Appendix H.1

Vancouver Energy Terminal
Vancouver, Washington

Biological Resources Report

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VANCOUVER ENERGY TERMINAL
BIOLOGICAL RESOURCES REPORT

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LIST OF ACRONYMS AND ABBREVIATIONS

BMP	best management practice
CALTRANS	California State Department of Transportation
CBFAT	Columbia Basin Fisheries Agencies and Tribes
CPU	Clark Public Utilities
CRD	Columbia River Datum
CRWMB	Columbia River Wetland Mitigation Bank
CWCS	Comprehensive Wildlife Conservation Strategy
dbh	diameter at breast height
DPS	distinct population segment
Ecology	Washington State Department of Ecology
EFSEC	Energy Facility Site Evaluation Council (EFSEC)
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FC	federal candidate
FE	federal endangered
FERC	Federal Energy Regulatory Commission
FP	federal proposed
FSC	federal species of concern
FT	federal threatened low
FTA	Federal Transit Authority
GRP	Geographic Response Plan
LCFRB	Lower Columbia Fish Recovery Board
MMMP	marine mammal monitoring and protection plan
MVCU	Marine Vapor Control Unit
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
ODFW	Oregon Department of Fish and Wildlife
OHWM	ordinary high water mark
PCE	primary constituent element

PHS	Priority Species and Habitat
PSMFC	Pacific States Marine Fisheries Commission
PWS	Professional Wetland Scientist
RM	river mile
SE	state endangered
SGCN	species of greatest conservation need
SOC	species of concern
SOPEP	shipboard oil pollution emergency plan
SPCC	spill prevention, control, and countermeasures
SS	state sensitive
ST	state threatened
SWH	shallow water habitat
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VGP	Vessel General Permit
WDFW	Washington Department of Fish and Wildlife
WNHP	Washington Natural Heritage Program
WQPMP	water quality protection and monitoring plan
WSDOT	Washington State Department of Transportation
WVFA	West Vancouver Freight Access

1.0 INTRODUCTION

1.1 Project Background

Tesoro Savage Petroleum Terminal LLC (Applicant) is proposing to construct Vancouver Energy Terminal (Facility) to receive crude oil by rail, store it on site, and load it on vessels for shipment to various consumers and end users located primarily on the West Coast (the proposed project). The project will require a site certification through the Washington State Energy Facility Site Evaluation Council (EFSEC), which requires an analysis of the potential for the proposed project to affect biological resources. The purpose of this biological resources report is (1) to document the extent of the habitat, vegetation, wildlife, fish, and wetland resources that could potentially be affected by the proposed project; (2) describe the impacts that the proposed project could potentially have on the biological resources; and (3) document the mitigation measures that will be employed to avoid minimize and mitigate for adverse impacts.

1.2 Location

The proposed Facility is located within the Port of Vancouver (Port) (Figures 1 and 2). The site is located on the north (Washington) shore of the Columbia River. State Route (SR) 501 (Lower River Road) is located immediately to the north of the site. Interstate 5 (I-5) is located approximately 2.5 miles east. Rail access to the site is available from the east. The site is located in the SE ¼ of Section 18, NW ¼ of Section 19, and the NW and NE ¼ of Section 20, Township 2 North, Range 1 East WM. Berths 13 and 14 are located at approximately Columbia RM 103.5.

1.3 Project Area of Potential Effect

This study included all of the areas that could be affected directly or indirectly by the construction, operation, decommissioning, or abandonment of the proposed project. The analysis was conducted at three scales: the project site, the project vicinity, and the project shipping prism.

1.3.1 Project Site

The majority of the analysis in this report is focused at the scale of the project site, as this is the area in which effects to biological resources will have the greatest potential to occur. The project site encompasses approximately 47.4 acres at the Port. Refer to Figures 3 and 4 below for a map of the existing conditions of the site. Ground-disturbing activities associated with project construction will occur only within the area of the project footprint.

1.3.2 Project Vicinity

The project vicinity includes parcels adjacent to the proposed project site as well as biologically important features within approximately 1 mile. Examples of features in the vicinity of the project include the wetland complexes associated with Vancouver Lake and the Shillapoo National Wildlife Refuge (NWR), the Columbia River Wetland Mitigation Bank (CRWMB), the Port's Parcel 1A and Parcel 2 wetland mitigation sites, and the wetlands and agricultural habitats on Port Parcel 3. Biological resources present within the project vicinity will not be directly impacted by the proposed project, but may be subject to effects associated with elevated noise from construction or operation, or from issues related to water quality.

1.3.3 Project Shipping Prism

A third scale of analysis includes the project's rail and vessel shipping prisms – the area in which effects associated with increased shipping could occur. The project's rail prism encompasses over 1,493 miles or of track along the delivery and return route within the state of Washington, and includes portions of nearly every major watershed and habitat type, ranging from forested to grasslands, within the state. The WDFW priority species list identifies 20 habitat types as having priority status within the state (WDFW 2008), all of which likely occur within the project's rail prism. A detailed discussion of each of these habitats is beyond the scope of this document, as the anticipated potential for and extent of impacts to priority habitats within the shipping prism are expected to be low, and are addressed programmatically within this document.

The vessel shipping area includes the entirety of the Lower Columbia River downstream of the site, as well as marine habitat off the coasts of Washington, out to the extent of Washington's Coastal Zone, a distance of 3 nautical miles offshore. Biological resources that are outside the immediate project site and vicinity could be affected by factors such as increased potential for wake stranding of fish and the other effects discussed in Section 5.2.

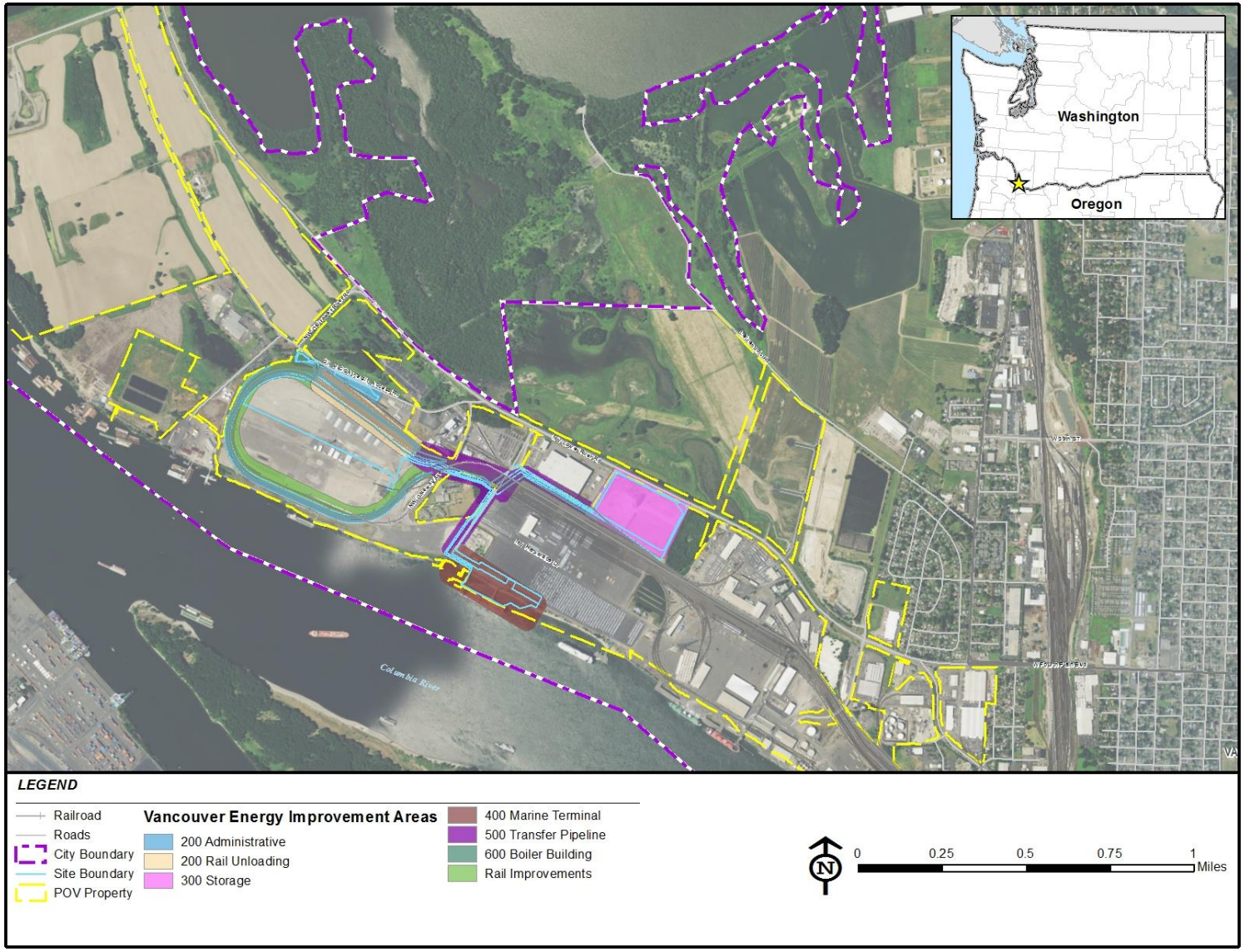

Figure 1. Vicinity Map

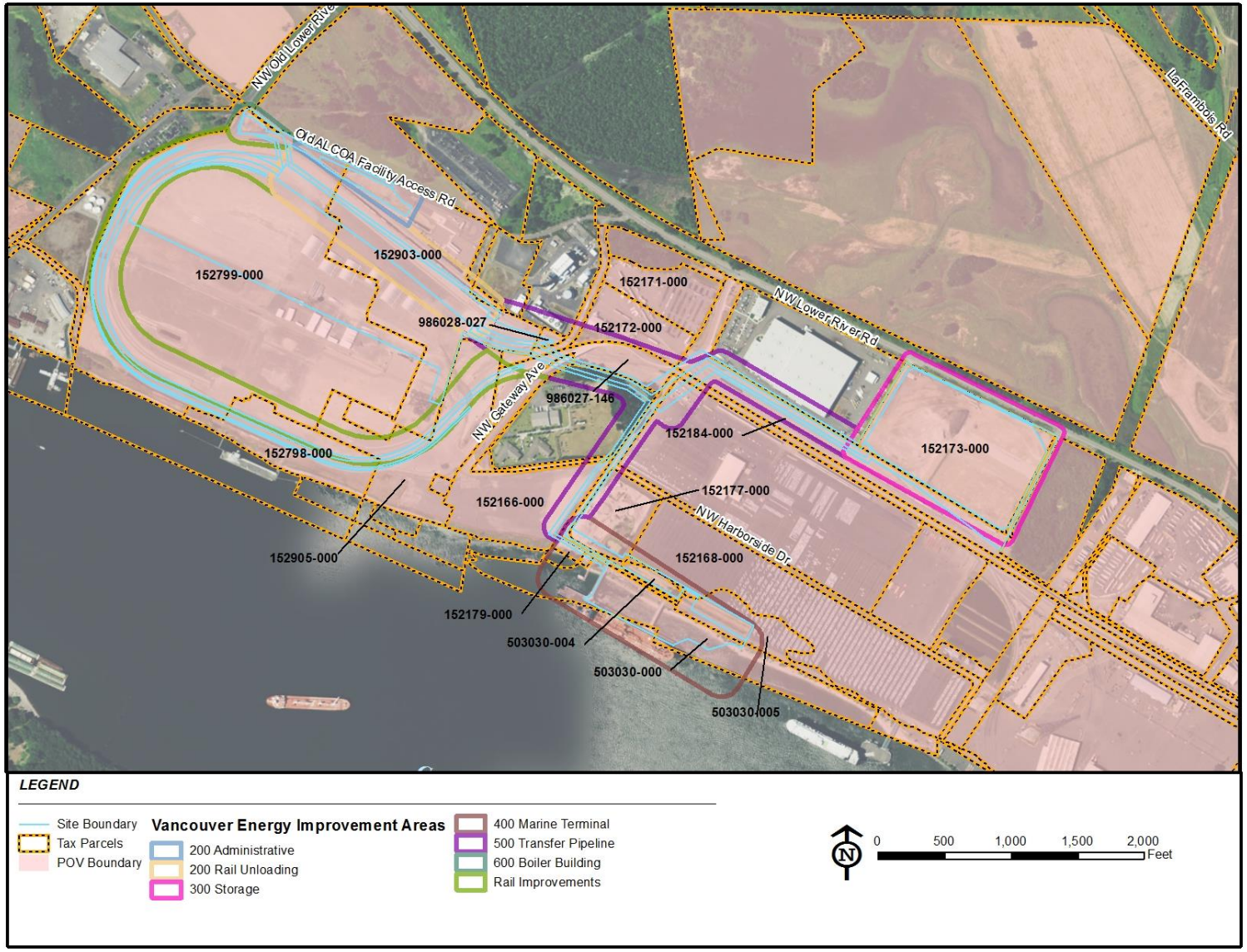

Figure 2. Tax Lots

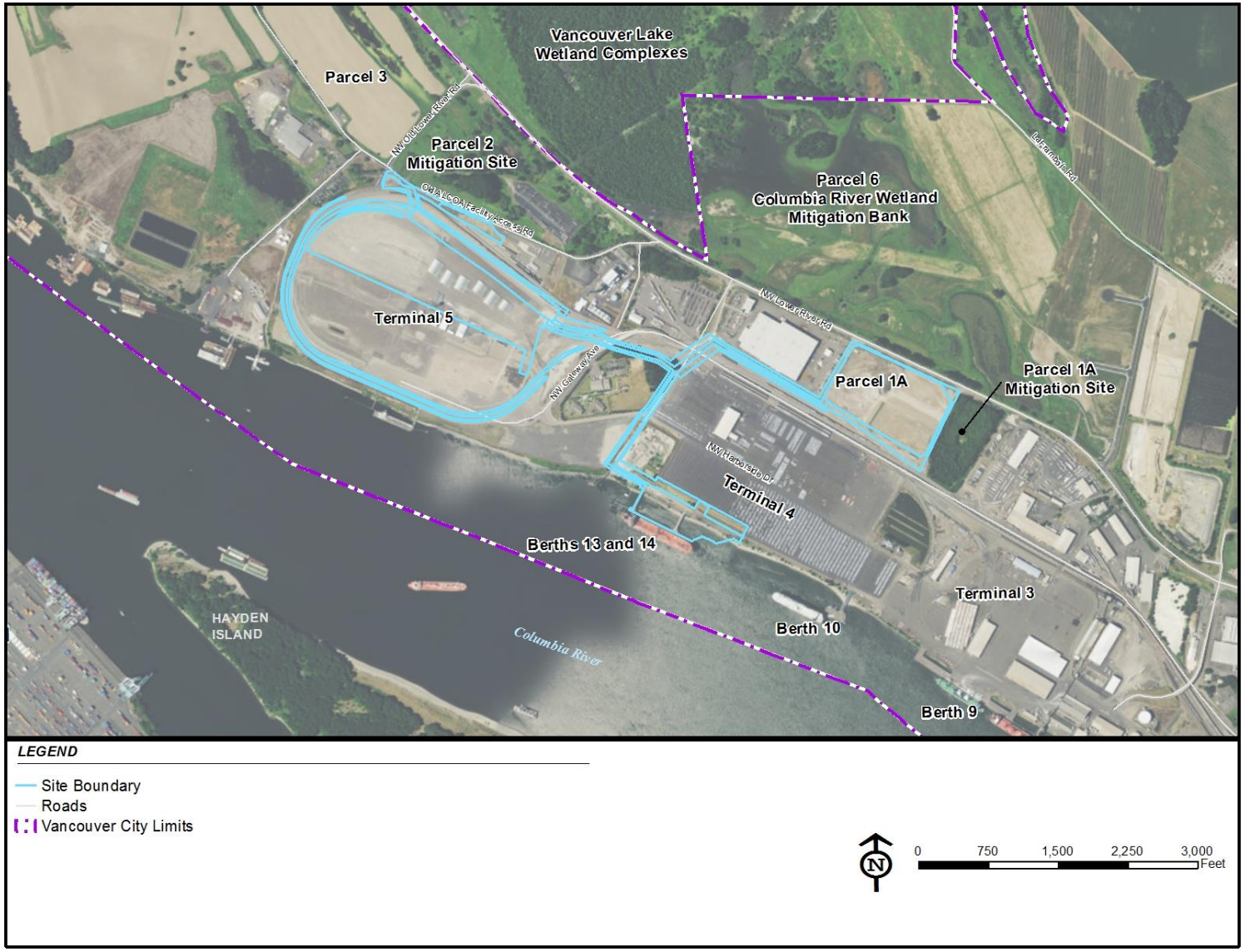

Figure 3. Existing Conditions

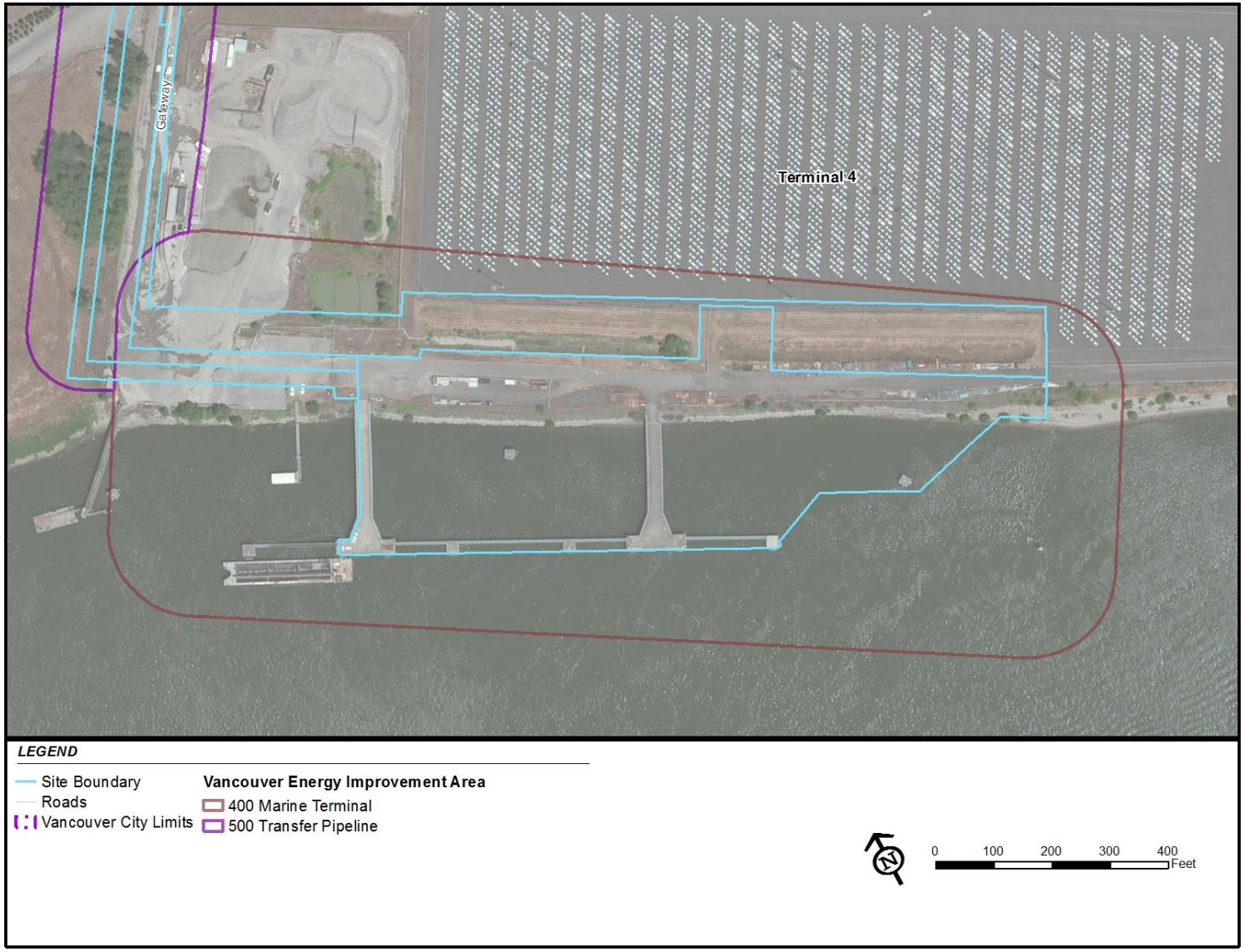

Figure 4. Existing Conditions of Area 400 Marine Terminal

2.0 PROJECT DESCRIPTION

2.1 Project Overview

The Applicant is proposing to construct a Facility to receive crude oil by rail, store it on site, and load it on marine vessels for shipment to various consumers and end users located primarily on the West Coast. Unit trains will arrive at the project site and will be stationed on the Facility rail loops. The trains will be "indexed" through the unloading area (Area 200), where the crude oil will be gravity-drained into the transfer pipeline system (Area 500). The crude oil will be pumped through the transfer pipelines to the crude oil storage tanks (Area 300) where it will be held until the marine vessel loading operation. The storage tanks are also designed to allow blending the various types of crude oil at the Facility to meet customer demands for specific qualities. Marine vessels will arrive and moor at the dock (Area 400) where they will be preboomed. Crude oil will be pumped from the storage tanks to the loading area, and loaded to the marine vessels. See Figure 5 for a site plan of the proposed Facility.

2.2 Project Elements

In addition to the primary components described above, the Facility will include ancillary elements that will support the offloading, storage, and loading operations. The primary and ancillary elements are described in detail below. Table 2-1 summarizes the primary and ancillary project elements by Facility area.

Table 2-1. Summary of Primary and Ancillary Project Elements

Facility Area	Primary and Ancillary Project Elements
Rail Infrastructure	• Rail facility loops
200 – Unloading and Office	• Rail unloading area • Control rooms\E-houses • Fire Pump and Foam Building • Administrative and Support Buildings
300 – Storage	• Crude Oil Storage Tanks • Secondary Containment Berm • Storage Building • Pump Basin • E-House • Fire Pump and Foam Building
400 – Marine Terminal	• Marine Vessel Loading Hoses and Equipment • Control Room/E-House • Dock Safety Unit • Marine Vapor Control Unit (MVCU) • Vapor Blower Skid • Spill Prevention, Response and Containment Equipment • Dock Improvements • Piping from Vessel Loading to MVCUs
500 – Transfer Pipelines	• Transfer Piping from Area 200 to Area 300 • Transfer Piping to/from Area 300 to Area 400
600 - Boiler Building	• Boiler Building

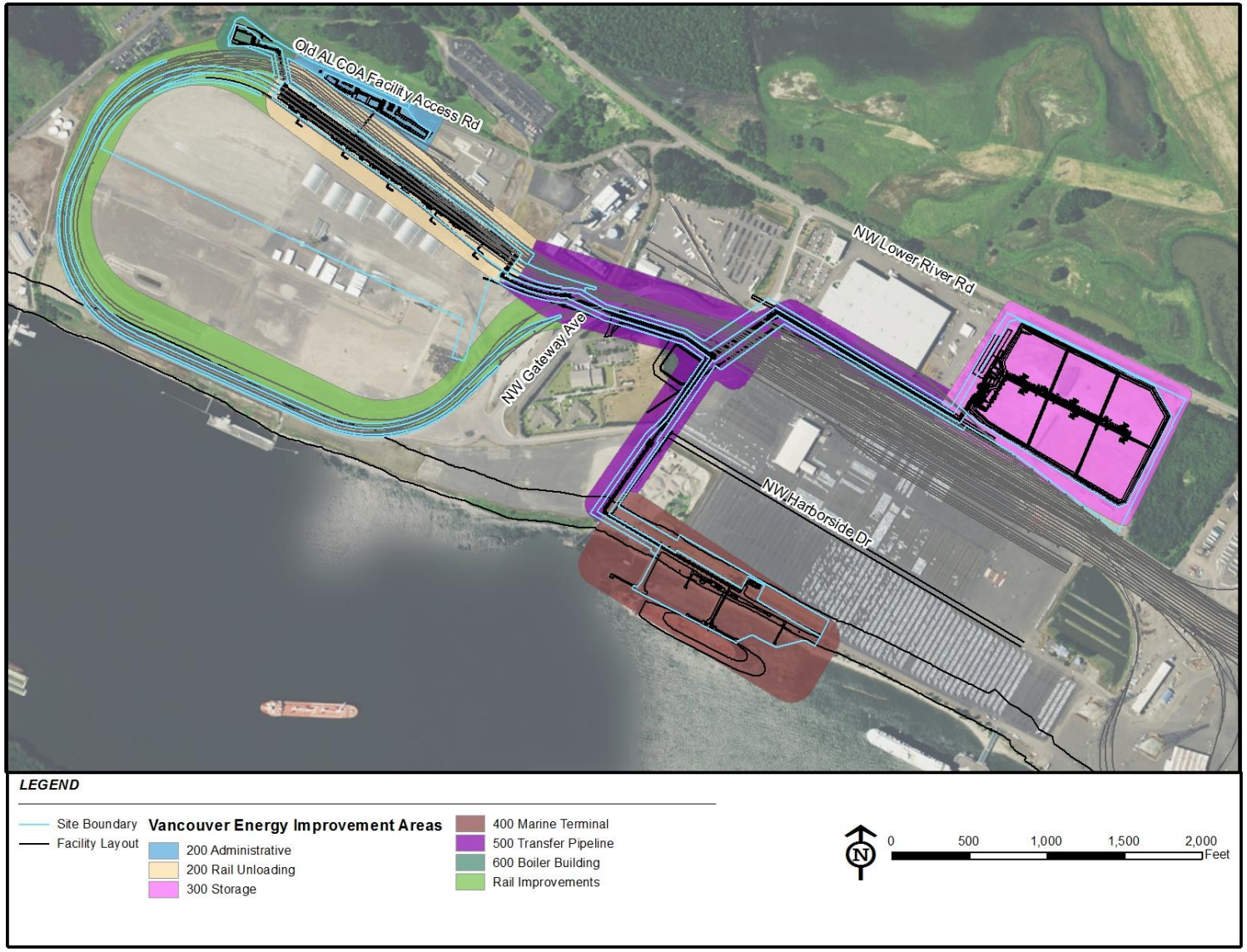

Figure 5. Overall Site Plan

2.2.1 Area 200 – Administrative/Support and Rail Unloading

Area 200 is located at 5501 NW Lower River Road in Vancouver. The following Facility elements will be located in Area 200: administrative and support buildings, parking, rail access to the rail unloading facility, and the rail unloading facility. Area 200 will be accessible from an unnamed private road owned and maintained by the Port. Area 200 facilities will be constructed on approximately 7.8 acres.

2.2.2 Area 300 – Storage

Area 300 is located at the Port's Parcel 1A on the south side of NW Lower River Road just east of the existing Farwest Steel facility. The following Facility elements will be located in Area 300: product storage tanks and associated secondary containment, the Area 300 Storage Building, and associated control and ancillary systems. Area 300 will be accessible from NW Gateway Avenue and NW Lower River Road via a shared private drive. Area 300 elements will be constructed on approximately 20.84 acres.

2.2.3 Area 400 – Marine Terminal

Area 400 is located at existing Port berths 13 and 14 on the Columbia River south of the current Subaru facility. The following Facility elements will be located in Area 400: product conveyance and loading facilities located on the dock, the marine vapor combustion units (MVCUs), emergency containment and response equipment, and control and ancillary facilities associated with vessel loading (see Figures 6 and 7) . This area will be accessed from NW Gateway Avenue and Harborside Drive by a driveway to be constructed with the project. Area 400 will be constructed on approximately 7.7 acres.

2.2.4 Area 500 – Transfer Pipelines

Area 500 consists of a non-exclusive easement located within Terminal 5, Parcel 1A, berths 13 and 14, and corridors adjacent to existing private Port roads. Area 500 includes the corridors for the approximately 38,500 lineal feet of transfer pipelines that will connect the Unloading (Area 200), Storage (Area 300), and Marine Terminal (Area 400) portions of the project. Area 500 will be constructed on approximately 4.9 acres.

2.2.5 Area 600 –Boiler Building

Area 600 is located at the northwest corner of Terminal 5. The Area 600 Boiler Building, associated parking, and an E-house will be constructed at this location. This area also includes the piping facilities to carry generated steam to Area 200. Area 600 will be accessed from Old Lower River Road and a private road owned and maintained by the Port. Area 600 facilities will be constructed on approximately 0.8 acre.

2.2.6 Rail Infrastructure

The Facility will take advantage of dual Class 1[1] (BNSF and Union Pacific Railroad) unit train access at the Port's Terminal 5. The Terminal 5 site represents the westernmost extension of the West Vancouver Freight Access (WVFA) project and is designed to accommodate unit trains.

[1] Class 1 railroads are defined as those carriers having operating revenues of $433.2 million or more.

The Port has permitted, has begun construction, and will continue to construct the WVFA project elements at Terminal 5. The existing rail infrastructure at Terminal 5 is illustrated in Figure 8.

Vancouver Energy will use up to two loop tracks constructed as part of the WVFA project and will construct a third loop at Terminal 5. Vancouver Energy and the Port will exchange the use of this new loop for an existing loop at Terminal 5. As part of Facility construction, the Applicant will also relocate approximately 1,500 feet of existing tracks to allow for track tie-ins into the Area 200 unloading structure.

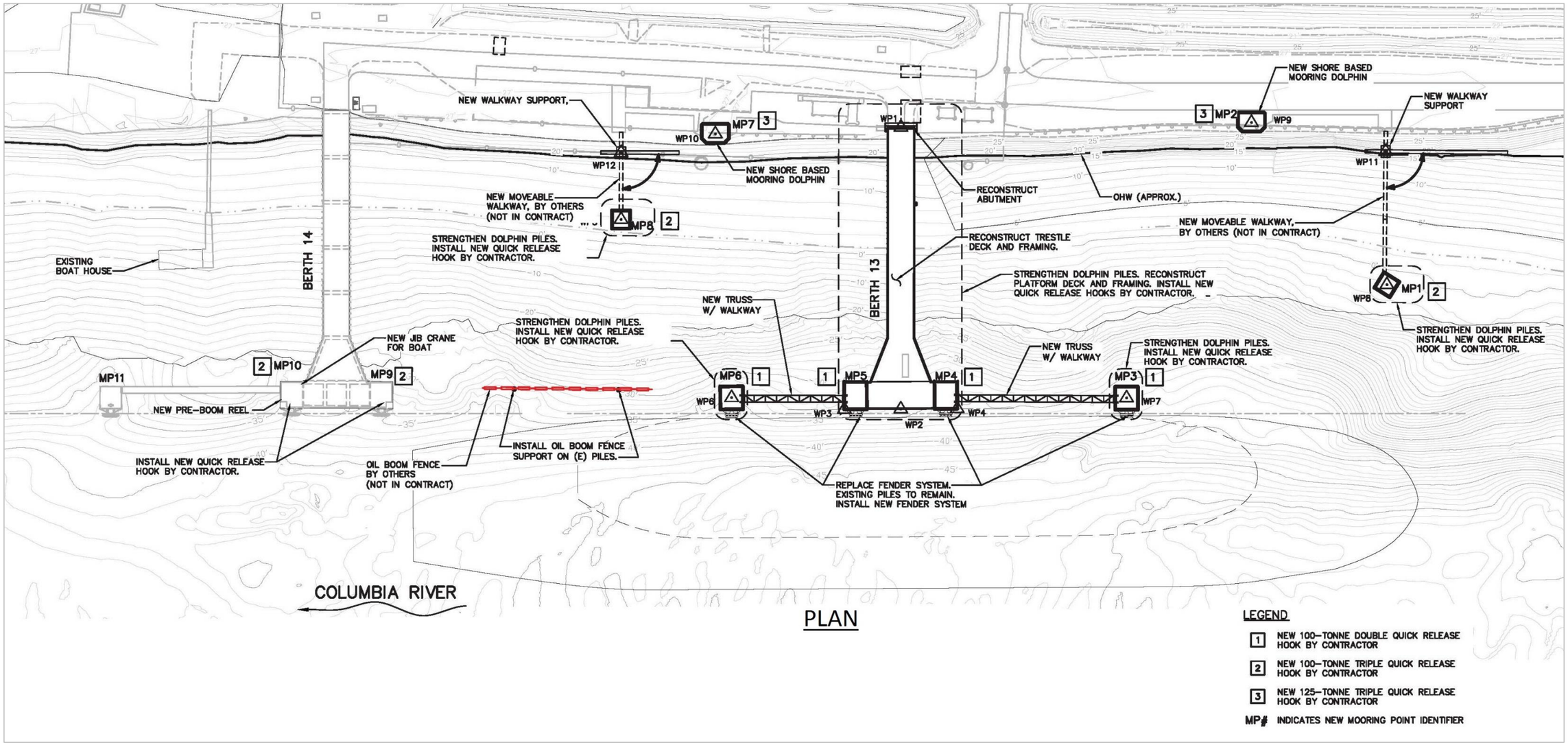

Figure 6. Site Plan Area 400 Marine Terminal

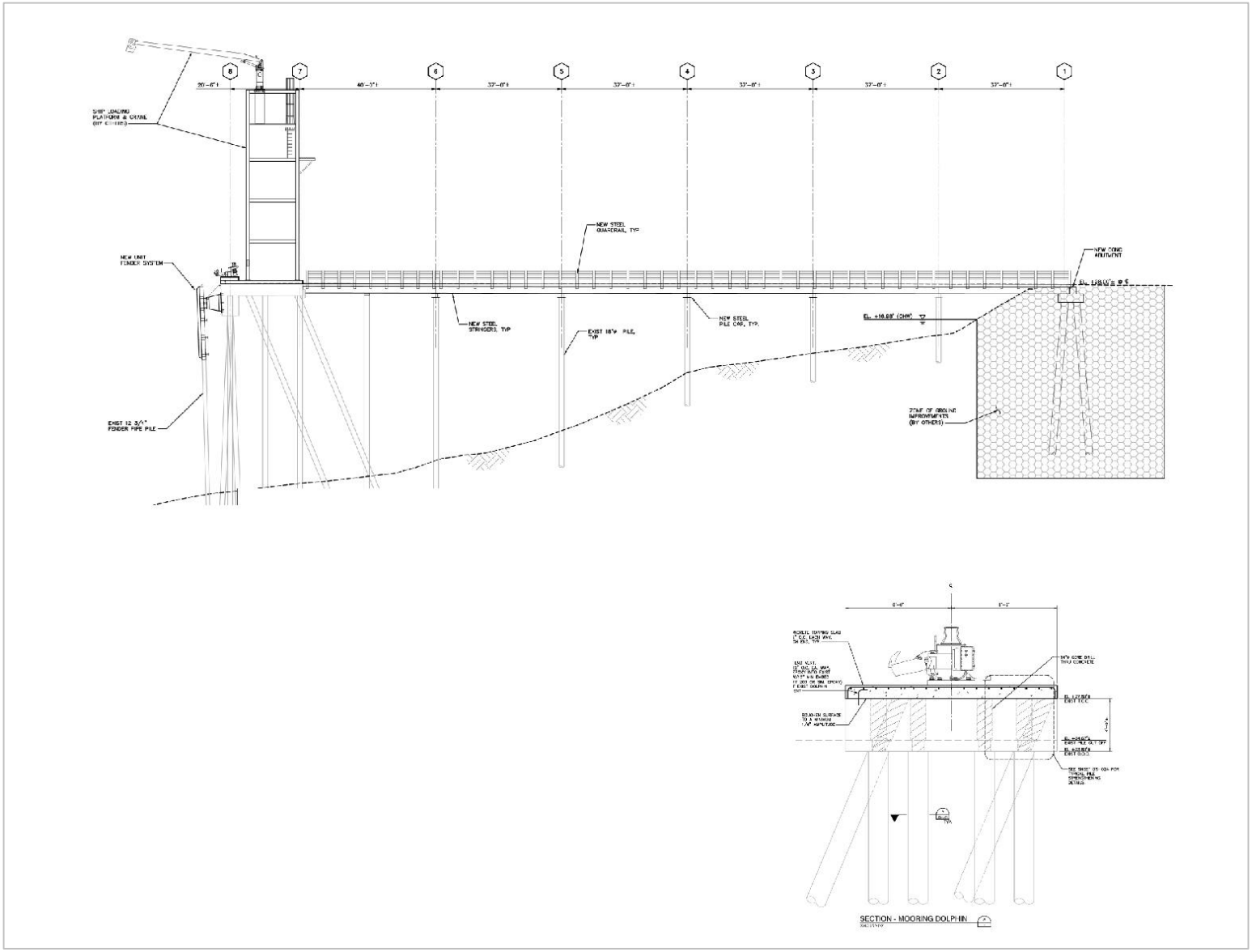

Figure 7. Cross Section Area 400 Marine Terminal

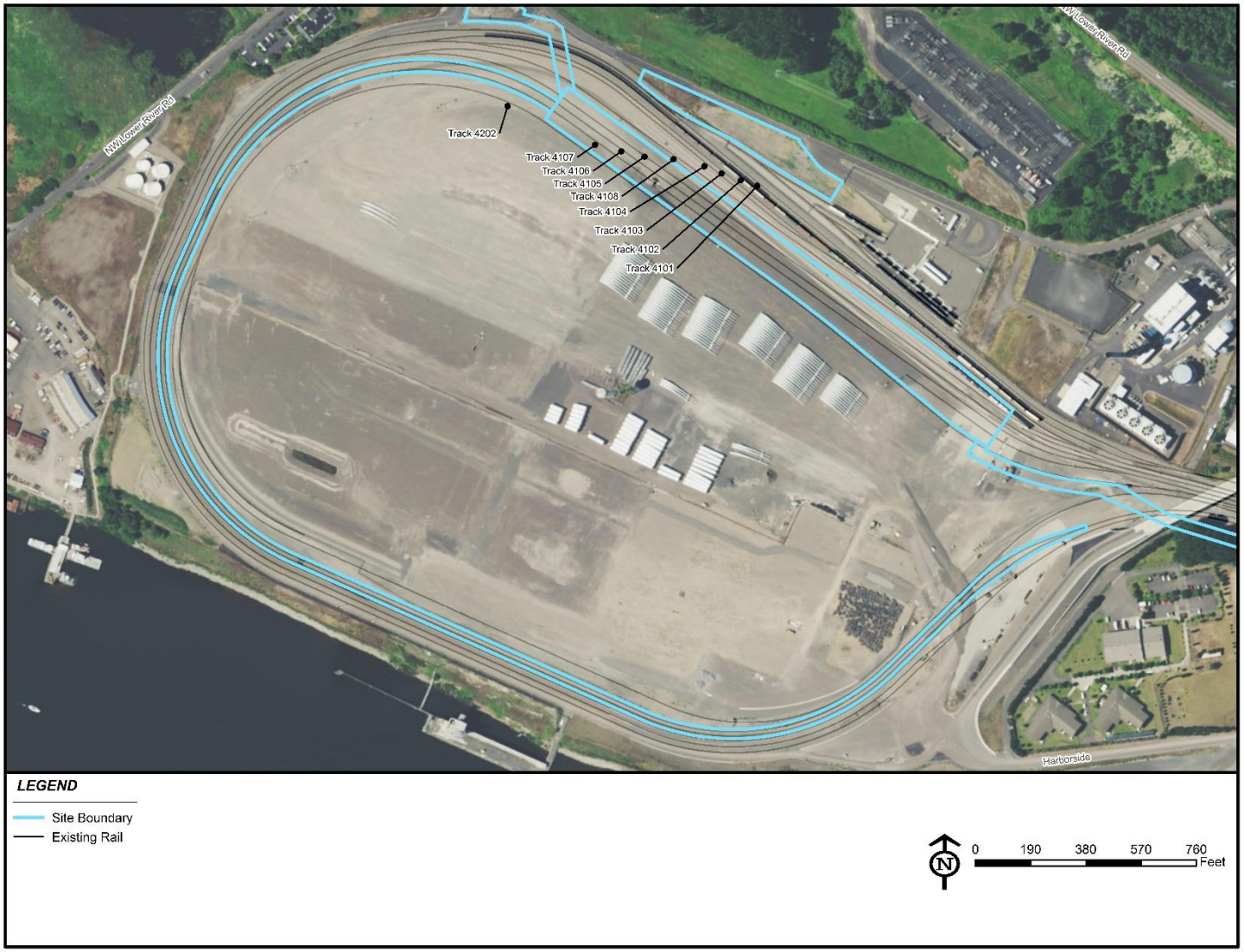

Figure 8. Existing Rail Infrastructure

3.0 METHODOLOGY

This section documents the methods that were used to evaluate the presence of biological resources and the baseline conditions of habitats and species, and to determine the nature and extent of effects that could result from the implementation of the proposed Facility. Project scientists coordinated with regulatory agency biologists, reviewed existing literature and reference material, and conducted field investigations at the project site.

