MILLENNIUM BULK TERMINALS—LONGVIEW SEPA ENVIRONMENTAL IMPACT STATEMENT

SEPA WILDLIFE TECHNICAL REPORT

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Acronyms and Abbreviations

ADD	auditory deterrence device
Applicant	Millennium Bulk Terminals—Longview, LLC
BA	biological assessment
BNSF	BNSF Railway Company
CDID	Consolidated Diking and Improvement District
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
CRC	Columbia River Crossing
CRD	Columbia River Datum
dB	decibel
dB_{PEAK}	peak sound pressure
dB_{RMS}	decibel root mean square
dB_{SEL}	decibel sound exposure level
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
g/m^2/year	grams per square meter per year
GIS	geographic information system
Hz	Hertz
IHA	Incidental Harassment Authorization
IPaC	Information, Planning, and Conservation
kHz	kilohertz
LOA	Letter of Authorization
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
PAH	polycyclic aromatic hydrocarbon
PHS	Priority Habitat and Species
PTS	permanent threshold shift
RCW	Revised Code of Washington
Reynolds facility	Reynolds Metals Company facility
SEL	sound exposure level
SEPA	Washington State Environmental Policy Act
SPLs	sound pressure levels
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation

Chapter 1
Introduction

This technical report assesses the potential wildlife impacts of the proposed Millennium Bulk Terminals—Longview project (Proposed Action) and No-Action Alternative. For the purposes of this assessment, wildlife refers to terrestrial and aquatic wildlife species other than fish. This report describes the regulatory setting, establishes the methods for assessing potential wildlife impacts, presents the historical and current wildlife conditions in the study area, and assesses potential impacts. Fish and their habitat are discussed in the Washington State Environmental Policy Act (SEPA) Fish Technical Report (ICF 2017a).

1.1 Project Description

Millennium Bulk Terminals—Longview, LLC (Applicant) is proposing to construct and operate a coal export terminal (Proposed Action) in Cowlitz County, Washington along the Columbia River (Figure 1). The coal export terminal would receive coal from the Powder River Basin in Montana and Wyoming, and the Uinta Basin in Utah and Colorado via rail shipment. The coal export terminal would receive, stockpile, and load coal onto vessels and transport the coal via the Columbia River and Pacific Ocean to overseas markets in Asia.

1.1.1 Proposed Action

Under the Proposed Action, the Applicant would develop the coal export terminal on 190 acres (project area) primarily within an existing 540-acre site that is currently leased by the Applicant (Applicant's leased area). The project area is adjacent to the Columbia River in unincorporated Cowlitz County, Washington near Longview, Washington (Figure 2). The Applicant currently operates and would continue to operate a bulk product terminal within the Applicant's leased area.

BNSF Railway Company (BNSF) or Union Pacific Railroad (UP) trains would transport coal on BNSF main line routes in Washington State, and the BNSF Spur and Reynolds Lead in Cowlitz County to the project area. Coal would be unloaded from rail cars, stockpiled, and loaded by conveyor onto ocean-going vessels for export at two new docks (Docks 2 and 3) located in the Columbia River.

Once construction is complete, the Proposed Action could have a maximum annual throughput capacity of up to 44 million metric tons of coal per year. The coal export terminal would consist of one operating rail track, eight rail tracks for storing up to eight unit trains, rail car unloading facilities, a stockpile area for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks 2 and 3), and shiploading facilities on the two docks. Dredging of the Columbia River would be required to provide access to and from the Columbia River navigation channel and for berthing at the two new docks.

Vehicles would access the project area from Industrial Way (State Route 432), and vessels would access the project area via the Columbia River. The Reynolds Lead and BNSF Spur track—both jointly owned by BNSF and UP, and operated by Longview Switching Company (LVSW)—provide rail access to the project area from a point on the BNSF main line (Longview Junction) located to the

east in Kelso, Washington. Coal export terminal operations would occur 24 hours per day, 7 days per week. The coal export terminal would be designed for a minimum 30-year period of operation.

At full terminal operations, approximately 8 loaded unit trains each day would carry coal to the export terminal, 8 empty unit trains each day would leave the export terminal, and an average of 70 vessels per month or 840 vessels per year would be loaded, which would equate to 1,680 vessel transits in the Columbia River annually.

