower than ideal for bocaccio, but rocky substrates exist in the Tacoma Narrows and rockfish populations exist there (NMFS 2009).

Yelloweye Rockfish

Yelloweye rockfish are more closely aligned with rocky, high-relief substrates than with very deep water (Federal Register 2010b). The waters near Tahlequah offer both rocky substrates and deep water. It is likely that yelloweye rockfish are in the vicinity.

4.19.2.15 Rockfish Species Critical Habitat

The Tahlequah Ferry Terminal is within rockfish nearshore critical habitat (less than or equal to 98 feet in depth) (Federal Register 2014). The physical and biological features (PBFs) (Federal Register 2014) essential to the conservation of juvenile Bocaccio rockfish are listed in Table TA-3. PBFs relevant to the terminal area are numbered per the CFR (Federal Register 2014). These PBFs are specific to nearshore environments, where only juvenile Bocaccio rockfish could be found. Deepwater (> 98 feet in depth) PBFs exist for adult Bocaccio, and adult and juvenile yelloweye rockfish; however, this habitat is not present at the Tahlequah Ferry Terminal and will not be discussed here.

Table TA-3
Existing Conditions of Rockfish PBFs at the Tahlequah Ferry Terminal

PBFs	Existing Conditions
<p>1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities.</p>	<p>The marine waters of Dalco Passage near the terminal are designated “Extraordinary” for aquatic life use. Impaired waters listings in the terminal area include organics (including PCBs in tissue), and bacteria (water)(Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of four drainage areas that drain to Dalco Passage. One of the areas includes treatment.</p> <p>The first drainage area drains the upper former house lot, the park and ride lot and the hillside above and below the lot, the side street parking, and the road at the east entrance to the pier, and consists of 13 catch basins, two daylight under-drains to quarry spall, and a swale. The under-drains and swale provide some stormwater treatment. This drainage area discharges through an outfall to the east of the trestle.</p> <p>The second drainage area drains the road at the west entrance to the trestle, consists of two catch basins that discharges through an outfall to the west of the trestle.</p> <p>The third drainage area drains the former house lots to the west of the trestle, and consists of infiltration to soil, and discharge directly to the beach or surface water (depending on tide level).</p> <p>The fourth drainage area consists of the trestle and transfer span (typically 90 feet long by 24 feet wide that carries traffic between the trestle and ferry), which discharges by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. The sand-gravel substrate in the intertidal zone likely supports epibenthic production.</p> <p>There is no documented forage fish spawning present at the terminal. Sand lance and herring spawning, and pre-spawn herring holding are present within 0.3 miles of the terminal (WSDOT 2018a).</p>
<p>2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.</p>	<p>There is some forested vegetation on either side of the ferry terminal. The immediate shoreline area is residentially landscaped.</p> <p>The east side of the ferry terminal area supports sandy substrates with low, medium, and high densities of eelgrass. Macroalgae occurs within the nearshore habitats of the area with a low to moderate density. The dominant macrophytes include: sea lettuce (<i>Ulva</i> spp.), red algae, Turkish towel, bleached brunette, rock weed, red cellophane, long laver, graceful sea hair, twisted sea tube, arctic sea moss, and wireweed. Sugar wrack, seersucker, flattened acid kelp, and bull kelp were more frequently encountered in the lower intertidal zone (PIE 2002c).</p> <p>There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of gravel between MHHW and +2 feet MLLW, a sand-gravel mix exists between +2 feet MLLW and MLLW, and from MLLW to -4 feet MLLW the substrate is predominantly sand with some shell hash (PIE 2002c). Some hardened shoreline is adjacent to the ferry terminal. Side channels do not occur in the ferry terminal area.</p>

4.19.2.16 *Pacific Eulachon*

The Tahlequah Ferry Terminal is very close to the Puyallup River, where eulachon spawning is known to occur sporadically. According to NMFS, eulachon are rare/absent in mid and south Puget Sound, and do not need to be consulted on for this terminal (Carey, personal communication, 2013).