3.1 Statement of Qualifications

This Biological Resources Report has been prepared by Dan Gunderson, a senior scientist with BergerABAM. Dan has over 15 years of experience as a professional scientist, including over 12 years of experience in Southwest Washington. Dan is an experienced field biologist, with a background that includes extensive field inventory and research experience for vegetation, wildlife, and fisheries resources. Dan is also a certified Professional Wetland Scientist (PWS) through the Society of Wetland Scientists, with a strong background in wetland science.

Other BergerABAM biologists that assisted with research and field inventory associated with the preparation of this Biological Resources Report include Dustin Day and Travis Kessler. Dustin Day is an environmental scientist with over 18 years of experience in the field. He is a certified PWS, and an experienced wetland and vegetation scientist. Travis Kessler is an environmental scientist with over 5 years of experience. Travis has a background in wildlife and fisheries ecology. He is also a certified PWS.

3.2 Agency Coordination

Throughout the development and design of this proposed action, BergerABAM coordinated closely with staff from federal, state, and local regulatory agencies to identify issues of concern.

BergerABAM scientists and other members of the project team met with Jeff Fisher, NMFS on July 19, 2013, to introduce the project and identify NMFS' concerns with regards to ESA consultation. The primary potential issue identified by NMFS during this meeting was the increased potential for wake stranding associated with increased shipping that would result from the project.

BergerABAM scientists also had several email and telephone conversations with Steve Manlow, USACE, regarding the project and the USACE's review as it relates to the ESA consultation with NMFS and USFWS.

BergerABAM scientists and the project team continue to coordinate with federal, state, and local regulatory agencies as the project design is refined.

Concurrent with the EFSEC review of this application, the Project Proponent has been pursuing a Section 10/404 permit from the USACE. Pursuant to Section 7 of the Endangered Species Act (ESA), USACE with the Project Proponent (as the non-federal representative) has been consulting with the USFWS and NMFS regarding the proposed action's effect on ESA listed species. The Project Proponent prepared a prepared and initially submitted a Biological Evaluation (BE) to the USACE in September 2014[2]. The BE was revised in December 2014 to

[2] A copy of the BE was submitted to EFSEC on 23 October 2014.

respond to comments received from the USACE in a Memorandum for the Record (MFR), dated November 19, 2014[3]. A final August 2015 revision responds to comments received from the USACE, USFWS, and NMFS, in a letter from the USACE, dated May 28, 2015, regarding the effects analysis, effects determinations, and extent of the Action Area in which the impacts are evaluated[4]. This BE was adopted by USACE as a Biological Assessment (BA) and submitted to USFWS and NMFS. Based upon this BA, in a letter dated March 16, 2016, USFWS concurred with USACE's conclusion that the proposed action was not likely to adversely affect ESA listed species under its jurisdiction. NMFS is currently developing a Biological Opinion that will analyze the impacts of the proposed action on ESA listed species under its jurisdiction.

3.3 Literature and Reference Material Review

Information regarding the potential presence of special status plant species was obtained from the US Fish and Wildlife Service (USFWS) web site (USFWS 2013), and from a review of the Washington Natural Heritage Program (WNHP) database (WNHP 2013a). A list of species documented as occurring within the project vicinity, or with the potential to occur, was generated based on the potential presence or absence of appropriate habitat for each species.

Information regarding the potential presence of special status fish and wildlife species was obtained from the USFWS web site (USFWS 2013) and the National Marine Fisheries Service (NMFS) web site (NMFS 2013) on June 27, 2013. Additional information came from data from the Washington Department of Fish and Wildlife (WDFW) two on-line databases, Priority Habitat and Species (PHS) on the Web (WDFW 2013a) and Salmonscape (WDFW 2013b), as well as from the 2008 PHS list (WDFW 2008).

Information regarding the potential presence of wetlands at the project site included a review of National Wetlands Inventory (NWI) data (USFWS 1989) and soils data (US Department of Agriculture Natural Resources Conservation Service [USDA NRCS] 2013), as well as a review of recent and historic permitting documentation.

3.4 Field Investigation

BergerABAM biologists Dustin Day and Travis Kessler conducted a site visit on May 28, 2013 to delineate the ordinary high water mark (OHWM) of the Columbia River at the project site, and to conduct a riparian habitat assessment and tree inventory. Biologists flagged the OHWM in the field, and this line was later recorded via professional land survey. Biologists also conducted a riparian vegetation inventory and habitat assessment, and measured and marked the locations of trees with diameters at breast height (dbh) of 6 inches or greater.

BergerABAM biologists Dan Gunderson and Dustin Day also assessed terrestrial site conditions on June 27, 2013. Biologists visited the project site to evaluate and document habitat conditions and to document the presence/absence of wetlands on terrestrial portions of the site. Site-specific wildlife or botanical surveys to determine use of the Facility site or the project vicinity were not conducted, which demonstrate that there is negligible habitat present to support wildlife species. BergerABAM has extensive knowledge of the Facility site and vicinity based on previous work conducted for the Port and Port tenants. The presence (or lack thereof) of terrestrial wildlife is indicative of the highly disturbed nature of the site (i.e., an active industrial area), and the small

[3] A copy of this revised BE was submitted to EFSEC on 16 January 2015.
[4] A copy of this revised BE was submitted to EFSEC on 30 July 2015.

amount of habitat present to support wildlife species. This report identified natural areas surrounding the site and, based on the types of habitat present and documented use, the types of species likely present.

4.0 AFFECTED ENVIRONMENT

Figure 9 provides a reference map for the discussion of biological resources that follows. This figure provides a reference for the parcels and important habitat areas and features that are referred to in the discussion within this section. Since biological resources (habitat types, wetlands, surface waters) at the project site are limited, a detailed mapping of biological resources was not undertaken for this analysis.

4.1 Terrestrial Vegetation and Wildlife Habitat Resources

4.1.1 Vegetation and Wildlife Habitat Types

4.1.1.1 *Project Site*

Terrestrial vegetation and wildlife habitat at the project site are of limited quality and quantity. As a result of past development and cleanup activities, there is very little vegetation or wildlife habitat present on the upland portions of the site. Most of the project site has been filled, paved, and/or capped in association with previous development and cleanup activities. For the purposes of this analysis, vegetation communities are defined by the observed vegetation present. Terrestrial habitats are characterized by the wildlife-habitat associations described by Johnson and O'Neill (2001) as the following subcategories.

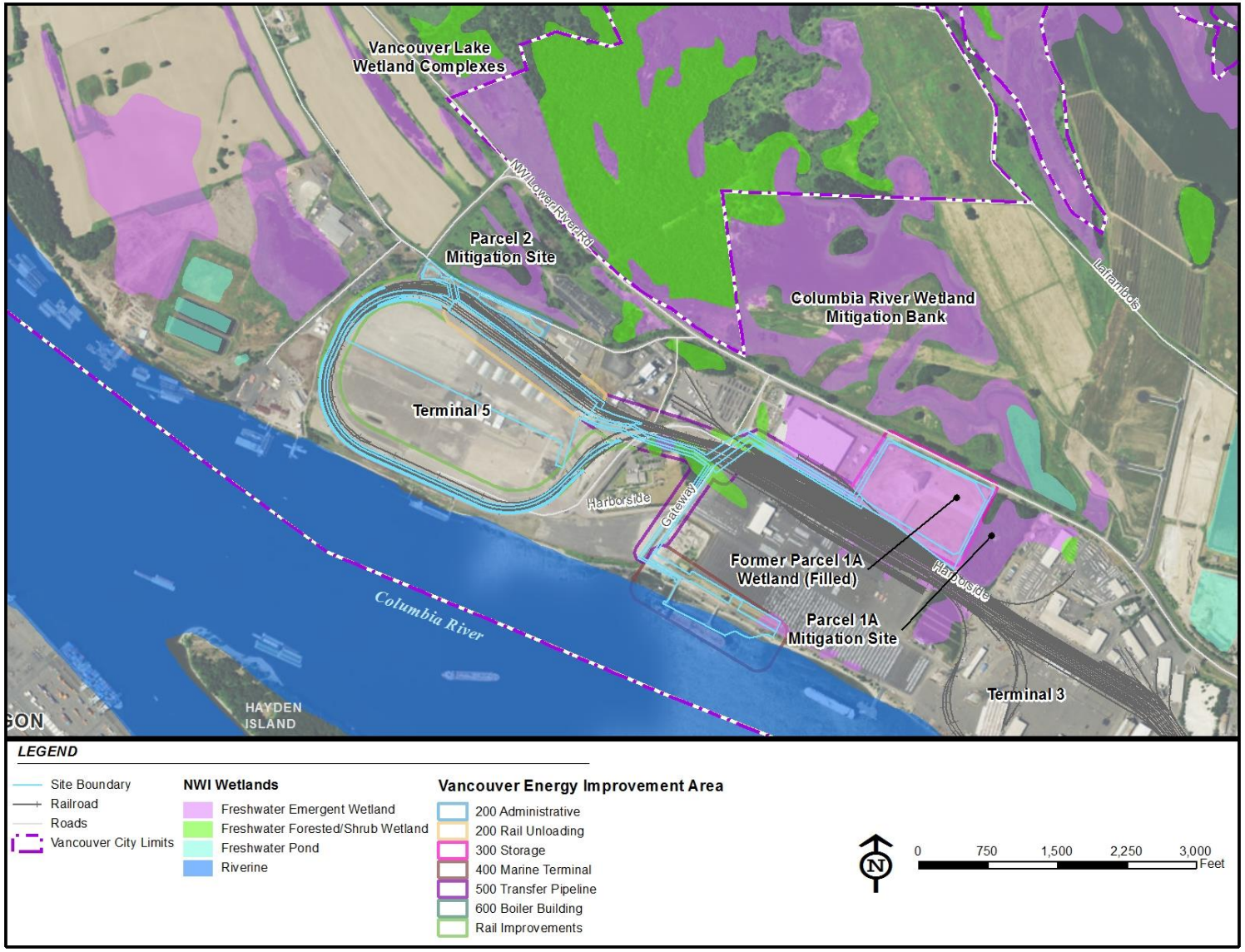

Figure 9. Biological Resources Overview

(a) Unvegetated Industrial

The unvegetated industrial habitat type comprises most of the project site (over 95 percent of the relative cover at the site) and consists of unvegetated areas that are completely developed with industrial infrastructure such as buildings, rail lines, roads, and other paved and graveled surfaces. These areas are completely or nearly devoid of vegetation, and largely impervious. They provide little to no wildlife habitat function.

(b) Ruderal Upland Grass/Forb

Upland vegetation within the ruderal upland grass/forb habitat type is primarily limited to small patches of grasses and a mix of native and non-native weedy herbaceous species including colonial bentgrass (*Agrostis capillaris*), rabbitfoot clover (*Trifolium arvense*), white sweet clover (*Melilotus alba*), and Canada thistle (*Cirsium arvense*). This vegetation type represents approximately 2 percent of the relative cover at the project site. These areas provide very little vegetation or wildlife habitat function, as they are small, isolated, patches of vegetation with little potential or opportunity to provide significant function.

(c) Riparian

The extent and quality of riparian habitat within the project site is very limited, as the bank drops steeply from the upland portion of the property down to the river, and the upland extent of functional riparian habitat is limited by existing impervious surfaces. Riparian habitat represents less than 1 percent of the relative cover at the project site. The riparian area within the proposed project site is mostly devoid of vegetation with the exception of scattered trees and vegetation below the top of the bank. Impervious surfaces include existing roadways, material laydown areas, compacted soil, access trestles, and stormwater facilities.

Vegetation within the functional portion of the riparian habitat at the site consists primarily of small diameter black cottonwood and willows (*Salix* spp.), non-native false indigo bush (*Amorpha fruticosa*), and Himalayan blackberry (*Rubus armeniacus*). The bank is armored with riprap, and above the riprap there is a narrow band of ruderal grass/forb habitat.

The terrestrial portion of the riparian buffer most likely provides some small amount of habitat for wildlife species that can tolerate a wide range of habitat conditions and are conditioned to living in industrialized environments (e.g., ground squirrels, rabbits, opossum, raccoons, coyote, and common rodent species). In addition to these terrestrial mammals, the riparian buffer likely provides a small amount of seasonal foraging habitat for resident and migratory songbirds and shorebirds, as well as raptors.

Riparian habitats are defined by WDFW as a priority habitat because of the important hydrologic, water quality, and habitat functions they provide. However, due to the highly altered nature of the riparian habitat at the site (i.e. riprap armored bank, minimal riparian vegetation, lack of structural complexity), riparian habitat at the project site does not provide any significant hydrologic, water quality or habitat functions.

(d) Upland Cottonwood Stands

Small upland stands of black cottonwood are present on the Clark County Jail Work Center (Jail Work Center) property adjacent to the project site. This habitat type represent approximately 2 percent of the relative cover at the project site. These are small stands dominated almost exclusively by a closed canopy black cottonwood overstory, with occasional Oregon ash

(*Fraxinus latifolia*) and limited understory vegetation. These stands are isolated from other forested areas in the vicinity by industrial infrastructure including rail tracks, roads, fences, and other paved surfaces. The isolated nature of these stands limits their habitat function and values. However, they do likely provide refuge and foraging habitat for migratory songbirds and small mammals as well as perching and nesting habitat for raptors. A previously permitted substation for the Clark Public Utilities (CPU) is removing 246 trees greater than 6 inches in diameter over approximately 1.1 acres. This project has yet to be constructed, but when complete would alter the quality of the existing forested habitat.

Terrestrial habitat of the project site is characterized by several habitat types described by Johnson and O'Neill (2001): Urban/Mixed Environs, Westside Riparian-Wetlands, and Westside Lowland Conifer-Hardwood Forest. Available habitat mapping (using data compiled by Johnson and O'Neill [2001]) is shown below in Figure 10. Within the immediate project footprint, habitats have been modified from the original habitat mapping based on site-specific reviews of available data.[5]

Urban/Mixed Environs – The Urban/Mixed Environs wildlife habitat covers the majority of the project site. Vegetation communities present in this habitat classification include the Unvegetated Industrial and Ruderal Upland Grass/Forb communities, which provide very little wildlife habitat function. The Urban/Mixed Environs habitat type is the most drastically altered from native conditions. The high-density distinction describes the least amount of total tree canopy cover, the lowest tree density, the highest percentage of exotics, the poorest understory and subcanopy, and the poorest vegetative structure (Johnson and O'Neill 2001). They are small, isolated patches of vegetation with little potential or opportunity to provide significant function. While this habitat is generally poor, the area may provide some opportunities for songbirds to forage and rest.

Westside Riparian-Wetlands – WDFW defines riparian habitats as a Priority Habitat for the important hydrologic, water quality, and habitat functions they provide (WDFW 2008). Because riparian habitat at the project site is highly altered (i.e., riprap armored bank, minimal riparian vegetation, lack of structural complexity), it does not provide any significant hydrologic, water quality, or habitat functions. Existing riparian vegetation communities in the immediate project site comprise this habitat type.

Westside Lowland Conifer-Hardwood Forest – Westside Lowland Conifer-Hardwood Forest habitat is scattered throughout the study area, but it is highly fragmented. This habitat types includes the Upland Cottonwood Stands. Several isolated cottonwood stands are present within the immediate area near the Jail Work Center and Parcel 3; however, the nature of these stands limits their habitat function and values for wildlife. They likely provide refuge and foraging habitat for songbirds and small mammals, as well as perching and nesting habitat for raptors. Within the study area, the species composition of this habitat is dominated almost exclusively by black cottonwood and Oregon ash, similar to the forested communities identified within the Westside Riparian-Wetlands habitat. The difference in the habitat type is related to the presence of aquatic habitat. Westside Lowland Conifer-Hardwood Forest is

[5] Outside of the project footprint existing habitats are displayed from the source data, available at: http://www.nwhi.org/index/gisdata#Columbia%20River%20Basin%20GIS%20Data. Mapped habitats were interpolated from aerial imagery and may not match existing land use.

primarily upland; therefore, not associated with aquatic areas. This habitat provides refuge and foraging habitat for migratory songbirds and small mammals, perching and nesting habitat for raptors, and cover and foraging habitat for upland mammals.

Aquatic habitat is characterized as the Open Water—Lakes, Rivers, Streams type and is limited to a stretch of the Columbia River at project site (see Figure 10).

Open Water—Lakes, Rivers, Streams - At the project site, aquatic habitat in the Columbia River and conditions are typical of an industrial waterway and port operations. In general, this reach of the Columbia River provides suitable habitat for the entire Columbia River bank, which has been armored with riprap, and the entire portion of the location that is above OHWM, which has been isolated from the historical floodplain. At this location, the river is approximately 2,800 feet wide with a maintained channel width of 600 to 800 feet, and a depth from -44 to -51 feet Columbia River Datum (CRD). Water quality conditions at the project site are generally appropriate for aquatic life, although the reach of the Lower Columbia River has several areas listed on the 2008 Ecology 303(d) list for chemical- and nutrient-related contamination (Ecology 2008).

An important component of aquatic habitat is the shallow water habitat (SWH) zone, which is also referred to in the literature as the nearshore, in the Columbia River. The SWH zone is considered to be the nearshore migratory corridor for salmonids and other fish species. Typically, the literature uses a water depth of less than 20 feet to describe the SWH zone. Recent literature suggests that shallow water habitat varies with river and tide stage in the Lower Columbia and is defined as the area with water depth from 0.1 to 2.0 meters for any given river stage (Bottom et al. 2005; Kukulka and Jay 2003). At the project site, ordinary high water has been defined as 15.2 feet and 1.7 feet for mean lower low water in the Columbia River Datum (CRD). Using this definition, the SWH zone at the project site would range from 15.2 feet to -4.3-feet CRD. Within this zone, existing conditions include the riprap shoreline with no riparian vegetation, an existing pile-supported trestle for access to Terminals 13 and 14, and a sandy/silty benthic substrate with no aquatic vegetation. The existing Marine Terminal is situated at an elevation of -20 feet CRD, and does not fall within the defined SWH zone.

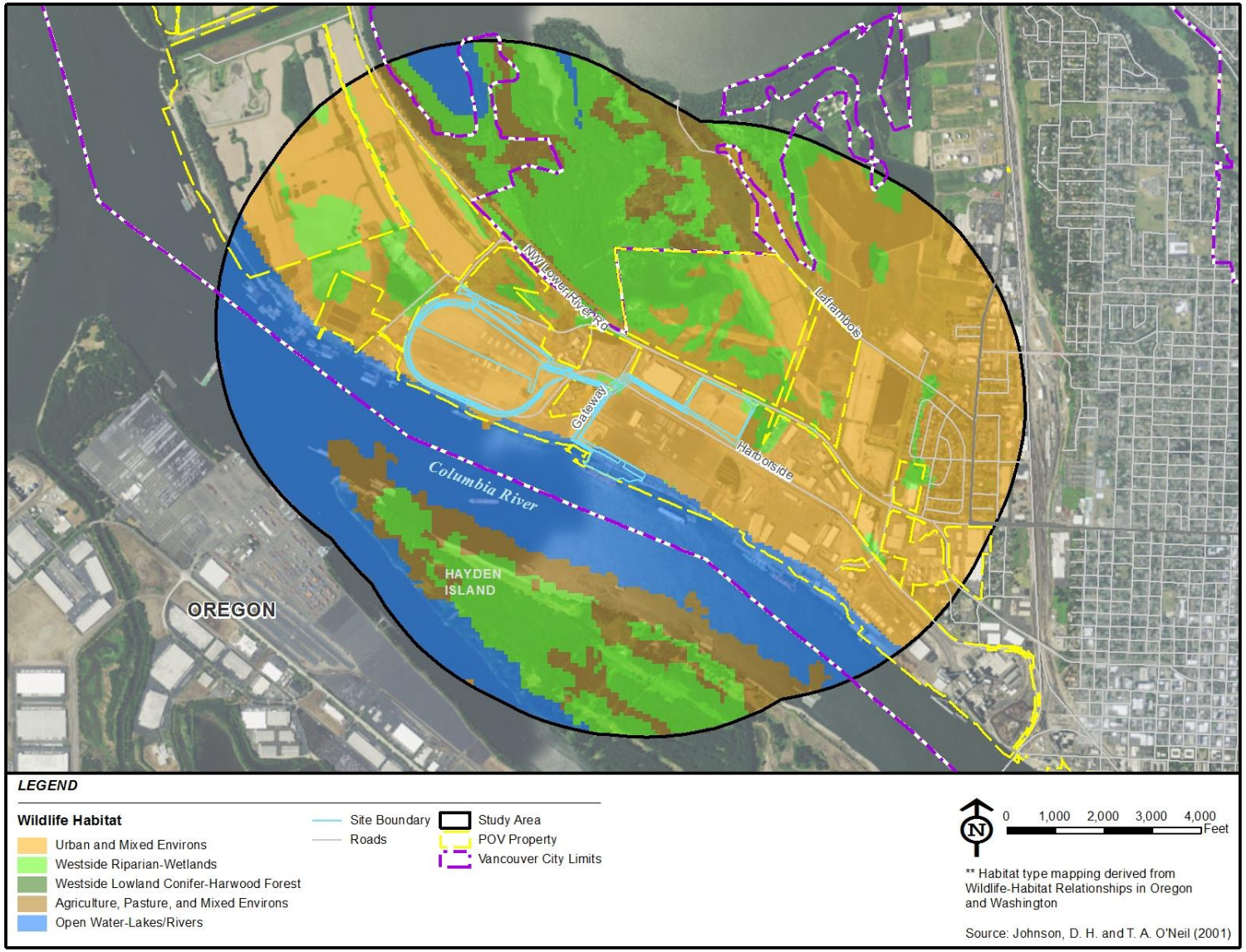

Figure 10. Wildlife Habitat Type

4.1.1.2 *Project Vicinity*

Vegetation communities are not assessed outside the project site, but generally consist of the same communities as described for the project site. While there is little habitat present at the project site, there are several areas of relatively higher quality terrestrial habitat adjacent to the project site, and within the immediate vicinity. These include Westside Riparian-Wetlands, Westside Lowland Conifer-Hardwood Forest and Agricultural, Pasture, and Mixed Environs. Aquatic habitat within the project vicinity includes the Columbia River and Vancouver Lake.

(a) Westside Riparian-Wetlands

Within the project vicinity, Westside Riparian-Wetland habitats are present on Hayden Island to the south and Vancouver Lake to the north, and include wetland, shrub, and forested communities. Forested communities are dominated by black cottonwood and Oregon ash, while various willow species comprise the shrub communities. Cottonwood-dominated riparian forests border the river west of the proposed Facility and south on Hayden Island. Riparian areas most likely provide a small amount of habitat for wildlife species that can tolerate a wide range of habitat conditions and are conditioned to living in industrialized environments (e.g., ground squirrels, rabbits, opossum, raccoons, coyote, and common rodent species). In addition to these terrestrial mammals, the riparian buffer likely provides a small amount of seasonal foraging habitat for resident and migratory songbirds and shorebirds, as well as raptors.

The project site is located within the Vancouver Lake Lowlands, an area historically subject to seasonal flooding from Vancouver Lake and the Columbia River. Human activities, including dam construction, floodplain fills, diking, and streambank armoring, have significantly altered the hydrology of the Columbia River. These activities also resulted in a significant reduction in the quantity and quality of wetland habitats in the Vancouver Lake Lowlands. However, there are still significant portions of the Vancouver Lake Lowlands that remain influenced by seasonal inundation and high groundwater tables, and these wetland habitats provide important water quality, hydrology, and habitat function.

The highest quality forested and emergent wetland habitat in the project vicinity is associated with the southern end of Vancouver Lake. The CRWMB, an approximately 154-acre wetland mitigation bank established in 2010, is located at the southern extent of this wetland complex. These wetlands provide high quality seasonally inundated habitats that most closely resemble the original hydrologic and wetland habitat functions of the Vancouver Lake Lowlands.

There are also two wetland mitigation sites in the vicinity of the project site. These sites were created and/or enhanced from upland sites, as compensatory mitigation for wetland impacts. The Parcel 1A wetland mitigation site, located immediately east of Parcel 1A, was created in 1994. The site is an approximately 7.9-acre depressional, palustrine, forested wetland, vegetated with mature black cottonwood trees and a variety of native shrubs and herbaceous species. The fifth and final year of monitoring was conducted in 2001 (David Evans and Associates 2001). This site is owned and maintained by the Port.

The Parcel 2 wetland mitigation site, also owned and maintained by the Port, is an approximately 16.4-acre mitigation site, situated on an approximately 31.3-acre parcel north of the existing Terminal 5 site. The mitigation site was established in 2000, and received final regulatory approval and release from further monitoring obligation from USACE in 2007. The site is currently a mosaic of forested, scrub-shrub, and emergent vegetation.

Several emergent wetlands also exist on Port parcels 3, 4, and 5, west of the Terminal 5 site. Because of their limited structural diversity, these wetlands primarily provide water quality functions but likely also provide some wildlife habitat functions.

Freshwater wetlands are a WDFW priority habitat, and they provide important habitat functions in addition to water quality and hydrologic functions. Wetlands can provide habitat for several species of waterfowl (i.e., mallard ducks, pintail, wigeon, merganser, gadwalls, green-winged teal, Canada goose, and snow goose), great blue heron, sandhill crane, and a variety of migratory songbird species. Mammals typically found in wetland habitats in the vicinity include beaver, raccoon, and coyote. Various reptile and amphibian species are frequently encountered as well.

Riparian habitats throughout most of this industrial reach of the Columbia River are heavily armored, with little native vegetation and little habitat function. While most of the shoreline within the Port is armored, some shoreline areas contain sandy banks, scattered rock, and large woody debris. However, approximately 1 mile downstream, adjacent to Port Parcel 3, there is a section of relatively intact forested riparian habitat that provides a relatively higher level of habitat function. The bank in this portion of the river is unarmored and a stand of mature black cottonwood trees has established itself. This stand of trees provides documented roosting and nesting habitat for bald eagle, and is also used by other raptor species, migratory songbirds, and mammals such as deer, raccoons, and coyote.

(b) Westside Lowland Conifer-Hardwood Forest

Several upland stands of black cottonwood, similar to those described in section 4.1.1.1 above, are present throughout the immediate project vicinity. These are small stands dominated almost exclusively by black cottonwood and Oregon ash, typically with limited understory vegetation. These stands are frequently located near wetland and aquatic habitats and, as such, likely provide relatively higher quality habitat than the upland cottonwood stands present at the project site. These stands provide refuge and foraging habitat for migratory songbirds and small mammals, perching and nesting habitat for raptors, and cover and foraging habitat for upland mammals.

(c) Agricultural, Pasture, and Mixed Environs Lands

Agricultural habitats are present within the project vicinity, notably to the northeast and west of the proposed Facility. Existing habitat mapping (Figure 10) shows these areas as Urban and Mixed Environs, which can include surrounding agricultural lands (Johnson and O'Neil 2001). The Port's Parcel 3, located east and northeast of the Terminal 5 site, is leased for agricultural activities. Parcel 3, an approximately 517-acre parcel, is used mostly to grow row crops and as pasture for horses and cattle. A few remnant sloughs, oriented roughly parallel to the Columbia River, are present in the eastern portion of the parcel, and the northernmost of these sloughs is hydrologically connected to the Parcel 2 wetland mitigation site. A cottonwood-dominated riparian forest, described in subsection (b) above, borders the river, inland from a sandy beach and levee. Several emergent wetlands have been delineated on this parcel and are described in subsection (a) above. These lands provide significant foraging habitat for geese and cranes as well as for other migratory birds (e.g., sparrows and other songbirds) and for a variety of small mammal species (e.g., mice, voles, and squirrels).

Aquatic habitats in the project vicinity are associated with the Columbia River and Vancouver Lake, and equate to the Open Water – Lakes, Rivers, Streams type described by Johnson and O'Neill (see Figure 10).

- *Open Water—Lakes, Rivers, Streams* - The Columbia River is an important waterway for commercial vessel traffic. Water depth is artificially maintained in the Columbia River Navigation Channel, approximately 600 feet wide and 43 feet deep, which extends from the mouth to River Mile 106.5. The Columbia River Navigation Channel has been historically dredged by USACE to allow commercial vessel traffic to the ports of Portland and Vancouver. Routine vessel traffic is normal in the vicinity of the proposed Facility and generates underwater noise. Existing vessel traffic in the Columbia River consists of a variety of vessel types and sizes, all of which generate different sound levels. Recent studies of background noise levels in the Columbia River indicate average sound levels between 110 and 120 decibel (dB), though passing vessels increased ambient sound to between 145 and 157 dB (CRC 2011).

Aquatic habitats are used by a variety of species, including mammals, birds, amphibians, and invertebrates (fish are discussed separately in section 4.2). Habitat at the immediate proposed Facility location is generally lacking in quality. Prior investigations of aquatic conditions at the marine terminal location indicate a general lack of habitat due to the steep shoreline and absence of overbank and riparian vegetation (Anchor Environmental 2007). Shallow water substrate is generally sands and gravels without the presence of large woody debris or submerged vegetation. The sandy bottom is not likely to support large communities of benthic invertebrates, which makes it less suitable as foraging habitat for fish. The lack of submerged vegetation also makes it less likely to be used by foraging waterfowl. Between berths 10 and 13, an area of higher quality habitat lies within the Port's shoreline. The channel bathymetry gradually transitions to deep water that provides some shallow water nearshore habitat, which many juvenile species of fish prefer (see section 4.2) and potentially provides some foraging habitat for piscivores when fish are present.

Habitat for marine mammals, is primarily limited to moderate-quality foraging habitat that occurs within the Lower Columbia River, namely Steller sea lion (*Eumatopius jubatus*), California sea lion (*Zalophus californianus*), and harbor seal (*Phoca vitulina*). As described previously, existing underwater noise is elevated from commercial vessel traffic and likely exceeds the threshold for behavioral effects throughout the lower reaches. Areas of noise refuge may occur in side channels where landforms and orientation to the navigation channel block sound transmission. No documented marine mammal haulouts are located within the study area; therefore, these species are considered to be transitory and likely only foraging within the vicinity (WDFW 2013). Diving ducks and other waterfowl forage within and adjacent to aquatic habitats at the study area where potential food sources are more likely to be present. Terrestrial wildlife (e.g., otter or muskrat) do not likely use aquatic habitat at the study area extensively due to the low habitat suitability and limited connectivity to other terrestrial habitats.

Aquatic habitat conditions throughout the study area are similar to those present at the proposed Facility location. There are several areas of relatively higher quality habitat within the immediate vicinity, however, which provide relatively higher levels of habitat function for terrestrial wildlife species. Some of these areas also provide relatively higher levels of connectivity to other areas of habitat, allowing terrestrial species better access to freshwater aquatic habitats. Vancouver Lake provides higher-quality habitat for multiple bird species, primarily dabbling ducks, kingfishers, raptors and songbirds, and forage within and adjacent to aquatic habitats throughout the vicinity of the proposed Facility. Terrestrial mammals, reptiles, and amphibians

that use habitats within the vicinity also likely forage within accessible nearshore aquatic habitats.

4.1.1.3 *Shipping Prism*

The rail prism includes portions of nearly every major watershed and habitat type, ranging from forested to grasslands, within the state. The project's rail prism also crosses or parallels numerous freshwater rivers and smaller tributaries to the Columbia River and to Puget Sound. The WDFW priority habitats and species (PHS) list identifies 20 habitat types as having priority status within the state (WDFW 2008), all of which likely occur within the project's rail prism. A detailed discussion of each of these habitats is beyond the scope of this document, as the anticipated potential for and extent of impacts to priority habitats within the shipping prism are expected to be low, and are addressed programmatically within this document.

Aquatic habitat within the project's vessel prism includes the mainstem Columbia River from the project site downstream to the river mouth and includes PHS-listed aquatic habitats (instream, freshwater wetlands – deep water and coastal nearshore). The Columbia River Navigation Channel begins at the mouth of the Columbia River and is maintained at a depth of approximately 43 feet deep and approximately 600 feet wide up to the project site. This reach of the river provides habitat for a variety of freshwater aquatic species including Pacific salmon and other resident and anadromous fish species, marine mammals (Steller sea lion, California sea lion, and harbor seal), and several species of aquatic reptiles and amphibians.

The shorelines of the Columbia River downstream of the project site are highly variable and provide different habitat types and vegetation communities. Shoreline types within the lower Columbia River are influenced by substrate composition, bank characteristics, currents, and waves among other variables. The Lower Columbia River Geographic Response Plan (GRP) has identified 14 shoreline types, listed below, that occur between the project site and mouth of the Columbia River (Ecology 2003).

Table 4-1. Lower Columbia River GRP Shoreline Types

1	Exposed rock shores and vertical, hard man-made structure (e.g., seawalls)
2	Exposed wave-cut platforms
3	Fine to medium grained sand beaches and steep unvegetated river banks
4	Course grained sand beaches
5	Mixed sand and gravel beaches, including artificial fill containing a range of grain size and material
6A	Gravel beaches - pebbles to cobble
6B	Gravel beaches - cobbles to boulders
6C	Exposed riprap
7	Exposed tidal flat
8A	Sheltered vertical rock shores and vertical, hard man-made structures (e.g., seawalls, docks, bulkheads)
8B	Sheltered rubble slope
9A	Sheltered sand and mud flats
9B	Sheltered vegetated low bank
10	Marshes

Note: Shoreline lengths are not quantified in the GRP.

4.1.2 Special Status Terrestrial Species

Special status species are defined for purposes of this report as those identified for protection under federal or state laws. They are either (1) listed, proposed for listing, or identified as a candidate species or species of concern under the federal Endangered Species Act of 1973 (ESA), or (2) are plant species identified as endangered, threatened or sensitive by the Washington Natural Heritage Program (WNHP), or (3) are identified as PHS, species of concern (SOC), or species of greatest conservation need (SGCN) by WDFW.

4.1.3 Special Status Plant Species

This section evaluates the potential for special status plant species to occur within the project area. A review of the WNHP database did not identify any documented occurrences of any special status plant species within the township/range/sections in which the project site is located (WNHP 2013a). The potential for these species to occur at the project site was evaluated based on the presence or absence of appropriate habitat for each species. Table 4-2 lists the special status plant species known to occur within Clark County (WNHP 2012).

State listed threatened or endangered plant species are not protected by state legislation or regulation, but are listed as threatened or endangered to assist with agency management and decision-making. The WNHP also places a management priority on the preservation of high-quality native plant communities; however, no high-quality native plant communities exist on the property.

At the federal level, a listing of species of concern is for advisory and management purposes only, as there may be insufficient information to support listing. The category of threatened is applied to plants that are likely to become endangered within the near future if factors contributing to its population decline, or habitat degradation or loss, continue. Plants listed as federally threatened or endangered are protected under the ESA, which is regulated by the USFWS.

Summaries of the habitat requirements for each species and its likelihood of occurrence within the project site or vicinity are presented below.

4.1.3.1 *Oregon bolandra (Bolandra oregana)*

This species occurs along the Columbia River drainage mostly at low elevations; it is usually found near streams and moist, rocky places in deep shade. Associated species include shooting star (*Dodecatheon dentatum*), western saxifrage (*Saxifraga occidentalis*), streambank spring beauty (*Montia parviflora*), and clasping arnica (*Arnica amplexicaulis*). This species grows in a variety of habitats. Although it usually is found in moist, shady, wooded areas on cliffs near waterfalls, it has also been found in open, rocky areas and on steep, grassy, semi-open slopes (WNHP 2013b). Documented sightings in the region are limited to East Clark County, near the entrance to the Columbia River Gorge.

This species is not documented or expected to occur at the project site or within the vicinity.

4.1.3.2 *Dense sedge (Carex densa)*

This is a peripheral species in Washington, known from only a few documented sightings. The primary habitat in Washington is eroding hummocks in intertidal marshland (WNHP 2013). The species has been reported from small cutbanks along rivers and shaded springs at high elevations (WNHP 2013b). Associated species include coyote willow (*Salix exigua*), riverbank wormwood

(*Artemisia lindleyana*), Columbia coreopsis (*Coreopsis atkinsoniana*), sneezeweed (*Helenium autumnale*), awned flatsedge (*Cyperus aristatus*), and conyza (*Conyza* sp.).

This species is not documented or expected to occur at the project site or within the vicinity.

4.1.3.3 *Golden paintbrush (Castilleja levisecta)*

This species occurs in open grasslands in the Puget Trough. The preferred substrate is generally composed of glacial outwash or depositional material. The species prefers sun and can tolerate partial shade, but will not tolerate a closed canopy. The most common associate is, depending on the site, variously Idaho fescue (Festuca idahoensis) or red fescue (*Festuca rubra*). Many weedy species also occur as associated species, as most of these areas have suffered from past disturbances (WNHP 2013b). There are no recent documented occurrences of golden paintbrush in Clark County.

The project site and vicinity do not provide suitable habitat for golden paintbrush, and this species is not documented or expected to occur at the project site or within the vicinity.

4.1.3.4 *Tall bugbane (Cimicifuga elata)*

This species is a tall understory plant of lowland forests. In Washington, it occurs in the Western Cascades, Puget Trough, Olympic Peninsula, and Southwest Washington physiographic provinces (WNHP 2013b). The species grows in or along the margins of mixed, mature or old growth stands of mesic coniferous forest, or mixed coniferous-deciduous forest. Associated species include Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), vine maple (*Acer circinatum*), oceanspray (*Holodiscus discolor*), hazelnut (*Corylus cornuta*), sword fern (*Polystichum munitum*), and snowberry (*Symphoricarpos albus*).

The project site and vicinity do not provide suitable habitat for this species, and it is not documented or expected to occur at the project site or within the vicinity.

4.1.3.5 *Few-flowered collinsia (Collinsia sparsiflora var. bruceae)*

In Washington, this species occurs in thin soils over basalt on a variety of slopes, from almost flat to rather steep, generally south-facing, at elevations ranging from 200 to 1000 feet. The microsites are generally quite open, but may be adjacent to or found within open stands of ponderosa pine (*Pinus ponderosa*) and Oregon white oak (*Quercus garryana*) (WNHP 2013b).

This type of habitat does not occur at the project site or within the project vicinity.

4.1.3.6 *Clackamas corydalis (Corydalis aquae-gelidae)*

This species is a regional endemic species to Clackamas and Multnomah counties in Oregon, and Clark and Skamania counties in Washington. The species occurs primarily in western hemlock (*Tsuga heterophylla*) and Pacific silver fir (*Abies amabilis*) forest habitats at elevations ranging from 2500 to 3800 feet. It is found growing in or near cold flowing water, including seeps and small streams, often occurring within the stream channel itself (WNHP 2013b).

These habitats do not occur at the project site or within the project vicinity.