Figure 1. Project Vicinity

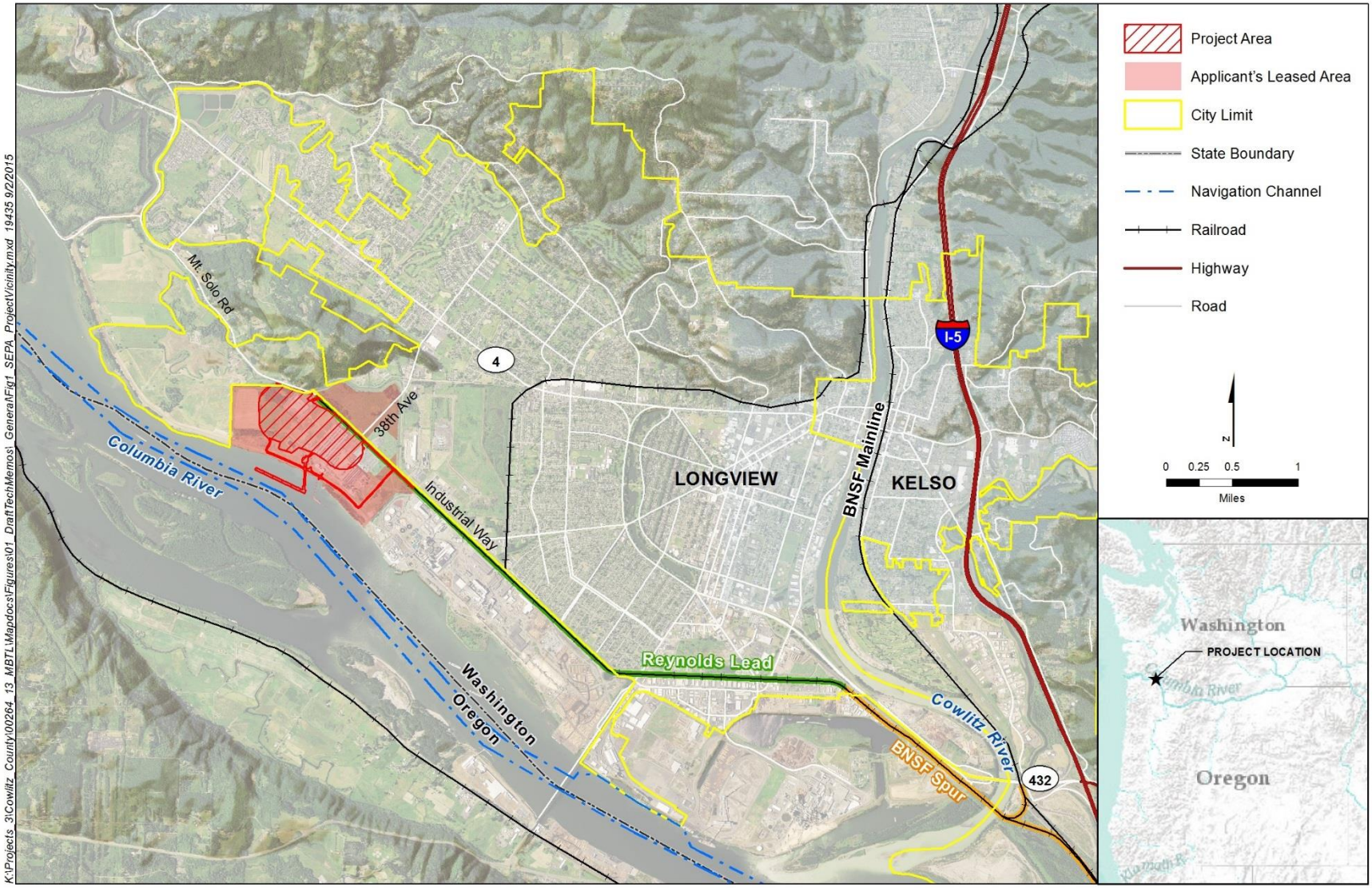
