GRAYS HARBOR RAIL TERMINAL LLC
FISH HABITAT TECHNICAL REPORT

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1. Introduction

The project is situated on the northern shore of Grays Harbor in Hoquiam, Grays Harbor County, Washington. Grays Harbor is a large, shallow estuary to the Chehalis River which is characterized by expansive mud flats and intervening channels created by discharge from the Hoquiam, Wishkah and Chehalis rivers. The estuary is divided into two major channels, the north and south. Terminal 3 is located along the relatively industrialized shoreline of the North Channel shipping lane, approximately 2.5-3 miles west of Terminals 1, 2 and 4 of the Port of Grays Harbor. The inner harbor is heavily industrialized with pulp mills, landfills, sewage treatment plants and log storage facilities. Bowerman Airport occupies the spit immediately west of Terminal 3 and a large sewage lagoon owned by the City of Hoquiam is located immediately adjacent to the Terminal 3 access road (Airport Way).

The existing Terminal 3 project site is located between SR 109 and Grays Harbor in Hoquiam, Washington, and consists of 150.0 acres of upland area and an existing 600-foot-long concrete shipping terminal. There are approximately 25.0 acres of the Terminal 3 site currently leased to a private tenant by the Port of Grays Harbor; the tenant utilizes the property for storing and sorting logs and operating a wood chipping and processing facility. The remaining area of the property is undeveloped, other than two metal buildings and a rail spur abandoned by previous port tenants, and is covered with old log decking areas with crushed rock roadways and surfacing; miscellaneous vegetation including grasses, blackberry vines, and miscellaneous trees; and some wetland areas. The wetlands and vegetation are described in a Wetlands Technical Report for the project.

The proposed project facility operations would include delivery of crude oil and condensates to the Terminal 3 facility via unit trains in fully contained liquid bulk rail cars, where it would then be unloaded into storage tanks. The crude oil would then be transported from the tanks through one or two 12–16-inch-diameter pipes down along the dock and loaded into the moored vessel for delivery to refineries along the west coast and overseas. Additional project elements would include construction of a 4–6-foot-deep, 1.627-acre storm water treatment pond; an operations building; perimeter security fencing; upgrading mooring fenders to accommodate vessels larger than barges; installation of up to four new mooring dolphins; and spill containment modifications.

The project property is situated along the shoreline of Grays Harbor which is inhabited by riverine and estuary fish including Pacific salmon species, bull trout (*Salvelinus confluentus*), green sturgeon (*Acipenser Medirostris*), and Pacific eulachon (*Thaleichthys pacificus*). Many fish species use Grays Harbor for migration, rearing, and foraging. Federally listed bull trout, green sturgeon, and eulachon are known to use the harbor for foraging and migration. Spawning beaches for species of forage fish such as smelt, herring, and sand lance occur in the outer areas of Grays Harbor.

This Technical Memorandum summarizes the existing baseline fish habitat and fish occurrence information collected to date in support of future environmental permitting for this project. Initial baseline studies were conducted in the spring of 2012, 2013, and 2014 to obtain a better understanding of fish presence and habitat at the site, with the focus on a surface water channel along north side of the property that receives the majority of drainage from the site and connects to the main channel that flows through the neighboring Bowerman Basin Wildlife Refuge out to Grays Harbor (Figure 1). As part of the assessment of habitat suitability, some water quality measurements were taken in the main drainage channels on the project site with respect to their potential to support fish and downstream effects to fish inhabiting the wildlife refuge.

2. Project Description

Grays Harbor Rail Terminal LLC (GHRT) is proposing a bulk liquids rail logistics facility at the Port of Grays Harbor Terminal 3 (T3) property. The facility will accommodate the receipt for export of not more than 45,000 barrels per day on average of various liquid bulk materials, specifically, various types of crude oil and condensates.

T3 is a 150 acre industrial site and includes an existing 600-foot- long concrete shipping terminal. The Port of Grays Harbor currently leases approximately 25 acres of the T3 site to a private tenant (Willis Enterprises), which utilizes the property for storing and sorting logs, and operating a wood chipping and processing facility. The tenant utilizes the existing wharf for product loading on to barges for export. The remaining area of the property (a former mill site) is occupied by 4 metal buildings and a rail spur line but is otherwise currently vacant.

The liquid bulk materials would be delivered to the proposed facility via unit trains in fully contained liquid bulk rail cars, unloaded into on-site storage tanks, and then loaded onto barges or other marine vessels for delivery to refineries.

The general layout of the proposed rail and off-loading facilities includes four 20-car yard tracks and two 20-car off-loading tracks (120 rail cars total). In addition, a “run-around” track would be used to reposition the locomotive engines and could also be used to hold cars awaiting maintenance. The off-loading spots would be equipped with permanent rack access structures where each rack structure would support connections for a maximum of 40 rail cars (20 spots on each side of a rack). The off-loading spots and central header would be located within secondary containment. The rack structures consist of elevated steel walkways with extendable access platforms used to access the tops of the rail cars. Off-loading would occur via 4-inch dry break connections, hoses, valves, and risers connecting the bottom rail car couplers to a central piping header. The rail cars would be off-loaded by gravity feed into the central header.

The liquid bulk materials would be stored in approximately six to eight above-ground storage tanks with secondary containment and internal floating roofs until a marine vessel (ship or barge) arrives. All tanks will be located outside the Shoreline District. The total combined tank storage would be approximately 800,000 – 1,000,000 barrels. Construction of multiple storage

tanks would allow the facility to accommodate interruptions in vessel schedules as well as changes in delivery volumes, and would allow the facility to maintain consistent operations. Vessel calls are anticipated by barge and Panamax vessels occurring approximately 3-4 times per month.