Table 4-2. Special Status Plant Species and Their Potential to Occur within the Project Site or Vicinity

Species	Federal	State	Potential for Occurrence	
	ESA Listing Status[1]	State Listing Status[2]	Project Site	Project Vicinity
Oregon Bolandra (*Bolandra oregana*)	None	SC	Low – no suitable habitat on site	Low – riparian species requiring deep shade
Dense Sedge (*Carex densa*)	None	ST	Low – no suitable habitat on site	Low – peripheral species of intertidal marshlands
Golden Paintbrush (*Castilleja levisecta*)	FT	SE	Low – no suitable habitat on site	Low – rare species of open grasslands in Puget trough on glacial outwash
Tall Bugbane (*Cimicifuga elata*)	FSC	SS	Low – no suitable habitat on site	Low – understory species of lowland forests
Few-Flowered Collinsia (*Collinsia sparsiflora* var. *brucea*)	None	SS	Low – no suitable habitat on site	Low - thin soils over basalt on a variety of slopes in Columbia Gorge.
Clackamas Corydalis (*Corydalis aquae-gelidae*)	FSC	SS	Low – no suitable habitat on site	Low – mid-elevation riparian species of hemlock and fir forests
Oregon Coyote-Thistle (*Eryngium petiolatum*)	None	ST	Low – no suitable habitat on site	Moderate – rare species of wet prairies and low ground
Western Wahoo (*Euonymus occidentalis*)	None	ST	Low – no suitable habitat on site	Low – shaded forest understory species
Western Sweetvetch (*Hedysarum occidentale*)	None	ST	Low – no suitable habitat on site	Low – high elevation species
Water Howellia (Howellia aquatilis)	FT	ST	Low – no suitable habitat on site	Moderate – aquatic species of small vernal ponds
Nuttall's Quillwort (Isoetes nuttallii)	None	SS	Low – no suitable habitat on site	Low – Terrestrial species of wet ground, seeps, and in mud near vernal pools
Smooth Goldfields (*Lasthenia glaberrima*)	None	SE	Low – no suitable habitat on site	Moderate – rare species of wet streambanks and vernal pools.
Torrey's Peavine (*Lathyrus torreyi*)	FSC	FT	Low – no suitable habitat on site	Low – open areas within Douglas fir-dominated sites
Bradshaw's Lomatium (*Lomatium bradshawii*)	FE	SE	Low – no suitable habitat on site	Moderate – wet, seasonally flooded prairies and grasslands near creeks and small rivers.
Branching Montia (*Montia diffusa*)	*None*	SS	Low – no suitable habitat on site	Low – moist Douglas fir forests
California Broomrape (*Orobanche californica ssp. grayana*)	None	X	Low – no suitable habitat on site	Low – thought to be extirpated from WA
Western Yellow Oxalis (*Oxalis suksdorfii*)	None	ST	Low – no suitable habitat on site	Low - meadows and moist woods, rare in Clark County

Species	Federal	State	Potential for Occurrence	
	ESA Listing Status[1]	State Listing Status[2]	Project Site	Project Vicinity
Western False Dragonhead (*Physostegia parviflora*)	None	SS	Low – no suitable habitat on site	Low – wet to mesic prairies, damp thickets, and banks of streams and ponds
Wheeler's Bluegrass (*Poa nervosa*)	None	SS	Low – no suitable habitat on site	Low - rock outcrops, cliff crevices, and occasionally in talus
Great Polemonium (*Polemonium carneum*)	None	ST	Low – no suitable habitat on site	Low - woody thickets, open and moist forests, prairie edges, roadsides, fence lines
Idaho Gooseberry (*Ribes oxyacanthoides* ssp. *irriguum*)	None	ST	Low – no suitable habitat on site	Low – streams and canyons in eastern WA
Soft-leaved willow (*Salix sessilifolia*)	None	SS	Low – no suitable habitat on site	Moderate – Variety of lowland riparian habitats
Hairy-Stemmed Checkermallow (*Sidalcea hirtipes*)	None	ST	Low – no suitable habitat on site	Moderate – prairie fragments along fencerows and openings along drainages
Western Ladies Tresses (*Spiranthes porrifolia*)	None	SS	Low – no suitable habitat on site	Moderate – Wet meadows, along streams, in bogs, and on seeps. Have previously been found on the Port's Parcel 3
Hall's Aster (*Symphyotrichum hallii*)	None	ST	Low – no suitable habitat on site	Moderate – dry to moist prairies in valleys and plains
Small-Flowered Trillium (*Trillium parviflorum*)	None	SS	Low – no suitable habitat on site	Moderate – moist forested habitats dominated by hardwoods
California Compassplant (*Wyethia angustifolia*)	None	SS	Low – no suitable habitat on site	Moderate – grasslands, meadows, and other open habitats

[1] ESA Classifications: FE = federal endangered; FT = federal threatened low – no suitable habitat on site; FSC = species of concern; FP = federal proposed; FC = federal candidate.

[2] Washington State Status: SE = state endangered; ST = State threatened; SS = State Sensitive; X = possibly extinct or extirpated;

Source: (WNHP 2012)

4.1.3.7 *Oregon coyote-thistle (Eryngium petiolatum)*

This species occurs from the Willamette Valley of Oregon to the eastern end of the Columbia Gorge in Washington and Oregon. In Washington, the taxon is restricted to a very small area within western Klickitat and Clark counties. It occurs in wet prairies and low ground, especially in places submerged in the spring and drier in the summer (WNHP 2013).

There is no potentially suitable habitat at the project site. The greater Vancouver Lake Lowlands, particularly the seasonally inundated habitats south of Vancouver Lake and within the CRWMB may provide potentially suitable habitat for Oregon coyote-thistle. However, this species is rare in Washington, and has not been documented in the vicinity.

4.1.3.8 *Western wahoo (Euonymus occidentalis)*

This species grows in woods on the west side of the Cascade Mountains. It is often found in shaded, moist draws and ravines. In the Puget Trough area it associated with remnant oak savannah. This species prefers moist, wooded/forested areas but is sometimes found in grassy areas with some trees (WNHP 2013b). These habitats do not occur at the project site or within the project vicinity.

4.1.3.9 *Western sweetvetch (Hedysarum occidentale)*

This species is found in meadows, shrubfields, bare rock outcrops, boulder-fields, and talus-slopes at elevations between approximately 3150 and 6500 feet in Washington. These habitats are not present at the project site or within the project vicinity.

4.1.3.10 *Water howellia (Howellia aquatilis)*

This species is a regional endemic species that occurs in low elevation minerotrophic wetland habitats, particularly small vernal ponds. The species apparently requires exposure to air to germinate and inundation for growth in the spring. This restricts the species to the zone within wetlands that is seasonally inundated, but which dries out in late summer or early fall (WNHP 2013b). Documented occurrences in Clark County are located downstream of the project area, in the vicinity of the Ridgefield National Wildlife Refuge.

There is no potentially suitable habitat at the project site. The seasonally inundated habitats south of Vancouver Lake and within the CRWMB may provide potentially suitable habitat for water howellia. However, this species has not been documented in the vicinity of the project.

4.1.3.11 *Nuttall's quillwort (Isoetes nuttallii)*

This species is currently known from Cowlitz, San Juan, and Thurston counties in Washington, but its range may extend into Clark County. It is an inconspicuous plant found from low to middle elevations in wet ground or seepages and in mud near vernal pools. It is known from only a few recent sites. However, it can be rather inconspicuous and may be somewhat more widespread than the data currently suggest (WNHP 2013b).

There is no potentially suitable habitat at the project site. The seasonally inundated habitats south of Vancouver Lake and within the CRWMB may provide potentially suitable habitat for Nuttall's quillwort. However, this species has not been documented in the vicinity of the project.

4.1.3.12 *Smooth goldfields (Lasthenia glaberrima)*

This species is typically found on wet stream banks and in vernal pools. It is a rare species in Washington, known only from one historical occurrence from Clark County and one recent

occurrence from Klickitat County. Very little information is known about this species (WNHP 2013b). All moist areas, vernal pools, and wetlands in Clark and Klickitat Counties are considered potentially suitable habitat.

There is no potentially suitable habitat at the project site. Wetlands throughout the Vancouver Lake Lowlands represent potentially suitable habitat for smooth goldfields, particularly the seasonally inundated habitats south of Vancouver Lake and within the CRWMB. However, this species has not been documented in the vicinity of the project.

4.1.3.13 *Torrey's peavine (Lathyrus torreyi)*

This species is rare in Clark County, known only form one historic occurrence in the County (WNHP 2013b). It was thought to have been extirpated from Washington as recently as 1994. The only known extant occurrences in WA are within somewhat open areas within Douglas fir dominated sites. These habitats are not present at the project site or within the project vicinity.

4.1.3.14 *Bradshaw's lomatium (Lomatium bradshawii)*

This species is endemic to the southern portion of western Washington in the Puget Trough physiographic province and to the central and southern portions of the Willamette Valley physiographic province in western Oregon. The species occurs in remnant fragments of the once widespread low elevation grasslands and prairies. The habitat type is described as wet, seasonally flooded prairies and grasslands common around creeks and small rivers. Associated species include tufted hairgrass (*Deschampsia cespitosa*), slender rush (*Juncus tenuis*), sawbeak sedge (*Carex stipata*), and one-sided sedge (*Carex unilateralis*).

There is no potentially suitable habitat at the project site. Wetlands throughout the Vancouver Lake Lowlands represent potentially suitable habitat for smooth goldfields, particularly the seasonally inundated habitats south of Vancouver Lake and within the CRWMB. However, this species has not been documented in the vicinity of the project.

4.1.3.15 *Branching montia (Montia diffusa)*

This species occurs in moist forests in the lowland and lower montane zones. It is occasionally located in xeric soil or disturbed sites. Associate species include Douglas fir (*Pseudotsuga menziesii*), ocean-spray (*Holodiscus discolor*) and miner's lettuce (*Montia perfoliata*) (WNHP 2013b). These habitats are not present at the project site or within the project vicinity.

4.1.3.16 *California broomrape (Orobanche californica ssp. grayana)*

This species is a parasitic plant that is native to coastal moist meadows/stream bank, primarily in California in the San Francisco Bay area, northern Sierra Nevada, and the Modoc Plateau. It is thought to be extirpated from Washington. Suitable habitat does not occur at the project site or within the project vicinity, and this species is unlikely to be present.

4.1.3.17 *Western yellow oxalis (Oxalis suksdorfii)*

This species ranges from the western slopes of the Cascades to the Pacific Coast from southwestern Washington to northwestern California. It is usually found growing in meadows and moist woods and sometimes on dry open slopes (WNHP 2013b). There has been only one documented historic occurrence in Clark County.

There is no potentially suitable habitat at the project site. Moist meadow habitat in the adjacent Vancouver Lake Lowlands may provide potentially suitable habitat for western yellow oxalis, but its presence within the project vicinity is unlikely.

4.1.3.18 *Western false dragonhead (Physostegia parviflora)*

The WNHP has little information on this species. Its habitat consists of wet to mesic prairies, damp thickets, and banks of streams and ponds. There is no published information about its distribution in Washington, but it appears to be known only from historic records in Washington. It is described in *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973), as occurring primarily east of the Cascades. There is no habitat for this species at the project site, and it is unlikely that this species occurs within the project vicinity.

4.1.3.19 *Wheeler's bluegrass (Poa nervosa)*

This species is a regional endemic species. In Washington, it has been documented in Clark and Cowlitz counties in the Puget Trough physiographic province. Its habitat consists of rock outcrops, cliff crevices, and occasionally in talus near the base of cliffs or outcrops. It occurs on sparsely and well vegetated outcrops, although it is more abundant in sparsely vegetated site (WNHP 2013b). These habitats do not occur at the project site or within the project vicinity, and this species is unlikely to be present.

4.1.3.20 *Great polemonium (Polemonium carneum)*

This species occurs on the western side of the Cascade Mountains in northwestern Washington, south to San Francisco Bay, California. It grows in the lowlands of mountain ranges and in prairies, to moderate elevations in the mountains. It has been documented in Lewis, Clallam, Grays Harbor, Clark, Skamania, and Pacific counties in Washington, though it is known only from historic occurrences in Clark County (WNHP 2013b). It is commonly found in woody thickets, open and moist forests, prairie edges, roadsides, and has been extensively documented along fence lines (WNHP 2013b).

There is no potentially suitable habitat at the project site. Moist meadow habitats, roadsides, and fences in agricultural lands in the adjacent Vancouver Lake Lowlands may provide potentially suitable habitat for great polemonium, but its presence within the project vicinity is unlikely.

4.1.3.21 *Idaho gooseberry (Ribes oxyacanthoides ssp. irriguum)*

This species occurs in north-central Idaho, western Montana, Oregon, and Washington. In Washington, the taxon is currently known from Asotin, Spokane, and Ferry counties in the Columbia Basin and in the Okanogan Highlands physiographic provinces. There are historical records of the species from Whitman, Stevens, and Clark counties. The historic Clark County record is considered suspect, given the significant disjunction from all other known locations of the taxon (WNHP 2013b). Habitat for this species does not occur at the project site or within the project vicinity, and it is unlikely to be present.

4.1.3.22 *Soft-leaved willow (Salix sessilifolia)*

This species is distributed from British Columbia to Washington, Oregon and northern California. In Washington it has been found in Cowlitz, Klickitat, Wahkiakum, Skagit, and Whatcom counties. It has been found in a number of lowland habitats: a riparian forest, in dredge spoils, and on a silty bank at the upper edge of an intertidal zone. Associated species at one or more sites include: Sitka willow (*Salix sitchensis*), heartleaf willow (*Salix rigida*), black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), big-leaf maple (*Acer macrophyllum*), and red-osier dogwood (*Cornus stolonifera*) (WNHP 2013b). It is known from less than

10 occurrences, and has not been documented in Clark County, but Clark County is thought to be within its potential range.

Riparian habitat at the project site and throughout the Vancouver Lake Lowlands may provide potentially suitable habitat for Soft-leaved willow, though its presence is unlikely. Soft-leaved willow has not been documented in Clark County, and riparian habitat within the project vicinity is limited in quantity and quality. The riparian forest habitat on Parcel 3 likely provides the highest quality potential habitat for soft-leaved willow in the vicinity.

4.1.3.23 *Hairy-stemmed checkermallow (Sidalcea hirtipes)*

This species is a regional endemic to Clark, Lewis, and Wahkiakum Counties in Washington, and Clatsop, Lincoln, and Tillamook counties in Oregon. Its habitat includes remnant prairie fragments along fencerows and openings along drainages. Some occurrences are in fairly mesic habitats associated with creeks and streams. Associated species include, large-leaved lupine (*Lupinus polyphyllus*), woolly vetch (*Vicia villosa*), bracken fern (*Pteridium aqualinum*), large-leaved avens (*Geum macrophyllum*), trailing blackberry (*Rubus armeniacus*), and oxeye daisy (*Chrysanthemum leucanthemum*) (WNHP 2013b). There are currently only five known occurrences in Washington, and documented occurrences in Clark County are primarily in the eastern portion of the County (WNHP 2013b).

4.1.3.24 *Western ladies tresses (Spiranthes porrifolia)*

This species occurs sporadically from Southern Washington to Southern California. In Washington, it has been documented in Chelan, Kittitas, Klickitat, Lincoln, Okanogan, and Skamania counties. It has not been documented in Clark County, but it is considered to be within its range. Its habitat includes wet meadows, areas adjacent to streams, bogs, and seepage slopes. A variety of associated species have been documented depending upon location (WNHP 2013b).

Wet meadow habitat throughout the adjacent Vancouver Lake Lowlands may provide potentially suitable habitat for western ladies-tresses, but its presence within the project vicinity is unlikely due to the fact that it has not been documented within the County. However, western ladies-tresses have been identified previously by Port staff at Parcel 3.

4.1.3.25 *Hall's aster (Symphyotrichum hallii)*

This species is rarely documented in Washington. It is known from two documented occurrences in Washington. Little is known about this species. Its habitat consists of mostly dry, open places in valleys and plains, but it has also been documented in a wet remnant prairie in a floodplain. There is no potentially suitable habitat at the project site. Given the potential habitat variability of this species, the remnant meadows and seasonally flooded habitats south of Vancouver Lake may provide potentially suitable habitat for this species.

4.1.3.26 *Small-flowered trillium (Trillium parviflorum)*

The species is a regional endemic, occurring from Pierce and Thurston counties southward into Lewis and Clark counties, Washington and into the Willamette Valley, Oregon. It is an uncommon species of very local distribution with few, widely scattered populations (WNHP 2013b). It occurs in association with moist areas dominated by hardwoods, most commonly Oregon ash, but sometimes red alder or even Garry oak.

There is no potentially suitable habitat at the project site. Hardwood-dominated forest habitat within the adjacent Vancouver Lake Lowlands, including forested riparian habitat on Parcel 3,

and forested habitats at the Parcel 2 and Parcel 1A wetland mitigation sites may provide potentially suitable habitat for small-flowered trillium.

4.1.3.27 *California compassplant (Wyethia angustifolia)*

The WNHP has little information on this species. It is a relatively widely distributed plant in Oregon and California, but it is rarely observed in Washington. Its habitat includes grasslands, meadows, and other open habitats.

There is no potentially suitable habitat at the project site. Most of the open meadow habitat within the adjacent Vancouver Lake Lowlands is likely too wet to provide suitable habitat for California compassplant; however, where dry open habitats occur, these may provide potentially suitable habitat. Given the relative rarity of this species in Washington, its presence is considered unlikely.

4.1.4 Special Status Wildlife Species

Information regarding the potential presence of special status wildlife species was obtained from the USFWS web site (USFWS 2013) and the NMFS web site (NMFS 2013) on June 27, 2013. Additional information came from data from WDFW's two on-line databases, Priority Habitat and Species (PHS) on the Web (WDFW 2013a) and Salmonscape (WDFW 2013b), as well as from the 2008 Priority Habitats and Species List (WDFW 2008). WDFW PHS Management Recommendations (available at http://wdfw.wa.gov/conservation/phs/mgmt_recommendations) have been reviewed and incorporated into this document as applicable. In general, the management recommendations focus on protecting nesting area and other important wildlife habitats. Recommended protection buffers are included where appropriate and are placed around the nest or habitat and not the activity. Proposed project activities occur outside all recommended protection buffers for the species addressed in this report.

No special status wildlife species have been documented at the project site according to PHS data. The developed and industrial nature of the project site provides only low to moderate habitat suitability for special status wildlife species. Several special status wildlife species have the potential to occur within the vicinity of the proposed project. Table 4-3 lists the special status wildlife species that are known or expected to occur in or near in the project vicinity and specifies their likelihood of occurring within the project area.

4.1.4.1 *Birds*

(a) Bald eagle (Haliaeetus leucocephalus)

The bald eagle is listed as a state sensitive species, a priority species, and an SGCN by WDFW (WDFW 2008). The species was removed from the federal endangered species list in 2007 (72 FR 37346). However, it remains under the protection of the federal Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act.

Bald eagles are closely associated with lakes and large rivers in open areas, forests, and mountains. Breeding bald eagles need large trees near open water with a relatively low level of human activity. In Washington, nearly all bald eagle nests (99 percent) are within 1 mile of a lake, river, or marine shoreline (Stinson et al. 2007). Perches from which nesting bald eagles forage are distributed throughout their nest territories along shorelines and prominent viewpoints. Nesting bald eagles are opportunistic foragers but feed most consistently on fish and waterfowl which are usually associated with large, open expanses of water (Stalmaster 1987).

Table 4-3. Special Status Wildlife Terrestrial Species and Their Potential to Occur within the Project Site or Vicinity

Species	ESU/ DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Birds									
Bald Eagle (*Haliaeetus leucocephalus*)	N/A	None	N/A	SS	1	Y	Moderate – low quality foraging habitat in riparian zone.	High – Documented nesting occurrences in Columbia River riparian forested habitats.	High – Foraging habitat throughout Lower Columbia River.
Aleutian Canada Goose (*Branta canadensis leucopareia*)	N/A	FSC	N/A	None	None	N	Low – No suitable habitat on-site.	Moderate – Potentially suitable migratory habitat in wetlands adjacent to Vancouver Lake and agricultural lands on Parcel 3.	Moderate – potentially suitable habitat throughout Lower Columbia River
Cavity nesting ducks (several species)	N/A	None	N/A	None	3	N	Low – No suitable habitat on-site.	High – Documented breeding areas and suitable habitat for breeding for several species in vicinity of Buckmire Slough.	Moderate – potentially suitable habitat throughout Lower Columbia River
Common Loon (*Gavia immer*)	N/A	None	N/A	SS	1, 2	Y	Low – No suitable habitat on-site.	Moderate – One or more documented occurrences and potentially suitable habitat at Vancouver Lake.	Low – Not in Columbia River mainstem or marine waters.
Great Blue Heron (*Ardea herodias*)	N/A	None	N/A	None	2	Y	Low – No suitable habitat on-site.	High – Documented breeding occurrences and rookeries near Vancouver Lake and Buckmire Slough.	Moderate – potentially suitable habitat throughout Lower Columbia River
Lewis' Woodpecker *(Melanerpes lewis)*	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	Low – Potentially suitable habitat throughout lowlands, but not documented extensively in Clark County.	Low – Not in Columbia River mainstem or marine waters.
Olive-Sided Flycatcher (*Contopus cooperi)*	N/A	FSC	N/A	None	N/A	N	Low – No suitable habitat on-site.	Low – There is no mature coniferous forest habitat present within the project vicinity	Low – Not in Columbia River mainstem or marine waters.
Pileated Woodpecker (*Dryocopus pileatus*)	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	Moderate – Riparian cottonwood forests provide potentially suitable foraging habitat.	Low – Not in Columbia River mainstem or marine waters.

Species	ESU/ DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Peregrine Falcon (*Falco peregrinus*)	N/A	FSC	N/A	SS	1	Y	Moderate – low quality foraging habitat present.	Moderate – One or more historic documented nesting occurrences in vicinity.	Low – Not in Columbia River mainstem or marine waters.
Purple Martin (*Progne subis*)	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	High – Documented nesting habitat and regular concentrations near Vancouver Lake.	Low – Not in Columbia River mainstem or marine waters.
Sandhill Crane (*Grus canadensis*)	N/A	None	N/A	SE	1	Y	Low – No suitable habitat on-site.	High – Documented regular concentrations throughout Vancouver Lake Lowlands, particularly on agricultural lands at Parcel 3.	Low – Not in Columbia River mainstem or marine waters.
Shorebird Concentrations (Several species)	N/A	None	N/A	None	2	N	Moderate – riparian and aquatic zone provides opportunities for foraging.	High – Regular concentrations of shorebirds documented on Vancouver Lake	High – potentially suitable habitat throughout Lower Columbia River and marine waters
Slender-Billed White-Breasted Nuthatch (*Sitta carolinensis aculeata*)	N/A	FSC	N/A	SC	1	Y	Low – No suitable habitat on-site.	Moderate – One or more documented occurrences near Vancouver Lake.	Low – Not in Columbia River mainstem or marine waters.
Streaked Horned Lark (*Eremophila alpestris strigata*)	N/A	FP	Not designated	SE	1	Y	Low – No suitable habitat on-site.	Moderate – Documented presence on dredge material placement sites and barren lands throughout Lower Columbia River.	Documented presence on dredge material placement sites and barren lands throughout Lower Columbia River.
Marbled Murrelet (*Brachyramphus marmoratus*)	N/A	FT	Designated	ST	1, 2	Y	Low – No suitable habitat.	Low – No suitable habitat.	High – Marine habitats represent foraging habitat
Short-Tailed Albatross (*Phoebastria albatrus*)	N/A	FE	Not Designated	SC	1	Y	Low – No suitable habitat.	Low – No suitable habitat.	Moderate – Marine waters represent foraging habitat, but species is rare

Species	ESU/ DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Western Snowy Plover (*Charadrius nivosus nivosus)*	N/A	FT	Designated	SE	1	Y	Low – No suitable habitat.	Low – No suitable habitat.	Moderate – Marine waters and intertidal and estuarine areas are documented habitat
Vaux's Swift (*Chaetura vauxi*)	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	Low – Limited presence of large snags for nesting in vicinity	Low – Not in Columbia River mainstem or marine waters.
Waterfowl Concentrations (several species)	N/A	None	N/A	None	3	N	Moderate – riparian and aquatic zone provides opportunities for foraging.	High – Documented concentrations throughout Vancouver Lake Lowlands.	High – potentially suitable habitat throughout Lower Columbia River and marine waters
Mammals									
Columbian White-Tailed Deer (*Odocoileus virginianus leucurus*)	N/A	FE	Not Designated	SE	1	Y	Low – No habitat	Low – No habitat	Moderate – Islands in the Lower Columbia River represent suitable habitat.
Gray-Tailed Vole (*Microtus canicaudus*)	N/A	None	N/A	SC	1, 2	Y	Moderate – Ruderal grass/forb habitat may provide limited habitat.	Moderate – Agricultural lands, pastures, and fields provide suitable habitat.	Low – Not in Columbia River mainstem or marine waters.
Pacific Townsend's Big-Eared Bat (*Corynorhinus townsendii townsendii*)	N/A	FSC	N/A	SC	1, 2	Y	Low – No suitable habitat on-site.	Moderate – potentially suitable foraging habitat throughout Vancouver Lake Lowlands, but limiting roosting habitat.	Low – Not in Columbia River mainstem or marine waters.
Myotis Bats (*Myotis evotis* and *Myotis volans*)	N/A	FSC	N/A	None	N/A	N	Low – No suitable habitat on-site	Moderate – potentially suitable foraging habitat throughout Vancouver Lake Lowlands, but limiting roosting habitat.	Low – Not in Columbia River mainstem or marine waters.
Invertebrates									
California Floater (*Anodonta californiensis*)	N/A	FSC	N/A	SC	1, 2	Y	Low – No suitable habitat on-site.	Moderate – One or more documented occurrences and potentially suitable habitat in Vancouver Lake.	

Species	ESU/ DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Amphibians									
Oregon Spotted Frog (*Rana pretiosa*)	N/A	FC	N/A	SE	1	Y	Low – No suitable habitat on-site.	Moderate – Suitable aquatic habitat in vicinity of Vancouver Lake and adjacent wetlands, but no documented occurrences.	Low – Not in Columbia River mainstem or marine waters.
Western Toad (*Bufo boreas*)	N/A	FSC	N/A	SC	1	Y	Low – No suitable habitat on-site.	Moderate – Potentially suitable habitat throughout Vancouver Lake Lowlands, but no recently documented occurrences.	Low – Not in Columbia River mainstem or marine waters.
Reptiles									
Pacific Pond Turtle (*Actinemys marmorata*)	N/A	FSC	N/A	SE	1	Y	Low – No suitable habitat on-site.	Moderate – Suitable habitat throughout Vancouver Lake Lowlands, but no documented occurrences.	Low – Not in Columbia River mainstem or marine waters.

[1] ESU = evolutionarily significant unit; DPS = distinct population segment

[2] ESA Classifications: FE = federal endangered; FT = federal threatened; FSC = species of concern; FP = federal proposed; FC = federal candidate.

[3] Washington State SOC Classifications: SE = state endangered; ST = state threatened; SS = state sensitive; SC = state candidate.

[4] WDFW PHS Listing Criteria: Criterion 1 = state-listed and candidate species; Criterion 2 = vulnerable aggregations; Criterion 3 = species of recreational, commercial, or tribal importance.

[5] SGCN – As defined in WDFW's Comprehensive Wildlife Conservation Strategy (CWCS) (WDFW 2005).

The riparian habitat at the project site may provide low quality foraging habitat for bald eagles, as there are no suitable perching trees nearby, and very little functional habitat in which prey items could be encountered. Bald eagles are relatively common within the greater project vicinity, and bald eagles use habitat throughout the greater Vancouver Lake Lowlands extensively. The WDFW PHS database identifies the area in the vicinity of Vancouver Lake as winter roosting habitat, and identifies two documented breeding occurrences (nests) in the riparian forest on Parcel 3 (WDFW 2013a). The nearest eagle nest site documented in the PHS database is approximately 1 mile west of the westernmost portion of the project site. At the scale of the shipping prism, bald eagles are common throughout the Lower Columbia River and adjacent marine waters.

(a) Aleutian Canada goose (*Branta canadensis* ssp. *leucopareia*)

The Aleutian Canada goose was removed from the federal endangered species list in 2001 (66 FR 15643) and from the Washington list in 2005. It is currently listed as a federal SOC (USFWS 2013), but is not considered a special status species in Washington (WDFW 2008).

Although Washington is potentially part of the species' historical wintering range, today the area is considered to be migration habitat (Hays 1997). The Willapa National Wildlife Refuge (NWR) and surrounding fields and farms in Willapa Bay provide the principal stopover habitat in Washington. Occasionally, individuals and small flocks stop briefly in other parts of the state, including the area in the vicinity of the Ridgefield National Wildlife Refuge (Kraege 2005), and as such, they presumably may utilize aquatic and agricultural habitats throughout the Vancouver Lake Lowlands.

The project site does not provide suitable habitat for Aleutian Canada goose. Aquatic and seasonally inundated habitats throughout the Vancouver Lake Lowlands likely do provide suitable habitat for wintering geese, and agricultural lands on Parcel 3 also likely provide suitable winter foraging habitat. At the scale of the shipping prism, Aleutian Canada geese are more common in the Lower Columbia River watershed, and may also occasionally be present in adjacent marine waters.

(b) Cavity-nesting ducks (Several species)

Breeding concentrations of several species of cavity nesting ducks are considered a priority species by WDFW (WDFW 2008). Cavity-nesting duck species considered in the listing include wood duck (*Aix sponsa*), Barrow's goldeneye (*Bucephala islandica*), common goldeneye, *Bucephala clangula*), bufflehead (*Bucephala albeola*), and hooded merganser (*Lophodytes cucullatus*). Of these species, only Barrow's goldeneye and wood ducks are expected or documented as occurring within the project vicinity.

In Washington, cavity-nesting ducks nest primarily in late successional forests and riparian areas adjacent to low gradient rivers, sloughs, lakes, and beaver ponds (Larsen et al. 2004). They are secondary cavity nesters, using cavities created by large woodpeckers, or by decay, or by damage to the tree. Shallow wetlands within approximately 0.5 mile of cavities provide optimal brood habitat (Larsen et al. 2004).

The project site does not provide any suitable habitat for cavity nesting ducks. Wetlands and forested habitats throughout the greater Vancouver Lake Lowlands provides excellent habitat for these ducks, and both wood ducks and Barrow's goldeneye may be present within the vicinity

year-round. Breeding concentrations of wood ducks have been documented in forested habitat adjacent to Vancouver Lake and Buckmire Slough.

(c) Common loon (*Gavia immer*)

Common loon is listed as a state sensitive species and an SGCN by WDFW (WDFW 2008). In its PHS listing, WDFW considers breeding sites, migratory stopover points, and documented areas of regular concentration as priority areas (WDFW 2008).

Common loons breed in North America from the coasts of the Aleutian Islands and Bering Sea, east throughout Canada and south to the northern tier of the lower 48 states. In western North America, common loons winter along the Pacific coast from southern Alaska to Baja California. Migrant loons arrive from the north to winter along Washington's coast, the Columbia and Snake rivers, and on lakes in northeastern Washington (Larsen et. al 2004).

Common loons breed on large lakes in forested areas, typically those greater than approximately 30 acres in size. They typically nest on or near shorelines. Nesting also may occur within approximately 5 feet of shore on masses of emergent vegetation (Larsen et. al 2004). Their primary diet is fish, and they require a healthy fish population on which to feed.

The riparian habitat at the project site does not provide any suitable habitat for common loon. The project vicinity does not likely provide any nesting habitat for common loon, but does provide suitable wintering/migratory habitat. WDFW PHS data indicate that common loon have been observed in the vicinity of Vancouver Lake, but no breeding loons or regular concentrations have been observed. At the scale of the shipping prism, common loon may occasionally be present in the watershed, but their presence is uncommon.

(d) Great blue heron (*Ardea herodias*)

Great blue heron is listed as a state priority species and an SGCN by WDFW (WDFW 2008). In its PHS listing, WDFW considers documented breeding areas to be priority areas (WDFW 2008).

Foraging, breeding, and pre-nesting habitats for the great blue heron usually are close to each other. Foraging habitat often is adjacent to or within a few kilometers of the nesting colony (Azerrad 2012). Prior to establishing nesting colonies, inland great blue herons gather at pre-nesting sites in habitats that include larger lakes, wetlands, and other watercourses. Nesting colonies, also frequently referred to as rookeries, are then established, typically in mature forested stands near foraging habitat. During the breeding season, herons feed in the shallow margins of various coastal and freshwater habitats, including wetland complexes, large rivers and creeks, and small lakes (Azerrad 2012).

There is no suitable habitat for great blue heron pre-nesting, nesting, or foraging at the project site. Within the greater Vancouver Lake Lowlands, great blue heron are quite common. Several rookeries have been documented in the vicinity of Vancouver Lake and Buckmire Slough, as well as further north on the Shillapoo and Ridgefield NWRs. Great blue herons forage extensively in the wetlands and agricultural lands within the project vicinity, including the wetland mitigation sites, the CRWMB, the wetlands and agricultural fields on Parcel 3, and the emergent wetlands on Terminal 5 West. At the scale of the shipping prism, great blue heron are very common throughout the Lower Columbia River and estuarine waters, but they are not likely present in the portion of the river where shipping traffic will occur.

(e) Lewis' woodpecker (*Melanerpes lewis*)

Lewis' woodpecker is listed as a Washington state candidate species, a priority species, and an SGCN by WDFW (WDFW 2008). In its PHS listing, WDFW considers breeding areas as priority areas (WDFW 2008).

This species recently declined in the Western states (Larsen et al. 2004). In Washington, Lewis' woodpecker is only locally abundant as a breeding bird, and its range has contracted within the last half of the 20th century to include only habitats east of the Cascade crest. The Lewis' woodpecker prefers a forested habitat with an open canopy and a shrubby understory, with snags available for nest sites and hawking perches (Bock 1970). The critical features of Lewis' woodpecker habitat are thought to be forest openness, understory composition, and availability of insect fauna (Bock 1970).

The project site does not provide any forested habitat suitable for nesting for Lewis' woodpecker, nor does it provide any natural habitat suitable for feeding or foraging. Snags and forested habitat in the vicinity of Vancouver Lake may provide potentially suitable nesting habitat for Lewis' woodpecker, and foraging habitat is also likely suitable throughout the lowlands, but this species is rare in Southwest Washington and has not been documented in the vicinity. Lewis' woodpeckers are not expected to be present either at the project site, vicinity, or shipping prism scales.

(f) Olive-sided flycatcher (*Contopus cooperi*)

The olive-sided flycatcher is a federal SOC (USFWS 2013). It is not currently listed or otherwise designated as an SOC by Washington.

The olive-sided flycatcher breeds widely across boreal forests of Canada and the northern United States, extending south along riparian, montane, and subalpine forests of the Rockies, the Sierra Nevada, and in isolated areas in southern California and northern Baja (Altman and Sallabanks 2000). The olive-sided flycatcher occurs in virtually all forested areas of Washington (Smith et al. 1997).

The olive-sided flycatcher inhabits primarily mature forest, old-growth forest, and wet conifer forest, especially those forests with an abundance of snags (Ehrlich et al. 1988; Sharp 1992). This species may also use mixed woodlands near edges and clearings. Nests are often located high in conifer trees, usually on a horizontal branch far from the trunk. Primary forage consists of insects.

Neither the project site nor the project vicinity provide any forested habitat that is suitable for olive-sided flycatcher nesting. This species is not expected to be present at the project site, vicinity, or shipping prism scales.

(g) Pileated woodpecker (*Dryocopus pileatus*)

The pileated woodpecker is a Washington state candidate species. It is also listed as a state priority species and an SGCN by WDFW (WDFW 2008).

The pileated woodpecker occurs from northern British Columbia south through the Pacific states to central California, in the northern Rockies through Idaho and western Montana, across southern Canada to Nova Scotia, and south to the Gulf Coast and Florida. The pileated woodpecker is found throughout the forested areas of Washington, primarily at low to moderate elevations (Smith et al. 1997).

Pileated woodpecker habitat typically consists of mature and old-growth forests and second-growth forests with substantial numbers of large snags and fallen trees. The species excavates large nest holes in snags or living trees with dead wood, generally excavating through hard outer wood into rotten heartwood. Tree cavities are also used for roosting. Pileated woodpeckers forage mainly by excavating wood and chipping bark from large-diameter dead and down logs, stumps, snags, and live trees. They feed primarily on ants, beetle larvae, and other insects (Bull et al. 1993).

Neither the project site nor the immediate project vicinity provides any forested habitat that is suitable for pileated woodpecker nesting or roosting. Pileated woodpeckers may potentially forage in forested habitats within the project vicinity, particularly in riparian cottonwood forests adjacent to the Columbia River or associated with Vancouver Lake. Pileated woodpeckers are not likely to be present within the shipping prism.

(h) Peregrine falcon (Falco peregrinus)

Peregrine falcon is a federal SOC and a state sensitive species. It is also considered a priority species and an SGCN by WDFW (WDFW 2008). Peregrine falcon was downgraded from a state endangered species to a state sensitive species in 2002.

Peregrine falcons occur nearly worldwide. In Washington, nesting may occur in all but the driest parts of the state. Breeding occurrences primarily occur along the outer coast, in the San Juan Islands, and in the Columbia Gorge (Hays and Milner 2004a). Nesting usually occurs on cliffs, typically 150 feet or more in height. The species will also nest on offshore islands and ledges on vegetated slopes, and has also been documented nesting on man-made structures in urban areas. Eggs are laid and young are reared in small caves or on ledges. Nest sites are generally near the water. Peregrines feed on smaller birds that are usually captured on-the-wing (Hays and Milner 2004a). In winter and fall, peregrines spend much of their time foraging in areas with large shorebird or waterfowl concentrations, especially in coastal areas (Dekkar 1995).

The project site does not provide any suitable nesting habitat for peregrine falcon, but does provide open areas that may provide suitable foraging habitat. Within the project vicinity, nesting habitat for peregrine falcon is also extremely limited. There are no large cliffs or ledges, apart from man-made structures, that will provide suitable nesting platforms. A peregrine falcon nest was documented on the I-5 Bridge in 2009, and peregrine falcons have nested on the Fremont Bridge in Portland, so the project vicinity has been documented as potentially suitable for nesting and foraging. Peregrine falcons are not likely to be present within the shipping prism.

(i) Purple martin (*Progne subis*)

The purple martin is a state candidate species. It is also listed as a state priority species and an SGCN by the WDFW (WDFW 2008).

Purple martins are insectivorous, colonial nesting swallows that nest in cavities (Brown 1997), typically in or near freshwater wetlands or ponds, or saltwater (Hays and Milner 2004b). In Washington, purple martins typically breed near the waters around the Puget Sound, along the Strait of Juan de Fuca, the southern Pacific coastline, and near the Columbia River (Hays and Milner 2004b). They feed in flight on insects (Brown 1997), with preferred foraging habitat consisting of open areas, often located near moist to wet sites, where flying insects are abundant (Hays and Milner 2004b).

The project site does not provide any suitable nesting or foraging habitat for purple martin. The greater project vicinity does likely provide suitable habitat for it. Forested wetland habitats associated with Vancouver Lake and other waterbodies within the Vancouver Lake Lowlands may provide suitable nesting habitat, and these areas, as well as adjacent aquatic habitats, likely provide suitable foraging opportunities. WDFW PHS data indicate that purple martin nests have been documented near Vancouver Lake, and regular concentrations of purple martins have also been documented (WDFW 2013a). Purple martins may also occur within the Lower Columbia and estuarine waters in the shipping prism.

No purple martin nests or nest boxes would be directly affected by the construction or operation of the proposed project. The proposed project activities do not include removal of any creosote-coated wood piling. All existing piles at the Marine Terminal are steel and do not contain cavities for nesting wildlife. There would be removal of steel piles, using vibratory methods within the in-water work window, but this would not affect purple martin nests.