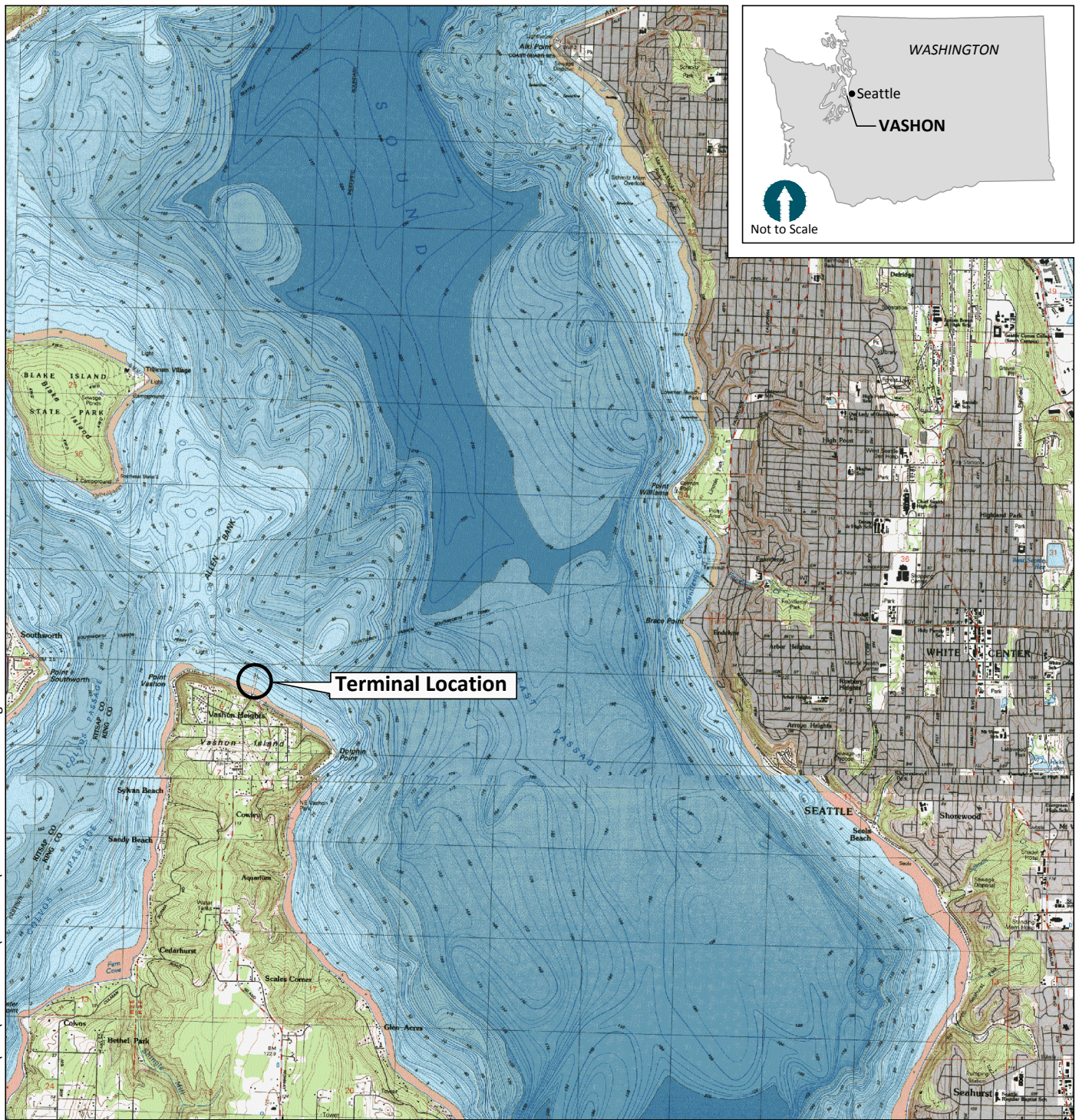
4.19.2.17 *Pacific Eulachon Critical Habitat*

No Pacific eulachon critical habitat has been designated near the Tahlequah Ferry Terminal (FEDERAL REGISTER 2011).

VASHON

K:\Jobs\100016-WSF\10001603\10001603-BA-059-VA1.dwg FIG VA-1

Jan 12, 2012 10:06am heriksen



NOTE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Seattle South, Washington.