As noted above, T3 includes an existing 600-foot-long concrete shipping terminal. There are currently four mooring dolphins (three downstream/one upstream) off the existing concrete wharf. Up to four additional mooring dolphins (two downstream and two upstream) would be constructed to minimize vessel movements during liquid bulk materials transfer. No additional overwater expansion of the wharf is proposed. The existing trestle (supporting the Willis conveyor) and the wharf can accommodate the liquid bulk materials pipe rack needed to transfer the materials from the tanks to the vessels. Stormwater collection, drainage improvements, and spill containment measures would be added to the existing wharf but no structural modifications are necessary.

To facilitate operations at the Grays Harbor Rail Terminal, the Puget Sound and Pacific Railroad would be permitting and supervising construction of an industrial lead track extension of their main line railroad system. This industrial lead track would extend from the current main line rail terminus, just east of Paulson Road, for approximately 1,300 lineal feet to the west. The industrial lead track would allow for the backing of rail cars strings into the project site and provide additional rail car storage for other Port tenants. The identification of the industrial lead track is to account for potential indirect or cumulative environmental impacts for the purposes of the State Environmental Policy Act (SEPA) only and is not a project component of the Grays Harbor Rail Terminal site development permitting.

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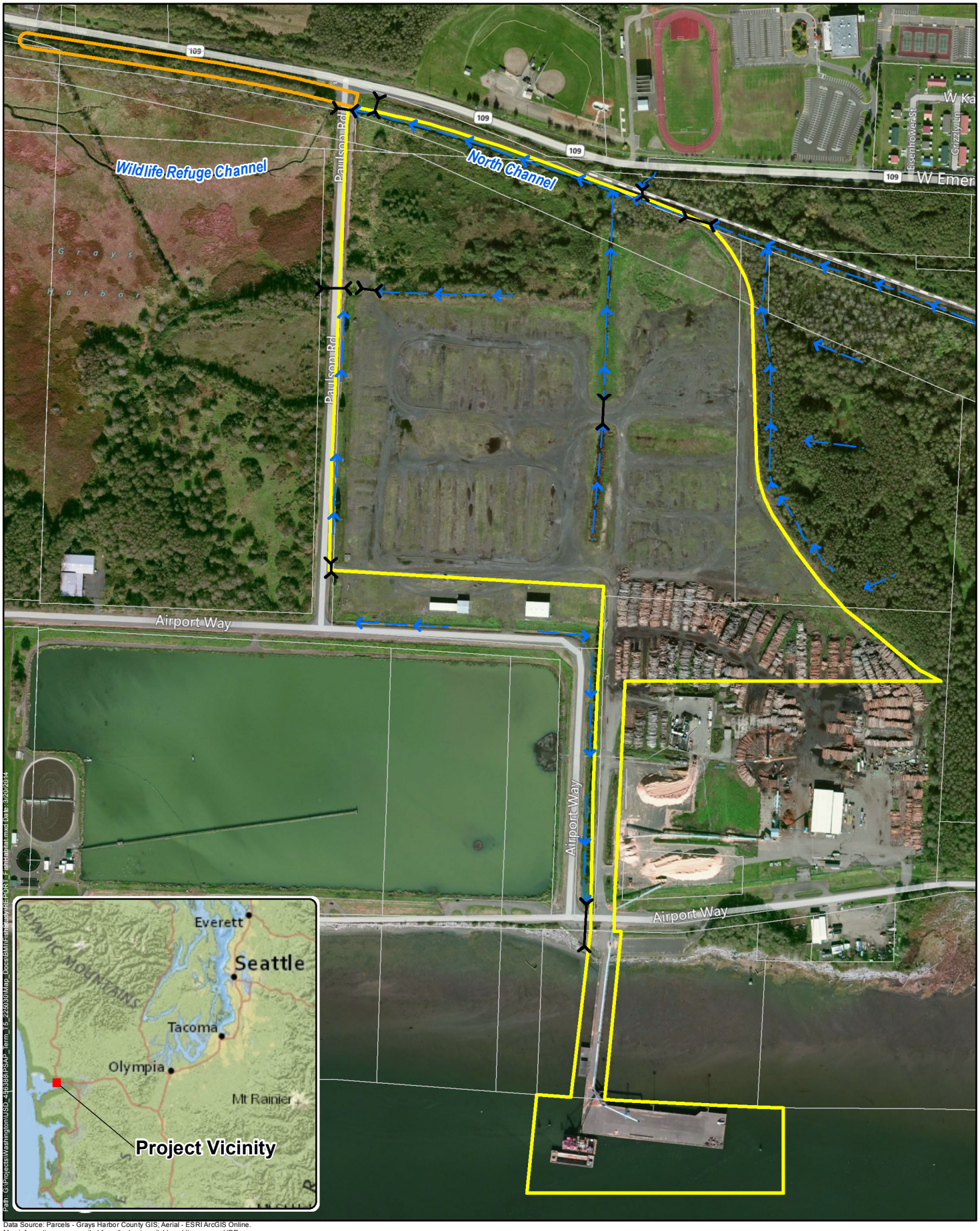

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Data Source: Parcels - Grays Harbor County GIS; Aerial - ESRI ArcGIS Online.
Map information was compiled from the best available public sources. HDR does not warrant that the information is accurate or complete.

Culvert
Flow
Project Area
Industrial Lead Track
Parcel

0 125 250 500 Feet

Figure 1 Project Vicinity and Surface Water Drainage Patterns Grays Harbor Rail Terminal

Terminal 3 – Port of Grays Harbor, Hoquiam WA
US Development Group LLC

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3. Methodology and Data Sources

The evaluation of existing conditions for fish and fish habitat was based on literature reviews; consultation of federal and state agencies websites; field work; and aerial mapping. A literature review of the salmon species that are documented to be present within Grays Harbor was conducted using data from Streamnet and WDFW's Salmonscape and Priority Habitats and Species (PHS), as well as WRIA 22 documents.