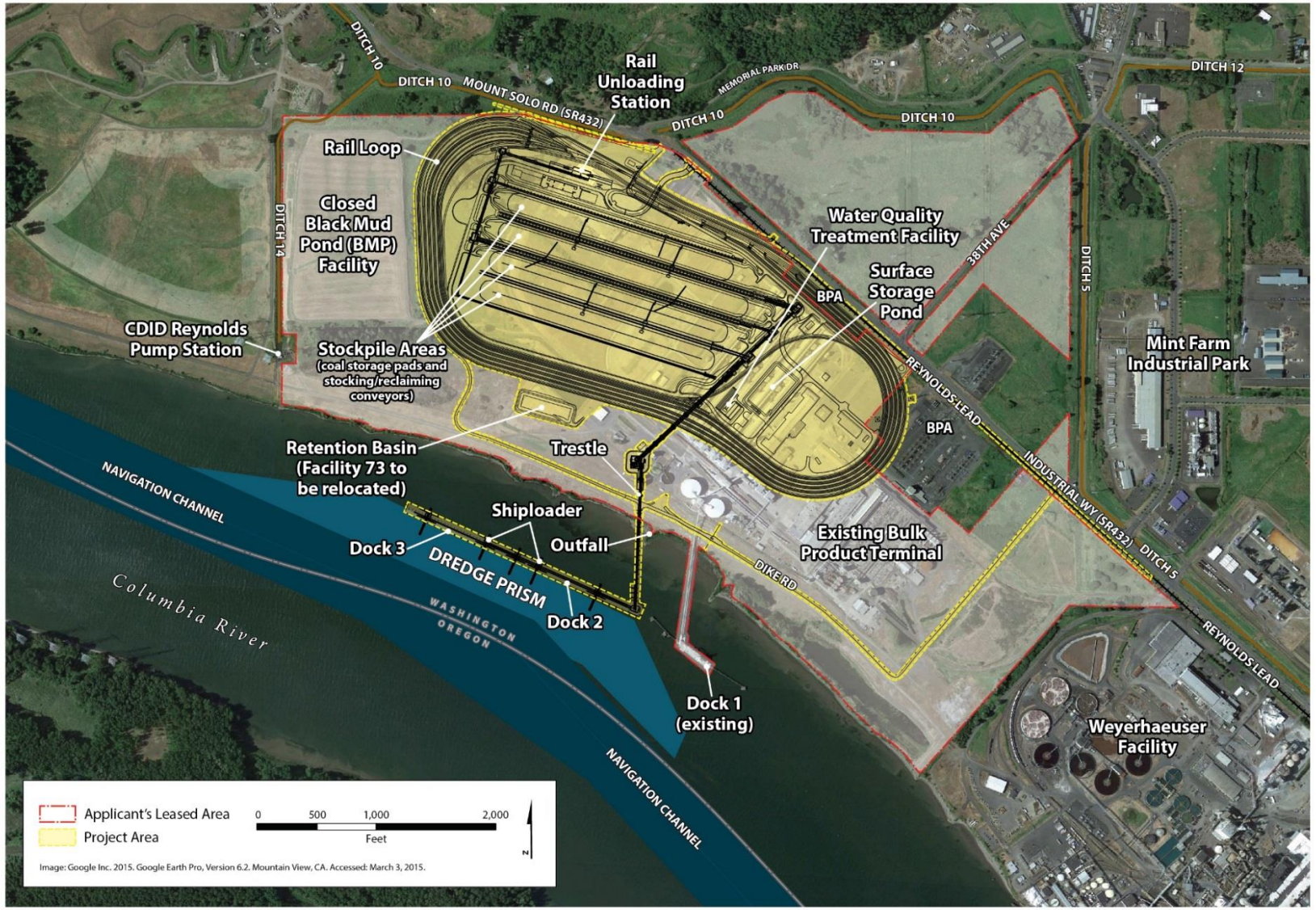