(j) Sandhill crane (*Grus canadensis*)

The sandhill crane is a Washington state listed endangered species. WDFW has also designated the sandhill crane as a priority species and as an SGCN (WDFW 2008). Three subspecies of sandhill crane occur within the Pacific Northwest: the greater sandhill crane, the Canadian sandhill crane, and the lesser sandhill crane. Of these, only the greater sandhill crane is known to breed in the state, and only within Yakima and Klickitat counties. Canadian sandhill cranes breed primarily in coastal British Columbia and winter in Washington or stop en route to wintering areas in California (Littlefield and Ivey 2002). The lesser sandhill cranes belong to the Pacific Flyway Population that stops off during migration to northern breeding grounds in Alaska or wintering areas in California (Littlefield and Ivey 2002).

The fall migration of sandhill cranes through the Vancouver Lake Lowlands typically occurs in late September and early to mid-October. Spring migration through the lowlands generally occurs from mid-March to mid-April. Sandhill cranes use the Vancouver Lowlands as stopover habitat during migration and for foraging by over-wintering birds. The Vancouver Lake Lowlands area is the sole example of a sandhill crane staging area in the U.S. that is adjacent to a major metropolitan area (Littlefield and Ivey 2002).

Sandhill cranes use large and small tracts of open habitat where visibility is good from all vantage points. Wet meadows, marshes, shallow ponds, hayfields, and grainfields are all favored for nesting, feeding, and roosting (Bettinger and Milner 2004). Sandhill cranes migrating and staging within the Lower Columbia region typically use shallow lakes with abundant mudflats and bars for roosting and loafing areas. The diet of sandhill cranes varies seasonally and includes grains (corn, barley, oats, rice, and wheat), roots, insects, amphibians, reptiles, earthworms, snails, and small rodents (Littlefield and Ivey 2002). In the spring, cranes eat high protein foods such as insects and other macroinvertebrates. Fall and winter foods typically include wheat, corn, barley, and rice.

The project site does not provide any habitat that could be used by sandhill cranes for resting, foraging, or any other wintering activities. The greater Vancouver Lake Lowlands do provide excellent winter foraging habitat for sandhill cranes, and sandhill cranes are frequently observed there. Agricultural habitats, including Port Parcel 3, provide excellent winter foraging habitat for sandhill cranes. Cranes are known to rest and feed on Parcel 3 which approximately 1 mile from the project site. Cranes more commonly use Parcels 4 and 5 further from the project site.

Sandhill cranes also utilize habitats adjacent to Vancouver Lake, including the wetland and upland complexes south of the lake and within the CRWMB and the Parcel 2 wetland mitigation site. Sandhill cranes are not expected to use habitats within the Columbia River extensively, nor are they expected to be present in marine waters. For these reasons, they are not expected to be present within the shipping prism.

(k) Shorebird concentrations (Several species)

WDFW designates regular concentrations of several species of shorebirds as priority species. In western Washington, breeding concentrations of cormorants (*Phalacrocoracidae*), storm-petrels (*Hydrobatidae*), terns (*Laridae*), and alcids (*Alcidae*) as well as non-breeding concentrations of loons (*Gaviidae*), grebes (*Podicipedidae*), cormorants, fulmar (*Procellariidae*), shearwaters (*Procellariidae*), storm-petrels, and alcids, are provided priority species status. Regular shorebird concentrations are not provided any other state or federal special status.

There is no suitable terrestrial habitat at the project site for any shorebird species, but these species likely occasionally fly over the site. The riparian and aquatic habitats at the site do provide potential foraging and resting opportunities for shorebirds. At the project vicinity scale, WDFW PHS data identify much of the area adjacent to Vancouver Lake as providing documented habitat for regular concentrations of shorebirds. Shorebirds of several species likely use seasonally ponded and emergent wetland habitats throughout the Vancouver Lake Lowlands and Lower Columbia River for feeding, foraging, and resting habitat. Regular concentrations of one or more shorebird species may potentially be present in the project site, vicinity, and shipping prism at any time during the year.

(l) Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)

The slender-billed white-breasted nuthatch is a federal species of concern (USFWS 2013) and a state candidate species. It is also considered a priority species and an SGCN by WDFW (WDFW 2008).

The slender-billed white-breasted nuthatch is a cavity user and year-round resident in western Washington (Anderson 1970, Anderson 1972). In Washington and Oregon, this species is associated with Oregon white oak west of the Cascade Range and conifer forest, primarily Ponderosa pine, east of the Cascades (Chappell 2005, Hagar 2006). Large decadent oak trees with a sparse understory are of primary habitat importance for both foraging and nesting (Anderson 1976).

There is no Oregon white oak habitat present on the project site, and Oregon white oak habitat within the vicinity is limited as well. There are sporadic white oak trees throughout the Vancouver Lake lowlands, including along the south end of Vancouver Lake, on the CRWMB, and on Parcel 3. Slender-billed white-breasted nuthatches have been documented near Vancouver Lake, and they may potentially occur within the project vicinity. Slender-billed nuthatches are not expected to use habitats within the Columbia River or adjacent marine waters, and they are unlikely to occur within the shipping prism.

(m) Streaked horned lark (Eremophila alpestris strigata)

The streaked horned lark has been proposed for listing under the federal ESA (77 FR 61937). Critical habitat has also been proposed for the species. It is a state endangered species and a WDFW priority species and SGCN (WDFW 2008).

Along the Willamette and Columbia rivers, nesting habitat for the streaked horned lark historically was found on sandy beaches and spits. Today, the streaked horned lark nests in a broad range of habitats, including native prairies, coastal dunes, fallow and active agricultural fields, wetland mudflats, sparsely vegetated edges of grass fields, recently planted Christmas tree farms with extensive bare ground, moderately to heavily grazed pastures, gravel roads or gravel shoulders of lightly traveled roads, airports, and dredge deposition sites, particularly islands in the Lower Columbia River (77 FR 61937). Wintering streaked horned larks use habitats that are very similar to breeding habitats. On the Columbia River, these habitats are typically adjacent to and in view of open water, which provides the open landscape context this species needs.

Streaked horned larks need expansive areas of flat, open ground to establish breeding territories. Horned larks forage on the ground in low vegetation or on bare ground (77 FR 61937); adults feed mainly on grass and weed seeds but feed insects to their young. Introduced weedy grasses and forb seeds comprise the winter diet. Horned larks form pairs in spring and create shallow nests in shallow depressions on the ground. The nesting season begins in mid-April and ends in the early part of August and streaked horned larks may re-nest in late June or early July. Most streaked horned larks winter in the Willamette Valley (72 percent) and on islands in the Lower Columbia River (20 percent), with the rest wintering on the Washington coast. Birds that breed on the islands of the Lower Columbia River tend to remain on the islands (77 FR 61937).

The project site does not provide any potentially suitable habitat for nesting or wintering streaked horned larks. The terrestrial portions of the site are largely devoid of vegetation, and there is no suitable nesting habitat present nor is there any vegetation that will provide foraging habitat. In the greater project vicinity, dredge material placement sites and other sparsely vegetated lands on and adjacent to the river provide potentially suitable habitat for streaked horned larks. The species has been documented on dredge material placement sites and a dredge material placement site on Port Parcel 3 provides potentially suitable habitat for streaked horned larks, although this site is likely disturbed too routinely to provide sufficient vegetative cover for suitable nesting or wintering habitat. Streaked horned larks do not use the aquatic habitats within the shipping prism, and are unlikely to occur there.

(n) Marbled murrelet (Brachyramphus marmoratus)

The marbled murrelet is a federal threatened species (USFWS 2013). It is also a state threatened species and a WDFW priority species and SGCN (WDFW 2008).

The marbled murrelet is a small sea bird that feeds primarily on fish and invertebrates in nearshore marine waters (City of Seattle 2007). Marbled murrelets nest in mature stands of coastal forest, typically closely associated with the marine environment, although murrelets have been documented in forested stands at distances of up to 50 miles inland in Washington (Hamer and Cummins 1991). Marbled murrelets require forests with large trees (greater than 30 inches dbh), multi-storied stands, and moderate canopy closure. Murrelets tend to nest in the largest trees in the stand (City of Seattle 2007). Marbled murrelets forage in nearshore marine habitats, generally in waters less than 260 feet deep, on a variety of small fish and invertebrates (FR 61 26256).

There is no habitat for marbled murrelet at the project site or within the vicinity. Marbled murrelets may potentially forage within marine habitats within the shipping prism.

(o) Short-tailed albatross (*Phoebastria albatrus*)

The short-tailed albatross is a federally listed endangered species (USFWS 2013). It is also a state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

Short-tailed albatross are oceanic birds that occur throughout most of the North Pacific Ocean and are often found close to the Pacific Coast (USFWS 2006). The short-tailed albatross generally breeds in the South Pacific, where it nests on the ground on small oceanic islands (NatureServe 2013). There are no breeding populations of short-tailed albatross in the United States, but attempted nesting has been regularly observed on Midway Atoll in the northwestern Hawaiian Islands (USFWS 2006). Short-tailed albatross forage at sea – typically at the water surface – on squid, fish, shrimp and other crustaceans, and the eggs of flying fish (USFWS 2006). Short-tailed albatross are also known to follow ships and forage on scraps and other refuse (NatureServe 2013).

There is no habitat for short-tailed albatross at the project site or within the vicinity. Short-tailed albatross may potentially forage within marine habitats within the shipping prism.

(p) Western snowy plover (Charadrius nivosus nivosus)

Western snowy plover is a federally listed threatened species (USFWS 2013). Critical habitat has also been designated for western snowy plover. It is also a state endangered species and a WDFW priority species and an SGCN (WDFW 2008).

The Pacific Coast population of western snowy plovers occurs from southern Washington to southern Baja California (Page et al. 1995). This species nests beside or near tidal waters on barren to sparsely vegetated sand beaches, dry salt flats in lagoons, dredge spoils deposited on beach or dune habitat, levees and flats at salt-evaporation ponds, and river bars (USFWS 2007). Plovers lay their eggs in shallow depressions in sandy or salty areas with sparse vegetation between early March and late September (USFWS 2007). Western snowy plovers forage primarily on invertebrates in the wet sand and among surf-cast kelp within the intertidal zone; in dry, sandy areas above high tide; on salt pans; on spoil sites; and along the edges of salt marshes, salt ponds, and lagoons (USFWS 2007).

There is no habitat for western snowy plover at the project site or within the vicinity. Western snowy plover may potentially be present adjacent to marine habitats within the shipping prism.

(q) Vaux's swift (*Chaetura vauxi*)

Vaux's swifts are a Washington state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

This species nests in late-successional coniferous forests (Manuwal and Huff 1987; Bull and Collins 1993). It requires large, hollow snags or cavities in the broken tops of live trees for nesting and night roosting (WDNR 1996) and feeds on flying insects, foraging primarily over the forest canopy or open water (Bull and Collins, 1993). In fall, Vaux's swifts congregate in large flocks, and hundreds of swifts may use a single large hollow tree for night roosting.

There is no late successional forest habitat present at the project site, nor within the Vancouver Lake Lowlands, that will provide suitable nesting habitat for Vaux's swifts. There are few large snags of the size or type that will typically be used by Vaux's swifts for nesting. Forested habitats within the Vancouver Lake Lowlands may provide potentially suitable foraging habitats for Vaux's swifts, but this species has not been documented within the project vicinity. Vaux's swifts do not use the aquatic habitats within the shipping prism, and are unlikely to occur there.

(r) Waterfowl concentrations (Several species)

WDFW provides priority species designation to regular concentrations of several species of waterfowl. In western Washington, non-breeding concentrations of Barrow's goldeneye (*Bucephala islandica*), common goldeneye (*Bucephala clangula*), and bufflehead (*Bucephala albeola*) are provided priority species status. Regular waterfowl concentrations are not provided any other state or federal special status.

There is no suitable terrestrial habitat at the project site for any waterfowl species, but these species likely occasionally fly over the site during migration. The riparian and aquatic habitats at the site do provide potential foraging and resting opportunities for waterfowl. At the project vicinity scale, WDFW PHS data identify much of the area adjacent to Vancouver Lake as providing documented habitat for regular concentrations of wintering waterfowl. Waterfowl of several species make extensive use of seasonally ponded and emergent wetland habitats throughout the Vancouver Lake Lowlands – as well as throughout the Lower Columbia River within the shipping prism – for feeding, foraging, and resting habitat during migration as well as for wintering habitat. Non-breeding concentrations of waterfowl may potentially be present at any time during the year, and particularly during the winter months.

4.1.4.2 *Mammals*

(a) Columbian white-tailed deer (Odocoileus virginianus leucurus)

The Columbian white-tailed deer is a state and federal endangered species (WDFW 2008; USFWS 2013). It is also a WDFW priority species and an SGCN (WDFW 2008). It is the westernmost subspecies of the white-tailed deer. Currently, there are two Columbian white-tailed deer DPSs; one is located in Douglas County, Oregon, and the other is located along the Lower Columbia River in Oregon and Washington (FR 68 43647).

Most deer within the Columbia River population are included in one of four subpopulations (Washington mainland, Tenasillahe Island, Puget Island, and the Oregon lowlands). Each subpopulation is geographically separated by major channels of the Columbia River (Brookshier 2004). Both the Washington mainland and Tenasillahe Island subpopulations occur within the Julia Butler Hansen NWR, which was established in 1972 as the Columbian White-tailed Deer National Wildlife Refuge, to protect over 5,600 acres of shoreline and island habitat for the preservation of the Columbian white-tailed deer (Brookshier 2004). In early 2013, the USFWS implemented a program to translocate up to 50 Columbian white-tailed deer from the Julia Butler Hansen NWR to the Ridgefield NWR in Clark County. As of June 2013, approximately 37 Columbian white-tailed deer had been successfully translocated.

Columbian white-tailed deer are unlikely to be present within the project site or vicinity. The shipping prism passes through the Lower Columbia River. Since Columbian white-tailed deer are present on islands in the river and are capable of swimming, they could be present occasionally within the shipping prism. They are unlikely to be present with any frequency, however.

(b) Gray-tailed vole (*Microtus* canicaudus)

Gray-tailed vole is a state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

The gray-tailed vole is a regionally endemic species, known to occur in lower elevations of the Willamette Valley in Oregon and at least two localities north of the Columbia River in Clark

County, Washington. It is associated almost exclusively with agricultural lands, especially with grasses grown for seed, small grains, and permanent pastures of legumes and grasses. It can also be present along grass-dominated highway and railroad rights-of-way. Nests are built either underground or aboveground under boards, bales, or other debris, and intricate runway and burrow systems are also constructed underground (Verts and Carraway 1987).

The project site and vicinity are at the northern end of the range of this species; only a few occurrences are documented in Clark County and it has not been documented within the project site or vicinity. The project site does not provide any suitable habitat for gray-tailed vole, as the terrestrial portions of the site are all paved, graveled, or otherwise developed. The agricultural habitats and grass-dominated fields adjacent to and in the vicinity of the project site do provide potentially suitable habitat for gray-tailed vole, and gray-tailed voles could potentially be present in these habitats. The shipping prism does not provide habitat for gray-tailed vole

(c) Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)

Townsend's big-eared bats are a federal species of concern (USFWS 2013). They are a state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

Townsend's big-eared bats have been documented in nearly every county in Washington (Woodruff and Ferguson 2005). Within its range, distribution is often linked to the presence of suitable maternity roosts and hibernacula located near suitable foraging habitat (Gruver and Keinath 2006). Townsend's big eared bats occupy a broad range of moist and arid habitats. In Washington, they occur in westside lowland conifer-hardwood forest, montane conifer forest, ponderosa pine forest and woodland, shrub-steppe, riparian habitats, and open fields (Johnson and Cassidy 1997). Caves, lava tubes, mines, old buildings, concrete bunkers, and bridges are commonly used as day roosts in Washington (Woodruff and Ferguson 2005). Temperatures, roost dimensions, sizes of roost openings, light quality, and extent of airflow are important factors in the selection of roosts (Hayes and Wiles 2013). Hibernacula occur mainly in caves, mines, lava tubes, and occasionally in buildings (Hayes and Wiles 2013).

There are no natural or man-made structures present on the project site that could provide suitable roosting or hibernacula habitat for Townsend's big-eared bats, and this species is not expected to be present at the project site. Within the greater project vicinity, roosting and hibernacula habitat is also somewhat limited. There are no natural caves, mines, or lava tubes in the vicinity, and most buildings and structures are in regular use. Bridges in the vicinity could potentially provide roosting habitat, but Townsend's big-eared bats have not been documented in the vicinity. At the project vicinity scale, there may be suitable foraging habitat for Townsend's big-eared bat, but there are likely limited opportunities for roosting or hibernacula. The shipping prism does not provide habitat for Townsend's big-eared bat.

(d) Myotis bats (Myotis evotis and Myotis volans)

Two species of bats (Western long-eared myotis [*Myotis evotis*] and long-legged myotis [*Myotis volans*]) that are known to occur within Clark County are designated as federal SOC (USFWS 2013). These species are not provided any special regulatory status by the state; however, WDFW does identify roosting concentrations of myotis bats as priority species (WDFW 2008). While these species have unique habitat requirements, their similarities allow them to be addressed together in this section.

Western long-eared myotis are most commonly associated with conifer forests ranging from drier ponderosa pine to humid coastal and montane forests (Hayes and Wiles 2013). Day roosts are located beneath loose bark on trees, snags, stumps, and downed logs, as well as in buildings, crevices in ground-level rocks and cliffs, tree cavities, caves, and mines (Hayes and Wiles 2013). Large-diameter conifer snags are typically used as maternity roosts.

Long-legged myotis primarily occur in coniferous forests, but also inhabit riparian forests and dry rangeland. They roost in snags and live trees with loose bark, long vertical cracks, or hollows; cracks and crevices in rocks, stream banks, and the ground; buildings; bridges; caves; and mines. In the Pacific Northwest, maternity sites have been mainly found in snags, but live trees, rock crevices, mines, and buildings are also used (Hayes and Wiles 2013).

There are no natural or man-made structures present on the project site that could provide suitable roosting habitat for any species of myotis bats. As both species are primarily associated with coniferous forest habitat, they are unlikely to be present at the site. Within the greater project vicinity, roosting and foraging habitat is also somewhat limited, as there are few large-diameter conifer snags or forests with mature habitat characteristics in the vicinity. Riparian forest habitat on Parcel 3 could potentially provide suitable roosting and foraging habitat for one or more species of myotis bats. The wetlands and aquatic habitats associated with Vancouver Lake likely provide suitable foraging habitat, and adjacent forest habitats could potentially provide roosting or maternity sites. The shipping prism does not provide habitat for myotis bats.

4.1.4.3 *Invertebrates*

(a) California floater (Anodonta californiensis)

California floater is a federal SOC (USFWS 2013). It is also a Washington state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

In Washington, the California floater is known to occur in the Columbia River system and in a few other lakes and rivers in eastern Washington. Historic eastern Washington locations included the Snake, Wenatchee (may be extirpated), and Okanogan rivers, and Hangman Creek (formerly Latah Creek) near Spokane (Larsen et al. 1995). In western Washington, the California floater has been reported from Seattle (a doubtful record), and the Columbia River counties of Wahkiakum, Cowlitz, Clark, Skamania, and Klickitat. There are no recent western Washington records of live California floaters (Frest and Johannes 1993).

The California floater lives, feeds, respires, and reproduces in clean freshwater. These clams feed by filtering planktonic organisms (Frest 1992) which also require clean, well oxygenated water (Larsen et al. 1995). Deriving oxygen, nutrients, and a means of reproduction from the water in which it lives, the California floater readily accumulates pollutants.

The larval stage of this clam is parasitic, adhering to a host fish while metamorphosing into a juvenile clam. When metamorphosis is complete, juvenile clams must fall from the host fish where they can attach to gravel or rocks in clean flowing, well-aerated waters. After growing for some time, young clams are washed downstream and settle in sandy or soft, muddy bottoms in the slower waters of lakes and large rivers where they mature (Larsen et al. 1995). The California floater is most commonly reported from rivers or river lakes in relatively stable, oxygenated mud, sand, or fine gravel beds, often located in pools just downstream from rapids. Another favorite habitat for this species is in fine-sediment bars fringing the mouths of large tributaries to

rivers (Frest 1992). Submerged alluvium surrounding the mouths of tributary streams or below riffle areas may support juvenile clams and seem to be especially important (Larsen et al. 1995).

The aquatic habitat at the project site likely does not provide suitable habitat for California floater, as neither a stable or well oxygenated substrate suitable for adult clams nor the gravel substrates required by maturing juvenile clams are provided nearby. Within the greater project vicinity and shipping prism habitat is similarly limited for California floater. The mainstem Columbia River provides limited suitable substrate for juveniles or adults. Vancouver Lake provides potentially suitable habitat, and California floater has been documented, at least historically, in the lake. However, substrate conditions, oxygenation, and limited hydraulic exchange with the mainstem Columbia River in Vancouver Lake are likely limiting factors.

4.1.4.4 *Amphibians*

(a) Oregon spotted frog (*Rana pretiosa*)

Oregon spotted frog is a federal candidate for listing under the ESA (USFWS 2013). It is also a state endangered species and a WDFW priority species and an SGCN (WDFW 2008).
The Oregon spotted frog is endemic to the Pacific Northwest. Historically, its range extended from northeast California, through the Puget Trough/Willamette Valley regions of Oregon and Washington, to the lower Fraser River Valley in British Columbia (Nordstrom and Milner 1997a).

In Washington, this frog once occurred throughout the Puget Trough lowlands from the Canadian border as far as Vancouver (Washington), and east into the southern Washington Cascades. Currently, there are only three locations in Washington where these frogs are known to still exist: Dempsey Creek in Thurston County and Trout and Conboy lakes in Klickitat County. Other lowland western Washington populations are believed to have been extirpated (Nordstrom and Milner 1997a).

Oregon spotted frogs are highly aquatic, inhabiting marshes and marshy edges of ponds, streams, and lakes. Spotted frogs usually occur in shallow, slow moving waters with abundant emergent vegetation and a thick layer of dead and decaying vegetation on the bottom. Oregon spotted frogs are active in lowland habitats from February through October, and hibernate in muddy bottoms near their breeding sites in winter. Courtship and breeding occurs between February and March at lower elevations in western Washington and takes place in warm, shallow margins of ponds or rivers or in temporary pools formed by rain or snowmelt. Adult spotted frogs are opportunistic feeders, feeding primarily on invertebrates, generally within one-half meter of shore on dry days (Nordstrom and Milner 1997a).

The project site does not contain any suitable habitat for Oregon spotted frog. There is no marsh habitat within the site that will provide suitable conditions for Oregon spotted frog presence. Within the greater Vancouver Lake Lowlands, emergent wetland and seasonally ponded sites – particularly those associated with the southern end of Vancouver Lake and the CRWMB – do provide potentially suitable habitat for Oregon spotted frog. These habitats are seasonally ponded wetland complexes, with abundant access to adjacent upland foraging habitats.

While there have been no recent documented occurrences in Clark County, the project vicinity does provide potentially suitable habitat for Oregon spotted frog.

(b) Western toad (*Bufo boreas*)

The western toad is a federal SOC (USFWS 2013), a state candidate species, and a WDFW priority species and an SGCN (WDFW 2008).

The western toad occurs from southeast Alaska eastward through British Columbia, western Alberta, and western Montana, south to Baja California and east to northern Colorado. It is found throughout western Washington and in the mountainous portions of eastern Washington (Dvornich et al. 1997). Western toads occur in forested and brushy areas from sea level to high mountains (ODFW 1996). Moist areas with dense cover are considered optimal (ODFW 1996). During dry weather, toads will spend the day under damp, woody debris or in burrows of other animals; they will also bury themselves in loose soil (Leonard et al. 1993). Western toads breed in springs, ponds, shallow areas in lakes, and slow-moving streams, and also use stock ponds and reservoirs in arid areas (ODFW 1996). Tadpoles form huge aggregations, generally in the warmest portion of a particular water body; western toad tadpoles are found in a wider variety of water bodies than the tadpoles of Pacific Northwest frogs (Blaustein et al. 1995). They can be locally abundant, and can live in a relatively wide variety of habitat types (Blaustein et al. 1995).

There is no forested or brushy aquatic habitat present at the site that will provide potentially suitable habitat for western toad. Within the greater project vicinity, forested and scrub-shrub wetland habitats within the Vancouver Lake Lowlands provide potentially suitable habitat for western toad, although these are likely not preferred habitats, as there is not significant forested wetland habitat in the vicinity. The slow-moving backwater habitats at the south end of Vancouver Lake may provide potentially suitable habitat for western toad breeding. This species has not been documented in the vicinity of the project. Western toads could potentially be present in habitats adjacent to the Columbia River downstream on the Columbia River.

4.1.4.5 *Reptiles*

(a) Pacific pond turtle (*Actinemys marmorata*)

The Pacific pond turtle is a federal SOC under the ESA (USFWS 2013). It is also a state endangered species and a WDFW priority species and an SGCN (WDFW 2008).

The range of the western pond turtle follows the Pacific coast of North America, from the Puget Sound region in Washington to northwestern Baja California. Most populations are found west of the Cascades (Nordstrom and Milner 1997b). Populations in Washington are confirmed only in Klickitat and Skamania counties. Individual turtle sightings were recently confirmed in Pierce and King Counties, which are part of the turtle's historic range. Historic records also exist for Clark and Thurston counties (McAllister 1995).

Pacific pond turtles have been found in marshes, ponds, sloughs, and small lakes in Washington from sea level to approximately 2,500 feet. The species has also been found in altered habitats such as gravel pits, reservoirs, stock ponds, and sewage treatment plants. They use both permanent and intermittent bodies of water and have been found using a variety of substrates, including rock, gravel, sand, mud, decaying vegetation, and various combinations of these (Nordstrom and Milner 1997b).

Pacific pond turtles also use open, upland habitats, primarily for nesting, but also for dispersal and overwintering. Female turtles leave the water to nest sometime between late May and July. Females usually dig nests and deposit their eggs in compact, dry soil on upland sites. Terrestrial overwintering sites usually have a thick layer of duff into which the turtle will burrow, and have

been found up to 1,640 feet away from watercourses. In aquatic habitats, these turtles will winter under banks or in mud. Movement to overwintering sites occurs between September and November, and emergence from these locations occurs between March and June (Nordstrom and Milner 1997b).

The project site does not provide any suitable aquatic or terrestrial habitat for Pacific pond turtle. Aquatic (and adjacent terrestrial) habitats throughout the Vancouver Lake Lowlands do provide potentially suitable habitat for Pacific pond turtle. The mosaic of wetlands at the south end of Vancouver Lake, with its connectivity to a variety of hydrologic regimes and vegetation communities, provides particularly well-suited habitat. However, Pacific pond turtle have not been documented in the vicinity. Pacific pond turtles could potentially be present in habitats adjacent to the Columbia River downstream on the Columbia River within the shipping prism, but they are not known to be strongly associated with the mainstem Columbia River.

4.2 Fish Habitat Resources

4.2.1 Fish Habitat Resources

In general, the environmental baseline conditions for fish habitat within the reach of the Columbia River that flows through the project site are typical of those associated with an urbanized and industrial reach of the river. At the watershed scale, its natural fluvial processes have been altered dramatically. The main channel of the river is maintained as a navigation channel for deep-draft shipping traffic, limiting the potential for any dynamic migration of the river thalweg. In addition, dam construction and streambank armoring throughout the watershed have limited floodplain connectivity and have reduced the quantity and quality of available backwater and off-channel habitats greatly.

At the scale of the project site, the entire streambank has been armored with riprap, and the entire portion of the site above the OHWM has been isolated from the historic floodplain. A narrow band of vegetation, primarily small diameter black cottonwood, willows, and non-native false indigo bush and Himalayan blackberry, is established in and immediately above the riprapped slope. Above this vegetated habitat, there is a narrow band of ruderal grass/forb habitat. The low quality and quality of riparian habitat at the site provides very little aquatic habitat function.

Water quality conditions at the site are generally appropriate for aquatic life. While this reach of the Columbia River within the action area is not identified on the Ecology 2008 303(d) list for elevated water temperatures (Ecology 2008), data published by the USGS in 2012 indicates that summer water temperatures downstream of Bonneville Dam routinely exceed 70°F (Tanner et al. 2012). These temperatures are significantly higher than those recommended for proper functioning condition in migratory waters. The reach of the Lower Columbia River in the vicinity of the project site has several areas listed on the 2008 Ecology 303(d) list for chemical- and nutrient-related contamination (Ecology 2008).

At the project vicinity scale, in-stream habitat complexity is limited, and there is no overhanging vegetation. As part of the WVFA project, some large woody debris will be installed along the shoreline of Terminal 4 just upriver from the project site. Sediments at the project site are predominantly fine-grained, which is the natural condition for the lower reaches of a large river. No substrate present is adequate for salmonid spawning. Below the riprapped streambank, there is an area of gradual transition to deep water that provides some shallow water nearshore habitat,

which many juvenile species of fish prefer. However, the lack of dense riparian vegetative cover and limited in-stream structural diversity limits the function of this nearshore habitat.

At the scale of the shipping prism, the Lower Columbia River and adjacent marine habitats provide high quality habitat for all life stages of Pacific salmon and other anadromous fish as well as for other freshwater and marine species.

In general, the reach of the Columbia River that is within the project site, vicinity, and shipping prism, provides aquatic habitat conditions suitable as a migratory corridor for several species of native Columbia River fish including several native salmonids, trout, sturgeon, lamprey, minnows, and eulachon. Several non-native fish species are also present throughout the Lower Columbia River. Several of these non-native species are present in numbers that may affect native fish populations.

4.2.2 Special Status Aquatic Species

The Columbia River represents documented and/or potentially suitable habitat for several special status aquatic species, including species and critical habitats listed or proposed for listing under the federal ESA (NMFS 2013, USFWS 2013), Washington state-listed species, and a WDFW priority species and an SGCN (WDFW 2008). Information regarding the documented or potential presence of special status aquatic species was obtained from species lists maintained by USFWS (USFWS 2013) and NMFS (NMFS 2013) and data from WDFW's two on-line databases, PHS on the Web (WDFW 2013a) and Salmonscape (WDFW 2013b). Table 4-4 lists the special status aquatic species that are known or expected to occur in or near in the project vicinity and specifies their likelihood of occurring at the project site or within the vicinity.

4.2.2.1 *Salmon and Trout*

(a) Bull trout (Salvelinus confluentus)

The proposed project area is located within the range of the Columbia River DPS of bull trout. Excluding one Nevada population, the Columbia River bull trout DPS includes all natural spawning populations in the Columbia River basin and the river's tributaries within the United States. Bull trout in the Columbia River DPS are listed as threatened under the federal ESA, and critical habitat for bull trout has been designated for Columbia River DPS bull trout (USFWS 2013). Bull trout are also a Washington state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

Once widely distributed throughout the Pacific Northwest, bull trout have been reduced to approximately 44 percent of their historical range (LCFRB 2004c). Compared to other salmonids, bull trout are thought to have more specific habitat requirements, and are most often associated with undisturbed habitat with diverse cover and structure. Spawning and rearing are thought to be primarily restricted to relatively pristine cold streams, often within headwater reaches (Rieman and McIntyre 1993). Adults can reside in lakes, reservoirs, and coastal areas or they can migrate to saltwater (63 FR 31647). Juveniles are typically associated with shallow backwater or side-channel areas, while older individuals are often found in deeper pools sheltered by large organic debris, vegetation, or undercut banks (63 FR 31467). Water temperature is also a critical factor for bull trout, and areas where water temperature exceeds 59°F are thought to limit distribution (Rieman and McIntyre 1993).

In southwest Washington, bull trout have been reported in the North Fork Lewis, White Salmon, and Klickitat river systems. Historically, bull trout were found in the Cowlitz and Kalama basins but are not believed to be present there today. Bull trout populations occur in two drainages downstream of Bonneville Dam: the Willamette River and the Lewis River (USFWS 1998). Because bull trout in the Lower Columbia River basin are not usually anadromous, they are primarily regulated by local habitat conditions, and are not directly affected by conditions in the mainstem Columbia River and its estuary (LCFRB 2004c).

Adult bull trout may be migrating through the project site and vicinity between approximately April and September, and outmigrating juveniles may be found in the Columbia River year-round. If juvenile or adult bull trout were present within the action area, they will likely be migrating quickly through, as there is no suitable rearing or refuge habitat in the vicinity. Bull trout prefer the upper reaches of cold, clear running streams with clean gravel and cobble substrate for spawning.

(b) Chinook salmon (Oncorhynchus tshawytscha)

The Columbia River is a migratory corridor for five ESU of Chinook salmon: the Lower Columbia River ESU, Upper Willamette River ESU, Upper Columbia River spring-run ESU, Snake River spring/summer run ESU, and Snake River fall-run ESU. These species are all listed as threatened under the federal ESA, with the exception of the Upper Columbia River spring-run ESU, which is listed as endangered (NMFS 2013). The Columbia River has also been designated as critical habitat under the federal ESA for each of these five ESUs. Chinook salmon are also a state candidate species and a WDFW priority species (WDFW 2008).

The Lower Columbia River ESU of Chinook salmon includes all natural spawning populations in river reaches accessible to Chinook salmon in the Columbia River tributaries between the Grays and White Salmon rivers in Washington and the Willamette and Hood rivers in Oregon (70 FR 37160). The other ESUs that have the potential to occur within the project site and vicinity use the Columbia River as a migratory corridor to spawning and rearing habitats higher in the watershed.

Compared to the other Pacific salmon, Chinook salmon have the most complex life history with a large variety of patterns. The length of freshwater and saltwater residency varies greatly (Myers et al. 1998). Channel size and morphology, substrate size and quality, water quality, and cover type and abundance may influence distribution and abundance of Chinook salmon (LCFRB 2004a). After 3–5 years in the ocean, Columbia River stocks return to spawn in the fall and spring. Spawning occurs in the mainstems of larger tributaries in coarse gravel and cobble (Myers et al. 1998).

Habitat use in the Lower Columbia River is variable, depending on the stock. Adult fish migrate through the lower river almost year-round. Depending on the ESU, adults enter the river between February and November and spawn in tributaries from August through September (Myers et al. 1998, LCFRB 2004b). The portion of the Columbia River that is within the project site and vicinity does not provide any suitable spawning or rearing habitat for Chinook salmon, as suitable spawning substrate is virtually non-existent. If they are present, migrating adults and juveniles are expected to be moving quickly through the deep water portion of the river.

Table 4-4. Special Status Aquatic Species and Their Potential to Occur within the Project Area

Species	ESU/DPS[1]	Federal		State			Potential for Occurrence	
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site and Vicinity[7]	Shipping prism
Salmon and Trout								
Bull Trout (*Salvelinus confluentus*)	Columbia River DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
Chinook Salmon (*Oncorhynchus tshawytscha*)	Lower Columbia River ESU	FT	Designated	SC	1, 2, 3	N		
	Upper Willamette River ESU	FT	Designated	SC	1, 2, 3	N		
	Upper Columbia River spring-run ESU	FE	Designated	SC	1, 2, 3	N		
	Snake River spring/ summer-run ESU	FT	Designated	SC	1, 2, 3	N		
	Snake River fall-run ESU	FT	Designated	SC	1, 2, 3	N		
Chum Salmon (*Oncorhynchus keta*)	Columbia River ESU	FT	Designated	SC	1, 2, 3	N		
Coho Salmon (*Oncorhynchus kisutch*)	Lower Columbia River ESU	FT	Proposed	SC	1 ,2, 3	N		
Sockeye Salmon (*Oncorhynchus nerka*)	Snake River ESU	FE	Designated	SC	1, 2, 3	N		
Steelhead (*Oncorhynchus mykiss*)	Lower Columbia River DPS	FT	Designated	SC	1, 2, 3	Y		
	Upper Willamette River DPS	FT	Designated	SC	1, 2, 3	Y		
	Middle Columbia River DPS	FT	Designated	SC	1, 2, 3	Y		
	Upper Columbia River DPS	FT	Designated	SC	1, 2, 3	Y		
	Snake River Basin DPS	FT	Designated	SC	1, 2, 3	Y		
Coastal Resident/Sea-Run Cutthroat Trout (*Oncorhynchus clarkii clarkii*)	Southwest Washington ESU	FSC	N/A	None	3	N	Columbia River is documented migratory corridor	Columbia River and adjacent marine waters are documented habitat
Pink Salmon (*Oncorhynchus gorbuscha*)	N/A	None	N/A	None	2, 3	N		
Sturgeon								
Green Sturgeon (*Acipenser medirostris*)	Southern DPS	FT	Designated	None	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
White Sturgeon (*Acipenser transmontanus*)	N/A	None	N/A	None	2, 3	N	Columbia River is documented migratory corridor	Columbia River and adjacent marine waters are documented habitat
Lamprey								
Pacific Lamprey (*Lampetra tridentata*)	N/A	FSC	N/A	None	3	Y	Columbia River is documented habitat for all life stages	Columbia River and adjacent marine waters are documented habitat
River Lamprey	N/A	FSC	N/A	SC	1	Y		
Minnow								
Leopard Dace (*Rhinichthys falcatus*)	N/A	None	N/A	SC	1	Y	Historic observations in mainstem Columbia River. May provide suitable habitat.	Historic observations in mainstem Columbia River. May provide suitable habitat.
Smelt								
Pacific Eulachon (*Thaleichthys pacificus*)	Southern DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented habitat and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
Mammals								
Steller Sea Lion (*Eumatopius jubatus*)	Eastern DPS	FT	Designated	ST	1, 2	Y	Moderate/High – Aquatic portion of site is within migratory/foraging corridor	High – Columbia River and adjacent marine habitats are documented habitat.
Whales (Several species)	Varies	Varies	Varies	Varies	Varies	Varies	Low – No habitat	High – Marine waters off coast provide documented habitat
Non-ESA-Listed Marine Mammals	N/A	None	N/A	Varies	Varies	Varies	Moderate/High – Aquatic portion of site is within migratory/foraging corridor	High – Columbia River is a documented migratory/foraging corridor.
Reptiles								
Sea Turtles (Various species)	Varies	Varies	Varies	Varies	Varies	Varies	Low – No suitable habitat on-site.	High – Marine waters represent documented habitat.

[1] ESU = Evolutionarily Significant Unit; DPS = Distinct Population Segment

[2] ESA Classifications: FE = federal endangered; FT = federal threatened; FSC = species of concern; FP = federal proposed; FC = federal candidate.

[3] Washington SOC Classifications: SE = state endangered; ST = state threatened; SS = state sensitive; SC = state candidate.

[4] WDFW PHS Listing Criteria: Criterion 1 = State-listed and Candidate Species; Criterion 2 = Vulnerable Aggregations; Criterion 3 = Species of Recreational, Commercial, or Tr bal Importance.

[5] SGCN – As defined in WDFW's Comprehensive Wildlife Conservation Strategy (CWCS) (WDFW 2005).

Juvenile movement through the river is also variable depending on the stock. Juveniles often move into the Columbia River and estuary to over-winter (LCFRB 2004c). Spring Chinook tend to rear in tributary streams for a year, and yearlings outmigrate rapidly during the spring freshet (LCFRB 2004b). Fall Chinook tend to outmigrate as sub-yearlings in the late summer and fall of their first year (LCFRB 2004b). Over-wintering and outmigrating Chinook salmon juveniles tend to occupy the nearshore habitat in the lower Columbia River.

The project site and vicinity both represent documented habitat for adult and juvenile Chinook salmon. Adult Chinook of one or more ESUs may be present within the lower river year-round. Juvenile Chinook salmon, if present within the vicinity, will likely be migrating quickly through during peak spring and fall migration periods. No suitable spawning or rearing habitat occurs within the project vicinity, and there is little suitable habitat for foraging or refuge. One or more life stages of Chinook salmon could potentially be present within portions of the shipping prism during any time of year.

(c) Chum salmon (Oncorhynchus keta)

The proposed project area is located within the Columbia River ESU of chum salmon. This ESU includes all naturally spawning populations in all river reaches accessible to chum salmon in the Columbia River downstream from Bonneville Dam (70 FR 37160). Historically, chum salmon were very abundant in the Columbia River. Today, only three strong populations (Grays River, Hardy Creek, and Hamilton Creek) are found – less than 1 percent of historic levels (LCFRB 2004a).