An intertidal habitat and invertebrate community characterization was undertaken in May 2012, described in the Intertidal Technical Report for the project. As part of this sampling effort, single-pass backpack electrofishing was conducted on May 9th for fish presence in the drainage channel along the north side of the property. The length of the channel that was sampled was approximately 2,600 feet.

The sampling effort began at the downstream end of the creek where it exits the property at a culvert under Paulson Road and progressed toward the upstream end at the culvert under the spur rail line (Figure 2). A hand held GPS unit was used to obtain the location of the start and end of the electrofishing effort. Fish collected during the sampling were placed in a water filled bucket carried by the crew member that was not operating the electrofisher. After each approximately 300 feet of channel length was completed (or less if more than a few fish were collected), the fish held in the buckets were identified and enumerated. This was done downstream of the next sampling event or in the location where numerous fish were collected, so the fish could be immediately released back into the channel without the potential for recapture. All fish greater than 20 millimeters (mm) in length were identified to species. Fish smaller than 20 mm were classified to the furthest extent possible. The collected fish were also examined for external anomalies (i.e., deformities, eroded fins, lesions, and tumors), and their fork lengths were recorded.

This methodology was repeated during a second electrofishing sampling trip conducted on March 10, 2014. This second trip was targeted at an earlier time in the outmigration season to determine if juvenile chum salmon (*Oncorhynchus keta*) were present in the intertidal channels and the north drainage channel on the property. This sampling effort began on the east side of Paulson Road at the culvert, and continued upstream to approximately 500 feet east of the spur line (Figure 2). Sampling was also conducted in the scour pool immediately downstream of the culvert under Paulson Road.

A habitat assessment of the north drainage channel was conducted in February 2013 during concurrent wetland delineations of the site. Fish habitat measurements included 10 transects along the north channel, and 4 additional transects including the east side of the culvert under the rail line spur. Three transects were also used to measure stream characteristics in the western part of the channel within the Wildlife Refuge. Physical/ chemical characterization of water quality was also sampled at several points along these drainage channels and in the channel in the Wildlife Refuge (Figure 2). Instantaneous water quality measurements were

made with a YSI 556 multi-probe meter and a Hach 2100P Turbidimeter. As part of these water quality measurements, conductivity in the north channel was also measured prior to electrofishing in order to fine tune the voltage and settings for the electrofishing. Water quality measurements were taken during both the May 2012 sampling, as well as the habitat measurements in February 2013. Measurements were taken during a high tide and a low tide for comparison.

Data Source: Fish and Fish Habitat Sampling - HDR; Aerial - ESRI ArcGIS Online.
Project Features - US Development Group LLC.
Map information was compiled from the best available public sources. HDR does not warrant that the information is accurate or complete.

HDR

0 125 250 500 Feet

E-Fish Start
E-Fish End
Transect
Juvenile coho salmon present
Water Quality Sample Site
Detention/Infill Pond, Tank Farm, Rail Car Unloading Tracks
Project Area
Industrial Lead Track

Figure 2 Fish and Fish Habitat Sampling Locations
Grays Harbor Rail Terminal

Terminal 3 – Port of Grays Harbor, Hoquiam WA
US Development Group LLC

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4. Affected Environment

4.1. Existing Conditions

Many fish species use Grays Harbor for migration, rearing, and foraging. Federally listed bull trout (generally subadults), green sturgeon (subadult and adult life stages), and eulachon (larvae and adult forms) are known to use the harbor for foraging and migration. Pacific salmon that spawn in the rivers and streams of the Chehalis basin all must pass through the nearshore habitats in the Grays Harbor estuary as they migrate to and from the ocean. Estuarine environments are extremely productive, rich habitats, and many life histories of juvenile salmon spend extended periods of time rearing in this environment.

Forage fish within Grays Harbor are important because they are the prey base of a variety of piscivorous species. At least seven species of forage fish are known to occur in Grays Harbor: Pacific herring (*Clupea harengus pallasi*), Pacific sand lance (*Ammodytes hexapterus*), northern anchovy (*Engraulis mordax*), surf smelt (*Hypomesus pretiosus*), longfin smelt (*Spirinchus thaleichthys*), whitebait smelt (Allosmerus elongatus), and American shad (*Alosa sapidissima*) (USACE 2006a). Surf smelt are the most common species in the lower estuary, while longfin smelt appear to be restricted to the upper reaches of the estuary (ICF Jones & Stokes 2009).

4.1.1. Terminal 3 Shoreline

Shoreline habitat adjacent to and within the footprint of the pier consists of armored banks interspersed with some upland vegetation, with a heavy concentration of large woody debris/logs. Shorelines adjacent to the terminal pier are comprised of asphalt, concrete, or boulder riprap, which is partially submerged during higher tides. Coarse marine sands occur waterward of the riprap. The shoreline and intertidal habitat is described in the Intertidal Technical Report for this project.

4.1.2. Surface Waters on the Project Property Site

The majority of the surface water on the property drains northward into the main drainage ditch that runs along the north side of the property. This north drainage channel is a fairly uniform grassy ditch about 6 to 10 feet wide (Figure 3). This channel flows east to west along the south side of the railroad embankment and through a 5 foot diameter cement culvert passing under Paulson Road where it continues westward through the Grays Harbor National Wildlife Refuge to empty into the Grays Harbor. During low tide in May, there was an approximate 1 foot outfall drop from the culvert on the west side of Paulson Road to the stream channel in the wildlife refuge. During subsequent field visits in February and March, the culvert exit remained submerged at low tide (Figure 4). During the field visit in May 2012, the low tide was -2 feet, and was +1.2 feet and +1.8 feet in February 2013 an March 2014 respectively. The culvert then only occasionally would pose a barrier to juvenile salmon passage upstream from the wildlife refuge during periods of low flows and lower low tides.