Figure 2. Proposed Action



1.1.2 No-Action Alternative

The Applicant plans to continue operating its existing bulk product terminal located adjacent to the project area. Ongoing operations would include storing and transporting alumina and small quantities of coal, and continued use of Dock 1. Maintenance of the existing bulk product terminal would continue, including maintenance dredging at the existing dock every 2 to 3 years. The Applicant plans to expand operations at the existing bulk product terminal, which could include increased storage and upland transfer of bulk products utilizing new and existing buildings. The Applicant would likely need to undertake demolition, construction, and other related activities to develop expanded bulk product terminal facilities.

If the coal export terminal is not constructed, the Applicant would likely propose expansion of the bulk product terminal onto areas that would have been subject to construction and operation of the proposed coal export terminal. Additional bulk product transfer activities could involve products such as a calcined pet coke, coal tar pitch, cement, fly ash, and sand or gravel. Any new operations would be evaluated under applicable regulations. Upland areas of the project area are zoned Heavy Industrial and it is assumed future proposed industrial uses in these upland areas could be permitted. Any new construction would be limited to uses allowed under existing Cowlitz County development regulations.

1.2 Regulatory Setting

The jurisdictional authorities and corresponding regulations, statutes, and guidance for determining potential impacts on wildlife are summarized in Table 1.

Table 1. Regulations, Statutes, and Guidelines for Wildlife

Regulation, Statute, Guideline	Description
Federal	
National Environmental Policy Act (42 USC 4321 et seq.)	Requires the consideration of potential environmental effects. NEPA implementation procedures are set forth in the President's Council on Environmental Quality's Regulations for Implementing NEPA (49 CFR 1105).
Endangered Species Act Section 7	Requires federal actions, such as issuing a permit under a federal regulation (e.g., NEPA, Clean Water Act, Clean Air Act) to undergo consultation with USFWS and/or NMFS to ensure the federal action is not likely to jeopardize the continued existence of any listed threatened or endangered animal species or result in the destruction or adverse modification of designated critical habitat. NMFS is responsible for managing, conserving, and protecting ESA-listed marine species. USFWS is responsible for terrestrial and freshwater species. Both NMFS and USFWS are responsible for designating critical habitat for ESA-listed species.
Migratory Bird Treaty Act of 1918, as amended (16 USC 703–713)	Makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts,

Regulation, Statute, Guideline	Description
	nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. Under the regulatory authority of USFWS.
Bald and Golden Eagle Protection Act of 1940, as amended (16 USC 668–668c)	Prohibits the taking of bald eagles, including their parts, nests, or eggs without a permit issued by the USFWS, and provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle... [or any golden eagle], alive or dead, or any part, nest, or egg thereof."
Marine Mammal Protection Act of 1972, as amended (50 CFR 216)	Protects marine mammals from “take” without appropriate authorization, which is only granted under certain circumstances. NMFS and the USFWS enforce the MMPA. Animals under the jurisdiction of NMFS could be present within the study area. An Incidental Harassment Authorization or Letter of Authorization (specific authorization to be determined) could be required pursuant to the MMPA.
State	
Washington State Environmental Policy Act (WAC 197-11, RCW 43.21C)	Requires state and local agencies in Washington to identify potential environmental impacts that could result from governmental decisions.
Washington State Growth Management Act (RCW 36.70A)	Defines a variety of critical areas, which are designated and regulated at the local level under city and county critical areas ordinances.
Washington State Shoreline Management Act (90.58 RCW)	Requires cities and counties (through their Shoreline Master Programs) to protect shoreline natural resources.
Washington State Hydraulic Code (RCW 77.55)	Designed to protect fish life. The hydraulic project approval is administered by WDFW under the state hydraulic code.
Clean Water Act Section 401 Water Quality Certification	Issued for in-water construction to ensure compliance with state water quality standards and the protection of other aquatic resources under Ecology’s authority as outlined in the federal Clean Water Act.
Marinas and Terminals in Freshwater Areas (WAC 220-660-160)	Applies to constructing, maintaining, and repairing marinas and terminals in freshwater areas and provides provisions intended to address fish life concerns.
Local	
Cowlitz County SEPA Regulations (Cowlitz County Code 19.11)	Provide for the implementation of SEPA in Cowlitz County.
Cowlitz County Critical Areas Protection Ordinance (19.15)	Regulates activities within and adjacent to critical areas including fish and wildlife habitat conservation areas.
Cowlitz County Shoreline Master Program (19.20)	Regulates development in the shoreline zone, including the shoreline of the Columbia River, a Shoreline of Statewide Significance.

Regulation, Statute, Guideline	Description
City of Longview Shoreline Master Program (Ord. 3300)	Regulates development in the shoreline zone, including the shoreline of the Columbia River, a Shoreline of Statewide Significance. Adopted in September 2015.
City of Longview Critical Areas Ordinance(17.10)	Regulates activities within and adjacent to critical areas and in so doing regulates fish and wildlife habitat conservation areas.