Section	Township	Range	Lat	Long	County
6	23N	3E	47° 30' 32" N	122° 27' 46" W	King
HUC 171100190404			WRIA 15		

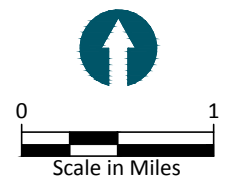


Figure VA-1
Vashon Island Ferry Terminal Vicinity Map
WSF Biological Assessment Reference
Vashon Island, Washington



Vashon Island Ferry Terminal: WSF Biological Assessment Reference

- Smelt Spawning
- - - Approximate Mean High Water (MHW)
- Eel Grass

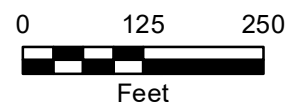
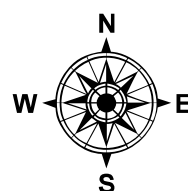


Figure VA-2
Aerial Photo of Vashon Ferry Terminal
WSF Biological Assessment Reference
Vashon Island, Washington

4.20 Vashon Ferry Terminal

The Vashon Ferry Terminal is on the northern end of Vashon Island, with the Colvos Passage to the west and south, and the East Passage to the east (see Figures VA-1 and VA-2).

The Vashon Ferry Terminal provides service to the Southworth and Fauntleroy Terminals. Additionally, King County provides passenger-only ferry service to the Seattle Terminal.

Features of the terminal include a terminal building, four vehicle holding lanes that accommodate up to 80 vehicles, and a parking lot. The terminal has main and auxiliary slips, a tie-up slip, and a passenger only slip. Steel wingwalls are present in the main and auxiliary slips and a two-pile steel tie up is present in the tie-up slip. Seven dolphins are associated with the terminal, four steel in the main slip, one steel and one timber dolphin in the auxiliary slip, and one composite dolphin in the tie-up slip. No overhead passenger loading facility exists at the terminal.

4.20.1 Vashon Environmental Baseline

4.20.1.1 Physical Indicators

Substrate and Slope

Substrates on the beach are composed of fine sand, coarse sand, shell hash, gravel, and cobble with a rocky intertidal area (Figure VA-3). The beach has a gentle slope. Substrates in the off-shore area consist of loose sands underlain by glacial till.

Offshore depths of terminal structures are: head of Slip 1 (-35.5 feet MLLW), Slip 2 (-36.5 feet MLLW), and tie-up slip (-29.0 feet MLLW). Maximum depth for fixed dolphins is -45.0 feet MLLW. The head of the passenger only pier is approximately -25.0 feet MLLW.



Figure VA-3
Beach and Intertidal Area West of the Vashon Ferry Terminal

Salt/Freshwater Mixing

An unnamed type 5 stream drains into Puget Sound via a pipe under the north end of the ferry terminal (Figure VA-4). Similar unnamed streams drain into the Sound approximately 700 feet west and 0.5 mile east of the terminal.

Flows and Currents

No site specific data are available in the vicinity of the ferry terminal. Based on data from NOAA, current flows are expected to be weak and variable.

4.20.1.2 Chemical Indicators

Water Quality

The marine waters of Colvos Passage near the terminal are designated “Extraordinary” for aquatic life use. No impaired waters listings data is available in the terminal area (Ecology 2018).

Sediment Quality

No information is available on sediment quality in the vicinity of the ferry terminal.

4.20.1.3 Biological Indicators

Shoreline Vegetation

Shrub and forested shoreline vegetation occurs east and west of the ferry terminal and includes Douglas fir, western red cedar, big-leaf maple, and red alder.

Macroalgae and Eelgrass

Macroalgae in the area includes Turkish towel, gracilaria, red algae, sugar wrack, bull kelp, sea lettuce, and diatoms. Eelgrass occurs east and west of the terminal (see Figure VA-2) getting sparser towards the northern end of the passenger only float.

Epibenthos, Macrofauna, Fish, and Marine Mammals

The shoreline area and substrates are expected to support epibenthic production.