Columbia River ESU chum salmon are listed as threatened under the federal ESA, and the Columbia River has been designated as critical habitat for Columbia River chum salmon (NMFS 2013). Chum salmon are also a state candidate species and a WDFW priority species (WDFW 2008).

Chum salmon have the broadest spawning distribution of Pacific salmon species. They have a very short freshwater residency time, and they require cool, clean water and substrate for spawning. Migration to saltwater occurs immediately after emerging from the gravel; therefore, freshwater rearing habitat is a lesser concern for this species. After 3–5 years in saltwater, Columbia River chum salmon return to spawn in the fall. Spawning typically takes place in the lower mainstems of rivers, including the Columbia River, frequently in locations within the tidal zone where there is an abundance of clean gravel (LCFRB 2004a). Juvenile outmigration to the Columbia River estuary for rearing occurs soon after emergence from spawning gravels from mid-February to mid-June. Some stocks of chum salmon spend a month or more rearing in rivers before migrating to the ocean (LCFRB 2004b).

Adults and juveniles likely use the reach of the Columbia River that is within the project vicinity only as a migration corridor. Adult fish migrate through the project vicinity from October to November. Spawning occurs from November through December within the Columbia River and major tributaries (LCFRB 2004b); however, no spawning habitat exists at the project site, and no chum spawning habitat has been identified within the vicinity. Chum salmon are known to spawn in shallow water within and adjacent to the main channel of the Columbia River (LCFRB 2004b). In 2010, chum salmon fry were also observed outmigrating past Bonneville Dam for the first time (the progeny of adult chum migrating above Bonneville Dam) (Ford et al. 2010).

No backwater channels or nearshore habitat suitable for rearing chum salmon occur within the project vicinity, and chum salmon are not likely to rear for significant periods within the vicinity.

The shipping prism represents suitable habitat for both outmigrating juvenile chum, migrating adult chum, and estuarine and nearshore marine habitats.

(d) Coho salmon (Oncorhynchus kisutch)

The project site and vicinity are located within the range of the Lower Columbia River ESU of Coho salmon. This ESU includes all natural spawning populations in Columbia River tributaries below the Klickitat River in Washington and the Deschutes River in Oregon (including the Willamette River up to Willamette Falls) (70 FR 37160). Lower Columbia River ESU Coho salmon are listed as threatened under the federal ESA (NMFS 2013). The portion of the Columbia River that is within the project vicinity has also been proposed to be designated as critical habitat for Lower Columbia River Coho salmon. Coho salmon are also state candidate species and a WDFW priority species (WDFW 2008).

Historically, the lower Columbia River reach was the center of Coho salmon abundance in the Columbia River basin, with the middle and upper reaches also containing large runs of Coho salmon. These two populations have been significantly reduced, with the lower Columbia River reach estimated at 5 percent of historic levels (LCFRB 2004b).

Coho salmon have one of the shortest life cycles of all anadromous salmonids. Different patterns of life history are linked to different populations. Forming large schools, juveniles rear in freshwater for 1 year, migrate to the ocean, and return in 5–20 months to spawn. The distribution and abundance of Coho salmon are most likely influenced by water temperature, stream size, flow, channel morphology, vegetation type and abundance, and channel substrate size and quality. Coho salmon return from the ocean to spawn during fall freshets in September and October. Spawning occurs in silt to large gravel of tributaries (LCFRB 2004c). Juvenile Coho in the LCR ESU tend to rear in small tributaries, and outmigrate as smolts in the late spring of their second year (LCFRB 2004b).

There are two types of run timing associated with Coho: Type S, which are early run, and Type N, which are late run (Myers et al. 2006). Type S fish generally return to the Columbia River from August to October and spawn in October and November. Type N fish return to the Columbia River from October to November/December and spawn in November through January. Some Type N Coho can spawn as late as mid-February (Myers et al. 2006).

There is no suitable spawning habitat within the action area for Coho salmon, and the Columbia River serves only as a migratory corridor within the project vicinity. Adult Lower Columbia River Coho salmon may potentially be migrating through the project vicinity between approximately August and February.

Juveniles rear in smaller tributaries, and likely do not rear in significant numbers within the project vicinity. Juvenile outmigration occurs in the spring and summer of the second year, with the peak occurring in May (LCFRB 2004b). Depending on the degree of maturation, some juveniles may forage in the nearshore during outmigration. Outmigrating juvenile Coho likely move quickly through the project site and vicinity, as there is little suitable nearshore foraging or refuge habitat present. One or more life stages of Coho salmon could potentially be present within portions of the shipping prism during any time of year.

(e) Sockeye salmon (Oncorhynchus nerka)

The reach of the Columbia River within the project vicinity is located within the range of the Snake River ESU of sockeye salmon. This ESU includes all river reaches and estuary areas

presently or historically accessible to sockeye salmon in the Columbia River and is defined as all river reaches east of a straight line connecting the west end of the Clatsop Jetty (Oregon side) and the west end of the Peacock Jetty (Washington side), and extending upstream to the confluence of the Snake River, upstream on the Snake River to the confluence of the Salmon River, and upstream on the Salmon River to the confluence of the Alturas Lake Creek and Stanley, Redfish, Yellow Belly, Pettit, and Alturas lakes (including their inlet and outlet tributaries) (70 FR 37160).

The Snake River ESU of sockeye salmon is extremely close to extinction. Factors cited for the decline include overfishing, water diversion for irrigation, and obstacles to migration including dams (LCFRB 2004c). The only extant sockeye salmon in the Snake River ESU spawn in lakes in the Stanley basin of Idaho.

The Snake River ESU of sockeye salmon is listed as endangered under the federal ESA, and the reach of the Columbia River that is within the project vicinity has been designated as critical habitat for Snake River sockeye salmon. Sockeye salmon are also state candidate species and a WDFW priority species (WDFW 2008).

Historically, adult sockeye salmon in the Snake River ESU enter the Lower Columbia River in June and July and migrate upstream through the Snake and Salmon rivers, arriving at their natal lakes in August and September. Spawning peaks in October and occurs in lakeshore gravels. Fry emerge in late April and May and move immediately to the open waters of the lakes where they feed on plankton for 1–3 years before migrating to the ocean. Juvenile sockeye generally leave Redfish Lake from late April through May and migrate to the Pacific Ocean. Snake River ESU sockeye salmon spend 2–3 years in the Pacific Ocean before returning to their natal lakes to spawn.

In the Columbia River basin, sockeye salmon spawn and rear in lakes in the upper Snake River watershed. Adults typically migrate through the Lower Columbia River in June and July. Juvenile outmigration begins in early spring after ice breakup on the lakes (LCFRB 2004c), and outmigrating juveniles may be present within the project vicinity between approximately April and June.

(f) Steelhead (Oncorhynchus mykiss)

The reach of the Columbia River within the project vicinity represents potential habitat for five DPS of steelhead: Lower Columbia River, Upper Willamette River, Middle Columbia River, Upper Columbia River, and Snake River Basin DPS. These five DPS are all listed as threatened under the federal ESA, and the reach of the Columbia River within the project vicinity has been designated critical habitat for all five DPS (NMFS 2013). Steelhead are also a state candidate species and a WDFW priority species (WDFW 2008).

Steelhead is the most widely distributed anadromous salmonid. The life history pattern of steelhead can be very complex, involving repeated spawnings and continuous reversals of freshwater to ocean phases (LCFRB 2004c). The distribution and abundance of steelhead are thought to be influenced by water temperature, stream size, flow, channel morphology, vegetation type and abundance, and channel substrate size and quality (LCFRB 2004c). Depending upon the specific requirements of a particular life stage, steelhead use a wide range of habitat types from low-order tributaries to river mainstems (61 FR 41541). Steelhead DPS that migrate within the Lower Columbia River return in the spring and fall to spawn. Spawning occurs in small to large gravel of tributaries and smaller rivers (LCFRB 2004b).

Adult and juvenile steelhead primarily use the project vicinity as a migration corridor. Adults migrate through the action area year-round, depending on the run type. Summer steelhead migrate upstream within the Columbia River between roughly May and October, with spawning occurring in tributaries between late February and early April. Winter-run adults enter the Columbia River between December and May, spawning in tributaries in late April and early May.

Peak adult spawning for both summer and winter runs occurs in the spring. Spawning occurs in the tributaries throughout the Columbia River basin (LCFRB 2004b). In streams that support both summer and winter steelhead runs, summer steelhead tend to spawn higher in the watershed. No suitable steelhead spawning habitat occurs within the project site or vicinity, and the reach of the river within the project vicinity serves largely as a migratory corridor.

The peak juvenile outmigration through the Lower Columbia River occurs in the spring. Over-wintering and outmigrating juvenile steelhead occupy the nearshore habitat within the project area. Juvenile steelhead may be present in high numbers during migration periods, but juvenile steelhead likely move quickly through the project site and vicinity, due to the relatively low quality of nearshore habitat. There is very little in-stream or riparian habitat structural complexity that will provide suitable areas for foraging or refugia for outmigrating juvenile steelhead. One or more life stages of steelhead could potentially be present within portions of the shipping prism during any time of year.

(g) Coastal resident/sea-run cutthroat trout (*Oncorhynchus clarkii clarkii*)

The coastal cutthroat trout is one of 13 subspecies of cutthroat trout indigenous to North America. The range of this subspecies extends northward along the Pacific Coast from northern California to the Prince William Sound region of southeast Alaska, and eastward to the crest of the Cascade Range (Johnson et al. 1994). This subspecies exhibits both resident fluvial and adfluvial life history patterns (resident) and is the only subspecies to also exhibit an anadromous (sea-run) life history pattern (Behnke 1992). Coastal cutthroat trout in the Columbia River system are part of the Southwest Washington ESU, which is a species of concern under the federal ESA (NMFS 2013). Coastal cutthroat trout are also a WDFW priority species (WDFW 2008).

The life history of the coastal cutthroat is probably the most complex and flexible of any Pacific salmonid (Johnson et al. 1994). Cutthroat trout in the Southwest Washington ESU exhibit fluvial, adfluvial, and anadromous life histories. The extent to which individuals expressing these various strategies are isolated from other life history forms is largely unknown, though there is growing evidence that individuals may express multiple life history behaviors in their life time (Johnson et al. 1999).

Coastal cutthroat trout spawn in the smallest headwater streams and tributaries used by any salmonid species, and the young usually remain in these streams about a year before moving down into larger streams (Palmisano et al. 1993). Individuals that migrate to the sea live in these larger streams for another 2 to 5 years before migrating to the Pacific Ocean as smolts, between approximately April and June (Wydoski and Whitney 2003; Johnson et al. 1994). Some stocks, primarily those with limited or no possibility of return migration from the ocean, remain as residents of small headwater tributaries, or migrate only into rivers or lakes (Scott and Crossman 1973; Johnson et al. 1994). Sea-run cutthroat do not migrate to the open ocean; rather, they stay in estuarine habitats near the mouths of their migratory streams for 5-8 months of the year

(Palmisano et al. 1993; Johnson et al. 1994). Upstream migration to freshwater feeding/spawning areas occurs from late June through March; re-entry timing is consistent from year to year within streams, but varies widely between streams (Johnson et al. 1994). Spawning generally occurs between December and February in the tails of pools located in streams with low gradient and low flows or in shallow riffles (Wydoski and Whitney 2003; Johnson et al. 1994). Preferred water temperatures for spawning and incubation range from 42°F to 63°F; cutthroat are generally not found in waters above 72°F (Johnson et al. 1994).

Coastal cutthroat in the portion of the mainstem Columbia River that is within the project site and vicinity would be sea-run individuals migrating to or from the estuary. Out-migrating coastal cutthroat trout smolts could potentially be present between approximately March and June, while upstream migrating adults could potentially be present between approximately June and March. For this reason, coastal cutthroat trout could be present within the project vicinity or shipping prism during any time of the year.

(h) Pink salmon (Oncorhynchus gorbuscha)

Pink salmon are the most abundant of the seven Pacific salmon species (Heard 1991). They are not listed under the federal ESA, but they are considered a WDFW priority species (WDFW 2008).

Pink salmon range throughout the North Pacific Ocean and Bering Sea. Populations originating from different coastal regions of the North Pacific occupy distinct ocean nursery areas. The range shifts southward for winter, northward in warmer months (Heard 1991). In Washington, the most significant runs are in streams tributary to Puget Sound. They are relatively uncommon in the Columbia River basin, with fewer than 100 fish counted at the Bonneville Dam fish ladder in most years. In 2011, however, a record run of 3,828 pink salmon was recorded at the dam (Columbia Basin Fisheries Agencies and Tribes [CBFAT] 2013a).

Pink salmon have the shortest lifespan of all the Pacific salmon found in North America. They mature and complete their entire life cycle in 2 years. This 2-year life cycle has created genetically distinct odd-year and even-year populations of pink salmon in most Puget Sound tributaries. Fish coming in odd years are unrelated to the individuals returning in even years. Odd-year and even-year populations do not interbreed even when they return to the same spawning grounds.

Adult pink salmon spend most of their lives at sea. They return to natal streams in the fall, with spawning occurring in rivers and tributary streams, or in lower tidal areas in some rivers. After juveniles emerge from gravel (in April–May), they immediately move downstream to estuary. Young fish may be found in inshore waters for several months before they move to sea (Scott and Crossman 1973).

Pink salmon are not common in the Columbia River in most years, but large runs have occasionally been recorded. While pink salmon are not expected to be present in significant numbers, it is possible that they may occasionally be present in the project site and/or vicinity in the fall (during adult migration), and spring (during juvenile out-migration). One or more life stages of pink salmon could potentially be present within portions of the shipping prism during any time of year.

4.2.2.2 *Sturgeon*

(a) North American green sturgeon (*Acipenser medirostris*)

North American green sturgeon in the Lower Columbia River are composed of approximately 60 percent northern DPS and 40 percent southern DPS (personal communication with Steve West, WDFW, April 24, 2009), with the southern DPS being listed as threatened under the ESA (USFWS 2013). The Columbia River estuary upstream to Bonneville Dam has also been designated critical habitat. Green sturgeon is a WDFW priority species and an SGCN (WDFW 2008).

The green sturgeon is distributed throughout Alaska, Washington, California, and Oregon (McCabe and Tracy 1994). In the mid-1930s before Bonneville Dam was constructed, green sturgeon were found in the Columbia River up to the Cascades Rapids; today, they occur upriver to Bonneville Dam but are predominantly found in the lower reach of the river. The estuaries of Willapa Bay, the Columbia River, and Grays Harbor are late summer concentration areas (NMFS 2003). The Columbia River does not support spawning populations of green sturgeon (personal communication with Steve West, WDFW, April 24, 2009).

Green sturgeon, which tend to prefer environments that are more saline, typically are not found in the Columbia River upstream of Skamokawa (personal communication with Steve West, WDFW, April 24, 2009). Adult and sub-adult green sturgeon are typically present in the Lower Columbia River from June through August, with August the peak month (McCabe and Tracy 1994). It is possible, but unlikely, that green sturgeon may be present in the project vicinity during the months of June through August. One or more life stages of green sturgeon could potentially be present within portions of the shipping prism during any time of year.

(b) White sturgeon (Acipenser transmontanus)

White sturgeon is a Washington priority species (WDFW 2008). White sturgeon are the largest of North American fishes. They occur from the Pacific slope of North America from the Aleutian Islands to Monterey, California (Lee et al. 1980). In the Columbia River, they spawn at roughly 3 to 11 year intervals, between approximately April and July (Wydoski and Whitney 2003). Larvae hatch from eggs in 1-2 weeks. Males may reach sexual maturity in about 9 years, females in 13-16 years (Wydoski and Whitney 2003). White sturgeon may live over 100 years, and can reach 20 feet in length and weigh over 1,800 pounds.

White sturgeon can be found at sea, usually near shore, as well as in large, cool rivers or streams. Some white sturgeon are anadromous and make extensive saltwater migrations. Many more stay primarily in estuarine waters, moving inland to freshwater to spawn. White sturgeon are bottom feeders. Young sturgeon feed mostly on the larvae of aquatic insects, crustaceans, and mollusks. A significant portion of the diet of larger sturgeon consists of fish.

White sturgeon may potentially be present within the project vicinity and shipping prism at all times of the year.

4.2.2.3 *Lamprey*

(a) Pacific lamprey (*Lampetra tridentata*) and river lamprey (*Lampetra ayresi*)

Two species of lamprey native to the Columbia River basin are provided special regulatory status: Pacific lamprey and river lamprey. Both are species of concern under the federal ESA

(NMFS 2013). The river lamprey is currently a candidate for listing in Washington. Both Pacific lamprey and river lamprey are WDFW priority species and an SGCN (WDFW 2008).

The Pacific lamprey is found in coastal streams from southern California to the Gulf of Alaska; in Washington it occurs in most large coastal and Puget Sound rivers and occurs long distances inland in the Columbia, Snake, and Yakima rivers (Wydoski and Whitney 2003). Larval lampreys (ammocoetes) spend up to 6 years burrowed in the sediment, feeding on diatoms and detritus where they transform into a juvenile stage called macropthalmia. At this stage, the lampreys are silver, develop teeth and a sucker-like disc, and form true eyes. Physiological transformations occur that initiate migratory behaviors and enable them to tolerate sea water (CBFAT 2013b). After a 2-month transformation into adults, Pacific and river lamprey migrate into the ocean where they spend 2 to 3 years parasitizing fishes and mammals (Pacific States Marine Fisheries Commission [PSMFC] 1997). Pacific lampreys enter saltwater between late winter and early spring, while river lampreys enter saltwater between May and July. Lampreys return to freshwater rivers to spawn in the spring, where they lay up to 100,000 eggs in a nest built in gravel or sandy sediments. Adults die after spawning (PSMFC 1997). Juveniles burrow into soft mud substrates and remain there for up to 6 years. Adults then move to marine environments for 2 to 3 years before returning to tributaries to spawn (Bayer and Seelye 1999).

Adult lamprey may be present within the project vicinity in the late winter and early spring. Juvenile lamprey may potentially be present within the project vicinity at all times of the year. The shallow nearshore habitat at the project site may provide suitable substrate conditions for rearing lamprey, though the limited in-stream complexity and lack of riparian cover limit this function of the habitat. One or more life stages of lamprey could potentially be present within portions of the shipping prism during any time of year.

(b) Leopard dace (Rhinichthys falcatus)

Leopard dace is a Washington state candidate for listing and a WDFW priority species and an SGCN (WDFW 2008). It is not provided any special federal regulatory status.

Leopard dace is a species of minnow endemic to the Columbia River system in Oregon, Washington, Idaho, and British Columbia, and to the adjacent Fraser River system in British Columbia (Lee et al. 1980). Its habitat is thought to be similar to that of other species of dace, and includes flowing pools and gravel runs of creeks and small to medium rivers and rocky margins of lakes (Page and Burr 1991). It is usually found in slow-moving current, typically in slower, deeper water than most other species of dace (Wydoski and Whitney 2003). Spawning is thought to occur between May and July in slow-moving riffles (Wydoski and Whitney 2003). Young-of-the-year feed mostly on dipterous larvae. Yearlings begin feeding on aquatic insect larvae (e.g., *Ephemeroptera* and *Diptera*); by September, they feed mostly on terrestrial insects. Adults eat aquatic insect larvae and terrestrial insects.

Leopard dace have been documented in the mainstem Columbia River within the project vicinity, and could be present within the project site, project vicinity, and/or project shipping prism at any time of the year. The project site and vicinity likely do not provide suitable spawning habitat for leopard dace, as there is no riffle habitat or suitable substrate.

4.2.2.4 *Eulachon*

(a) Pacific eulachon (Thaleichthys pacificus)

Pacific eulachon are endemic to the eastern Pacific Ocean ranging from northern California to southwest Alaska and into the southeastern Bering Sea. Eulachon in the Columbia River system are part of the Southern DPS, which is listed as threatened under the federal ESA. The Columbia River has also been designated critical habitat for Pacific eulachon. This is also a state candidate species and a WDFW priority species and an SGCN (WDFW 2008).

Eulachon typically spend 3 to 5 years in saltwater before returning to freshwater to spawn from late winter through early summer. Typically, spawning grounds are in the lower reaches of larger rivers fed by snowmelt and spawning occurs at night; in the Columbia River, spawning typically occurs at temperatures from 39 to 50° F over sand, coarse gravel, or detrital substrates in January, February, and March. Eulachon eggs hatch in 20–40 days, and then are carried downstream and dispersed by estuarine and ocean currents (NMFS 2010).

According to NMFS (NMFS 2010), most Pacific eulachon production for the southern DPS occurs in the Columbia River basin. In the Columbia River, spawning runs return to the mainstem of the river from RM 25, near the estuary, to immediately downstream of Bonneville Dam (RM 146). While most eulachon production occurs in tributaries downstream of the project vicinity, the Washougal and Sandy rivers, which empty into the Columbia River approximately 15 miles upstream of the action area, are both known to support smelt runs (NMFS 2010). Adult eulachon typically migrate through the project site and vicinity from approximately December through February, with the peak of the run in January and February (personal communication with Brad James, WDFW, January 21, 2010). The incubation period is approximately 1 month, and the peak outmigration of juvenile smelt larvae is February through April (personal communication with Brad James, WDFW, January 21, 2010).

Adult eulachon may begin migrating through the project site, vicinity, and freshwater portions of the shipping prism near the end of December. No spawning has been documented in the action area and the action area does not represent suitable spawning habitat for Pacific eulachon, and eulachon eggs are not expected to be present in the project vicinity at any time. Larval eulachon may potentially be flowing downstream through the project site, vicinity, and shipping prism between approximately February and April.

4.2.2.5 *Marine Mammals*

(a) Steller sea lion (*Eumatopius jubatus*)

The Steller sea lion is a Washington state-listed threatened species and a WDFW priority species and an SGCN (WDFW 2008). It was removed from the federal Endangered Species list on November 4, 2013 (78 FR 66139).

The range of the Steller sea lion includes the north rim of the Pacific Ocean from California to northern Japan. This sea lion is primarily a coastal and open-ocean species (Oregon Department of Fish and Wildlife [ODFW] 1998), although it does occur in the Rogue River in Oregon and in the estuary of the Columbia River.

Steller sea lions have been sighted as far upriver as Bonneville Dam, but these sightings are relatively rare. USACE has observed small numbers of Steller sea lions present as far upstream in the Columbia River as Bonneville Dam following salmonid runs from January through May

(Stansell et al. 2009). In Oregon and Washington, Steller sea lions feed offshore along the coast and in the ocean, although some Steller sea lions make seasonal journeys (usually January through May) into the Lower Columbia River to feed, primarily on sturgeon (personal communication with Brian Wright and Robin Brown, ODFW, March 6, 2010; personal communication with Steve West, WDFW, April 22, 2010).

The project site does not provide significant habitat for Steller sea lion. The species, if present in the project vicinity, is most likely present during the months of January to May, during one of these seasonal feeding journeys. While Steller sea lions do use the Columbia River as a foraging/migration corridor, no Steller sea lion rookeries or documented haulouts occur within the vicinity; if present, the species will be expected to be moving through either upstream or downstream. Steller sea lion may potentially be present within one or more portions of the shipping prism during all months of the year.

(b) *Whales* (Several species)

Seven species of whales are known to occur off the coasts of Oregon and Washington. These include blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus)*, humpback whale (*Megaptera novaeangliae*), North Pacific right whale (*Eubalaena japonica*), sei whale (*Balaenoptera borealis)*, southern resident DPS killer whale (*Orcinus orca*), and sperm whale (*Physeter macrocephalus*). All are federally listed endangered species (NMFS 2013) and are also state-listed endangered species (WDFW 2008).

Whales tend to feed during the summer in the northern latitudes and migrate to the tropical southern latitudes in the winter for breeding. Some whales do not migrate as far north as the rest of the population; therefore, whales can be encountered throughout the year off the coasts of Oregon, Washington, and California.

While the specific migratory patterns and habitat requirements for each whale species differ, it is possible that any of them may potentially be present within the shipping prism of the proposed project during some time of the year. There is no habitat for these species at the project site, or in the project vicinity, or within the freshwater portion of the shipping channel. ESA-listed whale species could potentially be present within the marine portion of the shipping prism for the proposed project.

(c) Non-ESA-Listed Marine Mammals (Several species)

In addition to ESA-listed species described above, the project vicinity and the project's shipping prism represent potentially suitable habitat for several species of non-ESA-listed marine mammals that are also provided special regulatory status. California sea lions (*Zalophus californianus*) and harbor seals (*Phoca vitulina*) forage throughout the Lower Columbia River system.

California sea lions are found from southern Mexico to southeast Alaska. The United States stock is defined geographically for management purposes and is described as comprising animals that breed in US waters. California sea lions travel up the Columbia River as far as Bonneville Dam following salmonid runs, typically between January and May (Stansell et al. 2009).

Pacific harbor seals inhabit coastal and estuarine waters and shoreline areas from Baja California to western Alaska. They are present throughout the year at the mouth of the Columbia River, although they do exhibit seasonal movements and their numbers within the Columbia River upstream of the South Jetty increase from January to April and then decrease from May through

August as they move to adjacent bays (e.g., Netarts Bay, Tillamook Bay, Willapa Bay, and Grays Harbor) during the pupping season (FERC 2008).

There are no seal or sea lion haulouts at the project site or within the vicinity, although California sea lion and harbor seals may occasionally migrate through the project vicinity. Within the shipping prism, there are numerous haulouts in the Columbia River estuary and adjacent marine waters, and the species are likely present within portions of the shipping prism at all times of the year.

4.2.2.6 *Reptiles*

(a) Sea turtles (Various species)

Three species of sea turtles have been documented off the coasts of Oregon and Washington. These are the green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle (*Caretta caretta*). All three species are federally and state-listed endangered species (NMFS 2013; WDFW 2008) as well as WDFW priority species and SGCNs.

***Green Sea Turtle*—**The green sea turtle is a federal endangered species (NMFS 2013d). Critical habitat was designated in 1998 for green sea turtles in coastal waters around Culebra Island, Puerto Rico (63 FR 46693).

Green sea turtles are the largest of all the hard-shelled sea turtles (NMFS 2013d). Adult green sea turtles are unique among sea turtles in that they eat only plants; they are herbivorous, feeding primarily on seagrasses and algae. This diet is thought to give them greenish-colored fat, from which they take their name. Eastern Pacific populations of the sea turtle primarily occur south of San Diego, but rarely extend northward to southern Alaska. Green sea turtles are rarely recorded in Washington with four individuals stranded on outer coast beaches from 2002 to 2012; the most recent of these occurring in November 2010 (WDFW 2013).

There is no habitat for green sea turtles at the project site or within the vicinity. Green sea turtles may potentially be present within marine waters within the shipping prism, but these species are relatively rare on the West Coast.

***Leatherback Sea Turtle*—**The leatherback sea turtle is a federal endangered species (NMFS 2013c). Critical habitat was designated in 1979 for leatherback sea turtles which includes coastal waters adjacent to Sandy Point, St. Croix, U.S. Virgin Islands. NMFS designated additional critical habitat for leatherback sea turtles along the west coast of the U.S. in January 2012 (77 FR 4170).

The leatherback sea turtle is the largest turtle, and one of the largest living reptiles, in the world. The leatherback is the only sea turtle that doesn't have a hard bony shell. Instead, its carapace is about 1.5 inches thick and consists of leathery, oil-saturated connective tissue overlaying loosely interlocking dermal bones (NMFS 2013c). Leatherback sea turtles are the most migratory and wide ranging of sea turtle species. Leatherbacks are commonly known as pelagic animals, but they also forage in coastal waters (NMFS 2013c). Leatherback turtle nesting grounds are located around the world. The largest remaining nesting assemblages are found on the coasts of northern South America and West Africa. Within the U.S., there are minor nesting colonies in the Caribbean and in Southeast Florida. Leatherbacks migrate seasonally to and along the U.S. West Coast to forage on jellyfish and regularly occur off the coasts of Washington (especially off the

Columbia River mouth), Oregon, and California during the summer and fall when large aggregations of jellyfish form (WDFW 2013).

There is no habitat for leatherback sea turtles at the project site or within the vicinity. Leatherback sea turtles are frequently present seasonally within marine waters within the shipping prism off the coast of Washington. Leatherback sea turtles would most likely only be encountered during the summer and fall months when water temperatures are more conducive to foraging for jellyfish.

***Loggerhead Sea Turtle*—**The North Pacific Ocean DPS loggerhead sea turtle is a federal endangered species (NMFS 2013b). Critical habitat has not been designated or proposed for loggerhead sea turtles.

The loggerhead sea turtle is named for its relatively large head, which support powerful jaws and enable them to feed on hard-shelled prey, such as whelks and conch (NMFS 2013b). Loggerhead sea turtles occupy three different ecosystems during their lives: 1) beaches (terrestrial habitats), pelagic waters (open ocean), and 3) nearshore coastal areas. Loggerheads can be found throughout tropical to temperate waters in the Pacific; however, their breeding grounds include a restricted number of sites in the North Pacific and South Pacific. Within the North Pacific, loggerhead nesting has been documented only in Japan, although some nesting may also occur outside of Japan in areas surrounding the South China Sea (76 FR 58868). In the eastern Pacific, loggerhead sea turtles have been reported as far north as Alaska, and as far south as Chile. In the U.S., occasional sightings are reported from the coasts of Washington and Oregon, but most records are of juveniles off the coast of California. The west coast of Mexico, including the Baja Peninsula, provides critically important developmental habitats for juvenile loggerhead sea turtles (WDFW 2013).

There is no habitat for loggerhead sea turtles at the project site or within the vicinity. Loggerhead sea turtles may occasionally be present in marine waters within the shipping prism off the coast Washington.

All three species potentially affected by the project are highly migratory. Eastern Pacific populations of sea turtles generally spend the winter months in breeding grounds off southern Mexico and Central America, and although sea turtles have been reported during the summer months as far north as Alaska, occurrences are more common in southern California and northern Mexico (NMFS and USFWS 1998a, 1998b, 1998c, 1998d). NMFS (2011) identifies the following major threats to all sea turtles: 1) destruction and alteration of nesting and foraging habitats; 2) incidental capture in commercial and recreational fisheries; 3) entanglement in marine debris; 4) vessel strikes; 5) disease, specifically fibropapillomatosis; 6) environmental contamination; 7) beach armoring; 8) artificial lighting on or near nesting beaches; and 9) non-native vegetation.

4.3 Wetland Resources

The following section describes the extent and condition of wetland resources at the project site and within the project vicinity. This information was compiled from a field review and from a review of existing literature, including NWI and soils data and recent and historic permitting documentation. Areas within 300 feet of the project site were visually assessed for the presence of wetlands in accordance with the City of Vancouver's Critical Areas Protection Ordinance (VMC Chapter 20.740).

4.3.1 Project Site

The NWI map for Vancouver, Washington USGS Quadrangle (USFWS 1989) indicates the presence of numerous wetlands within the project vicinity, including five wetland polygons on the portion of the project site that encompasses Parcel 1A (Figure 9).

Wetland types mapped on Parcel 1A include:

- PEMA – Palustrine Emergent Temporarily Flooded
- PEMC – Palustrine Emergent Seasonally Flooded
- PFOA – Palustrine Forested Temporarily Flooded
- PFOC – Palustrine Forested Seasonally Flooded

It is important to note that NWI mapping is a coarse-scale mapping tool, and does not always reflect the presence or absence of wetland features at a given site. The NWI identifies much of Port Parcel 1A as having wetland characteristics, but wetland delineations conducted on the parcel prior to its initial development in 1996 documented significantly less wetland than identified by the NWI (The JD White Company 1993).

Nine wetlands, totaling approximately 16 acres in size, were present on Parcel 1A prior to development of that parcel (The JD White Company 1993), but these wetlands were all filled through permitted actions. Development on Parcel 1A was initiated in 1996. USACE permit number 96-1850 authorized impacts to 9.92 acres of emergent wetlands on the parcel. Wetland impacts associated with this development activity were mitigated through the establishment of the Port's Parcel 2 wetland mitigation site. A small forested wetland at the extreme eastern property boundary of Parcel 1A was enlarged and enhanced into the existing Parcel 1A wetland mitigation site.

In 2012, the Port applied for and received permission to fill a 1.76-acre isolated emergent wetland in the northeast corner of Parcel 1A, which was hydrologically and functionally isolated and provided little function and was filled in 2012.

The NWI also identified two isolated wetlands located north of the Jail Work Center. The boundaries of these wetlands were delineated in 2006 and 2007 in association with the Port's WVFA project (The JD White Company 2007). These wetlands were filled as part of that project in 2007. Impacts were permitted under a USACE nationwide permit (NWP-2007-721) and an Ecology administrative order (AO # 6902), and mitigation was accomplished through the purchase of credits in the CRWMB.

No other wetlands are present within the project site. Field investigations conducted on May 28 and June 26, 2013 included a visual reconnaissance to document the presence of any potential wetlands. A series of shallow, linear, stormwater swales are located in the southwest corner of Parcel 1A. These features were excavated from uplands for the purpose of stormwater treatment, and would not be considered wetlands by the City code, which exempts artificial wetlands intentionally created from non-wetlands sites for stormwater treatment. The OHWM of the Columbia River within the vicinity of the dock was also delineated during the May 28, 2013 site visit. All portions of the project site above the OHWM are either impervious, paved, or gravel-covered surfaces, or are upland ruderal grass/forb habitats that are clearly dominated by upland vegetation and have neither the potential to accumulate or detain surface water or precipitation

nor any visible hydrologic features that indicate the potential presence of wetlands. It has been determined, therefore, that there are no wetlands present on the project site.

4.3.2 Project Vicinity

Within the greater project vicinity, there are numerous wetlands, including several relatively high-quality wetland complexes. The NWI map (USFWS 1989) identifies a large complex of emergent, scrub-shrub, and forested wetlands north of the project site associated with the south end of Vancouver Lake; emergent and forested wetlands on Port Parcel 2; emergent wetlands to the east and south of Parcel 1A; and emergent wetlands to the west of Port Parcel 5, extending onto Parcel 3 (Figure 9).

Mapped wetland types include the following:

- PEMA – Palustrine Emergent Temporarily Flooded
- PEMC – Palustrine Emergent Seasonally Flooded
- PEMF – Palustrine Emergent Semi-permanently Flooded
- PEMR – Palustrine Emergent Seasonal – Tidal
- PEMT – Palustrine Emergent Semi-permanent – Tidal
- PFOA – Palustrine Forested Temporarily Flooded
- PSSA – Palustrine Scrub-shrub Temporarily Flooded
- PSSC – Palustrine Scrub-shrub Seasonally Flooded
- PSSR – Palustrine Scrub-shrub Seasonal – Tidal
- PSS/EMC – Palustrine Scrub-shrub/Emergent Seasonally Flooded
- PUBH – Palustrine Unconsolidated Bottom Permanently Flooded

As with the project site mapping, the NWI mapping within the project vicinity is only accurate at a coarse scale. Extensive wetland delineations associated with various project proposals and wetland mitigation activities have been conducted throughout the project vicinity, and these defined the actual boundaries of many of the wetlands within the project vicinity more accurately.

There are two wetland mitigation sites present in the vicinity of the project site and within 300 feet of the project site. The Parcel 1A wetland mitigation site, located immediately east of Parcel 1A, was established in 1994 under USACE permit number 94-00061. This approximately 7.9-acre wetland is a depressional, palustrine forested wetland (PFO), vegetated with mature black cottonwood trees and a variety of native shrubs and herbaceous species.

The Parcel 2 wetland mitigation site is an approximately 16.4-acre mitigation site, situated on an approximately 31.3-acre parcel north of the existing Terminal 5 site. The mitigation site was established in 2000, under USACE permit number 96-1850, for wetland impacts associated with the initial development of Parcel 1A. The mitigation site received final approval from the USACE in 2007. The site is currently a mosaic of forested, scrub-shrub, and emergent vegetation.

The most significant complex of wetlands in the project vicinity within 300 feet is associated with the southern end of Vancouver Lake. These wetlands are a mosaic of emergent, scrub-shrub, and forested wetlands that are hydrologically connected to Vancouver Lake and, by extension, the Columbia River. These wetlands provide high quality seasonally inundated, tidally influenced, and permanently flooded habitats that most closely resemble the original hydrologic and wetland habitat functions of the Vancouver Lake Lowlands. An approximately 154-acre portion of this wetland complex, located on portions of Port Parcels 6 and 7, has been established as the CRWMB.

There are several emergent wetlands west and northwest of the project site as well, but extend past the 300-foot limit specified in City code. The NWI identifies emergent wetlands on property west of the Terminal 5 property, and on Port parcels 3, 4, and 5. A wetland delineation conducted on parcels 3, 4, and 5 in 2001 identified approximately 148 acres of wetland on these parcels (The JD White Company, Inc. 2001). The wetland delineation report documented that these wetlands provide primarily water quality functions, due to their limited vegetative structural diversity, but they also provide some wildlife habitat function.

4.3.3 Project Shipping Prism

The shipping prism includes only the Lower Columbia River and adjacent marine waters. While there are numerous backwater and side channel wetland habitats present on the Lower Columbia River, a detailed analysis of the quantity and/or quality of these wetlands is beyond the scope of this document

5.0 ENVIRONMENTAL CONSEQUENCES

This section describes the impacts that could occur to biological resources from the construction and operation of the proposed project.

5.1 Construction

Construction of the proposed upland facilities and in-water improvements have the potential to affect biological resources through direct permanent and temporary modification of terrestrial and aquatic habitats as well as through the potential for temporarily reduced water quality conditions during construction, and through the generation of temporarily elevated levels of underwater and terrestrial noise during pile installation. These impacts are discussed in greater detail below.

5.1.1 Terrestrial Vegetation and Habitat

The primary effect to terrestrial habitat and vegetation at the project site will be the direct, permanent removal of vegetation during construction of the terrestrial components of the project. There is very little terrestrial vegetation or wildlife habitat present at the project site. Most of the site has been filled, paved, and/or capped in association with previous development and cleanup activities. What little natural vegetation is present is small and isolated, and/or significantly disturbed from its natural condition. As such, construction of the proposed project will have little direct impact to terrestrial vegetation and wildlife habitat.

Construction of the upland portion of the project will occur almost exclusively within the unvegetated industrial and ruderal upland grass/forb vegetation communities (Table 5-1). These vegetation communities correspond to the Urban/Mixed Environs habitat type (Table 5-2), which provides little or no wildlife habitat function. Direct permanent impacts to unvegetated industrial

communities total approximately 40.21 acres and will not result in any impacts to vegetation or habitat resources. Temporary impacts, approximately 53.65 acres for staging and construction access, will be restored to previous conditions following construction and are not expected to result in a permanent loss of the vegetation community and the associated habitat function it provides.

Approximately 42,000 square feet (0.96 acre) of ruderal upland grass/forb vegetation will be permanently impacted by construction in Area 200 related to the office building and Area 500 related to portions of the pipeline. Temporary impacts associated with staging and construction access, approximately 3.49 acres, would be restored to existing conditions following construction. These areas provide very little habitat function because of their isolated and disturbed nature. Permanent and temporary impacts to ruderal upland grass/forb habitat will not result in any significant impacts to vegetation or habitat resources.

Construction of portions of the pipeline will result in direct permanent impact to approximately 3,252 square feet (0.07 acre) of a small, isolated upland cottonwood stand north of the Jail Work Center. This stand contains approximately 273 trees, 246 of which have previously been permitted for removal from 1.1 acres of the stand for the construction of the proposed CPU substation adjacent to that location (BergerABAM, 2012). The current stand provides moderate habitat function, which would be reduced to low quality following construction of the CPU substation because of the limited number and extent of the remaining trees. The proposed pipeline will remove 9 of the remaining 27 trees which are not already permitted for removal associated with the CPU project (see Figure 11). The tree removal is not expected to change habitat quality, the trees to be removed are located on the fringes and would not increase fragmentation of the remnant stand.