Notes:
USC = United States Code; NEPA = National Environmental Policy Act; CFR = Code of Federal Regulations; Corps = U.S. Army Corps of Engineers; CEQ = Council on Environmental Quality; USFWS = U.S. Fish and Wildlife Service; NMFS = National Marine Fisheries Service; ESA = Endangered Species Act; MMPA = Marine Mammal Protection Act; WAC = Washington Administrative Code; RCW = Revised Code of Washington; WDFW = Washington Department of Fish and Wildlife; Ecology = Washington State Department of Ecology; SEPA = State Environmental Policy Act

1.3 Study Area

Three study areas have been identified for the wildlife analysis, described in the following sections.

1.3.1 Direct Impact Study Area: Terrestrial Species and Habitats

The study area for direct impacts on terrestrial species and habitats consists of the project area plus the area up to 0.5 mile beyond the project area (Figure 3). This distance accommodates noise and visual disturbance thresholds set by the U.S. Fish and Wildlife Service (USFWS) for some sensitive species (U.S. Fish and Wildlife Service 2006).

1.3.2 Direct Impact Study Area: Aquatic Species and Habitats

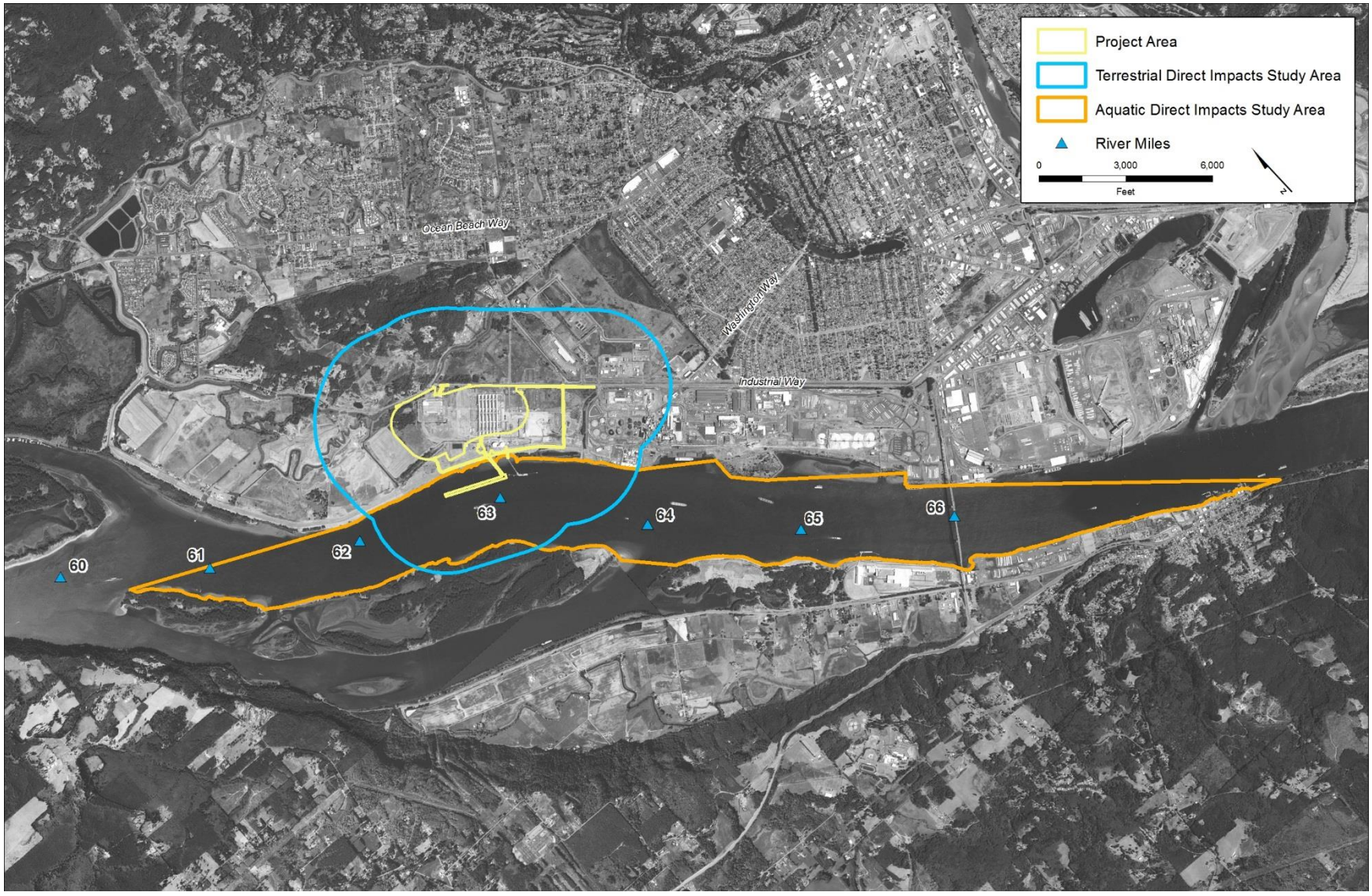
The study area for direct impacts on aquatic species and habitats includes the main channel of the Columbia River and extends 5.1 miles upstream and 2.1 miles downstream, measured, respectively, from the upstream and downstream extents of the proposed docks (Docks 2 and 3) at the project area (Figure 3). The aquatic study area is based on the distances where underwater noise is estimated to reach harassment levels. These distances represent the in-water line-of-site distances from the ends of the dock with respect to underwater noise.