Macrofauna in the area includes red rock crab, plume worm (*Eudistylia vancouveri*), chink shell snail (*Lacuna vincta*), anemone, hermit crab, coon-striped shrimp, moon snail, sea pens, kelp crab, sunflower star, sun star, horse clam, and sponge. Subtidal geoducks occur north of the terminal. Fisheries resources include tubesnout, lingcod, sand sole (*Psettichthys melnaostictus*), pile perch, cabezon, and various flatfish and sculpin. Marine mammals likely to occur in the area include killer whale, harbor seal, Steller sea lion, California sea lion, harbor porpoise, and Dall's porpoise.

Forage Fish

Documented surf smelt spawning is present (see Figures VA-2), extending approximately 500 ft. to the NW of the terminal (WSDOT 2018a).

4.20.2 Vashon Species Distributions

4.20.2.1 Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)

Adult and juvenile Chinook salmon could occur throughout the marine portions of the project area. Chinook salmon use much of Puget Sound for feeding during their migration to and from the open ocean and their upriver spawning grounds.

Adult and Sub-adult Chinook

Migrating adult and sub-adult Chinook salmon have free access to the entire marine portion of the project area. These fish could be present near the project year-round, but are likely to be more abundant in mid- to late summer as they prepare to migrate to their natal rivers to spawn.

Juvenile Chinook

Juvenile Chinook salmon could use the project area as they migrate out of their natal streams and rivers. As described below, juvenile Chinook salmon are generally most abundant along the shoreline in the action area between May and July, with a consistent downward trend in abundance from August to October.

The closest major rivers that support Chinook salmon are the Duwamish/Green River (approximately 8.5 miles northeast shoreline distance) and the Puyallup River (approximately 21 miles southeast shoreline distance). Chinook may also be present from rivers and streams in southern Puget Sound (WDFW 2007a). Chinook salmon have been documented by WDFW as present in Judd Creek (Vashon Island), but there is no documented spawning or juvenile rearing in the creek. Judd Creek is tributary to Quartermaster Harbor (approximately 22 miles southeast shoreline distance).

Near Colvos Passage and in the Sinclair Inlet drainages, there are several small streams that support Chinook salmon. Curley Creek, which drains Long Lake and is a tributary to Yukon Harbor, is the nearest stream with Chinook (approximately 4 miles northwest shoreline distance). Tributaries to Sinclair Inlet, Blackjack Creek (approximately 16 miles shoreline distance) and Gorst Creek (approximately 18 miles shoreline distance), also support Chinook salmon (WDFW 2007a).

Beach seines were conducted from April through September of 2001 and 2002 on Vashon and Maury Island. Juvenile Puget Sound Chinook salmon first entered the area in mid-May with numbers peaking in mid-July and steadily tapering off through August and September (Duffy et al. 2005). Additional beach seining was conducted in 2000 at Fauntleroy Cove and Seahurst Park from June 5 through August 16. Catches of juvenile Chinook peaked in mid-June and again in late July. The size of Chinook smolts captured in late June averaged 85 mm, 100 mm in July, and 130 mm in August (Mavros and Brennan 2001).

4.20.2.2 Puget Sound Chinook Salmon Critical Habitat

The Vashon Ferry Terminal lies within Chinook Zone 14 (70 FR 52630). While there are no streams that support Chinook salmon near the ferry terminal, eelgrass in close proximity to the facility may be used by juvenile Chinook for rearing.

The PCEs provided in the ferry terminal area, and their existing conditions, are listed in Table VA-1. PCEs relevant to the terminal area are numbered per the CFR (70 FR 52630).

Table VA-1
Existing Conditions of Chinook Salmon PCEs at the Vashon Ferry Terminal