While the proposed transfer pipeline will pass through the riparian area, this will occur primarily in an unvegetated portion. Construction of the transfer pipeline and other improvements in Area 400 will not impact high-quality vegetation and riparian function will not be affected. As stated previously, vegetation within the riparian area consists primarily of small-diameter black cottonwood (*Populus trichocarpa*) and willows (*Salix* spp.), and non-native false indigo bush (*Amorpha fruticosa*), and Himalayan blackberry (*Rubus armeniacus*). No riparian trees or vegetation will be removed, and no impacts to bank margin habitat are anticipated.

The proposed project would not result in any significant temporary impacts to vegetation or habitat resources.

Construction of the proposed project would not result in any direct or indirect impacts to vegetation or terrestrial habitat resources at either the project vicinity scale, nor within the shipping prism. Construction-related impacts to vegetation will be limited to the direct, permanent impacts to on-site vegetation associated with project construction. In general, construction of the proposed project will have only minor effects to terrestrial vegetation and wildlife habitat.

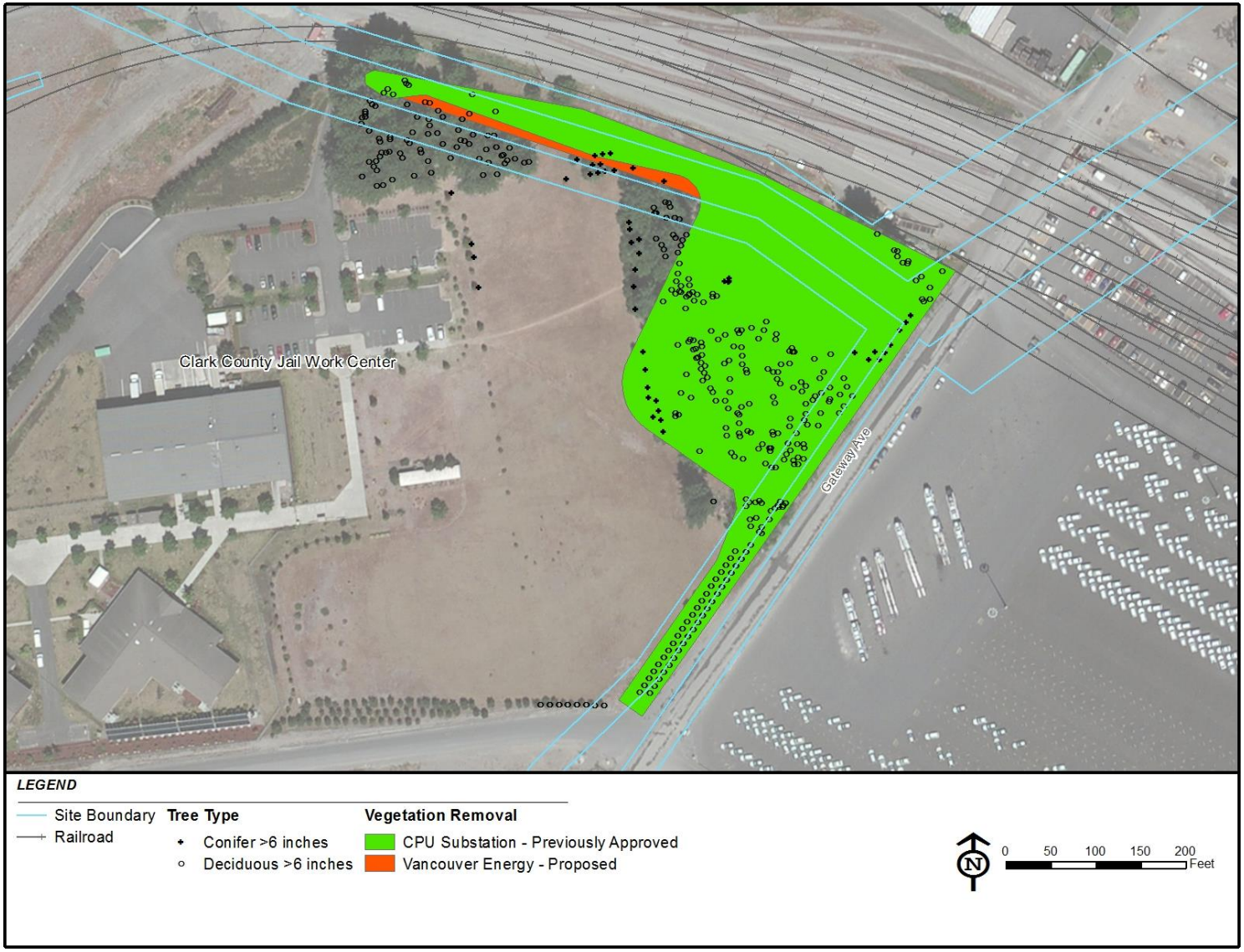

Figure 11. CPU Tree Plan

Table 5-1 summarizes each of the habitats summarizes the impacts to each of the vegetation communities present resulting from construction of the Facility, while Table 5-2 summarizes the corresponding impacts to habitats.

Table 5-1. Summary of Vegetation Community Acreage Impacts

Vegetation Community	Existing Community Acreage	Permanent Impacts							Total Permanent Impact	Temporary Construction and Laydown Impacts
		Area 200 – Rail Unloading	Area 200 – Admin	Area 300	Area 400	Area 500	Area 600	Rail Improvements		
Ruderal Upland Grass/Forb	4.45	0.0	0	0.00	0.44	0.52	0.00	0.00	0.96	3.49
Upland Cottonwood Stands	1.68	0.00	0	0.00	0.00	0.07[a]	0.00	0.00	0.07	0
Riparian	0.88	0.00	0	0.00	0.0[b]	0.00	0.00	0.00	0.0	0[b]
Subtotal	*7.01*	*0.0*	0	0.00	*0.44*	*0.59*	*0.00*	*0.00*	*1.03*	*3.49*
Unvegetated Industrial	92.99	6.24	1.60	20.85	1.74	3.55	0.8	5.43	40.21	53.65
Open Water	4.62	0	0	0	4.62[c]	0	0	0	4.62[c]	0
Total Acreage	104.63	6.24	1.60	20.85	7.68	4.89	0.81	5.43	47.47	57.14

[a] Impacts to upland cottonwood stands include prior approvals for the construction of the Clark County PUD substation and total 0.81 acres. Actual impacts associated with the transfer pipeline that occur outside of previous approved tree removal are listed in this table.

[b] Facility elements would be constructed in an area with scarce riparian vegetation at Area 400 covering approximately 0.85 acre. Temporary construction areas would cover approximately 0.03 acre. No high-quality riparian vegetation would be removed and existing riparian habitat function would not be negatively affected.

[c] Construction activities occurring within open water would occur on the existing structure.

Table 5-2. Summary of Habitat Acreage Impacts

Habitat Type	Area 200 – Rail Unloading	Area 200 - Admin	Area 300	Area 400	Area 500	Area 600	Rail Improvements	Total Permanent Impact	Temporary Construction and Laydown
Urban/Mixed Environs	6.24	1.60	20.85	2.84	4.89	0.81	5.43	42.66	57.14
Westside Riparian-Wetlands	0.00	0.00	0.00	0.00[b]	0.00	0.00	0.00	0.00	0.00
Westside Lowland Conifer-Hardwood Forest	0.00	0.00	0.00	0.00	0.07[c]	0.00	0.00	0.07	0.00
Open Water – Lakes, Rivers, Streams	0.00	0.00	0.00	4.62	0.00	0.00	0.00	0.00	0.00
Total Acreage	6.24	1.60	20.85	7.68[d]	4.96	0.81	5.43	47.47[d]	57.14

[a] A total of 1.13 acres of vegetation communities within this habitat would be converted and result in a loss of habitat (Table 4.4-2). The remaining area is unvegetated industrial and not considered habitat.

[b] Facility elements would be constructed in an area with scarce vegetation and no high-quality vegetation would be removed or existing riparian habitat function would be negatively affected.

c Impacts to upland cottonwood stands include prior approvals for the construction of the Clark County PUD substation and total 1.7 acres. Actual impacts associated with the transfer pipeline that occur outside of previous approved tree removal are listed in this table.

d Includes water areas of 4.8 acres within the marine terminal.

Operation

The operation of the proposed project could permanently and indirectly affect vegetation and terrestrial wildlife habitats through operational water quality impacts, including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and through an increased potential for catastrophic accidents such as a spill to surface water. The operation of the Facility also could result in effects associated with the shipping traffic that will occur in conjunction with the proposed project.

5.1.2 Wildlife Resources

As described above in section 5.1.1, construction of the proposed project will have only minor effects to terrestrial habitat and vegetation at the project site. The only construction-related impacts will be any direct impacts to habitat and vegetation associated with the terrestrial components of the project. Vegetation and habitat within these portions of the project site will be permanently removed.

Direct Habitat Modification – Impacts associated with direct habitat modification are described in section 5.1.1.

The project site provides potentially suitable, relatively low quality, foraging habitat for raptors such as bald eagles and peregrine falcons. Bald eagles have been documented extensively in the project vicinity, and it is likely that they use riparian habitats throughout the project vicinity as foraging habitats. Peregrine falcons have not been documented foraging at the project site, but they may occur in the vicinity. If present, peregrine falcons could forage in upland and riparian

habitats at the site. The ruderal grass/forb habitats at the site provide potentially suitable, relatively low quality habitat for gray-tailed vole. The limited quality and quantity of available terrestrial habitat for these species, and the highly industrial nature of the surroundings, likely greatly limit the extent of habitat function. Direct impacts consisting of removal of approximately 42,000 square feet (0.96 acre) of ruderal grass-forb and approximately 3,252 square feet (0.07 acre) of upland cottonwood stands are expected to result in only minor potential impacts to bald eagle, peregrine falcon, and gray-tailed vole.

The aquatic portion of the project site represents suitable foraging and resting habitat for shorebirds and wintering waterfowl, which are WDFW priority species. As identified in section 5.1.3 below, the project will not result in any net increase in permanent impacts to the aquatic portion of the project, and is therefore not expected to result in any measurable or significant impact to shorebird or waterfowl habitat suitability.

The aquatic portion of the project site also represents potentially suitable habitat for marine mammals. If present, they are expected to be passing through in deep water habitats outside the immediate project site. They are not known or expected to use habitats near the existing dock, and are therefore unlikely to be affected by the relatively small amount of direct habitat impacts associated with the proposed dock modifications.

Temporary Water Quality Impacts – As with any construction project, there is a potential for leaks and/or spills from construction equipment. The proposed overwater work creates the potential for construction debris to enter the waterway. Equipment and storage containers associated with the proposed project also create the potential for leaks and spills of fuel, hydraulic fluids, lubricants, and other chemicals.

The proposed project also has the potential to disturb sediments and increase turbidity temporarily at the project site during pile installation and removal activities. These impacts would not affect terrestrial wildlife species or habitats at the site, but could affect wildlife species that use aquatic habitats. Increased levels of turbidity could have temporary negative impacts on aquatic habitats and, if any wildlife species are present in the project vicinity during construction, could affect them directly.

The aquatic portion of the project site represents suitable foraging and nesting habitat for shorebirds and wintering waterfowl. The aquatic portion of the project site also represents potentially suitable foraging habitat for marine mammals.

The accidental release of construction debris or leaks or spills of fuel or other chemicals into the waters of the project site has the potential to reduce habitat suitability for shorebirds and waterfowl as well as for marine mammals.

Similarly, temporarily elevated levels of turbidity that could result during pile removal activities also have the potential to reduce habitat suitability for these species by reducing visibility and habitat suitability for prey species. However, any temporary elevation of turbidity is expected be short term, and to not exceed the turbidity levels generated by natural events such as high volume flow events.

A water quality protection and monitoring plan (WQPMP) has been developed and describes how the project will monitor and control releases of turbidity, suspended sediment, concrete, and other construction-related materials that may be generated during Facility construction activities in, over, and adjacent to the Columbia River and other adjacent water bodies. The plan describes

water quality protection measures; monitoring parameters, methods, evaluation criteria; and contingency response and notification procedures in the event a water quality criterion is exceeded during such construction activities.

Impacts to special status wildlife species from temporary water quality impacts are expected to be minor.

Temporary Construction Noise – The proposed project has the potential to result in temporarily elevated terrestrial and underwater noise levels during pile installation and removal activities. Pile installation and removal includes both in-water temporary piles that would be installed and removed with vibratory methods. Upland pile installation for shore-based mooring points and building foundation/support at Area 200 would be completed with impact hammers.

Terrestrial construction noise and noise from other human activity can result in a variety of effects to wildlife species, including displacement from occupied habitats, interference with hearing ability in songbirds and mating and alarm calls in amphibians and ground squirrels, and disruption of raptor foraging activities (Madsen 1985; Van der Zande et al. 1980; Fyfe and Olendorff 1976). Noise generating activities are expected to occur during all phases of construction between October and July.

Terrestrial noise levels will peak within the vicinity of the project site during impact pile installation, but these sound levels will be expected to decrease to ambient conditions within 5,000 feet from the immediate project site.

Peak terrestrial noise generated during impact pile installation has been estimated at a maximum of approximately 110 A-weighted decibels (dBA), measured at 50 feet (FTA 2006). Baseline and construction-related noise levels were inferred using an industry-standard technique recommended by WSDOT (WSDOT 2013). This guidance includes information regarding noise levels associated with typical construction procedures from the City of Boston's noise assessment methodology (Thalheimer 2000) and noise attenuation data from the Federal Transit Administration's construction noise methodology (FTA 2006).

As stated above, the baseline noise levels associated with the project site and vicinity are relatively high, and this terrestrial noise attenuation analysis assumes baseline noise levels similar to those associated with a high density urban area (70 dBA measured at 50 feet). Hard site conditions were assumed for noise attenuation purposes because the surrounding landscape is largely unvegetated, so the linear attenuation rate was estimated to be approximately -6 dBA per doubling of distance. At this rate, terrestrial noise from -impact pile driving is expected to attenuate to ambient conditions between 3,200 and 6,400 feet from the location of project activities. The following equation was used to determine the distance at which terrestrial noise will attenuate to the baseline noise level of 70 dBA:

$TL = 20*Log(R_1/R_2)$

TL = amount of spreading loss (known noise level – ambient noise level)

R_1 = distance where noise attenuates

R_2 = range of known noise level (50 feet in this case)

$R_1 = (10^{(TL/20)})(R2) = (10^{(110-70/20)})(50) = 5{,}000$ feet

This indicates that terrestrial noise associated with impact pile driving would be expected to attenuate to baseline noise levels within a maximum of 5,000 feet from the location of project activities.

Most of the terrestrial habitat within approximately 5,000 feet of the project site includes Urban/Mixed Environs and is of low quality and low suitability for terrestrial wildlife. Species that utilize these industrialized habitats are generally well adjusted to nearly continuous human presence and activity. Terrestrial habitats at the project site represent low-quality foraging habitat for bald eagle, peregrine falcon, and other raptor species. These species may avoid habitats near the pile driving activity temporarily, but the foraging habitat in the vicinity is sufficient so that a significant adverse effect to any species is not anticipated.

Temporarily elevated terrestrial construction noise levels could extend beyond the project site onto portions of the CRWMB and associated wetlands and forested habitats on the Shillapoo NWR Vancouver Lake Unit. Modeled noise levels in the vicinity of the CRWMB and Shillapoo Vancouver Lake Unit would range between 65 dB at the north end and 75 dB at the south end during impact pile driving (see Figure 12).

In addition to being used extensively by a variety of waterfowl, raptors, migratory birds, small mammals, amphibians, and reptiles, these habitats provide potentially suitable habitat for a number of special status wildlife species. There is potential for these species to be present in these habitats during construction and they could be exposed to periods of elevated terrestrial noise levels. Terrestrial noise from impact pile driving will have attenuated by the time it reaches these habitats (see Figure 12). Additionally, these habitats receive noise from other temporary sources not accounted for in the noise model, including adjacent port activities at other terminals, SR 501 road noise, and seasonal hunting noise (firearms).

These noise levels may potentially be of sufficient intensity to generate a behavioral response, such as head turns to the source or changes in alertness (Pater et. al. 2009), but will not be expected to elicit avoidance or other behaviors that could result in adverse effects to any wildlife species such as missed feeding opportunities, nest abandonment, or increased susceptibility to predation that could result in adverse effects to any special status wildlife species. While data in the literature is lacking, noise levels that typically result in flushing or avoidance behaviors are much higher than modeled. Delaney (2002) found that northern spotted owls did not flush until helicopter noise was 92 dBA and less than 105 meters. Bowles (1995) suggests that most wildlife habituate to loud noises under 100 dBA and exhibit startle responses above that threshold. Modeled noise levels in the CRWMB are well below these levels, therefore there are no expected impacts to special status species using these habitats.

Direct impacts to special status species have been minimized by locating all project activities within and existing industrial site. According to WDFW Priority Habitats and Species (PHS) data, there are no occurrences of special status species within the project site. Within the project vicinity, there are several occurrences of PHS point, including bald eagle nests (approximately 1.2 miles to the west), bald eagle concentration areas (approximately 1.2 miles northwest), sandhill crane concentrations (approximately 3,000 feet west), and great blue heron breeding (approximately 4,000 feet northeast). Waterfowl concentrations are also known to occur on Vancouver Lake, approximately one mile north of the project.

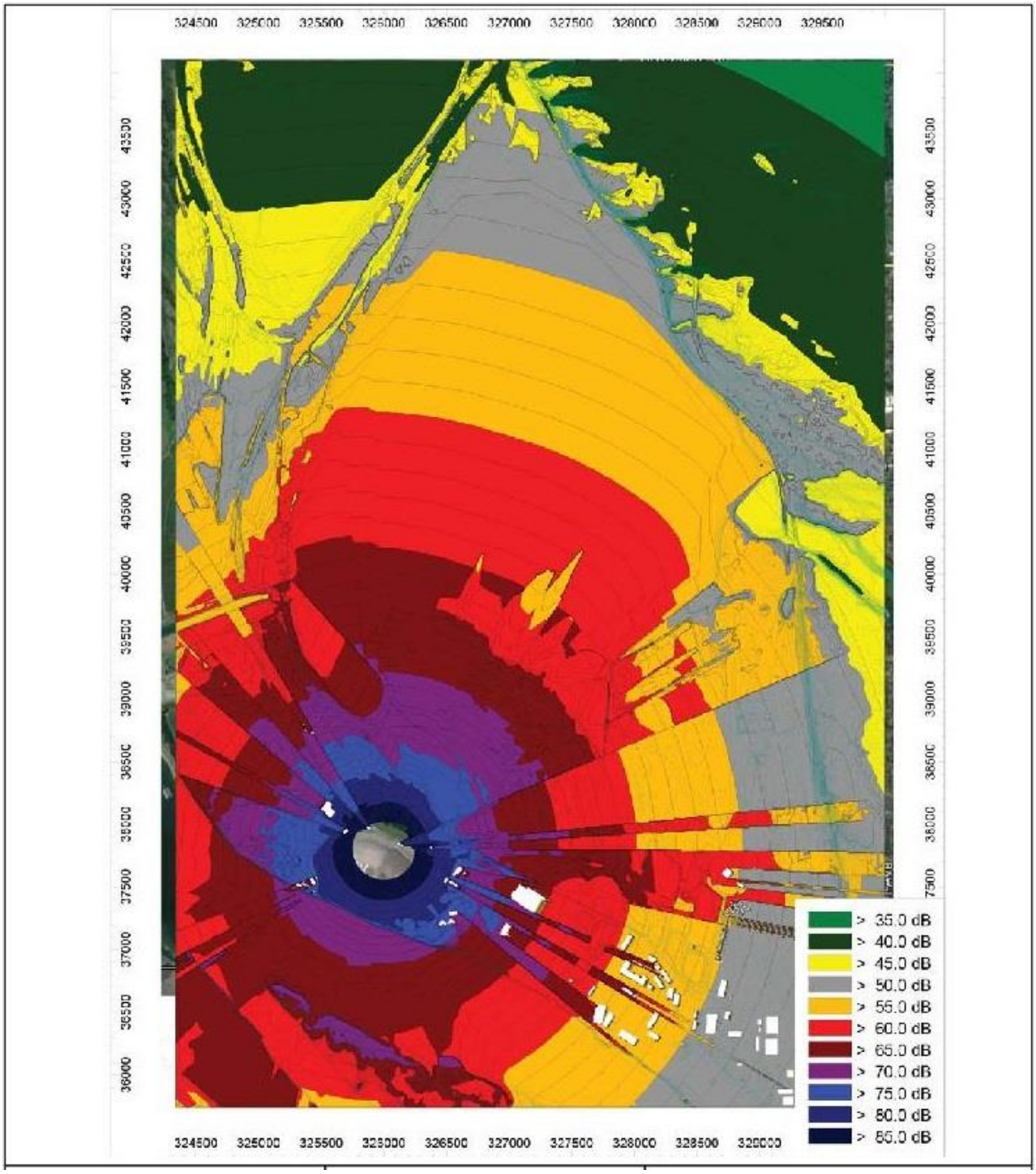

Figure 12. Modeled Temporary Impact Pile-Driving Noise Levels in the Project Vicinity

Temporary construction noise has been minimized to the extent practical to reduce impacts to special status species using habitats (e.g., foraging and resting) within the project vicinity. Peak construction noise would be generated by impact pile driving for the rail unloading facility and has been located outside of WDFW and USFWS recommended management buffers for bald eagle nests (660 feet and 0.5 miles respectively) and great blue heron rookeries (656 feet). Foraging or resting species may be temporarily displaced from habitats within the project vicinity during periods of construction noise. These impacts have been minimized during construction sequencing to complete the noise generating aspects of construction as efficiently as possible.

In addition, the aquatic portion of the action area is suitable foraging and resting habitat for several species of shorebirds and waterfowl and foraging habitat for marine mammals. Shorebirds and waterfowl will avoid the area in the immediate vicinity of vibratory pile installation and removal activity temporarily, but the foraging and resting habitat in the vicinity is sufficient, and this is not expected to represent a significant adverse effect.

Elevated underwater noise can also affect aquatic wildlife species, particularly marine mammals. WSDOT recently published a memorandum reporting average root mean square (rms) values associated with vibratory installation of 30-inch steel piles as ranging from 164 to 176 dB_{RMS} with an overall average rms value of 171 dB_{RMS} (Laughlin 2010). WSDOT also published data in 2011 documenting average underwater sound pressure levels of 150 dB_{RMS} at a distance of 10 meters from the pile, during vibratory removal of timber piles (WSDOT 2011). For purposes of this analysis, therefore, it has been assumed that underwater noise associated with vibratory pile installation and removal will not exceed 176 dB_{RMS}.

Vibratory pile installation and removal is not expected to generate levels of underwater noise that will result in significant adverse effects to marine mammals. NMFS has established a disturbance threshold of 120 dB_{RMS} for pinnipeds. Vibratory pile installation and removal may result in underwater sound levels that meet or exceed this threshold throughout the project vicinity. Any marine mammals that are present within this distance of the pile could be temporarily disturbed. The extent of effects associated with vibratory pile installation and removal would not be expected to exceed mild disturbance. Marine mammals are also not expected to occur in great numbers within the portion of the project site and vicinity that could potentially receive elevated underwater noise levels during the in-water work period. For these reasons, marine mammals are not expected to be significantly affected by underwater construction noise.

During construction, small vessels, tugs, and work barges will be used in support of in- and over-water construction activities. This equipment would be furnished and operated by contractors to Vancouver Energy. This equipment could be contaminated with aquatic invasive species if it was previously used in waterbodies outside the Columbia River where such species are present and if the equipment was not properly cleaned prior to arrival at the Vancouver Energy work location. Certain construction materials (e.g., temporary piles) could also have been previously employed at other locations and may transport invasive species if not properly cleaned.

Operation

The operation of the proposed project could affect wildlife habitat and special status wildlife species through operational water quality impacts, including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery and a potential for catastrophic accidents such as a spill to surface

water. Lighting associated with the project could lead to direct and/or indirect impacts to wildlife species because it may affect the nocturnal behavior of animals within the project vicinity, including bird and bat species. Increased shipping traffic also could result in effects associated with the operation of the Facility.

Operational Water Quality Impacts – Operational water quality impacts that could be associated with the proposed project include an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery and a potential for accidental spills during transportation of product by rail or vessel.

The project has the potential to increase stormwater runoff at the site, which could affect water quality and quantity. The project will provide both water quality and water quantity treatment.

Terrestrial habitats could be affected by an increased potential for spills or leaks. Accidental leaks or spills of fuel or other chemicals into surface- or groundwater at the project site have the potential to reduce habitat suitability for shorebirds and waterfowl as well as marine mammals.

Spills occurring at time of vessel loading will have the potential to affect wildlife species adversely as well as shorebirds, waterfowl, and marine mammals, as these species occupy aquatic habitats at the project site and within the vicinity. A spill while in transit in the project's shipping prism also has the potential to affect a number of special status species, depending on the location of the spill.

Impacts to special status wildlife species from water quality impacts related to normal operation of the Facility are expected to be minor.

Increased Shipping – The operation of the Facility will result in an increase in the number of ships transiting the Columbia River within the project site, vicinity, and shipping prism. It is estimated that the proposed Facility will result in approximately 140 ship trips per year in the first full year of operations, and up to 365 ship trips per year at full capacity. Marine traffic on the Columbia River has the potential to result in impacts to wildlife through increases in the potential for shoreline erosion associated with propeller wash as well as waves, and through the introduction of exotic species, and (for certain species) through increased potential for direct mortality through ship strikes.

- *Bank Erosion* – Propeller wash from ships in transit, as well as wakes breaking on shore, could cause increased erosion along unarmored sections of shoreline. Erosion can re-suspend eroded material within the water column, increasing turbidity, which can affect habitat suitability for fish, marine mammals, and other aquatic organisms. While most of the streambanks in the project vicinity are armored, and thus less susceptible to erosion, unarmored beaches could be susceptible to erosion from vessel wakes.

  Wildlife habitat and special status wildlife species within the project site, vicinity, and shipping prism may be affected by an increased potential for bank erosion that will result from increased ship traffic. Streambanks at the project site are well armored, and not particularly sensitive to erosion, so these habitats will not likely be affected. Elsewhere in the project vicinity and shipping prism there are unarmored banks which could potentially be susceptible to increased erosion from vessel wakes. This could result in temporary degradation of wildlife habitat suitability and could affect special status wildlife species. However, because shoreline erosion is a natural phenomenon at susceptible locations and vessel wakes from existing shipping activity also occur, the fish and marine mammals that

use these habitats have typically adapted to the conditions that attend the erosion, primarily temporary, localized turbidity. Benthic organisms can also be affected, as they are known to be more abundant in shallow water than in deep water. These organisms, however, typically recolonize disturbed areas very quickly. See section 5.2.1 for additional discussion on bank erosion.

- *Exotic Species* – Ships in transit could potentially import exotic and/or invasive species on their hulls and exterior equipment and/or in ballast water. Introduced species often can out-compete native species and have the potential to alter natural habitats by competing with native species significantly. Similarly, spill response equipment may be contaminated if it is brought from off-site locations where it may have contacted waters known to contain aquatic invasive species. See section 5.2.1 for additional discussion on exotic species.
- *Ship Strikes* – The addition of 140 vessel transits per year in the first full year of operations, and up to 365 ship transits per year at full capacity on the Lower Columbia River, as well as in marine waters during transit has the potential to result in collisions of ships with species that include sea turtles, marine mammals, and cetaceans. Although sea turtles and cetaceans will not occur in the immediate vicinity of the project site or its vicinity, they could be affected in marine waters by vessels transiting to/from the Columbia River.

5.1.3 Fish Resources

Fish habitat both at the project site and within the project vicinity also could be temporarily affected by the potential for temporarily reduced water quality conditions during construction and the generation of temporarily elevated levels of underwater noise during temporary pile installation and removal, permanent pile removal, and installation of ground improvements. At the scale of the shipping prism, fish and fish habitat would not be directly or indirectly affected by project construction.

Construction of the improvements to the Marine Terminal (Area 400) is not expected to result in permanent impacts to aquatic habitats. The proposed dock improvements have the potential to affect aquatic habitat through changes in the amount and configuration of overwater coverage at the site. Minor increases in overwater coverage would occur in deeper water and outside of the SWH zone and would include an open truss configuration to allow light penetration. There would be no increase in the number of piling or overwater coverage through the SWH zone as a result of improvements to the access trestle. Additional information regarding the impacts of the project to aquatic habitat with respect to fish can be found in section 6.3.

Construction of the proposed project could result an increase in the establishment and spread of noxious weeds in the project site. Proposed construction would result in new ground disturbance potentially allowing existing weed populations to spread. Seeds could also be introduced through construction vehicles entering and leaving the proposed Facility location, which could result in the establishment and spread of new species.

Direct Habitat Modification – The project will not result in any net increase in permanent impacts below the OHWM of the Columbia River (see Figure 6). Removal of existing overwater structures and piles will offset the additional overwater coverage associated with the project. The project proposes to remove 15 steel piles (eleven 18-inch steel pipe piles and four 12-3/4-inch steel pipe piles) restoring approximately 23 square feet of benthic habitat at the project site.

The project has been designed to minimize the extent of impact to the aquatic environment, and as such, will not require the installation of any permanent piles below the OHWM of the Columbia River. The project may, however, require the installation of up to 40 temporary piles to support the guides that will be used for the concrete formwork. It is estimated that up to approximately 40 temporary piles may be required. These temporary piles will be 18- to 24-inch-diameter open-ended steel pipe or H-piles and will be installed with a vibratory hammer. These piles will only be placed for short period of time (on the order of hours or days) and any temporary loss of productivity will be minor and the area is expected to recolonize following removal.

Additionally, the project will result in a net reduction of approximately 400 square feet of solid overwater coverage, 1,370 square feet of grated overwater coverage, and a net increase of approximately 920 square feet of open truss overwater coverage associated with walkways.

During the installation of ground improvements, construction may occur at night to complete required work during the applicable fish window and would require additional temporary lighting on the shoreline, increasing the amount of light on the water. Increased light levels may affect fish by attraction.

The aquatic portion of the project site provides habitat for a number of native fish species, including the 14 special status wildlife species identified in Table 4-3. Nearshore habitats in particular (those less than approximately 20 feet deep) provide suitable migratory and foraging habitat for juvenile salmonids and trout, lamprey, minnows, eulachon, and other native fish species. Deep-water habitats provide these functions for returning adult ESA-listed salmon, and also provide suitable migratory and foraging habitat for sturgeon.

The project will not result in an increase in impacts to benthic habitat or overwater coverage and therefore impacts to fish habitat at the project site are not expected to result in any significant effect on the quality or function of the habitat. The impacts of new overwater coverage will be offset by the removal of existing piles and overwater structure. Because the project will not result in a net increase in impact to either benthic habitat or overwater coverage, the project is not expected to result in any measurable or significant impact to the quality or function of habitat for special status fish species or to any designated or proposed critical habitats for them.

Temporary Water Quality Impacts – As with any construction project, there is a potential for leaks and/or inadvertent releases from construction equipment. The proposed overwater work creates the potential for construction debris to enter the waterway. Equipment and storage containers associated with the proposed project also create slight potential for leaks and inadvertent releases of fuel, hydraulic fluids, lubricants, and other chemicals.

The proposed project also has the potential to disturb sediments and increase turbidity temporarily at the project site during temporary pile installation and removal activities. Increased levels of turbidity could have temporary negative impacts on aquatic habitats and, if any special-status fish species are present during the time of construction, could affect them directly.

These potential temporary water quality impacts have the potential to affect fish habitat function and special status fish species both at the project site and within the project vicinity, by reducing water quality, reducing visibility and increasing potential exposure to predators, and reducing habitat suitability for prey species. These effects would be temporary, and conditions would return to baseline conditions following completion of construction. At the scale of the project

shipping prism, fish and fish habitat would not be affected by any temporary water quality impacts associated with construction, as these effects would be localized to the project vicinity.

During the in-water work period (anticipated to be November 1 to February 28), outmigrating juveniles and migrating adult salmon, steelhead, and bull trout could be present within the action area, as could migrating adult Pacific eulachon. Larval and juvenile eulachon are not expected to be present during the in-water work period. Similarly, green sturgeon will not be exposed to any direct effects of temporarily decreased water quality, as they are not expected to be present within the project vicinity during the in-water work period.

Special status salmon, steelhead, bull trout, and Pacific eulachon, if present, likely will be migrating through the project site and vicinity, and are not expected to be present for any significant period. Habitat suitability for adult and juvenile salmonids, steelhead, bull trout, and adult Pacific eulachon is limited at the site, and provides little function aside from a suitable migratory corridor. Fish are expected to move rapidly through the site and vicinity. Exposure to temporarily decreased water quality conditions, including temporarily elevated turbidity levels and/or potential debris contamination, is expected to be limited, and effects to fish habitat and special status fish species will be minor.

Designated and proposed critical habitats within the action area also may experience temporarily increased levels of turbidity during the proposed action. The geographic extent and duration of any potential short-term increases in sedimentation or turbidity are expected to be limited, and are not expected to exceed baseline sedimentation conditions measurably. Any temporarily elevated sedimentation levels will not result in any significant effect to any PCE of designated or proposed critical habitat for any species.

Temporary Construction Noise – The proposed project has the potential to result in temporarily elevated terrestrial and underwater noise levels at the project site and within the project vicinity during temporary pile installation and removal, and impact pile driving for Area 400 improvements, including shore-based mooring points, dolphin access points, and the trestle abutment.

Elevated underwater noise has the potential to affect fish in several ways. The effects can range from the alteration of behavior to physical injury or mortality, depending on the intensity and characteristics of the sound, the distance and location of the fish in the water column relative to the sound source, the size and mass of the fish, and the fish's anatomical characteristics (Hastings and Popper 2005). The effects of temporarily elevated noise levels can range from mild disturbance to severe auditory damage or death.

In-Water Pile Installation and Removal. As part of impact minimization, a vibratory hammer will be used for all in-water pile driving. Construction of the marine terminal is expected to install and remove up to approximately 40 temporary piles with vibratory methods. A vibratory hammer will also likely be used to remove approximately 15 existing piles from below the OHWM of the river at the marine terminal area. Some piles may also be removed through direct-pull methods, which would further reduce the potential for temporarily elevated underwater noise levels.

This analysis assumes that forty 30-inch-diameter temporary steel piles would be installed to support dock modifications. Since the exact type and size of temporary piles are not known, temporary piles would most likely be steel piles, and would not exceed 30-inches in diameter.

WSDOT recently published a memorandum reporting average root mean square (rms) values associated with vibratory installation of 30-inch steel piles as ranging from 164 to 176 dB_{RMS} with an overall average rms value of 171 dB_{RMS} (Laughlin WSDOT 2010). WSDOT also published data in 2011 documenting average underwater sound pressure levels of 150 dB_{RMS} at a distance of 10 meters from the pile, during vibratory removal of timber piles (WSDOT 2011). For purposes of this analysis, therefore, it has been assumed that underwater noise associated with vibratory pile installation and removal will not exceed 176 dB_{RMS}.

Vibratory pile installation and removal is not expected to generate levels of underwater noise that will result in significant adverse effects to fish habitat or species. NMFS has established a disturbance threshold of 150 dB_{RMS} for fish of any size. Vibratory pile installation and removal may result in maximum underwater sound levels that meet or exceed this threshold at a distance of approximately 541 meters from the pile, respectively. Any fish that are present within this distance of the pile could be temporarily disturbed. During vibratory pile driving, fish may avoid the area temporarily, but this is unlikely to affect feeding and/or migratory activities significantly. Any elevated underwater noise levels associated with the proposed project will be temporary and will have no effect on any fish species, fish habitat, or any PCE of designated or proposed critical habitat for ESA-listed fish species.

Upland Impact Pile Installation. The project will conduct impact pile driving at the top of the bank within approximately 15 feet of the OHWM to construct several Area 400 elements, including two pile-supported shore-based mooring points, mooring dolphin access points, and strengthen the access trestle abutment. These structures would most likely be supported by 24- and/or 36-inch steel piles. Upland pile installation typically generates significantly lower levels of in-water noise than those generated during in-water pile driving. However, sound flanking (transmission of sound waves through substrate and into the aquatic environment) during upland pile driving has been documented in the literature (Batelle 2004; Caltrans 2012), and can potentially generate elevated underwater sound pressure levels in adjacent aquatic habitats. Upland impact pile driving will also occur within Area 200 (rail unloading building foundation support) and Area 500 (pipe foundation supports), but these locations are not in close proximity to OHWM and are not expected to result in sound flanking.

Underwater sound pressure levels generated by upland pile driving have been documented during construction of the Geyserville Bridge in Geyserville, California, in 2006 (Caltrans 2012), and during construction of a temporary work trestle for replacement of a portion of the Hood Canal Bridge in 2004 (Batelle 2004). Data collected during the Geyserville Bridge project documented average sound pressure levels, recorded at a distance of approximately 30 to 35 meters from the pile, averaging approximately 186 dB_{PEAK}, 171 dB_{RMS}, and 162 dB_{SEL}, with maximum sound pressure levels approximately 5 dB higher (Caltrans 2012). Data collected during the Hood Canal Bridge project documented average peak sound pressure levels between approximately 164.3 and 179.6 dB_{PEAK}, and average RMS sound pressure levels ranging between approximately 147.6 and 166.2 dB_{RMS}. While site conditions are likely an important and highly variable factor in the extent to which sound pressure is transmitted to the adjacent aquatic environment, for purposes of this consultation, a worst case estimate of underwater noise levels that could be generated during upland impact pile driving of 24- and 36-inch steel piles is estimated at approximately 191 dB_{PEAK}, 176 dB_{RMS}, and 167 dB_{SEL} (Caltrans 2012).

The noise attenuation analysis indicates that the worst-case estimate of up to 6,000 strikes per day that may be necessary to drive upland piles to final elevation could exceed the cumulative

underwater noise injury thresholds for fish greater than 2 grams (187 dB_{RMS}) and for fish less than 2 grams (183 dB_{RMS}) within approximately 1,338 feet of pile driving activity. This would extend throughout the nearshore environment and approximately halfway across the Columbia River at the project site. However, these worst-case estimates result in turn from the worst-case estimate of 6,000 strikes per day, and the estimates also assume that noise is transmitted fully to the adjacent aquatic environment through the soil.

WSDOT (2014) reports that there is no approved method for calculating transmission loss (i.e., attenuation) through soil outside of the water, and then for calculating the sound level at the point at which sound is transmitted into the adjacent aquatic habitat. WSDOT has conducted monitoring on only a few projects in which piles have been driven in the dry adjacent to or within the OHWM of a river. This includes H-piles and 16-inch and 72-inch steel piles. In all cases, the pile installation did not exceed the currently established injury thresholds for fish (WSDOT 2014). Based on this information, WSDOT has concluded that pile driving in the dry is an effective means of minimizing effects to fish (WSDOT 2014).

In order to further minimize the potential for exposure of ESA-listed fish species to cumulative underwater sound pressure levels that could result in injury, upland impact pile driving associated with Area 400 improvements (mooring points, dolphin access points, and trestle abutment) would be restricted to the in-water work window. Additionally, given the nature and quality of the habitat at the site, most fish are expected to be moving through the action area, and they would not be expected to be exposed to the sound from all of the impact strikes in a given day.

For these reasons, it is unlikely that any ESA-listed fish species would be exposed to cumulative underwater sound pressure levels above the established injury threshold.

Upland Ground Improvements. Temporary noise levels associated with vibratory installation of temporary sheet pile containment wall above the OHWM and installation of ground improvements will be less than those of impact-drive piles considered for possible effects. Additional impacts to aquatic species will, therefore, not be incurred. Given the nature and quality of the habitat, however, most fish are expected to be moving through the action area; their exposure to the sound from all 6,000 strikes per day is not expected.