The aquatic study area also includes the various surface and stormwater ditches, ponds, and wetlands found throughout the project area.

1.3.3 Indirect Impact Study Area: All Species and Habitats

The study area for indirect impacts on terrestrial species includes the rail corridors in Washington State that would be used by Proposed Action-related trains. This area accounts for potential coal spill and wildlife strike impacts. See the SEPA Rail Transportation Technical Report (ICF and Hellerworx 2017) for rail routes in Cowlitz County and Washington State). The study area for indirect impacts on aquatic species includes the Columbia River downstream from the project area to mouth of the river to account for potential impacts to marine mammals.

Figure 3. Study Area Boundaries



Chapter 2
Existing Conditions

This chapter explains the methods for assessing the existing conditions and determining impacts, and describes the existing conditions in the study area for the Proposed Action as they pertain to wildlife.

2.1 Methods

This section describes the sources of information that were used to characterize the existing conditions and assess potential impacts of the Proposed Action and No-Action Alternative on wildlife and wildlife habitat.

2.1.1 Data Sources

The following data sources were used to define the existing conditions relevant to wildlife and wildlife habitat and to evaluate potential impacts of the Proposed Action and No-Action Alternative in the terrestrial and aquatic study areas.

- Two site visits to the project area conducted by ICF biologists on April 8, 2014, and December 12, 2014.
- One site visit to the Mount Solo Landfill, located adjacent to and north of the project area, was conducted by ICF biologists on December 12, 2014, to view the project area with binoculars from an elevated position. The site was also viewed with binoculars from the project area and from publicly accessible roads.
- Reports prepared by Grette Associates for the Applicant as part of the permit application materials.
    - *Docks 2 and 3 and Associated Trestle: Direct Effects of Construction Pile Driving and Marine Mammals* (Grette Associates 2014a).
    - *Wetland and Stormwater Ditch Delineation Report – Parcel 619530400* (Grette Associates 2014b).
    - *Bulk Product Terminal Shoreline Wetland Delineation Report – Parcel 61950* (Grette Associates 2014c).
    - *Wetland and Stormwater Ditch Delineation Report – Parcel* 61953 (Grette Associates 2014d).
    - *Bulk Product Terminal Wetland Stormwater Reconnaissance Report – Parcel 10213* (Grette Associates 2014e).
    - *Wetland Impact Report – Parcel 619530400* (Grette Associates 2014f).
    - *Permanent Impacts to Aquatic Habitat* (Grette Associates 2014g).
    - *Affected Environment Biological Resources. Technical Report* and associated appendices (Grette Associates 2014h).