PCEs	Existing Conditions
5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.	<p>Obstructions In-water structures include the passenger only pier and slip, two trestles and two slips, the tie-up slip, and dolphins. The existing ferry terminal may affect fish passage in the nearshore.</p> <p>Water Quality and Forage The marine waters of Colvos Passage near the terminal are designated "Extraordinary" for aquatic life use. No impaired waters listings data is available in the terminal area (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of two drainage areas that drain to Colvos Passage. None of the runoff is treated.</p> <p>The first drainage area drains the trestle holding lanes, and consists of 26 3-inch drains that discharge directly to surface water.</p> <p>The second drainage area consists of the transfer spans (typically 90 feet long by 24 feet wide that carry traffic between the trestle and ferry), which discharge by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. Substrates are expected to support epibenthic production.</p> <p>Documented surf smelt spawning is present (see Figures VA-2), extending approximately 500 ft. to the NW of the terminal (WSDOT 2018a).</p> <p>Natural Cover Shrub and forested shoreline vegetation occurs east and west of the ferry terminal. Eelgrass is present to the east and west of the ferry terminal. There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of sand in the nearshore area. Some riprap and hardened shoreline are adjacent to the ferry terminal. Side channels do not occur in the ferry terminal area.</p>
6) Offshore areas with water quality conditions and forage, including aquatic invertebrates and fishes,	The marine waters of Colvos Passage near the terminal are designated "Extraordinary" for aquatic life use. No impaired waters listings data is available in the terminal area (Ecology 2018).

PCEs	Existing Conditions
supporting growth and maturation.	Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity. Offshore areas provide habitat for forage fish.

4.20.2.3 Puget Sound Steelhead (*Oncorhynchus mykiss*)

The nearest natal streams in the area of the Vashon Ferry Terminal that support Puget Sound steelhead are Shingle Mill Creek on Vashon Island (approximately 3 shoreline miles southwest) and Curley Creek, a tributary to Yukon Harbor, (approximately 4 shoreline miles northwest). Major river systems in this area of Puget Sound that support winter steelhead include the Lake Washington/Cedar River (approximately 13 shoreline miles northeast), and the Puyallup River (approximately 21 shoreline miles southeast). The Duwamish/Green River also supports a run of summer steelhead.

Available data from tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) efforts around Puget Sound have reported the capture of few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). The total sampling effort data was not available, but the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

During 2001 and 2002, beach seining conducted in central Puget Sound by King County Department of Natural Resources captured only nine steelhead out of a total of approximately 34,000 juvenile salmonids. All the steelhead were caught between May and August and ranged in size from 141 to 462 mm with a mean size of 258 mm (Brennan et al. 2004). Also during 2001 and 2002, beach seining, tow netting, and purse seining were conducted by WDFW in Sinclair Inlet. This sampling effort focused on beach seining, which occurred monthly from April to October in 2001 and from mid February to September in 2002. Tow-netting was conducted monthly from May to August in 2002 only and purse seining was limited to only 2 days in July of 2002. The sampling effort resulted in the capture of four steelhead out of a total of 21,500 salmonids. Despite the larger effort given to beach seining, of the four

steelhead, only one was caught in the beach seine and the remaining three were caught in deeper water with the tow net and purse seine (Fresh et al. 2006).

Steelhead were also infrequently captured in a beach seine study around Bainbridge Island (City of Bainbridge Island, Suquamish Tribe, and WDFW 2005). The study consisted of 271 beach seine sets conducted between April and September 2002 and between April 2003 and December 2004. Three steelhead were captured in the study: one in May and two in September. Lengths were 179, 280, and 300 mm. One had been fin clipped, indicating it was of hatchery origin.

4.20.2.4 *Puget Sound Steelhead Critical Habitat*

The Vashon Ferry Terminal does not fall within designated steelhead critical habitat (Federal Register 2016a).

4.20.2.5 *Humpback Whale (Megaptera novaeangliae)*

Humpback whale may be present near the Vashon ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.20.2.6 *Southern Resident Killer Whale (Orcinus orca)*

Southern Resident Killer Whale (SRKW) may be present near the Vashon ferry terminal. Sightings data will be summarized in each project BA. The data may come from previous WSF projects, relevant Navy documents, or reports requested from the Friday Harbor Whale Museum.

4.20.2.7 *Southern Resident Killer Whale Critical Habitat*

The Vashon ferry terminal area lies within designated critical habitat (Area 2 – Puget Sound). Areas with water less than 20 feet deep relative to the extreme high water mark are not included in the critical habitat designation (Federal Register 2006).

The PCEs provided in the terminal area, and their existing conditions are listed in Table VA-2. PCEs relevant to the terminal area are numbered per Federal Register 2006.