Another drainage ditch flows north from the middle of the gravel areas in the interior of the site and discharges into the north drainage channel (Figure 3). This ditch passes through a metal culvert 3 feet in diameter in the middle of the site and around a small wooden weir near the north end, just downstream of its confluence with the north drainage channel. On the east side of the spur line, a small channel flows northward along the edge of the forested area (Figure 1). This channel drains areas of standing water throughout the forest and discharges into the north drainage channel just east of the spur line junction. The westernmost ditch on the property flows into a small pond on the west side of the site. The water then drains through a culvert under the fence into a small ponded area. A culvert conveys some water from here under Paulson Road into the Wildlife Refuge. There is little to no flow in this area, and the ponded water was stagnant during the May field visit. During higher flow events, surface water also flows north along the ditch on the east side of Paulson Road where it discharges into the north drainage channel just east of the culvert under Paulson Road (Figure 1).

The roadside ditch at the southern end of the site along Airport Way flows southward and drops through a vertical drain in the southwest corner of the property near the roadway entrance to the wood chipping facility (Figure 4). This water is conveyed underneath the roadway and drains into Grays Harbor through a culvert exit behind large rip rap boulders on the shoreline just west of the terminal pier. Another drainage ditch which drains the log yard area flows through a drain and likely merges into the same culvert. There are no tidegates at the site, and the vertical drain is a complete passage barrier to any fish access from Grays Harbor.

Figure 3. Downstream (Western) end of the channel flowing towards the culvert under Paulson Road. The rail line can be seen on the far right.

Figure 4. Culvert exit under west side of Paulson Road. The channel flows out through the wildlife refuge. The culvert occasionally becomes a hanging culvert at low flows and lower low tides.

4.1.3. Fish Census of North Drainage Channel

The initial backpack electrofishing and water quality sampling occurred on May 9 and 10, 2012, and a second sampling effort was conducted on March 10, 2014. This creek channel is not shown on the DNR stream typing map and is not documented to contain any salmonid fish by

WDFW Salmonscape (accessed January 2014). However, during backpack electrofishing sampling, juvenile coho (*Oncorhynchus kisutch*), and a few juvenile Chinook (*Oncorhynchus tshawytscha*) and chum were observed in the north drainage channel.

In the 2012 sampling effort, juvenile salmon were found in the north drainage channel between Paulson Road and upstream to a culvert where water enters from alongside SR 109 near the rail spur line junction (Figure 2). Most of the fish recorded were three spined stickleback (*Gasterosteus aculeatus*), and only 1 sculpin (*Cottus* spp) was observed (Table 1). In total, 20 juvenile coho, and 4 juvenile Chinook were found between Paulson Road and the spur line junction. All but 3 of the juvenile coho were of similar size, suggesting that they were all from the same cohort. The remaining 3 coho were 30 to 40mm in length. Parr marks were visible on most of the coho and all of the Chinook that were sampled. This indicated that these fish were inhabiting the estuary while undergoing smoltification in order to complete their migration to salt water.

In March 2014, 24 juvenile coho and 2 juvenile chum salmon were sampled during backpack electrofishing efforts in the northern main drainage channel. Later that same day, an additional brief sampling effort was conducted at the upstream end of the tidal channel in the wildlife refuge in the scour pool immediately downstream of the culvert under Paulson Road. This effort yielded nine juvenile coho, three sticklebacks, and three sculpin (Table 1). All juvenile coho sampled in 2014 were of similar size (80 mm to 110 mm) and retained parr marks, indicating they were in the pre-smolt life stage.

Table 1. Number of fish from each species recorded during electrofishing sampling in the north channel east of Paulson Road.

Numbers in parentheses are those sampled in the scour pool at the culvert exit on the west side of Paulson Road.

Species	May 2012 Sample	March 2014 Sample
Coho salmon	20	24 (9)
Chinook salmon	4	0
Chum salmon	0	2
Three spined stickleback	115	56 (3)
Sculpin*	1	13 (3)

*Sculpin not identified to species.

During both sampling efforts, juvenile coho were consistently found within small scour pools associated with culverts and channel features that provided deeper areas within the channel and instream cover. The sampling effort in 2014 revealed that some juvenile coho pass upstream through the culvert under the spur line and were found within a small scour pool at the culvert entrance. Farther upstream of this area, the channel becomes shallow with little to no cover and less flow; coho were not found in this upper reach.

4.1.4. In-Stream Habitat

The surface water channel along the north edge of the project property is a relatively straight and uniform channelized ditch that runs alongside the rail line. The wetted channel is typically around 6 to 10 feet wide and 2 to 3 feet in depth at the western end and gradually becomes narrower and more shallow towards the east end. The bankfull channel is approximately 10 to 15 feet wide and around 3 feet deep. The majority of the riparian vegetation along the channel is nonnative upland vegetation such as Himalayan blackberry (*Rubus armeniacus*), reed canarygrass (*Phalaris arundinacea*), and Japanese knotweed (*Polygonum cuspidatum*). The banks are predominantly covered with reed canary grass and some salmonberry (*Rubus spectabilis*) in the western portion, with some secondary deciduous forest cover in the eastern portion near the rail spur line. This channel conveys water draining north from the project site through a 5-foot diameter concrete culvert under Paulson Road into a channel that traverses the wildlife refuge and enters into Grays Harbor. The western (downstream) end of the channel within approximately 600 feet east of Paulson Road is tidally influenced.