- *Affected Environment Biological Resources. Addendum: Technical Memorandum: Streaked Horned Lark Surveys at Millennium Bulk Terminals* (Grette Associates 2014i).
- *Docks 2 and 3 and Associated Trestle: Proposed Mitigation Measures to Minimize Construction and Long-Term Effects* (Grette Associates 2014j).
- *Docks 2 and 3 and Associated Trestle Direct Effects of Construction* (Grette Associates 2014k).
- *Affected Environment Biological Resources. Addendum: Technical Memorandum: Docks 2 and 3 and Associated Trestle Effects of Construction and Terminal Operations on Streaked Horned Larks and Columbian White-Tailed Deer* (Grette Associates 2014l).

- National Marine Fisheries Service (NMFS) West Coast Region species list.
- National Oceanic Atmospheric Administration (2016) technical guidance for assessing the effects of underwater sounds on marine mammals.
- USFWS Information, Planning, and Conservation (IPaC) system online database (2015).
- Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) Statewide List and Distribution for Cowlitz County (Washington Department of Fish and Wildlife 2015a).
- WDFW interactive mapping for PHS spatial data provided by WDFW on May 5, 2014, for a 5-mile radius surrounding the project area.
- Washington State Department of Natural Resources online Herpetological Atlas spatial database (2015).
- Literature relative to threatened and endangered species.
- Comments received from interested parties during the project scoping period relative to wildlife, as summarized in the SEPA Scoping Report (February 10, 2014).

2.1.2 Impact Analysis

The impact analysis involved conducting a quantitative analysis of vegetated habitats at the project area and a qualitative analysis of wildlife species in the study areas. For the purpose of this analysis, construction impacts are based on peak construction period and operations impacts are based on maximum throughput capacity (up to 44 million metric tons per year).

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative.

2.1.2.1 Vegetated Habitats

Direct impacts on habitat are based on the method outlined in the SEPA Vegetation Technical Report (ICF 2017b). Vegetation communities were identified, characterized, and mapped for both project area using recent and historic aerial photographs and the information gathered from the references cited in Section 2.1.1, *Impact Analysis*, of the SEPA Vegetation Technical Report. Mapped plant communities in the majority of the project area for the Proposed Action were checked by ICF biologists during the December 12, 2014 site visit. The vegetation types present in the project area were also verified by observing the project area, Mount Solo Landfill, and public roads through binoculars. Visual observations of the vegetation in the study area on adjacent, off-site areas and

along Industrial Way, Mt. Solo Road, and Memorial Park Drive were also documented during this site visit.

Once verified, vegetation communities were mapped on a recent aerial photograph using geographic information system (GIS) and overlain with the wetland boundaries delineated by Grette Associates (2014b, c, d, e, f). Direct impacts on vegetation from the clearing of land to construct the buildings and infrastructure of the Proposed Action were determined by overlaying the coal export terminal footprints on the vegetation maps using GIS. All vegetated areas that fell within the footprint were considered direct impacts.

2.1.2.2 Wildlife Species

Potential impacts on wildlife species were determined by considering species that are likely to occur in the study area based on field surveys, site visits, the presence of suitable habitat and geographic range, and documented species occurrences. For documented occurrences, the focus was on wildlife species identified in the WDFW PHS database. The PHS program provides comprehensive information on important fish, wildlife, and habitat resources in Washington. It is the principal means by which WDFW provides wildlife and habitat information to public and private entities for planning purposes. In addition, the USFWS list of federally listed species in Cowlitz County and the NMFS West Coast Region species list of marine mammals (most of which are also included in the PHS database) were also considered.

WDFW maintains a PHS geospatial database that maps locations of priority species occurrences and priority habitats. Priority species in the PHS program include wildlife species classified under state law (Washington Administrative Code [WAC] 232-12-297) as threatened, endangered, or sensitive, as well as species that are candidates for such classification. Other PHS species include vulnerable aggregations of species or groups of animals that are susceptible to significant population declines due to their inclination to aggregate, and species of recreational, commercial, or tribal importance. The PHS database also includes state-monitored species, which are not considered special-status, but are monitored for status and distribution trends. Geospatial PHS data containing mapped locations of priority species occurrences and priority habitats were obtained from WDFW (Washington Department of Fish and Wildlife 2014). These data were overlaid with the study area to determine presence of documented priority species and habitat occurrences.