Upland impact pile driving associated with the installation of the upland mooring points and trestle abutment improvements would be restricted to the in-water work window. Additionally, given the nature and quality of the habitat at the site, most fish are expected to be moving through the area, and would not be expected to be exposed to the sound from all of the impact strikes in a given day. For these reasons, it is unlikely that fish would be exposed to cumulative underwater sound pressure levels above the injury threshold that has been established for ESA-listed species, and this activity is not expected to result in any adverse effects to fish habitat, or to any PCE of designated or proposed critical habitat for ESA-listed fish species.

5.1.4 Wetland Resources

Impacts associated with the construction of the proposed upland facilities and in-water improvements have the potential to result in effects associated with direct permanent and temporary modification of terrestrial and aquatic habitats as well as through the potential for temporarily reduced water quality conditions during construction, and through the generation of temporarily elevated levels of underwater and terrestrial noise during pile removal.

None of these impacts are expected to result in any measurable or significant temporary or permanent wetland impacts at the project site, project vicinity, or project shipping prism scales. There are no wetlands present on the project site, and the project will not result in any direct permanent or temporary wetland fills. At the scale of the project vicinity, there is a chance that off-site wetlands would be indirectly permanently and/or temporarily affected by construction or operational water quality impacts. Wetlands within the shipping prism would not be affected by construction-related water quality impacts. Wetland function will not be affected by temporarily elevated noise levels during construction.

5.2 Operation

The operation of the proposed Facility could affect biological resources through operational water quality impacts. The operation of the facility also could result in effects associated with the increase in shipping traffic that will occur in conjunction with the proposed project. These impacts are discussed in greater detail below.

5.2.1 Terrestrial Vegetation and Habitat

The operation of the proposed project could permanently and indirectly affect vegetation and terrestrial wildlife habitats through operational water quality impacts, including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and through an increased potential for catastrophic accidents such as a spill to surface water. The operation of the Facility also could result in effects associated with the shipping traffic that will occur in conjunction with the proposed project.

Operational Water Quality Impacts – Operational water quality impacts that could be associated with the proposed project include an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as an inadvertent crude oil release to surface water.

The project has the potential to increase stormwater runoff at the site, which could affect water quality and quantity. The entire Facility is located on 47.4 acres, and the proposed construction will result in approximately 44.4 acres of impervious surface. Treatment for stormwater will include enhanced treatment at Area 300 (Storage) and basic treatment at other areas of the Facility, with discharge to existing stormwater systems at Terminal 4 and Terminal 5. The proposed facilities will provide both water quality and water quantity treatment and will be designed to handle the six-month, 24-hour event as estimated using Ecology's Western Washington Continuous Simulation Hydrology Model (Ecology's hydrology model).

The operation of the Facility also has the potential to increase the risk of catastrophic accidents, such as an inadvertent release of crude oil to the environment. While the likelihood of such an event is exceedingly low, the possibility must be addressed. According to projected volumes, the proposed project will result in approximately 140 shipping trips annually in the first full year of operations, and up to 365 shipping trips per year at full capacity. Spills could occur at the project site or while docking or filling, or in transit downstream on the Columbia River or in marine waters.

Terrestrial vegetation and wildlife habitats will not be affected significantly by any potential water quality impacts associated with operation of the proposed project. Terrestrial habitats that

would remain at the project site post-construction could potentially be affected by an increased potential for spills or leaks. The project has implemented several impact minimization measures and best management practices (BMPs) to reduce the potential for any spills or release of materials to occur, and to minimize the extent of any impacts resulting from any accidental spill or release. A comprehensive strategy for spill prevention and control for the project as described in the Spill Prevention, Control and Countermeasure (SPCC) Plan will be implemented. A spill to surface water would not be likely to affect terrestrial vegetation or wildlife habitats.

Shipping – The operation of the Facility will result in ships transiting the Columbia River within the project site, vicinity, and shipping prism. It is estimated that the proposed Facility will result in approximately 140 ship trips per year in the first full year of operations, and up to 365 ship trips per year at full capacity. Marine traffic on the Columbia River has the potential to result in impacts to vegetation and wildlife habitats through increases in the potential for shoreline erosion associated with propeller wash and wake, and through the introduction of exotic species.

- *Shallow Water Habitat* – During loading operations, potential activities that could affect the SWH zone include the use of two moveable, grated walkways to provide access to the mooring dolphins. These walkways are only intended to cross the SWH zone when vessels are mooring or departing. When not in use, the walkways will be staged onshore. The vessel mooring occurs in deep water, outside the SWH zone, and will not increase temporary shading. Therefore, no additional impacts will occur to the SWH zone as a result of project operations, and there will be no further degradation of the nearshore migratory corridor used by salmonids and other fish species.

- *Bank Erosion* – Propeller wash from ships in transit, as well as vessel wakes breaking on shore, could cause an increase in bank erosion along unarmored sections of the shoreline. The shoreline at the Facility site is well armored, and not particularly sensitive to erosion. At the Facility, and other armored shorelines on the river, the impact of vessel traffic on bank erosion should be negligible. Elsewhere in the project vicinity and shipping prism, there are unarmored banks, which could potentially be susceptible to erosion. Effects associated with bank erosion would be minor, temporary and localized to unarmored banks, and would result in only minor impacts to vegetation and terrestrial wildlife habitat. This could result in a minor decrease in the quantity and quality of vegetation and terrestrial wildlife habitat along the shoreline. However, the risk of adverse effects to shoreline habitat from increased bank erosion caused by vessels calling at the Facility is minimal.

  The Corps' Channel Deepening EIS (USACE 1999) reported that the natural shorelines of the lower Columbia River (encompassing the vessel corridor for the project) have remained very stable over the past 100 years, consisting largely of erosion-resistant sand, silt, and clay deposits (USACE 1999). Approximately half of the shoreline between RM 21 and 106 are consists of dredge disposal sites which are not natural shorelines and are highly susceptible to erosion (USACE 1999). The disposal sites are subject to vessel wakes, currents, and continual wind waves which contribute to regular erosion patterns in the river (USACE 1999).

  The vessel corridor and habitats along the shoreline are already exposed to vessel wakes from the ships that use the river and a baseline level of propeller scour. The vessels that would call at the Facility terminal are within the size range of current vessels and would be piloted at similar speeds and course through the navigation channel. Therefore, the wakes from these

vessels would be similar to wakes from vessels currently using the navigation channel. This means the natural shorelines, which have little susceptibility to erosion, would be subject to an incremental increase in vessel wakes that are not currently causing erosion. As a result, any localized minor change would not be expected to result in a long-term change to the habitat because there is a regular state of disturbance. In addition, these habitats are continually disturbed by natural currents and waves.

- *Exotic Species* – – Ships in transit could import exotic and/or invasive species on their hulls and exterior equipment and/or in ballast water. However, operators of commercial vessels have a significant economic interest in maintaining underwater body hull platings in a clean condition. Fouled bottom platings result in increased fuel costs and can reduce the vessel's maximum transit speed. To prevent fouling and higher costs, operators preserve and maintain the hulls of their ships aggressively (FERC 2008), greatly reducing the risk of the transport of exotic species. Additionally, the USCG has developed mandatory practices for all vessels with ballast tanks in all waters of the United States. Washington has developed similar requirements. These practices include requirements to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin, to regularly remove fouling organisms from the hull, piping, and tanks, and to dispose of any removed substances in accordance with local, state, and federal regulations. This also reduces the risk of the transport of exotic species.

  During operation, with the exception of tanker vessel and ATB calls for loading as discussed below, the following activities involve an in-water component that could also potentially introduce exotic species: the placement and removal of Facility-owned mobile spill booms during vessel loading operations; participation of Facility[6] and contractor vessels[7] in spill response exercises; and participation of Facility and contractor vessels in spill response activities.

  With respect to Facility-owned equipment, the skiff and mobile booms will be primarily used at Vancouver Energy Terminal. The Applicant may enter into mutual aid agreements with other facilities; in the event of drills or incidents at such other facilities the skiff and booms could be dispatched to those locations to participate in response; it is anticipated that mutual aid agreements would primarily be entered into with facilities located along the Columbia River. The skiff and booms would therefore most likely only be exposed to waters within the Columbia River, and there is negligible potential for contamination with invasive species which are not already present in this waterbody. If the equipment was dispatched outside the Columbia River, it would be inspected and cleaned in accordance with the state requirements noted above before being re-introduced to the Columbia River.

  With respect to spill response equipment not owned by the Facility but furnished by third party organizations that the Applicant will contract with (including organizations providing mutual aid), based on the current equipment requirements for the Columba River, there are

[6] The only vessel anticipated to be directly operated by the Facility will be the skiff associated with the Area 400 Marine Terminal, as described in Section 2.3.7 of the Application for Site Certification No. 2013-01 Supplement, February 2014.

[7] The Applicant has identified mutual aid agreements in their Operations Spill Contingency Plan, July 2015; organizations providing mutual aid may supply vessels during drills and spill response activities.

sufficient response resources to meet the current 300,000 bbl response planning standard currently staged on or in proximity to the river[8]. Therefore, this equipment also has minimal potential for introduction of species not already present in the Columbia River. Contractors and mutual aid providers may source equipment from other locations in the event of larger and more complex spill drills or response activities. In such cases, contractors and mutual aid providers are also required to comply with applicable state statutes and rules aimed at preventing the introduction of such species, as identified above.

If introduced species can often out-compete native species, and have the potential to alter natural habitats significantly. Once an aggressive exotic species is introduced, it may be nearly impossible to eradicate it. However, the BMPs that will be in place for the proposed operation of the terminal including hull maintenance and ballast water practices (section 2.23.3.3) will greatly minimize the potential for any transport of these species. For these reasons, the proposed project is unlikely to result in a significant risk of the increased transport of exotic and/or invasive species.

5.2.2 Wildlife Resources

The operation of the proposed project could affect wildlife habitat and special status wildlife species through operational water quality impacts, including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery and a potential for catastrophic accidents such as a spill to surface water. Lighting associated with the project could lead to direct and/or indirect impacts to wildlife species because it may affect the nocturnal behavior of animals within the project vicinity, including bird and bat species. Increased shipping traffic also could result in effects associated with the operation of the Facility.

Operational Water Quality Impacts – Operational water quality impacts that could be associated with the proposed project include an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery and a potential for spills to surface waters during transportation of product by vessel.

The project has the potential to increase stormwater runoff at the site, which could affect water quality and quantity. Stormwater from the storage area will be treated to enhanced water quality standards and discharged to the existing Terminal 4 stormwater system. Stormwater from areas 200, 500, and 600 and the rail improvements will be treated to basic levels and discharged to the existing Terminal 5 stormwater system. Stormwater from Area 400 will be treated to an enhanced treatment level and conveyed to existing infiltration swales located immediately north of the site. Stormwater treatment facilities will be sized to accommodate the six-month, 24-hour event as estimated using Ecology's hydrology model. The proposed stormwater treatment will provide treatment to a level that is consistent with the discharge permits applicable to the Facility and will ensure that fish and fish habitat are not adversely affected by operational stormwater.

Operations at the site will be governed by an SPCC Plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks

[8] If an increase of the spill response planning standard were approved in the future, spill response organizations receiving such approval would acquire necessary additional response equipment and stage it appropriately in proximity to the Columbia River on a permanent basis, thereby also minimizing the potential for introduction of aquatic invasive species.

or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs and safety and security measures will minimize the risk of impacts to biological resources.

These impact minimization measures and BMPs will fully mitigate for the operational water quality impacts associated with the project.

Increased Shipping – The proposed project will result in approximately 140 ship trips per year in the first full year of operations, and up to 365 ship trips per year at full capacity. Increased marine traffic on the Columbia River has the potential to result in impacts to fish and fish habitat through increases in the potential for fish stranding, increased potential for shoreline erosion associated with propeller wash and wake, and through the introduction of exotic species.

- *Bank Erosion* – See section 5.2.1 for a detailed discussion on bank erosion.
- *Exotic Species* – See section 5.2.1 for a detailed discussion on exotic species.
- *Ship Strikes* – The addition of approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity on the Lower Columbia River, as well as in marine waters during transit has the potential to result in collisions of ships with species that include sea turtles, marine mammals, and cetaceans. Although sea turtles and cetaceans will not occur in the immediate vicinity of the project site or its vicinity, they could be affected in marine waters by vessels transiting to/from the Columbia River.

5.2.3 Fish Resources

The operation of the proposed project could permanently and indirectly affect fish habitat and special status fish species through operational water quality impacts, including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and through an increased potential for catastrophic accidents such as an inadvertent release to surface water. The operation of the Facility also could result in effects associated with the shipping traffic that will occur in conjunction with the proposed project.

Operational Water Quality Impacts – Operational water quality impacts that could be associated with the proposed project include an increased potential for impacts associated with temporary water quality during vessel berthing, stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as an inadvertent crude oil release to surface water.

During vessel berthing, temporary impacts to water quality (increased turbidity) could occur from sediment suspended by propeller wash. The impacts could occur twice per day as vessels dock and depart. Temporary increases in turbidity are likely to be short in duration and dissipate naturally in response to river currents. Vessels will dock outside the SWH zone in deep water where any potential increase in temporary turbidity is not expected to be significant.

The project has the potential to increase stormwater runoff at the site, which could affect water quality and quantity. The entire Facility is located on 47.4 acres, and the proposed construction will result in approximately 44.4 acres of impervious surface. Treatment for stormwater will include enhanced treatment at Area 300 (Storage) and basic treatment at other areas of the Facility, with discharge to existing stormwater systems at Terminal 4 and Terminal 5. The proposed facilities will provide both water quality and water quantity treatment and will be designed to handle the six-month, 24-hour event as estimated using Ecology's Western Washington Continuous Simulation Hydrology Model (Ecology's hydrology model).

The operation of the Facility also has the potential to increase the risk of catastrophic accidents, such as an inadvertent release of crude oil to the environment. While the likelihood of such an event is exceedingly low, the possibility must be addressed. According to projected volumes, the proposed project will result in approximately 140 shipping trips annually in the first full year of operations, and up to 365 shipping trips per year at full capacity. Spills could occur at the project site or while docking or filling, or in transit downstream on the Columbia River or in marine waters.

The project site and vicinity provide documented habitat for the adult and juvenile forms of several special status populations of salmon, steelhead, and bull trout as well as for Pacific eulachon, green sturgeon, Pacific and river lamprey, and leopard dace. While run timing differs by species and population, these populations may be present within the project site and/or vicinity at various times during the year. Since operational impacts will not be restricted to an in-water work window, each species and its habitat have the potential to be affected by water quality impacts associated with the operation of the Facility.

Habitat suitability for native fish (including special status species) is limited at the site. The project site and vicinity primarily provide habitat as a migratory corridor. For this reason, fish are expected to move rapidly through the vicinity.

Accidental leaks or spills of fuel or other chemicals into surface- or groundwater at the project site have the potential to reduce fish habitat suitability, which also could affect special status fish species. However, the project has implemented several impact minimization measures and BMPs to reduce the potential for any spills or release of materials to occur, and to minimize the extent of any impacts resulting from any accidental spill or release.

Proposed stormwater treatment for new impervious surface at the site will minimize the potential for any adverse effects associated with stormwater. The proposed stormwater treatment will result in an improved water quality condition within the project site in the long term, and will not result in any adverse effects to fish habitat or to special status fish species.

A release to surface water has the potential to result in significant adverse effects to habitat for fish habitat and for special status fish species and their designated or proposed critical habitats. Fish that were exposed to high concentrations of spilled crude oil or other fuels could experience a range of effects up to and including direct mortality. However, the likelihood of a spill is extremely low, and the proposed BMPs and safety and security measures will manage the risk of impacts to fish species and habitats effectively.

Impacts to fish habitat and to special status fish species and their designated or proposed critical habitats from water quality impacts associated with operation of the facility are expected to be minor.

Increased Shipping – The operation of the Facility will result in an increase in the number of ships transiting the Columbia River within the project site, vicinity, and shipping prism. It is estimated that the proposed Facility will result in approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity. Marine traffic on the Columbia River has the potential to result in impacts to biological resources through increases in the potential for fish stranding and shoreline erosion associated with propeller wash and wake, and through the introduction of exotic species.

- *Wake Stranding* – Wake stranding occurs when fish are caught in the wave created by a passing ship and deposited on shore by the wave the wake generates. An analysis pertinent to vessel wakes and fish stranding within the Vessel Corridor area was completed for the project (see Appendix H.5) and provides a review of wake stranding as the mechanism which could cause mortality for juvenile salmonids and eulachon as a result of wakes caused by deep-draft vessels. The focus of this review is the lower 104 miles of the Columbia River, between the Pacific Ocean and Vancouver, Washington. The study concluded wake stranding occurs on a small subset of the shoreline beaches of the vessel corridor. Pearson et al. (2008) predicted that 16 percent or about 33 miles of non-contiguous beaches had some potential to strand fish. When additional beach morphology criteria (i.e., beaches with slopes flatter than about 5 or 6 percent) were included, Person et al. (2008) predicted that about 4 percent or about 8 miles of beaches had a high susceptibility to stranding. All the beaches in this 8 mile total are located upstream of RM 33. These results indicate that stranding risk is relatively high only in a very small portion of the 208 miles of shoreline in the Vessel Corridor and all these beaches are upstream of the lower 33 miles of the Columbia River.

  With respect to stranding of Chinook salmon, only small (35mm to 80mm) fish of one age group (0+ subyearlings) is at risk of stranding and only when present in shallow water. During the Pearson et al. (2006) study, a total of 126 ship passages were observed at the three study sites (County Line Park, Barlow Point, and Sauvie Island), and 46 passages resulted in the stranding of 520 fish of all species. The majority (426 fish, 82 percent) of stranded fish were small subyearling (age-0+) Chinook salmon. A total of eight juvenile chum salmon and seven juvenile coho salmon were stranded, for a combined total of 441 juvenile salmon (85 percent of all fish). Non-salmon comprised 15 percent of the observed stranded fish. Although yearling (age-1+) Chinook salmon, juvenile steelhead, and sculpin were detected in beach seines nets at the study sites in very low numbers, they were not observed in stranding events.

  Overall, subyearling (age-0+) Chinook salmon are the species that are most often stranded by vessel wakes. That species and life stage was also the most common fish captured in beach seine nets at the study sites, indicating they were highly available to be stranded. Based on these results no generalized conclusions about moderate to major long-term effects to nearshore fish can be supported by the data.

  As indicated above wake stranding does not pose a risk to all juvenile salmonids but rather only to small subyearling Chinook salmon. Extensive studies at specific locations on the Columbia River where wake stranding occurs have shown that ship wakes primarily result in stranding when small subyearling Chinook are present in the shallow water margin near the shore, and the majority of shorelines where wake stranding may occur are within the tidal freshwater region (Bauersfeld 1977, Ackerman 2002, Pearson et al. 2006, Pearson et al. 2008). This area is roughly defined as occurring from RM 34 to RM 104.

Finally, the vessels that would call at the Facility terminal are within the size range of current vessels and would be piloted at similar speeds and course through the navigation channel. Therefore, the wakes from these vessels would be similar to current wakes, and the effects of wakes on salmonids potentially stranded would be the same as stranding occurring presently. The potential for any additional impacts resulting from Facility-related vessel trips also must be placed in the context of whether these trips even cause a measurable increase in the normal ebb and flow of the Columbia River vessel transportation system.

- *Bank Erosion* – See section 5.2.1 for a detailed discussion on bank erosion.
- *Exotic Species* – See section 5.2.1 for a detailed discussion on exotic species.

5.2.4 Wetlands

Impacts to wetlands associated with operation of the proposed facility would be minor in extent. Wetlands could be affected by impacts associated with operational water quality, including an increased potential for spills or leaks associated with on-site equipment and machinery, and an increased potential for catastrophic accidents such as a spill to surface waters. However, none of these poses a significant risk to the quantity or quality of wetland habitats.

There are no wetlands on the project site that would be affected by water quality-related impacts associated with operation of the facility.

At the scale of the project vicinity, wetlands within the project vicinity have the potential to be affected by impacts associated with construction and operational water quality. Accidental leaks or spills of fuel or other chemicals into groundwater at the project site have the potential to reduce habitat function of wetlands in the vicinity. Increased stormwater associated with new impervious surface also has the potential to indirectly affect wetlands within the project vicinity.

Parcel 1A wetland mitigation site is located adjacent to Area 300. In the event of a spill and failure of the containment berm on the east side, adjacent to the mitigation site, could result in impacts to the wetland. The wetland is situated in a depression that would be contained and not spread to other wetlands north of the site. Spill response and cleanup measures would restore the wetland to previous conditions.

Within the shipping prism, wetlands also have the potential to be affected by impacts associated with construction and operational water quality, and could also potentially be affected by the potential for increased shipping traffic. Wetlands within the shipping prism could be indirectly affected through increased potential for accidental leaks or spills, effects associated with increased stormwater, through the introduction of exotic aquatic plant or animal species, and through the potential for catastrophic events such as a spill to surface waters.

6.0 MITIGATION MEASURES

6.1 Terrestrial Vegetation and Habitat

The project will implement several impact minimization measures and BMPs to minimize the potential for impacts to terrestrial habitats and vegetation.

Direct Habitat Modification

The proposed project has been designed to avoid and/or minimize impacts to biological resources to the greatest extent possible. The upland facilities associated with the project have

been located on developed portions of an existing industrial site, which in its current state provides very little habitat function and very little native vegetation. By siting the project in a developed location, impacts to native terrestrial habitats and native species of vegetation, including special status species, have been avoided.

Ground disturbance and vegetation removal will be limited to the minimum amount necessary to construct the project, and construction fencing will be used to protect existing vegetation to be retained.

The following mitigation is proposed for each of the habitats impacted by construction of the facility as follows:

- Unvegetated Industrial: Impacts to unvegetated, industrial land do not require mitigation
- Ruderal Upland Grass/Forb and Upland Cottonwood Stands: as noted above, the 0.96 acre of existing ruderal upland grass/forb habitat have very limited value; nevertheless, even if no net loss to this impact was required, together with the Upland Cottonwood Stands (0.07 acre) 1.03 acres of compensatory habitat mitigation is warranted for no-net loss. To mitigate for the removal of this habitat, the project will install urban landscaping including trees and shrubs in areas 200 and 300. Native species will be used to the extent practical. These landscaped areas will provide wildlife habitat typical in an urban environment, including perching and foraging opportunities for migratory birds. This action also complies with VMC 20.770 and will plant additional trees to compensate for development that will impact pervious surfaces. In addition, trees will be planted as part of landscaped buffers and parking lot landscaping where currently no trees exist. In total approximately 2.21 square of planted areas will be completed.

  Locations where ruderal habitat has been impacted by temporary construction, laydown would be restored to previous condition so as to result in no net loss to this community.
- Riparian: as noted above, the riprapped bank has very limited riparian vegetation, and the Applicant is not disturbing any existing high quality vegetation or negatively impacting existing habitat function. No mitigation is therefore warranted.

These impact minimization measures and BMPs will fully mitigate for the direct habitat modification effects associated with the project.

Operational Water Quality Impacts

The proposed project has the potential to result in indirect effects to vegetation and terrestrial wildlife habitats through operational water quality impacts including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as spills to surface waters. A comprehensive strategy for spill prevention and control for the project as described in the SPCC Plan, will be implemented.

The Facility will discharge to existing Columbia River outfalls through existing manmade conveyance pipelines, and is categorically exempt from the flow control provisions of the Ecology stormwater manual. According to Appendix I-E of the manual, the Columbia River is listed as a flow control-exempt water body.

As described in sections 5.2.2 and 5.2.3 of this report, operational stormwater will be collected, treated, and conveyed in permanent constructed conveyances from source to discharge.

Stormwater from the storage area will be treated to enhanced water quality standards and discharged to the existing Terminal 4 stormwater system. Stormwater from areas 200, 500, and 600 and the rail improvements will be treated to basic levels and discharged to the existing Terminal 5 stormwater system. Stormwater from Area 400 will be treated to an enhanced treatment level and conveyed to existing infiltration swales located immediately north of the site. Stormwater treatment facilities will be sized to accommodate the six-month, 24-hour event as estimated using Ecology's hydrology model. The proposed stormwater treatment will provide treatment to a level that is consistent with the discharge permits applicable to the Facility and will ensure that vegetation and terrestrial wildlife habitat are not adversely affected by operational stormwater.

Operations at the site will be governed by an SPCC Plan (Appendix B.2), which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a shipboard oil pollution emergency plan (SOPEP) govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs and safety and security measures will minimize the risk of impacts to vegetation and terrestrial wildlife habitat.

These impact minimization measures and BMPs will fully mitigate for the operational water quality impacts associated with the project.

Lighting

Facility lighting will be directional in areas adjacent to sensitive wildlife areas, including the north side of Area 300 to ensure lights are not pointed in the CRWMB and Area 400 to minimize the amount of light in aquatic habitats. Lighting will directional and aimed away from sensitive habitats to the extent possible to minimize nightlight and glare.

Facility maintenance activities will be conducted using methods and products consistent with local, state, and federal regulations. Vegetation maintenance would not occur outside the proposed Facility location. Maintenance-related impacts to vegetation will be minimized by limiting activities to the Facility location, i.e., tracks, pipeline corridors, and tank farm.

Shipping

The proposed project will result in approximately 140 ship trips per year in the first full year of operations, and up to 365 ship trips per year at full capacity. Oceangoing vessel traffic on the Columbia River has the potential to result in impacts to vegetation and terrestrial wildlife habitat through increased potential for shoreline erosion associated with propeller wash and wake, and through the potential introduction of exotic species. See section 5.2.1 for a detailed discussion on exotic species.

The risk of adverse effects to vegetation and terrestrial wildlife habitat from increased bank erosion is minimal. See section 5.2.1 for a detailed discussion on bank erosion.

These impact minimization measures and BMPs will fully mitigate for the increased shipping-related impacts associated with the project.

6.2 Wildlife Resources

The project will implement an array of impact minimization measures and BMPs to minimize the potential for construction and operational impacts to wildlife species.

Direct Habitat Modification

The upland facilities associated with the project have been located on developed portions of an existing industrial site, which in its current state provides very little habitat function and very little native vegetation. By siting the project in a developed location, impacts to native terrestrial habitats and native species of vegetation, including special status species, have been avoided. Ground disturbance and vegetation removal will be limited to the minimum amount necessary to construct the project, and construction fencing will be used to protect existing vegetation to be retained.

These impact minimization measures and following BMPs fully mitigate for the direct habitat modification impacts associated with the project.

Construction

A SPCC Plan will be implemented during construction, that would define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills, including daily inspection of construction equipment leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbodies and outside environmentally sensitive areas. Spill plans will be used for appropriate response and cleanup procedures, including the handling of vegetation that would be affected by spills.

The Applicant will adhere to the requirements of VMC 20.770 and plant a minimum of 30 tree units per acre for undeveloped sites, and, based on a development area of 10,550 square feet, plant a minimum of eight tree units in other areas of the Facility. [9]

Compensatory habitat mitigation of 1.03 acres will be provided, including installation of urban landscaping (approximately 2.21 acres), including trees and shrubs in areas 200 and 300.

Operation

Directional lighting will be used in areas adjacent to sensitive wildlife habitats, including the north side of Area 300 to ensure lights are not pointed in the CRWMB and Area 400 to minimize the amount of light in aquatic habitats. Lighting will be aimed away from sensitive habitats to the extent possible to minimize nightlight and glare. LED bulbs that fall within optimum wavelengths in area lighting to reduce light pollution impacts will be incorporated where practicable and within safety regulations. Spotlighting at Area 400 will only be used during

[9] Note: VMC 20.770.070(B)(4) allows trees planted in landscaped islands and other areas to meet the tree density requirements. The project includes a Landscaping Plan in Area 200 that calls for the planting of buffer landscape trees and parking lot trees that would exceed the eight tree units required for the project under VMC 20.770. The planted trees would be deciduous and planted at a minimum of 2-inch caliper. These landscaped areas would provide wildlife habitat typical in an urban environment, including perching and foraging opportunities for migratory birds. In total, about 2.21 acres of planted areas would be completed.

loading operations if approved by the USCG in compliance with 33 CFR Part 105 and/or Part 154.

Maintenance activities will be conducted to minimize maintenance-related impacts to wildlife habitat by limiting activities to the Facility location, i.e., tracks, pipeline corridors, and tank farm. Maintenance activities will use methods and products consistent with local, state, and federal regulations. Vegetation maintenance would not occur outside the proposed Facility location.

Tree removal will be performed outside of the nesting season (February 15 to September 1) to avoid potential impacts to active nests of protected migratory birds. If trees are to be removed during the nesting season, complete a preconstruction nesting survey no more than two weeks prior to removal to ensure that no active nests are present. If active nests of protected migratory birds are found, suspend tree removal activities until after nests have hatched and young have fledged.

- Monitor the approximate 2.2 acres of landscape plantings for two years after planting and replace all trees that do not become successfully established.
- Incorporate design features, such as enclosing structures, so that no horizontal top surfaces are accessible, screen openings to prevent access to enclosed spaces for roosting or nesting, and install spikes or wires to prevent perching to avoid attracting birds, such as pigeons, gulls, and starlings, to the proposed Facility.
- Include measures in the waste management plan to control and contain food waste, and educate workers on the risk to native wildlife from supplemental feeding and the importance of disposing of all garbage in secured containers to prevent supplemental feeding of wildlife.

Temporary Water Quality Impacts

The project has the potential to result in temporary water quality impacts during construction including increased potential for spills, and a potential for temporarily elevated levels of turbidity during construction. Construction at the site will be governed by an SPCC Plan. The plan defines specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills and outlines responsive actions in the event of a release, and notification and reporting procedures. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas. Spill plans will be used for appropriate response and cleanup procedures, including the handling of vegetation that would be affected by spills.

Natural currents and flow patterns in the Lower Columbia River routinely disturb sediments. Flow volumes and currents are affected by precipitation as well as upstream water management at dams. High volume flow events can result in hydraulic forces that re-suspend benthic sediments, temporarily elevating turbidity locally. Any temporary increase in turbidity as a result of the proposed project is not anticipated to measurably exceed levels caused by these normal periodic increases. Additionally, the volume of flow will help minimize the intensity and duration of any temporary episodic increases in sediment suspension or turbidity.

A WQPMP has been developed and describes how the project will monitor and control releases of turbidity, suspended sediment, concrete, and other construction-related materials that may be

generated during Facility construction activities in, over, and adjacent to the Columbia River and other adjacent water bodies. The plan describes water quality protection measures; monitoring parameters, methods, evaluation criteria; and contingency response and notification procedures in the event a water quality criterion is exceeded during such construction activities.

In addition, all in-water temporary pile installation and removal below the OHWM will be conducted within the approved in-water work period for the project (anticipated to be November 1 to February 28). This work window has been established to minimize potential impacts to native fish species, but also avoids the peak migration timing for marine mammals in the Lower Columbia River.

These impact minimization measures and BMPs will fully mitigate for the temporary water quality impacts associated with the project.

Temporary Construction Noise

Terrestrial noise levels will peak within the vicinity of the project site during impact pile driving but these sound levels will be expected to decrease to ambient conditions within a maximum of approximately 5,000 feet from the immediate project site. Most of the terrestrial habitat within approximately 5,000 feet of the project site is not suitable for wildlife species, and terrestrial wildlife habitats at the immediate project site are of limited quality and quantity. Species that utilize these industrialized habitats are generally well adjusted to nearly continuous human presence and activity.

The proposed project has the potential to result in elevated underwater noise during construction which can temporarily affect marine mammals and the quality of their habitat. The project has been designed to minimize the likelihood of any impacts resulting from underwater noise during pile removal activities by using vibratory methods. The dock modifications have been designed so as to require no impact pile driving, which will greatly reduce the extent of underwater noise generated during construction. This will reduce the intensity of underwater noise, and will limit the potential for adverse effects to marine mammals.

In addition, all work below the OHWM will be conducted within the published in-water work period for the project (November 1 to February 28). This work window has been established to minimize potential impacts to native fish species, but also avoids the peak migration timing for marine mammals in the Lower Columbia River. Marine mammals are not expected to occur within the action area during the in-water work period. A marine mammal monitoring and protection plan (MMMP) has been developed and describes procedures to identify the presence of marine mammals during construction activities, which may result in “take” and establishes actions that will be taken to minimize impacts to such marine mammals. The plan will be implemented during in-water construction activities related to Area 400 modifications, including removal of existing piles, temporary pile installation and removal, and pile strengthening; and upland work related to impact pile driving of shore-based mooring points, dolphin access points and the trestle abutment. Monitoring will be conducted prior to and during the activities listed above with the potential to impact marine mammals. Work activities will be stopped when a marine mammal is detected within the monitoring area and will not restart until after the marine mammal has left the monitoring area.

A construction wildlife monitoring plan has also been developed that describes the means and methods to monitor noise levels during project upland pile-driving activities in order to demonstrate that noise levels attenuate to a level of non-disturbance to PHS species potentially

present in the vicinity of the construction site. The PHS species of concern include the bald eagle, sandhill crane, great blue heron, and the Oregon spotted frog. The plan will be implemented during impact pile driving for Area 200 rail unloading facility foundation support and Area 400 improvements (shore based mooring points, dolphin access points, trestle abutment), and during vibratory pile installation and removal for Area 400 marine terminal modifications. Wildlife monitoring will only occur in areas of potentially suitable habitat and construction noise monitoring will be conducted to determine what actual noise levels are observed.

These impact minimization measures and BMPs will fully mitigate for the temporary construction noise impacts associated with the project.

Aquatic Invasive Species

WDFW hydraulic code rules require that the transportation and introduction of aquatic invasive species be prevented by thoroughly cleaning vessels, equipment, boots, waders, and other gear before removing the gear from a job site [WAC 660-120 (7)(j)]. Contractors would be required to provide documentation that all equipment and materials that will be used in- and overwater have be cleaned to comply with applicable aquatic invasive species statutes and rules, including WAC 660-120 (7)(j). This would include providing documentation that in-water equipment and construction materials have either not been in contact with waters containing state prohibited aquatic invasive species, which could be potentially transferred to the Columbia River, or that equipment and materials have been appropriately decontaminated from potentially transferrable aquatic invasive species prior to arrival at the project site.

During operations, the Facility may source spill response equipment from other locations in the event of larger and more complex spill drills or response activities. In such cases, contractors and mutual aid providers will comply with applicable state statutes and rules aimed at preventing the introduction of such species, as identified above.

Operational Water Quality Impacts

The proposed project has the potential to result in indirect effects to wildlife through operational water quality impacts including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as spills to surface waters. However, the terrestrial habitats at the site provide very little functional habitat, and the impact minimization measures and BMPs that will be implemented will effectively reduce the potential for any adverse effects to the quantity or quality of terrestrial habitats as a result of operation.

As described previously in sections 5.2.2 and 5.2.3, operational stormwater will be collected, treated, and conveyed in permanent constructed conveyances from source to discharge. The proposed stormwater treatment will provide treatment to a level that is consistent with existing treatment at the site, which will ensure that wildlife are not adversely affected by operational stormwater. On-site stormwater treatment facilities will be provided for water quality and quantity that are designed to handle a six-month, 24-hour event. Stormwater discharges will be contained within the proposed Facility location and directed to existing systems at Terminals 4 and 5.

Operations at the site will be governed by an SPCC Plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills and would outline responsive actions in the event of a release, and notification and

reporting procedures. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs and safety and security measures will manage the risk of impacts to biological resources effectively.

These impact minimization measures and BMPs will fully mitigate for the operational water quality impacts associated with the project.

Shipping

The proposed project will result in approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity through the project shipping prism. Increased marine traffic on the Columbia River has the potential to result in impacts to wildlife and wildlife habitat through increased potential for shoreline erosion associated with propeller wash and wake, through the introduction of exotic species, and through increased potential for ship strikes.

The risk of adverse effects to wildlife from increased bank erosion is low. See section 5.2.1 for a detailed discussion on bank erosion.

Operators of commercial vessels have a significant economic interest in maintaining underwater body hull platings in a clean condition. Fouled bottom platings result in increased fuel costs and can reduce the vessel's maximum transit speed. To prevent fouling and higher costs, operators preserve and maintain the hulls of their ships aggressively (FERC 2008), greatly reducing the risk of the transport of exotic species. Additionally, the USCG has developed mandatory practices for all vessels with ballast tanks in all waters of the United States. Washington has developed similar guidelines. These practices include requirements to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin, to regularly remove fouling organisms from the hull, piping, and tanks, and to dispose of any removed substances in accordance with local, state, and federal regulations.

Vessels calling at the Facility are expected to be crude oil tankers and articulated tug barges operating within the Exclusive Economic Zone. These vessels will be subject to the U.S. Environmental Protection Agency's Vessel General Permit (VGP)[10] issued under the National Pollutant Discharge Elimination System (NPDES) for discharges incidental to operation of such vessels, including ballast water discharges[11]. The Washington State ballast water requirements added to the VGP as 401 WQC conditions include the state requirements codified in Chapter 220-150 WAC, administered by the WDFW. These requirements include technology-

[10] Vessel General Permit for Discharges Incidental to the Normal Operation of Vessels (VGP), 2013. Available at: http://www3.epa.gov/npdes/pubs/vgp_permit2013.pdf

[11] See: http://www.epa.gov/npdes/vessels-incidental-discharge-permitting-2.

driven treatment requirements and management practices so that vessel discharges meet state water quality standards, Chapter 173-201A WAC.

Furthermore, ballast water discharges, if not treated, would be of saltwater to freshwater (because of the 401 WQC requirements to perform, at least, open sea ballast water exchange), which has less propensity to introduce invasive species than if the exchange is salt-to-salt or fresh-to-fresh water[12]. Because of this, only negligible impacts would be anticipated as a result of ballast water discharge.

The potential for vessel strikes to affect sea turtles, marine mammals, and/or cetaceans is relatively low. While sea turtles, marine mammals, and cetaceans all may be at risk for propeller or collision injuries, these injuries are most frequently caused by small, fast-moving vessels (FERC 2008). In contrast, because of their design and large displacement tonnage, the ships that will dock at the Facility produce a bow wave. This wave tends to push in-water objects away from the vessel. Therefore, sea turtles, marine mammals, and cetaceans are not likely to be struck by ships as a result of the project.

These impact minimization measures and BMPs will fully mitigate for the increased shipping-related impacts associated with the project.

Cumulative Impacts

The impact minimization measures that have been incorporated into the design of the project are the same measures that will reduce the potential for cumulative impacts. The project has been designed to minimize the extent of impacts to wildlife and wildlife habitat resources to the extent practicable, and this will reduce the potential for cumulative effects to these resources as well. The project itself will not result in any cumulative impacts to wildlife and wildlife habitat resources.

6.3 Fish Resources

The project will implement several impact minimization measures and BMPs to minimize the potential for impacts to fish and fish habitat.

Direct Habitat Modification – The project will result in no net new direct, permanent impacts to fish habitat. Design modification to the existing dock will be used that only require temporary support pilings. No new permanent piles below the OHWM and no net increase in overwater structure will be installed in the Columbia River. No new structures will be constructed. Fifteen existing piles will be removed from the river to mitigate for temporary support pilings. The removal of piles and existing overwater coverage will further minimized the extent of impacts. The no net increase in direct, permanent impacts to fish habitat at the project site is expected to result in no significant effects on the quality or function of fish habitat within the project site, project vicinity, or project shipping prism.

If ground improvement installation requires the use of temporary lighting at night, all lights will be shielded and directed away from the water to the extent practicable and installation of jet

[12] See, for example, the discussion of the increasing risk for invasive introduction when the source and discharge waters share environmental similarity here: http://www.reabic.net/journals/mbi/2016/Accepted/MBI_2016_Verna_etal_correctedproof.pdf.

grout columns directly adjacent to the shoreline will be scheduled for daylight hours to the extent practicable.