The habitat metrics measured at the 10 transects surveyed in the north drainage channel are presented below in Table 2. The transects are numbered in increasing order progressing upstream from the Paulson Road culvert. The channel is fairly uniform in width and depth along the length of the property. Water depths ranged from around 2 to 3 feet in the western portion of the channel downstream of the forested area. East of the rail spur line the channel becomes shallow to less than a foot deep. The substrate throughout was comprised mostly of fine material and organics, with some highly embedded gravels in a few places. The water was very turbid at the time of sampling and the substrate was not readily visible from the surface in the deeper areas.

Table 2. Habitat metrics from the north drainage channel survey upstream of the culvert at Paulson Road.

Transect	Habitat Type	Wetted Width (feet)	Bankfull Width (feet)	Average Depth (feet)[1]	Dominant Substrate
1	Glide	9.7	18.8	3.2	Silt
2	Glide	6.7	10.7	2.0	Silt
3	Glide	10.1	11.7	2.2	Silt
4	Glide	9.2	13.3	2.4	Silt
5	Glide	7.3	13.1	2.7	Silt
6	Glide	8.7	11.9	2.2	Silt
7	Glide	19.0	26.2	2.2	Silt
8	Glide	11.7	9.0	2.4	Silt
9	Glide	13.2	21.0	2.4	Silt
10	Glide	16.0	11.3	2.8	Silt

1. Water depth varies tidally and during rain events, therefore bankfull depths are reported.

Channel characteristics measured in the east end of the tidal channel in the wildlife refuge are presented below in Table 3. The stream channel in this area was fairly uniform in size, with steep cut banks with multiple bends (Figure 5). The channel is incised into the tidal floodplain and the banks are scoured and nearly vertical with the wetted width nearly spanning the bankfull width (Table 3).

Table 3. Habitat metrics from the stream channel within the wildlife refuge downstream of the culvert at Paulson Road.

Transect	Habitat Type	Wetted Width (feet)	Bankfull Width (feet)	Average Depth (feet)[1]	Dominant Substrate
R1	Glide	7.5	8.4	1.8	Silt
R2	Glide	8.3	10.6	2.8	Silt
R3	Glide	9.2	10.7	3.0	Silt

1. Water depth varies tidally and during rain events, therefore bankfull depths are reported

This tidal channel contains multiple forks with the main channel carrying the flow from the north channel on the project property. The characteristics of these tidal channels are further described in the Intertidal Technical Report.

Figure 5. Tidal channel in the eastern edge of the Bowerman Wildlife Refuge downstream of the culvert at Paulson Road.

4.1.5. Water Quality

The water in the channels throughout the property site is highly turbid and the channel substrate is almost entirely comprised of fines and organic debris. Despite the poor water quality conditions, juvenile coho and a few juvenile Chinook and chum were found in the north drainage

channel as described above. In most natural streams there are periods when the water is relatively turbid and contains variable amounts of suspended sediments. Larger juvenile and adult salmon and trout are typically unaffected by periodic high concentrations of suspended sediments such as from storm events. Turbidity levels that exceeded 70 NTU were avoided (when possible) by juvenile coho (Bisson and Bilby 1982). Turbidity measured at the culvert under Paulson Road was 28.2 NTU on February 21, 2013 and was 53.6 NTU on February 22, 2013. This was most likely the result of a rainstorm that occurred on February 22 resulting in a larger amount of runoff from the property site. In May 2012, the turbidity levels measured near the culvert were taken during a drier period with less rainfall and ranged between 19.7 and 29.6 NTU. Turbidity in the main ditch flowing north that drains the middle of the property was much higher (74.4 NTU).

Other metrics measured were temperature, dissolved oxygen, oxygen saturation, conductivity, and pH. These parameters were repeated at each of the sampling points during high tide and low tide, and the results are presented in Tables 4, 5 and 6 below. Temperature and pH levels were within suitable levels for salmonids.

Table 4. Water quality sampling results from May 9, 2012 during high tide

Location	Temperature ^{o}C	D.O. (mg/L)	Conductivity	pH
Station1	13.8	7.16	325	6.88
Station2	14.6	5.11	320	6.93
Station3	13.8	4.88	311	6.88
Station4	11.8	4.81	289	6.85
Central N/S drainage ditch	10.9	1.3	387	6.97

Table 5. Water quality sampling results from February 21, 2013 during high Tide

Location	Temperature ^{o}C	D.O.(mg/L)	O_2 Sat.	Conductivity	pH
Station1	6.1	6.4	51.4 %	254	7.84
Station2	6.6	7.2	58.9 %	188	7.07
Station3	6.6	8.02	64.7 %	217	7.09
Stattion4*	6.6	8.11	66.0 %	281	6.96
East boundary	6.1	10.02	80.7 %	232	7.32

Table 6. Water quality sampling results from February 21, 2013 during low tide

Location	Temperature ^{o}C	D.O.(mg/L)	O_2 Sat.	Conductivity	pH
Station1	7.2	6.45	53.4 %	252	6.66
Station2	7.4	6.86	56.7 %	220	6.74
Station3	7.4	7.05	58.5 %	264	6.82
Stattion4*	7.5	7.46	62.1 %	280	7.04
East boundary	7.3	9.53	79.1 %	211	6.76

*Station 4 located in channel in wildlife refuge downstream of site

Conductivity levels indicated that the north channel was composed of freshwater during both low and high tides. Salt tolerant plant species were also used as an indication of the influence of salt water in this channel and is described in the Wetlands Technical Report for the project.

The dissolved oxygen levels in this channel are low, but adequate for juvenile salmon survival and growth (Bjornn and Reiser 1991). Studies have shown that initial symptoms of DO deprivation occur at around 6 mg/L and maximum swimming performance of coho and Chinook salmon decreased when DO levels fell below about 8 mg/L (Bjornn and Reiser 1991). Therefore oxygen levels, particularly at low tide, are adequate but at risk. In the channel that flows north and drains the center of the property, the dissolved oxygen levels were much too low to support fish (Table 4).