Table VA-2
Existing Conditions of Southern Resident Killer Whale PCEs at the Vashon Ferry Terminal

PCEs	Existing Conditions
1) Water quality to support growth and development	<p>The marine waters of Colvos Passage near the terminal are designated “Extraordinary” for aquatic life use. No impaired waters listings data is available in the terminal area (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of two drainage areas that drain to Colvos Passage. None of the runoff is treated.</p> <p>The first drainage area drains the trestle holding lanes, and consists of 26 3-inch drains that discharge directly to surface water.</p> <p>The second drainage area consists of the transfer spans (typically 90 feet long by 24 feet wide that carry traffic between the trestle and ferry), which discharge by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column, degrading water quality in the terminal vicinity.</p>
2) Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth	Salmonids are the primary prey of SRKW, and may be present near the terminal. Further information on prey can be found in the Puget Sound Chinook section, and Appendix B – Species Biology.
3) Passage conditions to allow for migration, resting, and foraging	Existing structures that occur below -20 feet in critical habitat include the passenger only pier and slip, two trestles and two slips, the tie-up slip, and dolphins.

4.20.2.8 Bull Trout (*Salvelinus confluentus*)

There are no natal streams in the area of the Vashon Ferry Terminal that support bull trout (WDFW 2007a).

The aquatic portions of the ferry terminal are within marine FMO habitat. While bull trout have not been documented in the ferry terminal area, suitable FMO habitat is present, and bull trout are thought to occur throughout south, central, and northern Puget Sound. Therefore, it is expected that the ferry terminal area would be used by anadromous adult and sub-adult bull trout for foraging, migration, and overwintering (USFWS 2004b). Within the ferry terminal area it is expected that individual bull trout from the Duwamish/Green River (approximately 8.5 miles

northeast shoreline distance) and the Puyallup River (approximately 21 miles southeast shoreline distance) core areas are most likely to be present (WDFW 2007a).

4.20.2.9 *Bull Trout Critical Habitat*

The shoreline of the Vashon Ferry Terminal is not within designated bull trout critical habitat per Federal Register 2010a.

4.20.2.10 *Green Sturgeon (Acipenser medirostris)*

There are no natal streams in the area of the Vashon Ferry Terminal that support green sturgeon.

Two confirmed Southern DPS green sturgeon were detected in Puget Sound in 2006, but the extent to which green sturgeon from the Southern DPS use Puget Sound is uncertain (Federal Register 2018). Observations of green sturgeon in Puget Sound are much less common compared to the coastal Washington estuaries and bays such as Willapa Bay, Grays Harbor, and the Lower Columbia River estuary (Federal Register 2018). In addition, Puget Sound does not appear to be part of the coastal migratory corridor that Southern DPS fish use to reach overwintering grounds north of Vancouver Island (Federal Register 2018).

4.20.2.11 *Green Sturgeon Critical Habitat*

The Vashon Ferry Terminal does not fall within designated green sturgeon critical habitat (Federal Register 2009).

4.20.2.12 *Marbled Murrelet (Brachyramphus marmoratus)*

The Vashon terminal area provides suitable marbled murrelet marine foraging habitat.

Documented surf smelt spawning (prey species) is present (see Figure VA-2), extending approximately 500 ft. NW of the terminal (WSDOT 2018a).

WDFW surveys conducted from 2001 to 2012 show a density of less than 1 bird per square kilometer in the terminal area (WDFW 2016). The nearest documented

marbled murrelet nesting site is located 31 miles NW of the terminal (WSDOT 2018b).

The Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program (2012) identified habitat suitability throughout the range of the species, and ranked it as Zero, Low, Marginal, Moderately High and Highest. The Vashon murrelet habitat suitability within the pile driving/heavy equipment zone of potential effect (0.25 miles), ranges from Zero to Marginal (WSDOT 2019b).

Five acres of contiguous forest that may offer nesting opportunity is present within the pile driving/heavy equipment zone of potential effect (0.25 miles) (WSDOT 2014/2018c). The 0.25 mile zone radius of potential effect was evaluated. A WSF Biologist visited the terminal area on 12/3/18. Although there were 5 acres of contiguous forest, it was less than the required 60% coniferous. Therefore, the forest does not offer appropriate nesting opportunity (WSDOT 2018f).