The impact minimization measures and BMPs fully mitigate for the direct habitat modification impacts associated with the project.

Temporary Water Quality Impacts – The project has the potential to result in temporary water quality impacts during construction including increased potential for spills, and a potential for temporarily elevated levels of turbidity during construction. Construction at the site will be governed by a construction SPCC Plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Applicable spill response equipment and material designated in the construction SPCC Plan will be maintained at the job site. In the event of an inadvertent release of fuels, lubricants, or other materials during construction, containment and begin cleanup efforts immediately and complete in an expeditious manner, in accordance with all local, state, and federal regulations, and taking precedence over normal work. Cleanup will include proper disposal of any inadvertently released material and used cleanup material. The cause of the inadvertent release will be assessed and appropriate action will be taken to prevent further incidents or environmental damage. Inadvertent releases will be reported to Ecology's Southwest Regional Spill Response Office at 360-407-6300.

Natural currents and flow patterns in the Lower Columbia River routinely disturb sediments. Flow volumes and currents are affected by precipitation as well as upstream water management at dams. High volume flow events can result in hydraulic forces that re-suspend benthic sediments, temporarily elevating turbidity locally. Any temporary increase in turbidity as a result of the proposed project is not anticipated to measurably exceed levels caused by these normal periodic increases. Additionally, the volume of flow will help minimize the intensity and duration of any temporary episodic increases in sediment suspension or turbidity.

A preliminary WQPMP has been prepared for the project. The WQPMP describes how the Applicant will monitor and control releases of turbidity, suspended sediment, concrete, and other construction-related materials that may be generated during Facility construction activities in, over, and adjacent to the Columbia River and other adjacent water bodies. The plan describes water quality protection measures; monitoring parameters, methods, evaluation criteria; and contingency response and notification procedures in the event a water quality criterion is exceeded during such construction activities.

In addition, all in-water construction activities, and temporary pile installation and removal will be conducted within the published in-water work period for the project (November 1 to February 28). This work window has been established to minimize potential impacts to native fish species, particularly to ESA-listed salmonids and Pacific eulachon. While there is no time when ESA-listed fish are absent from the project vicinity, the window between November 1 and February 28 avoids the peak migratory periods for adult fish and out-migrating juveniles of most populations.

These impact minimization measures and standard BMPs, as well as BMPs for construction, pile removal, pile installation, and overwater concrete work, will fully mitigate for the temporary water quality impacts associated with the project.

In response to the Advisory HPA dated April 16, 2015 (WDFW, Dave Howe, April 2015, Letter to Justin Allegro, Advisory Provisions for the Tesoro-Savage Oil Terminal), the Applicant is also providing the following mitigation during in-water construction to protect fish life:

- Work below the ordinary high water line shall only occur between November 1 and February 28[13].
- If at any time the stone column seismic stability work is expected to cause release of sediments below the high water line, this work shall also adhere to the above-mentioned work window.
- The Region 5 Habitat Program Manager will be notified in writing (e-mail, FAX, or mail) from the agent/contractor no less than three working days prior to the start of construction activities. The notification will include the contractor's name, project location, and starting date for work.
- If at any time, as a result of project activities, fish are observed in distress, a fish kill occurs, or water quality problems develop (including equipment leaks or spills), immediate notification will be made to the Washington Military Department's Emergency Management Division at 1-800-258-5990, and to the Region 5 Habitat Program Manager.
- Work will be accomplished per plans and specifications entitled "Tesoro Savage Vancouver Energy Distribution Terminal – Dock Maintenance and Utility Infrastructure" project, dated February 2014, except as modified by these provisions. A copy of these plans will be available on site during construction.
- Extreme care will be taken to ensure that no petroleum products, hydraulic fluid, fresh cement, sediments, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into the stream.
- Equipment used for this project will operate stationed on a barge, boat, bank, or pier.
- All work operations will be conducted in a manner that causes little or no siltation to adjacent areas.
- Piling installation or removal will be accomplished primarily by vibratory methods and will use an impact hammer, and "proofing" will occur only when sound attenuation devices, such as a "bubble curtain," are employed.
- Any impact hammer pile driving will be accomplished during daytime hours to avoid attracting fish to lights at night.
- The existing piling will be removed and disposed of in an upland location such that they do not enter waters of the state. In the event that the piles cannot be completely removed, then the remainder of the pile will be removed with a clamshell bucket, chain, or similar means, OR cut off 2 feet below the mudline.

[13] U.S. Army Corps of Engineers. (USACE). 2015. Approved Work Windows For Fish Protection For Waters Within National Park Boundaries, Columbia River, Snake River, And Lakes By Watercourse. Available at: http://www.nws.usace.army mil/Portals/27/docs/regulatory/ESA%20forms%20and%20templates/work_windows%20Waters_in_NPs_CR_SR_Lakes.pdf

- All holes or depressions will be backfilled with clean native bed materials to reduce leaching of residual chemicals into the water column.
- Proposed replacement grating for walkways will be designed to pass a minimum of 60 percent sunlight in areas over shallow-water habitat (less than 30 feet deep).

Temporary Construction Noise – The proposed project has the potential to result in elevated underwater noise during construction which can temporarily affect fish and fish habitat quality. The project has been designed to minimize the likelihood of any impacts resulting from underwater noise by using vibratory methods. The dock modifications have been designed so as to require no impact pile driving, which will greatly reduce the extent of terrestrial and underwater noise generated during construction. This will reduce the intensity of underwater noise, and will limit the potential for adverse effects to fish.

In addition, all work below the OHWM will be conducted within the published in-water work period for the project (November 1 to February 28). The upland impact pile driving for the shore based mooring points, dolphin access points, and trestle abutment located above the OHWM will also be conducted within the in-water work window to minimize the potential for effects from potential sound flanking. This work window has been established to minimize potential impacts to native fish species, particularly to ESA-listed salmonids and Pacific eulachon. While there is no time when ESA-listed fish are absent from the project vicinity, the window between November 1 and February 28 avoids the peak migratory periods for adult fish and out-migrating juveniles of most populations.

An MMMP will be implemented for vibratory installation and removal of temporary piles, and upland impact pile driving associated with Area 400 improvements to minimize the exposure of marine mammals to temporarily increased underwater noise levels. Construction activities will be stopped if marine mammals are observed in the project vicinity during these activities. Construction activities will be resumed when observers no longer detect the presence of marine mammals in the vicinity.

These impact minimization measures and BMPs will fully mitigate for the temporary construction noise impacts associated with the project.

Operational Water Quality Impacts – The proposed project has the potential to result in indirect effects to fish and fish habitat through operational water quality impacts including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as spills to surface waters. The Facility will discharge to existing Columbia River outfalls through existing manmade conveyance pipelines, and is categorically exempt from the flow control provisions of the Ecology stormwater manual. According to Appendix I-E of the manual, the Columbia River is listed as a flow control-exempt water body.

As described previously in sections 5.2.2 and 5.2.3, operational stormwater will be collected, treated, and conveyed in permanent constructed conveyances from source to discharge. Stormwater from the storage area will be treated to enhanced water quality standards and discharged to the Terminal 4 stormwater system. Stormwater from areas 200, 500, and 600 and the rail improvements will be treated to meet the water quality benchmarks established in the Industrial Stormwater General Permit and prior to its discharge to the existing Terminal 5 stormwater system. Stormwater from Area 400 will be treated to an enhanced treatment level and conveyed to existing infiltration swales located immediately north of the site. Stormwater

treatment facilities will be sized to accommodate the six-month, 24-hour event as estimated using Ecology's hydrology model. The proposed stormwater treatment will provide treatment to a level that is consistent with existing treatment at the site, which will ensure that fish are not adversely affected by operational stormwater.

Operations at the site will be governed by an operations SPCC Plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs and safety and security measures will manage the risk of impacts to biological resources effectively.

These impact minimization measures and BMPs will fully mitigate for the operational water quality impacts associated with the project.

Shipping – The proposed project will result in approximately 140 ship trips per year in the first full year of operations, and up to 365 ship trips per year at full capacity. Increased marine traffic on the Columbia River has the potential to result in impacts to fish and fish habitat through increases in the potential for fish stranding, increased potential for shoreline erosion associated with propeller wash and wake, and through the introduction of exotic species.

The risk of adverse effects to fish and fish habitat from increased bank erosion is low. See section 5.2.1 for a detailed discussion on bank erosion.

Operators of commercial vessels have a significant economic interest in maintaining underwater body hull platings in a clean condition. Fouled bottom platings result in increased fuel costs and can reduce the vessel's maximum transit speed. To prevent fouling and higher costs, operators preserve and maintain the hulls of their ships aggressively (FERC 2008), greatly reducing the risk of the transport of exotic species. Additionally, the USCG has developed mandatory practices for all vessels with ballast tanks in all waters of the United States. Washington has developed similar guidelines. These practices include requirements to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin, to regularly remove fouling organisms from the hull, piping, and tanks, and to dispose of any removed substances in accordance with local, state, and federal regulations.

These impact minimization measures and BMPs will fully mitigate for the increased shipping-related impacts associated with the project.

Cumulative Impacts – The impact minimization measures that have been incorporated into the design of the project are the same measures that will reduce the potential for cumulative impacts. The project has been designed to minimize the extent of impacts to fish and fish habitat resources to the extent practicable, and this will reduce the potential for cumulative effects to these resources as well. The project itself may affect, but is not likely to adversely affect, fish or fish habitat resources.

6.4 Wetland Resources

The proposed project has been designed to avoid and/or minimize impacts to wetlands to the greatest extent possible. The project will implement several impact minimization measures and BMPs during construction to further reduce or mitigate the potential for impacts to wetlands.

Direct Habitat Effects

The upland facilities associated with the project have been located on developed portions of an existing industrial site, and no wetlands are present at the site. By siting the project in a developed location, the project has completely avoided the need to directly impact wetlands. However, three wetlands are present within 300 feet of the proposed Facility site. These include a wetland mitigation site located immediately east of the proposed storage tank area (Parcel 1A mitigation site), the CRWMB located north of SR 501, and a wetland mitigation site west of the proposed Facility site (Parcel 2 Mitigation Site). All three of these wetlands are separated from the Facility site by rail lines and/or roads.

Parcel 1A, the wetland mitigation site, is located adjacent to Area 300. In the event of a spill and failure of the containment berm on the east side, adjacent to this mitigation site, the wetland could be impacted. The wetland is situated in a depression that would be contained and not spread to other wetlands north of the site. Spill response and cleanup measures would restore the wetland to previous conditions. These impact minimization measures and BMPs will fully mitigate for the direct habitat modification impacts associated with the project.

Temporary Water Quality Impacts

The project has the potential to result in temporary water quality impacts during construction which could affect off-site wetlands within the project vicinity or shipping prism. Construction will only occur within the marked construction boundaries at the Facility site and will be governed by a construction SPCC Plan. The SPCC Plan will define specific BMPs to minimize the potential for leaks and spills from construction equipment and the extent of damage from any unavoidable leaks or spills. These include BMPs for inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas. These sensitive areas include wetlands and regulated wetland buffers that are present within 300 feet of the proposed Facility site; a wetland mitigation site located immediately east of Area 300 (Parcel 1A mitigation site), the CRWMB located north of SR 501, and a wetland mitigation site west of the proposed Facility site (Parcel 2 Mitigation Site).

The SPCC Plan will also outline responsive actions in the event of a release, and notification and reporting procedures.

The Applicant will also implement the following additional construction mitigation measures:

- Install wick drains to reduce the risk of water and/or air moving laterally underground during the installation of vibro replacement stone columns.
- Conduct daily visual inspections of wetlands during installation of vibro replacement. Temporarily suspend installation activities until counteractive measures (i.e., additional wick drains) can be installed if there is any observation of lateral movement of water or air.
- Implement construction spill prevention, containment, and response BMPs identified in the SPCC Plan.

These impact minimization measures and BMPs will fully mitigate for the temporary water quality impacts associated with construction of the project.

Operational Water Quality Impacts

The proposed project has the potential to result in indirect effects to wetlands through operational water quality impacts including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as spills to surface waters.

Operations at the site will be governed by an operations SPCC Plan, which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas. The SPCC Plan will also outline responsive actions in the event of a release, and notification and reporting procedures.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs and safety and security measures will manage the risk of impacts to wetlands effectively.

The following operational mitigation measures will also be implemented:

- Provide stormwater treatment to a level that is consistent with or exceeds existing treatment at the site to ensure that off-site wetlands are not adversely affected by operational stormwater.
- Design the Area 300 secondary containment berm to have a capacity at least equal to 110 percent of the volume API 650 maximum capacity of the largest tank and plus precipitation from a 24-hour, 100-year, 24-hour rainstorm event.
- Design the rail unloading area to include containment rail drip pans, pumps, and containment sump tanks, of sufficient size to contain and store the entire volume of a single rail car staged within the unloading building.

These impact minimization measures and BMPs will fully mitigate for the operational water quality impacts associated with the project.

Increased Shipping

The proposed project will result in approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity through the project shipping prism. Increased marine traffic on the Columbia River has the potential to result in impacts to wetlands through the introduction of exotic species.

Wetlands are unlikely to be affected by an increase in shipping traffic. Wetland resources within the project vicinity or downstream in the shipping prism could be impacted through the introduction of exotic species, but there is little risk of ships increasing the transport of exotic species. See section 5.2.1 for a detailed discussion on exotic species.

These impact minimization measures and BMPs will fully mitigate for the increased shipping-related impacts associated with the project.

While the project will result in some unavoidable impacts to biological resources, the project includes BMPs, which will be implemented to further reduce or mitigate the effects of the unavoidable impacts.

7.0 REFERENCES

Ackerman, N.A. 2002. Effects of vessel wake stranding of juvenile salmonids in the Lower Columbia River, 2002 – A pilot study. Produced by SP Cramer & Associates, Inc., Sandy, Oregon, for the U.S. Army Corps of Engineers, Portland District, Portland, OR.

Altman, B., and R. Sallabanks. 2000. Olive-sided Flycatcher (CONTOPUS COOPERI). No. 502 IN A. Poole and F. Gill (eds.), The Birds of North America. The Birds of North America, Inc., Philadelphia, PA. 28pp.

Anchor Environmental (Anchor Environmental, LLC). 2007. Biological assessment Port of Vancouver Phase 1 berth deepening river miles 103.5 to 105.5.

Anderson, S.H. 1970. The avifaunal composition of Oregon white oak stands. Condor 72:417-423.

Anderson, S.H. 1972. Seasonal variations in forest birds of western Oregon. Northwest Science 46:194-206.

Anderson, S.H. 1976. Comparative food habits of Oregon nuthatches. Northwest Science 50:213-221.

Azerrad, J.M. 2012. Management recommendations for Washington's priority species: Great Blue Heron. Washington Department of Fish and Wildlife, Olympia, WA.

Batelle Marine Sciences Laboratory (Batelle). 2004. Hydroacoustic Monitoring during Beach Pile Driving at Hood Canal Bridge on June 14, 2014. June 2004. Prepared for the Washington State Department of Transportation. Batelle Marine Sciences Laboratory. Sequim, WA. June 14, 2014.

Bauersfeld, K. 1977. Effects of peaking (stranding) of Columbia River dams on juvenile anadromous fishes below The Dalles Dam, 1974 and 1975. State of Washington Department of Fisheries, Technical Report No. 31. Report to the U.S. Army Corps of Engineers, Contract DACW 57-74-C-0094, 32 p. plus appendices.

Bayer, J.M. and J.G. Seelye. 1999. Characteristics of Upstream Migrating Pacific Lampreys (Lampetra tridentata) in the Columbia River. Final report of research to U.S. Army Corps of Engineers, Portland, OR.

Behnke, R.J. 1992. Native trout of western North America. Pp. 61-72 in American Fisheries Society Monograph 6.

BergerABAM. 2012. Level V tree plan Port of Vancouver, USA. Clark Public Utilities electrical substation. BergerABAM, Vancouver, WA.

Bettinger, K.A., and R. Milner. 2004. Sandhill Crane. In E. Larsen, J. M. Azerrad, N. Nordstrom, editors. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, WA, USA.

Blaustein, A.R., J.J. Beatty, D.H. Olson, and R.M. Storm. 1995. The biology of amphibians and reptiles in old-growth forests in the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-337. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon. 98 pp.

Bock, C.D. 1970. The ecology and behavior of the Lewis' woodpecker (Asyndesmus lewis). University of California, Berkeley Publications in Zoology 92:1-100

Bowles, A.E. 1995. Responses of wildlife to noise. In Knight, R.L. and K.J. Gutzwiller, (eds). Wildlife Recreationists. Island Press, Washington, DC.

Brookshier, J.S. 2004. Columbian white-tailed deer. Management recommendations for Washington's priority species: volume v, Washington Department of Wildlife, Olympia, WA.

Brown, C.R. 1997. Purple martin (Progne subis). Number 287 in A. Poole and F. Gill, editors, The Birds of North America. Academy of National Science and American Ornithologists' Union, Philadelphia, PA, USA.

Bull, E.L., and C.T. Collins. 1993. Vaux's swift (*Chaetura vauxi*). In Poole, A., and F Gill (eds.). The birds of North America. Acad. Nat. Sci., Philadelphia.

Bull, E.L., and R.S. Holthausen. 1993. Habitat use and management of pileated woodpeckers in northeastern Oregon. J. Wildl. Manage. 57:335-345.

Caltrans (California Department of Transportation). 2012. Technical guidance for assessment and mitigation of the hydroacoustic effects of pile driving on fish. Updated October 2012.

Chappell, C.B. 2005. White-breasted nuthatch. Pages 280-281 *in* T. R. Wahl, B. Tweit, and S.G. Mlodinow, editors. Birds of Washington: status and distribution. University of Washington Press, Seattle, WA.

City of Seattle. 2007. Seattle Biological Evaluation. Seattle, WA. May 1, 2007.

Columbia Basin Fisheries Agencies and Tribes (CBFAT). 2013a. Adult Salmon Annual Totals. Available at: http://www.fpc.org/adultsalmon/adultqueries/Adult_Annual_Totals_Query_ResultsV2.asp (Accessed July 2 2013).

Columbia Basin Fisheries Agencies and Tribes (CBFAT). 2013b. Fish Passage Center – Lamprey Data. Available at: http://www.fpc.org/lamprey/lamprey_home.html (Accessed July 2 2013).

Columbia River Crossing (CRC). 2011. Columbia River Crossing test pile project hydroacoustic monitoring final report. Prepared by David Evans Associates.

David Evans and Associates (DEA). 2001. Wetland Mitigation Monitoring for the Port of Vancouver: Columbia Gateway Phase 1. Portland, OR.

Dekkar, D. 1995. Prey capture by peregrine falcons wintering on southern Vancouver Island, British Columbia. Journal of Raptor Research 29:26-29.

Delaney, D.K. 2002. Prioritization of Threatened and Endangered Species Sound Research on Army Installations. Construction Engineering Research Laboratory. U.S. Army Corps of Engineers. Technical Report ERDC/CERL TR-02-30.

Dvornich, K.M., K.R. McAllister, and K.B. Aubry. 1997. Amphibians and reptiles of Washington State: location data and predicted distributions. Volume 2 in Cassidy, K.M., C.E. Grue, M.R. Smith, and K.M. Dvornich (eds.). Washington State Gap Analysis – Final Report. Washington Cooperative Fish and Wildlife Research Unit, University of Washington, Seattle, WA. 146 pp.

Engler, J.D, E.D. Anderson, and M.A. Stern. 2003. Population status of fall-migrant sandhill cranes along the lower Columbia River, 2003 report. U.S. Fish and Wildlife Service, Ridgefield National Wildlife Refuge Complex, and The Nature Conservancy of Oregon.

Entrix, Inc. 2008. Spatial Analysis of Beach Susceptibility for Stranding of Juvenile Salmonids by Ship Wakes. Prepared for the Port of Vancouver, Vancouver, Washington. February 2008.

Federal Energy Regulatory Commission (FERC). 2008. Bradwood Landing project. Final Environmental Impact Statement. Cooperating agencies: U.S. Army Corps of Engineers, United States Coast Guard, Department of Transportation. June 2008.

Ford M.J. (ed.). 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-113, 281 p.

Ford, M.J., T. Cooney, P. McElhany, N. Sands, L. Weitkamp, J. Hard, M. McClure, R. Kope, J. Myers, A. Albaugh, K. Barnas, D. Teel, P. Morgan, and J. Cowan. 2010. Status Review Update for Pacific Salmon and Steelhead Listed Under the Endangered Species Act: Northwest, Draft. U.S. Department of Commerce.

Frest, T.J. 1992. Mollusc fauna in the vicinity of three proposed hydroelectric projects on the middle Snake River, central Idaho. Supplemental report on the California floater *Anodonta californiensis.* Final report prepared for Don Chapman Consultants.

Frest, T.J. and E.J. Johannes. 1993. Mollusc species of special concern within the range of the northern spotted owl. Final rep. prepared for: For. Ecosystem Manage. Working Group, USDA For. Serv.

Fyfe, R.W., and R.R. Olendorff. 1976. *Minimizing the Dangers of Nesting Studies to Raptors and Other Sensitive Species*. Canadian Wildlife Service, Information Canada. Catalogue No. CW69-1/23. Ottawa, Canada.

Gruver, J.C. and D.A. Keinath. 2004. Townsend's big-eared bat (Corynorhinus townsendii): a technical conservation assessment. Rocky Mountain Region, USDA Forest Service, Golden, CO.

Hagar, J. 2006. White-breasted nuthatch (*Sitta carolinensis*). Pages 449-451 *in* D.B. Marshall, M.G. Hunter, and A.L. Contreras, editors. Birds of Oregon: a general reference. Oregon State University Press, Corvallis, OR.

Hamer, T.E. and E.B. Cummins. 1991. Relationships between forest characteristics and use of inland sites by Marbled Murrelets in northern Washington. Report on file; Washington Department of Wildlife, Nongame program. Olympia, WA. 47p.

Hastings, M.C. and A.N. Popper. 2005. Effects of Sound on Fish. Prepared for Jones & Stokes and the California Department of Transportation. Sacramento, CA.

Hayes, G. and G.J. Wiles. 2013. Washington bat conservation plan. Washington Department of Fish and Wildlife, Olympia, WA. 138+viii pp.

Hays, D.W. and R.L Milner. 2004a. Peregrine Falcon. In E. Larsen, J. M. Azerrad, N. Nordstrom, editors. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, WA, USA.

Hays, D.W. and R.L Milner. 2004b. Purple Martin. In E. Larsen, J. M. Azerrad, N. Nordstrom, editors. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, WA, USA.

Heard, W.R. 1991. Life history of pink salmon (Oncorhynchus gorbuscha). Pages 120-230 in C. Groot and L. Margolis, editors. Pacific salmon life histories. University of British Columbia Press, University of British Columbia, Vancouver. xv + 564 pp.

Hinton, S.A. and R.L. Emmett. 1994. Juvenile salmonid stranding in the Lower Columbia River, 1992 and 1993. NOAA Technical Memorandum NMFS-NWFSC-20. Prepared by NMFS, NFSC, Coast Zone and Estuaries Studies Division, Seattle, WA.

Hitchcock, C.L., and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press, Seattle, WA.

Howe, Dave. 2015. Washington Department of Fish and Wildlife Letter to Justin Allegro, Advisory Provisions for the Tesoro-Savage Oil Terminal. April 2015.

Howe, J. 2002. 2002 Yukon Queen II Investigations (CRE-95-02). Prepared for Dawson District Renewable Resource Council and the Yukon River Panel. October 24, 2002.

JD White Company. 1993. Wetlands Functional Assessment, Parcels 1A and 1B. Port of Vancouver. Vancouver, WA.

JD White Company. 2001. Wetland Delineation and Function Assessment Technical Report. Port of Vancouver Columbia Gateway SEPA-EIS and Subarea Plan.

JD White Company. 2007. Rail Access Project Wetland Delineation Report. February 2007.

Jeffries, S.J., P.J. Gearin, H.R. Huber, D.L. Saul, and D.A. Pruett. 2000. Atlas of Seal and Sea Lion Haulout Sites in Washington. Washington Department of Fish and Wildlife, Wildlife Science Division, 600 Capitol Way North. Olympia, WA. 150p.

Johnson, R.E. and K.M. Cassidy. 1997. Terrestrial mammals of Washington State: location data and predicted distributions. Pages 67-97 in K.M. Cassidy, C.E. Grue, M.R. Smith, and K.M. Dvornich, editors. Washington State Gap Analysis – Final Report. Volume 3. Washington Cooperative Fish and Wildlife Research Unit, University of Washington, Seattle, WA.

Johnson, D.H., and T.A. O'Neil, editors. 2001. Wildlife habitat relationships in Oregon and Washington. Oregon State University Press, Corvallis, OR, USA.

Johnson, O.W., W.S. Grant, R.G. Kope, K. Neely, F.W. Waknitz, and R.S. Waples. 1997. Status Review of Chum Salmon from Washington, Oregon, and California. NOAA Technical Memorandum NMFS NWFSC- 32, Northwest Fisheries Science Center, National Marine Fisheries Service, Seattle, WA.

Johnson, O.W., R.S. Waples, T.C. Wainwright, K.G. Neely, F.W. Waknitz, and L.T. Parker. 1994. Status review for Oregon's Umpqua River sea-run cutthroat trout. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-15. 122 pp.

Johnson, O.W., T.A. Flagg, D.J. Maynard, G.B. Milner, and F.W. Waknitz. 1991. Status Review for Lower Columbia River Coho Salmon. US National Marine Fisheries Service, Seattle, WA. 95 pp.

Kraege, D. 2005. Washington State status report for the Aleutian Canada goose. Washington Department of Fish and Wildlife, Olympia, WA. 26 + iii pp.

Larsen, E., E. Rodrick, and R. Milner , editors. 1995. Management recommendations for Washington's priority species, Volume I: Invertebrates. Washington Department of Fish and Wildlife, Olympia, WA, USA.

Larsen, E., J.M. Azerrad, N. Nordstrom, editors. 2004. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, WA, USA.

Laughlin, J. 2010. Port Townsend Test Pile Project, Underwater Noise Monitoring Draft Final Report. Prepared for Washington State Department of Transportation office of Air Quality and Noise. November 10, 2010.

Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister, and J.R. Stauffer, Jr. 1980. Atlas of North American freshwater fishes. North Carolina State Museum of Natural History, Raleigh, NC. i-x + 854 pp.

Leonard, W.P., H.A. Brown, L.L.C. Jones, K.R. McAllister, and R.M. Storm. 1996. Amphibians of Washington and Oregon. Seattle Audubon Society, Seattle, WA. 168 pp.

Littlefield, C.D. and G.L. Ivey. 2002. Washington Department of Fish and Wildlife Sandhill Crane Recovery Plan (Final). Washington Department of Fish and Wildlife, Olympia, WA.

Lower Columbia Fish Recovery Board (LCFRB). 2004a. Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan, Volume I—Regional Plan.

Lower Columbia Fish Recovery Board (LCFRB). 2004b. Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan, Volume II—Subbasin Plans.

Lower Columbia Fish Recovery Board (LCFRB). 2004c. Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan, A—Focal Fish Species.

Lower Columbia Fish Recovery Board (LCFRB). 2004d. Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan. Appendix B—Other Species.

Madsen, J. 1985. "Impact of Disturbance on Field Utilization of Pink-footed Geese in West Jutland, Denmark." *Biological Conservation* 33:53–64.

Manuwal, D.A., and M.H. Huff. 1987. Spring and winter bird populations in a Douglas-fir forest sere. J. Wildl. Manage. 51:586-595.

McAllister, K.R. 1995. Distribution of amphibians and reptiles in Washington State. Northwest Fauna 3:81-112.

McCabe, G.T., Jr., and C.A. Tracy, 1994. Spawning and early life history of white sturgeon, Acipenser transmontanus, in the lower Columbia River. Fishery Bulletin 92:760–772.

McGarigal, K. 1988. Human–Eagle Interactions on the Lower Columbia River. Master's thesis, Oregon State University, Corvallis, OR.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California. US Department of Commerce, NOAA Tech. Memo. NMFS-NWFSC-35, 443 pp.

Myers, J., C. Busack, D. Rawding, A. Marshall, D. Teel, D.M. Van Doornik, and M.T. Maher. 2006. Historical population structure of Pacific salmonids in the Willamette River and lower Columbia River basins. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-73, 311 p. NTIS PB2006-109278.

National Marine Fisheries Service (NMFS). 2013. ESA salmon listings. Available at: http://www.nwr.noaa.gov/publications/protected_species/salmon_steelhead/status_of_esa_salmon_listings_and_ch_designations_map.pdf, accessed June 26, 2013.

National Marine Fisheries Service (NMFS). 2011. Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead. Northwest Region. Prepared for NMFS by the Lower Columbia River Estuary Partnership and PC Trask & Associates, Inc. January 2011. Website: http://www.nwr.noaa.gov/Salmon-Recovery-Planning/ESA-Recovery-

Plans/upload/Estuary-Misc.pdfOregon Department of Fish and Wildlife (ODFW). 1998. Chapter 4: Information specific to steelhead. Revisions to the steelhead supplement. September 6, 2006. Oregon Plan. Oregon Department of Fish and Wildlife, Portland, OR.

National Marine Fisheries Service (NMFS). 2010. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of Eulachon. Federal Register/Vol. 75, No. 52/Thursday March 18, 2010.

National Marine Fisheries Service (NMFS). 2003. 12-month finding on a petition to list North American green sturgeon as a threatened or endangered species. January 29, 2003. Federal Register 68(19):4433-4441.

National Marine Fisheries Service (NMFS).and U.S. Fish and Wildlife Service. 1998a. Recovery Plan for U.S. Pacific Populations of the Olive Ridley Turtle (Lepidochelys olivacea). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service. 1998b. Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle. National Marine Fisheries Service, Washington, DC.

National Marine Fisheries Service (NMFS).and U.S. Fish and Wildlife Service. 1998c. Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (Dermochelys coriacea). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service (NMFS).and U.S. Fish and Wildlife Service. 1998d. Recovery Plan for U.S. Pacific Populations of the East Pacific Green Turtle (Chelonia mydas). National Marine Fisheries Service, Silver Spring, MD.

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Available online at http://www.natureserve.org/explorer. Accessed July 2013.

Nordstrom, Noelle and R. Milner. 1997a. Oregon Spotted Frog (Rana pretiosa), in in E.M. Larsen, ed. Management recommendations for Washington's Priority Species, Volume III: Amphibians and Reptiles. Wash. Dept. Fish and Wildlife, Olympia.

Nordstrom, Noelle and R. Milner. 1997b. Pacific Pond Turtle (*Clemmys marmorata*), in in E.M. Larsen, ed. Management recommendations for Washington's Priority Species, Volume III: Amphibians and Reptiles. Wash. Dept. Fish and Wildlife, Olympia.

Oregon Department of Fish and Wildlife (ODFW). 2010. Lower Columbia River Conservation and Recovery Plan for Oregon Populations of Salmon and Steelhead. August 6, 2010.

Oregon Department of Fish and Wildlife. 1996. Species at risk; sensitive, threatened, and endangered vertebrates of Oregon. Second Edition, June 1996. Oregon Department of Fish and Wildlife, Wildlife Diversity Program, Portland, OR.

Oregon Department of Fish and Wildlife (ODFW). 1998. Chapter 4: Information specific to steelhead. Revisions to the steelhead supplement. September 6, 2006. Oregon Plan. Oregon Department of Fish and Wildlife, Portland, OR.

Pacific States Marine Fisheries Commission (PSMFC). 1997. Available online at http://www.psmfc.org/habitat/edu_lamprey_fact.html. Accessed July 2013.

Page, L.M., and B.M. Burr. 1991. A field guide to freshwater fishes: North America north of Mexico. Houghton Mifflin Company, Boston, MA. 432 pp.

Page, G.W., J.S. Warriner, J.C. Warriner, and P.W.C. Paton. 1995. Snowy plover (Charadrius alexandrinus). In The Birds of North America, No. 154 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, DC.

Palmisano, J.F, R.H. Ellis, and V.W. Kaczynski. 1993. The impact of environmental and management factors on Washington's wild anadromous salmon and trout. Report prepared for the Washington Forest Protection Association and the Washington Department of Natural Resources. Olympia, WA. 371 pp.

Pater, L.L., Grubb, T.G., and D.K. Delaney. 2009. Recommendations for Improved Assessment of Noise Impacts on Wildlife. Journal of wildlife management. 73(5):788–795.

Pearson, W.H. 2011. Assessment of potential stranding of juvenile salmon by ship wakes along the Lower Columbia River under scenarios of ship traffic and channel depth. Prepared by Peapod Research for the USACE, Portland District. March 21, 2011.

Pearson, W. and J. Skalski. 2011. Factors affecting stranding of juvenile salmonids by wakes from ship passage in the lower Columbia River. River Res. and App. 27: 926-936.

Pearson, W.H., J.R. Skalski, K.L. Sobocinski, M.C. Miller, G.E. Johnson, G.D. Williams, J.A. Southard, and R.A. Buchanan. 2006. A Study of Stranding of Juvenile Salmon by Ship Wakes Along the Lower Columbia River Using a Before-and-After Design: Before-Phase Results. Produced by Pacific Northwest National Laboratory, Richland, Washington for the U.S. Army Corps of Engineers, Portland District, Portland, OR.

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for the conservation of bull trout Salvelinus confluentus. USDA Forest Service

Scott, W.B., and E.J. Crossman. 1973. Freshwater Fishes of Canada. Fish. Res. Bd. Canada. Bul. 14.

Smith, M.R., P.W. Mattocks, Jr., and K.M. Cassidy. 1997. Breeding birds of Washington state: location data and predicted distributions. Volume 4 *in* Cassidy, K.M., C.E. Grue, M.R. Smith, and K.M. Dvornich (eds.). Washington state gap analysis – final report. Seattle Audubon Society Publications in Zoology No. 1. Seattle, WA. 538 pp.

Stansell, R. Tackley, S., W. Nagy, and K. Gibbons, 2009. Field Report: Evaluation of pinniped predation on adult salmonids and other fishes in the Bonneville Dam tailrace. U.S. Army Corps of Engineers, Fisheries Field Unit, Bonneville Lock and Dam, Cascade Locks, OR. 37 pp.

Stalmaster, M.V. 1987. The Bald Eagle. Universe Books. New York. 227 pp.

Stinson, D.W., J.W. Watson, and Kelly R. McAllister. 2007. Washington State Status Report for the Bald Eagle. Washington Department of Fish and Wildlife, Olympia. 86 + viii pp.

Tanner, D.Q., Bragg, H.M., and Johnston, M.W. 2012. Total dissolved gas and water temperature in the lower Columbia River, Oregon and Washington, water year 2011: Quality-assurance data and comparison to water-quality standards: U.S. Geological Survey Open-File Report 2011-1300, 28 p.

URS Corporation. 2010. Terminal 5 Bulk Handling Facility, Port of Vancouver, Washington, Preliminary Geotechnical Engineering Report – Revision 1, URS Project No. 33762561. December 8, 2010.

U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). 2013. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

U.S. Fish and Wildlife Service (USFWS). 2013. Listed and proposed endangered and threatened species and critical habitat; candidate species; and species of concern in Clark County. Available at: http://www.fws.gov/wafwo/speciesmap/ClarkCounty121112.pdf, accessed June 26, 2013. U.S. Fish and Wildlife Service, Western Washington Fish and Wildlife Office, Clark County. Revised December 11, 2012.

U.S. Fish and Wildlife Service (USFWS), 2007. Recovery plan for the Pacific coast population of the western snowy plover (Charadrius alexandrinus nivosus). 2 volumes. U.S. Fish and Wildlife Service, Sacramento, CA.

U.S. Fish and Wildlife Service (USFWS), 2006. Short-tailed Albatross Endangered Species Fact Sheet. Available online at http://alaska.fws.gov/fisheries/endangered/pdf/STALfactsheet.pdf

U.S. Fish and Wildlife Service (USFWS), 1998. Endangered and Threatened Wildlife and Plants: Determination of Threatened Status for the Klamath River and Columbia River Distinct Population Segments of Bull Trout. Final Rule. June 10, 1998. Fed. Reg. 63(111): 31647-31674.

U.S. Fish and Wildlife Service (USFWS). 1989. National Wetlands Inventory (NWI) Map for Vancouver, Washington - Oregon. Scale 1:24,000. US Geological Survey.

Van der Zande, A.N., W.J. ter Keurs, and W.J. Van der Weijden. 1980. "The Impact of Roads on the Densities of Four Bird Species in an Open Field Habitat—Evidence of a Long Distance Effect." *Biological Conservation* 18:299–321.

Verts, B.J., and L.N. Carraway. 1987. Microtus canicaudus. Mammalian Species 267:1-4

Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, WA. 177 pp.

Washington Department of Fish and Wildlife (WDFW) 2005. Washington's comprehensive wildlife conservation strategy. Final draft. Submitted September 19, 2005). Olympia, WA. 618 pp. + appendices.

Washington Department of Natural Resources. 1996. Draft environmental impact statement for the draft habitat conservation plan. Prepared for the Washington State Department of Natural Resources. Olympia, WA. March 22, 1996.

Washington State Department of Ecology (Ecology). 2008. Washington State Water Quality Assessments 303(d). http://www.ecy.wa.gov/programs/wq/303d/.

Washington State Department of Ecology (Ecology). 2003. Northwest Area Committee: Lower Columbia River, geographic response plan (GRP). November 2003. Publication No. 95-258 (Revised 11-03). Available at: http://www.ecy.wa.gov/programs/spills/preparedness/GRP/ColumbiaRiver/LCR-AllChapters.pdf, accessed December 12, 2013.

Washington State Department of Fish and Wildlife (WDFW). 2013a. WDFW Priority Habitats and Species (PHS) on the Web. On-line database. Accessed at http://wdfw.wa.gov/mapping/phs/ Accessed June 26, 2013.

Washington State Department of Fish and Wildlife (WDFW). 2013b. WDFW Salmonscape database. Accessed online at http://wdfw.wa.gov/mapping/salmonscape/index.html. Accessed June 26, 2013.

Washington State Department of Transportation (WSDOT). 2014. Biological Assessment Preparation – Advanced Training Manual Version 02-2014. February 2014.

Washington State Department of Transportation (WSDOT). 2011. Port Townsend dolphin timber pile removal: Vibratory pile monitoring technical memorandum. Washington State Department of Transportation, Olympia, WA. January 3, 2011.

Washington State Department of Transportation (WSDOT). 2010. Keystone ferry terminal: Vibratory pile monitoring technical memorandum. Washington State Department of Transportation, Olympia, WA. May 4, 2010.

Washington Natural Heritage Program (WNHP). 2013a. WNHP Online Self Service System. Sections that Contain Natural Heritage Features. Information last updated November 4, 2011. Online document. URL: http://www.dnr.wa.gov/ResearchScience/HowTo/ConservationRestoration/Pages/amp_nh_data_instructions.aspx. Accessed June 26, 2013.

Washington Natural Heritage Program (WNHP). 2013b. Field Guide to Washington's Rare Plants. Washington State Department of Natural Resources (WDNR). Olympia, Washington. On-line document: http://www1.dnr.wa.gov/nhp/refdesk/fguide/htm/fsfgabc.htm Accessed June 26, 2013.

Washington Natural Heritage Program (WNHP). 2012. Clark County List of Rare Plants—Updated August 2012 On-line document http://www1.dnr.wa.gov/nhp/refdesk/lists/plantsxco/clark.html Accessed June 26, 2013.

Woodruff, K. and H. Ferguson. 2005. Townsend's big-eared bat, *Corynorhinus townsendii*. In J. M. Azerrad, editor. Management recommendations for Washington's priority species. Volume V: mammals. Washington Department of Fish and Wildlife, Olympia, WA.

Wydoski, R.S., and R.R. Whitney. 2003. Inland Fishes of Washington. Second edition, revised and expanded. American Fisheries Society, Bethesda, MD, in association with University of Washington Press, Seattle, WA.