The north drainage channel has a direct connection to the tidal channel in the wildlife refuge and provides the only marginal habitat for fish on the property. The other drainages on the property lack depth, flow, and most importantly oxygen levels were too low to support fish.

4.1.6 Listed Fish Species present in Grays Harbor

There are three fish species that inhabit Grays Harbor that are listed as threatened under the ESA (Table 7). These species are Coastal/Puget Sound bull trout, eulachon, and the southern DPS of green sturgeon. Critical habitat has been designated for both the bull trout and green sturgeon within Grays Harbor and includes the shoreline in the project area. Grays Harbor also contains Essential Fish Habitat defined under the Magnuson-Stevens Fishery Conservation and Management Act for Pacific salmon, Pacific coast groundfish, and coastal pelagic species.

Table 7. Fish species listed under the ESA that occur in Grays Harbor

Species	Scientific Name	Federal Species Status	Critical Habitat
Bull trout Coastal-Puget Sound DPS	*Salvelinus confluentus*	Threatened (USFWS)	Designated
Green Sturgeon Southern DPS	*Acipenser medirostris*	Threatened (USFWS/NMFS)	Designated
Pacific eulachon	*Thaleichthys pacificus*	Threatened (NMFS)	Designated (None in Grays Harbor)

<u>Bull Trout</u>

Bull trout are members of the char subgroup of the salmon family. They spawn in the fall after water temperatures drop below 48°F, in streams with cold, unpolluted water, clean gravel and cobble substrate, and gentle stream slopes. The eggs incubate for four to five months, hatching in late winter or early spring. Some bull trout may live near areas where they were hatched, while others may migrate to lakes, reservoirs, or salt water. Bull trout that exist within Grays Harbor and the Chehalis River Basin watershed are considered part of the Coastal-Puget Sound Distinct Population Segment (DPS), which was listed as threatened by the USFWS in 1999.

Anadromous bull trout sub-adults move downstream in April through June, and adults migrate from the marine environment to freshwater spawning grounds during May, June and July (Kraemer 1994). Bull trout may migrate past the project area while they are foraging in the marine environment. A native char utilization study (USACE 2006b) documented occurrences of bull trout in the Lower Chehalis/ Grays Harbor area. The study indicated that the native char were least likely to be present in the lower Chehalis River/ Grays Harbor area from July 16 through the end of February.

Green Sturgeon

Green sturgeon are the most broadly distributed, wide ranging, and most marine-oriented species of the sturgeon family (NMFS 2014). The green sturgeon ranges from Mexico to at least Alaska in marine waters, and forages in estuaries and bays ranging from San Francisco Bay to British Columbia. Green sturgeon are believed to spend the majority of their lives in nearshore marine waters, and estuaries. Early life-history stages (< 4 years old) reside in fresh water, with adults returning to freshwater (early spring) to spawn (late spring to early summer) when they are more than 15 years of age (NMFS 2014). Green sturgeon are known to congregate during summer months in coastal estuaries such as Grays Harbor, Willapa Bay, and the Columbia River estuary.

There is no evidence of current spawning in the, Chehalis Rivers or other tributaries of Grays Harbor (NMFS 2005; NMFS 2014). Green sturgeon are migratory, utilizing the open ocean to travel vast distances between freshwater rivers. Adult green sturgeon feed on benthic invertebrates including shrimp, mollusks, amphipods, and also small fish species (NMFS 2014).

Genetic and tagging data indicate the stocks (Northern and Southern DPS) co-mingle in Grays Harbor during the summer as adults and sub-adults. Northern and Southern DPS green sturgeon are found in approximately equal numbers within Grays Harbor, and Grays Harbor is considered to provide “important” over-summering habitat for both populations (Dumbauld et al. 2008; NOAA 2009). Some green sturgeon spend the entire summer in Grays Harbor while others move back and forth between estuaries (NMFS 2014). .

Eulachon

Eulachon (commonly called smelt) are a small, anadromous fish from the eastern Pacific Ocean. After spending 3 to 5 years in the ocean, adult eulachon return to freshwater in the lower reaches of rivers to spawn. Like salmonids, both male and female adults die after spawning. They are broadcast spawners, and typically spawn at night over sand, coarse gravel, or detrital substrates. Spawning can occur at various depths ranging from 1 to 25 feet in different locations and river systems (Wilson et al. 2006). Spawning in the project area is unlikely to occur due to the salinity of the water and poor habitat. The near shore areas around the terminal are concrete and rip-rap and lack estuarine vegetation. The fertilized eggs sink to the bottom and adhere to the sand or gravel where they incubate for 20 to 40 days before hatching (Howell et al. 2001). Larval eulachon are about 0.15 inch in size and drift with the

bottom currents as they develop, ultimately entering the ocean (Howell et al. 2001). Estuarine currents may entrain larvae for a brief period; however, strong tidal fluctuations facilitate rapid mixing and dispersal. Estuarine vegetation like sedges and grasses provide shelter from predators and opportunities to forage for food. Eulachon typically utilize this estuarine environment during their juvenile life stage (8 weeks to 12 months) (Cambria Gordon 2006).

All life stages are plankton feeders typically eating crustaceans such as copepods and euphausiids (Wilson et al. 2006). Larvae and juveniles eat phytoplankton, copepods, copepod eggs, mysids, barnacle larvae, worm larvae, and eulachon larvae.

4.1.6. Critical Habitat

On October 9, 2009, NMFS designated critical habitat for the Southern DPS of green sturgeon that includes nearshore marine areas from the mouth of Grays Harbor north to the Washington/Canada border, and Grays Harbor (NOAA 2009). This includes coastal waters with depths less than 360 feet (110 meters) and bays and estuaries upstream to the extent of tidal influence.