Ferry traffic creates regular disturbance in the immediate terminal area. From July 2017 to June 2018, there were approximately 18,200 scheduled arrivals and departures from the terminal. During the nesting season (April 1-September 23), when foraging murrelet are more active, there were approximately 9,260 scheduled arrivals and departures (WSDOT 2018d).

4.20.2.13 *Marbled Murrelet Critical Habitat*

No marbled murrelet critical habitat has been designated near the terminal (USFWS 1996).

4.20.2.14 *Rockfish Species*

Bocaccio

Bocaccio are rarely caught in north Puget Sound and only sparse records exist for the Strait of Georgia (Federal Register 2010b). Because larvae are widely dispersed, it is possible that bocaccio juveniles could be found near the Vashon Ferry Terminal at any time of year. Adult bocaccio generally move to very deep water. The waters

beyond Vashon Point drop off sharply from the shoreline to a depth of over 300 feet (NMFS 2009).

Yelloweye Rockfish

Yelloweye rockfish are more closely aligned with rocky, high-relief substrates than with very deep water (Federal Register 2010b). Yelloweye may potentially be found near Vashon Point.

4.20.2.15 Rockfish Species Critical Habitat

The Vashon Ferry Terminal is within rockfish nearshore critical habitat (less than or equal to 98 feet in depth) (Federal Register 2014). The physical and biological features (PBFs) (Federal Register 2014) essential to the conservation of juvenile Bocaccio rockfish are listed in Table VA-3. PBFs relevant to the terminal area are numbered per the CFR (Federal Register 2014). These PBFs are specific to nearshore environments, where only juvenile Bocaccio rockfish could be found. Deepwater (> 98 feet in depth) PBFs exist for adult Bocaccio, and adult and juvenile yelloweye rockfish; however, this habitat is not present at the Vashon Ferry Terminal and will not be discussed here.

Table VA-3
Existing Conditions of Rockfish PBFs at the Vashon Ferry Terminal

PBFs	Existing Conditions
1) Quantity, quality, and availability of prey species to support individual growth, survival, reproduction, and feeding opportunities.	<p>The marine waters of Colvos Passage near the terminal are designated “Extraordinary” for aquatic life use. No impaired waters listings data is available in the terminal area (Ecology 2018).</p> <p>The existing stormwater system at the ferry terminal consists of two drainage areas that drain to Colvos Passage. None of the runoff is treated.</p> <p>The first drainage area drains the trestle holding lanes, and consists of 26 3-inch drains that discharge directly to surface water.</p> <p>The second drainage area consists of the transfer spans (typically 90 feet long by 24 feet wide that carry traffic between the trestle and ferry), which discharge by sheet flow directly to surface water.</p> <p>Existing creosote treated piles may leach PAHs into the water column degrading water quality in the terminal vicinity.</p> <p>Overwater coverage from the existing ferry terminal structures may reduce the production of aquatic invertebrates that are prey species to salmon. Substrates are expected to support epibenthic production.</p> <p>Documented surf smelt spawning is present (see Figures VA-2), extending approximately 500 ft. to the NW of the terminal (WSDOT 2018a).</p>
2) Water quality and sufficient levels of dissolved oxygen to support growth, survival, reproduction, and feeding opportunities.	<p>Shrub and forested shoreline vegetation occurs east and west of the ferry terminal. Eelgrass is present to the east and west of the ferry terminal. There is no large overhanging wood vegetation. The existing conditions within the defined area of critical habitat consist of sand in the nearshore area. Some riprap and hardened shoreline are adjacent to the ferry terminal. Side channels do not occur in the ferry terminal area.</p>

4.20.2.16 *Pacific Eulachon*

The terminal is within 50 miles of the Puyallup River mouth, where sporadic spawning is known to occur; however, this distance is measured across the water rather than along the shoreline. According to NMFS, eulachon are rare/absent in mid and south Puget Sound, and do not need to be consulted on for this terminal (Carey, personal communication, 2013).

4.20.2.17 *Pacific Eulachon Critical Habitat*

No Pacific eulachon critical habitat has been designated near the Vashon Ferry Terminal (FEDERAL REGISTER 2011).