When the USFWS designated critical habitat for the Coastal-Puget Sound bull trout in 2005, the designation included portions of the Chehalis River and the marine waters of Grays Harbor. To be considered critical habitat, an area must be occupied by the species and contain sufficient primary constituent elements (PCEs) to provide for: 1) spawning, rearing, foraging, or over-wintering habitat to support existing bull trout local populations; 2) movement corridors necessary for maintaining migratory life-history forms; and 3) suitable occupied habitat that is essential for recovery of the species (USFWS 2005).

4.1.7. EFH and Forage Fish

Grays Harbor is part of the Washington State Estuarine EFH composite and has been designated as EFH for various life stages of 24 species of groundfish, five coastal pelagic species, and two species of Pacific salmon according to the NMFS Fisheries Management Plans (PFMC 1999). The Pacific salmon management unit includes Chinook, coho, and pink salmon (*O. gorbuscha*). Chinook and coho salmon use Grays Harbor for adult migration, juvenile out-migration, and rearing where suitable habitat is present.

In addition to Pacific salmon, EFH has been established for the coastal pelagic species fishery. This includes four finfish [Pacific sardine (*Sardinops sagax*), Pacific (chub) mackerel (*Scomber japonicus*), northern anchovy (*Engraulis mordax*), and jack mackerel (*Trachurus symmetricus*)] and one invertebrate, market squid (*Loligo opalescens*) (PFMC 1998). These fishes are primarily associated with the open ocean and coastal areas and are not likely to occur in the project area.

Forage fish species in Grays Harbor include Pacific herring (*Clupea harengus pallasi*), Pacific sand lance (*Ammodytes hexapterus*), northern anchovy (*Engraulis mordax*), surf smelt

(*Hypomesus pretiosus*), longfin smelt (*Spirinchus thaleichthys*), whitebait smelt (*Allosmerus elongatus*), and American shad (*Alosa sapidissima*). Northern anchovy were the most widely distributed species and were present in all life history stages (Simenstad 1981). Surf smelt were present in the lower estuary, while longfin smelt were present in the upper reaches of the estuary.

5. Environmental Consequences

5.1. Long-Term (Operational)

Pacific salmon that spawn in the rivers and streams of WRIA 22 and 23 all must pass through the nearshore habitats in the Grays Harbor estuary as they migrate to the ocean. Estuaries have been shown to enhance the survival of juvenile salmon by providing habitat for overwintering juvenile salmonids, low-velocity refugia such as off-channel sloughs and large woody debris, time for migrating juveniles to adapt physiologically to sea water, settling of suspended sediments and detritus, which can fuel soft-sediment habitat formation and detritus-based food webs exploited by salmon and a refuge from piscivorous and avian predators, due in part to the often turbid water resulting from river flows and tidal action (Sandell et al. 2011).

Estuarine environments are extremely productive, rich habitats, and many juvenile salmon spend extended periods of time rearing in this environment. Salmonids often shift their habitat preferences seasonally, primarily due to changes in flow and usable stream area. For example, juvenile coho prefer off-channel, backwater, or wetland/ beaver ponds during the winter, and show a preference for main-channel pools formed by large woody debris in the summer months (Guillermo and Hinch 2003; Nickelson et al. 1992). Tidal channels and sloughs provide habitat for juvenile salmon rearing and migrating through the estuary. Smoltification involves a number of behavioral, morphological, and physiological changes that prepare juvenile salmonids for their trophic migration to the sea. The wildlife refuge to the west of the property contains a tidally influenced channel, through which juvenile salmon can move upstream into the drainage channel along the north side of the property. Runoff from the property flows into this channel and consequently effects water quality and habitat for the salmon in the channel and downstream through the refuge.

Field work for this project has confirmed that the channel through the wildlife refuge and the drainage channel along the north side of the project property are inhabited by salmon smolts during their spring outmigration. The project would result in the loss of approximately 340 feet of the north drainage channel where it would need to be piped through a culvert under the proposed rail lines. This culvert would be constructed to meet fish passage criteria, but would not provide tidal channel habitat and would result in the loss of that portion of the natural channel.

The project would alter the drainage patterns of the site and the flows within the ditches and consequently the wildlife refuge channel downstream. A stormwater retention pond would be

constructed to improve water quality of the runoff from the site and the system would be designed to have no net loss of flow compared to pre-project levels.

Improved water quality in the north drainage channel and downstream into the Wildlife Refuge would result from the completion of the project, and the channel would likely become less turbid. From a water quality perspective this would be beneficial, but loss of turbidity could also affect fish cover in the channel. Turbid water can provide a refuge from piscivorous and avian predators (Gregory and Levings, 1998; De Robertis et al., 2003). Conversely, excessive turbidity can hamper foraging success by visual predators such as salmon. Overall, improved water quality by controlling runoff from the site would prove beneficial for fish habitat and the wildlife refuge by preventing excessive turbidity and harmful substances from entering the waters used by fish.

The operation of the mainline extension west of Paulson Road would not have any permanent impacts of fish or fish habitat since the footprint of the rail line would be outside the tidal channel areas used by fish in the Bowerman Wildlife Refuge. These channels are described in further detail in the Intertidal Technical Report for the project.

Completion and operation of the project would result in a slight increase in vessel traffic of 3 to 4 more ships per month at the terminal. This could affect fish use of the navigation channel at and downstream of the terminal with added disturbance. The frequency of these added ships is quite small, so the disturbance would be intermittent and minimal. The footprint of the Terminal 3 dolphins is immeasurable compared to the overall acreage of EFH in Grays Harbor. No permanent adverse effects on EFH for ground fishes, coastal pelagics, Pacific salmonids, or their prey species would result from the proposed installation of additional dolphins at the project site. Added overwater structure from the new dolphins could provide additional perching areas for piscivorous birds resulting in a small increase in predation opportunities.

5.2. Short-Term (Construction)

5.2.1. Surface water channels on property

Construction impacts would be temporary and limited to the period during and immediately following project construction. Aquatic resources in the north channel and downstream in the wildlife refuge would be at risk during construction based on the amount of ground-disturbing activity in the vicinity of the drainage. The risk of construction-related impacts to water resources would be controlled by complying with the NPDES Construction Stormwater General Permit process and best management practices (BMPs), as appropriate. For aquatic species and habitat, earthwork and equipment associated with project construction could introduce sediment and contaminants (e.g., fuel or hydraulic fluids) to streams that could also be carried downstream to the wildlife refuge. The contractor would implement BMPs to prevent turbidity plumes downstream and pollutants from equipment and runoff during construction. Seasonal restrictions (i.e., work windows) would apply to work conducted below the ordinary high water mark.

A culvert would need to be constructed under the new rail lines that traverse the project property. Design and construction of the culvert under the new rail spur would comply with WAC 220-110-070 regarding fish passage requirements. Construction of this culvert would result in temporary impacts to the channel. Coffer dams would be required to isolate the construction reach, with a temporary bypass to divert the flow around the site of the construction and return it to the tidal channel downstream. After completion of construction activities, the channel outside the new culvert would be restored to pre-project conditions, with improvements to the riparian vegetation by planting of native plant species, and improvements to fish cover and habitat by adding some large woody debris.

5.2.2. Dolphin Installation

Project components that would generate impacts in the nearshore environment of Grays Harbor are pile installation for the four additional mooring dolphins at Terminal 3. Depending on final design considerations, this would likely entail the installation of 32 new 24-inch diameter steel piles to be placed behind the existing dolphins. It is anticipated that a barge-mounted crane and work skiffs would be used during pile installation. Above mean high high water (MHHW), a crane, a vibratory hammer, and miscellaneous hand tools would be mounted from a barge. Use of an impact driver for proofing would be necessary to drive the final 10 to 15 feet for all piles. This work could result in increased sound pressure levels and water quality and turbidity impacts. The bottom substrates in Grays Harbor in the vicinity of Terminal 3 consist of sandy silts. The area affected by turbidity or water quality degradation is confined to the immediate project vicinity both upstream and downstream of each pile to be driven, given the potential for sediment plumes and movement due to the occurrence of currents within the harbor and tidal influence in the area.

To reduce sound pressure waves produced from pile driving, a common practice is the use of bubble curtains that would be employed from the water surface to the mudline. Each curtain would consist of a series of rings, space uniformly apart, and hung from the leads that are also used for pile driving. Implementation of a bubble curtain is expected to reduce noise levels by at least 10 decibels (dB) (WSDOT 2014).

The potential for injury and/or mortality of any aquatic organism from pile driving depends on the type and intensity of the sounds produced. These are greatly influenced by a variety of factors, including the type of hammer, the type of subsurface conditions and substrate, depth of water, and formations that may serve to naturally intercept and attenuate Sound Pressure Levels (SPL). Even in the absence of mortality, elevated noise levels can cause sub lethal injuries. Fish suffering damage to hearing organs may suffer equilibrium problems, and may have a reduced ability to detect predators and prey (Hastings and Popper 2005, Turnpenny et al. 1994). Adverse effects on survival and fitness may occur even in the absence of overt injury. Exposure to elevated noise levels may cause a temporary shift in hearing sensitivity, decreasing sensory capability for periods lasting from hours to days (Turnpenny et al. 1994; Hastings et al. 1996). Popper et al. (2005) found temporary threshold shifts in hearing sensitivity after exposure to cumulative SELs as low as 184 dB. Temporary threshold shifts reduce the survival, growth,

and reproduction of the affected fish by increasing the risk of predation and reducing foraging or spawning success.

Vibratory pile driving could potentially disturb migratory or foraging salmon and bull trout that may be present offshore in the project area. This acoustic effect could create a temporary barrier to use of habitat immediately adjacent to terminal during installation; however, by conducting work during the approved in-water work window, potential impacts would be minimized. All in-water pile driving would occur during the WDFW in-water work window for the project (July 16 to October 14) during the construction season. Because the only elements of the proposed action requiring work below the MHHW line include piling installation, other elements of the action above MHHW may occur outside the in-water work window.

Overall, the project construction activity would have temporary effects through the presence of machinery and activities in and adjacent to bull trout and green sturgeon critical habitat (below MHHW). However, activities would result in no permanent destruction or adverse modification of critical habitat. No soil stabilization is anticipated to be necessary as the nature of the proposed action would not affect shorelines, banks or shoreline vegetation. Due to the developed nature of the site and the depths at which piles would be driven, no riparian vegetation is located in the proximity of proposed pile installation activities. Construction barges would be moored at sufficient depth so as to not ground out during low water conditions, so substrate should not be affected.

EFH for Pacific coast groundfish and coastal pelagic species includes all waters from the mean high water line along the coasts of Washington, upstream to the extent of saltwater intrusion and seaward to the boundary of the U.S. EEZ 200 miles (370 km.). This project has only a very small component that occurs within the waters of the estuary for the installation of mooring dolphins next to the existing Terminal 3. This project would have no measureable affect on EFH in Grays Harbor. Open water habitats occupied by forage fish would not be affected. Therefore, these prey species should not be affected by pile installation activities.

6. Mitigation

Possible mitigation measures for the loss of tidal channel habitat on the property could be the addition of tidal channel habitat through meandering the existing channel in the northwest corner of the property. A newly constructed channel could also incorporate habitat features such as LWD, pool forming characteristics, and native riparian vegetation to improve the tidal channel habitat for use by rearing juvenile salmonids. Mitigation for the loss of tidal habitat from the project is described in detail in the Mitigation Report.

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