- A list of special-status wildlife species was compiled for the study area, consisting of those species federally listed as threatened, endangered, proposed, or candidate species; wildlife species listed in the WDFW PHS database; and marine mammals.
- A list of federally listed wildlife species for Cowlitz County was generated from the USFWS iPAC online planning tool (U.S. Fish and Wildlife Service 2015).
- A list of state priority species that occur in Cowlitz County was obtained from the WDFW PHS program website (Washington Department of Fish and Wildlife 2013).
- A list of federally protected marine mammals that could occur in the study area was compiled from the NMFS (2015) West Coast Region website.

The impact analysis for wildlife habitat is quantitative; however, the impact analysis for wildlife species is qualitative because wildlife species are generally mobile and their presence in the study area cannot be predicted at any one location or time. In addition, a species' reaction to an impact mechanism, such as construction-generated noise, can be different for each species given the

variability in species' hearing frequencies, mobility, vision, and overall sensitivity (e.g., juveniles could be more sensitive and susceptible to potential impacts than older animals). Therefore, impact mechanisms are identified and a qualitative impact discussion describes the potential effect an impact mechanism could have on species that could be in the study area during construction and operations.

2.1.2.3 Assessing Noise and Visual Disturbance

An animal's response to sounds depends on various factors, including noise level and frequency, distance and event duration, equipment type and conditions, frequency of noisy events over time, slope, topography, weather conditions, previous exposure to similar noises, hearing sensitivity, reproductive status, time of day, behavior during the noise event, and an animal's location relative to the noise source (Delaney and Grubb 2003 in Washington State Department of Transportation 2015). As sound waves spread out from their source, their energy level decreases. This assessment considers potential impacts of terrestrial sound on wildlife and potential impacts of underwater sound on diving birds and marine mammals.

Terrestrial Noise and Visual Disturbance

USFWS has established terrestrial distance thresholds at which harassment[1] may occur for some sensitive species in Washington (U.S. Fish and Wildlife Service 2006) due to construction activity. Species for which USFWS has determined harassment distance thresholds include the bald eagle (*Haliaeetus leucocephalus*), marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), and Columbian white-tailed deer (*Odocoileus virginianus leucurus*). Table 2 presents distances from construction activity at which USFWS predicts these species may experience harassment (U.S. Fish and Wildlife Service 2006). Of these four sensitive species, the bald eagle can experience harassment from visual impacts as far as 0.5 mile from a construction site, the greatest distance of potential harassment of the four species. The remaining three species may experience harassment through either visual or noise disturbance at lesser distances. Therefore, using a conservative approach, the terrestrial study area for direct impacts extends 0.5 mile beyond the project area. While this distance is based on the bald eagle's sensitivity to noise and visual impacts, it is a reasonable proxy to use for terrestrial wildlife species in the absence of similar information for those species.

[1] *Harassment* under the Endangered Species Act is defined as actions that create the likelihood of injury to such an extent as to significantly disrupt normal behavior patterns, which include but are not limited to breeding, feeding, or sheltering (50 CFR 17.3).

Table 2. Harassment Distances for Federally Listed Species in Washington State

Species	Scientific Name	Activity and Harassment Distance
Bald eagle	*Haliaeetus leucocephalus*	Noise: 0.25 mile Visual: 0.5 mile
Marbled murrelet	*Brachyramphus marmoratus*	Pile driving: 180 feet Visual: 300 feet
Northern spotted owl	*Strix occidentalis caurina*	Pile driving: 180 feet
Columbian white-tailed deer	*Odocoileus virginianus leucurus*	Noise: 0.25 mile

Source: U.S. Fish and Wildlife Service 2006

Underwater Noise Disturbance

For underwater impacts on marine mammals and diving birds due to sound, USFWS and NMFS have determined noise level thresholds that may result in behavioral changes or injury. The distance at which these thresholds would be reached is based on the practical spreading loss model as described by Thomsen et al. (2006).

Marine Mammal Underwater Noise Impact Thresholds

NMFS currently provides regulatory acoustic thresholds for assessing the effects of noise exposure on marine mammal hearing from impulsive (impact) and nonimpulsive (vibratory) pile driving or other noise sources (Table 3) (National Oceanic and Atmospheric Administration 2016). These thresholds represent peak and cumulative sound energy levels that may cause a permanent threshold shift (PTS), a physical injury that results in reduced hearing sensitivity, in the hearing of five functional hearing groups of marine mammals.

Table 3. Underwater Sound Level Effect Thresholds for Permanent Threshold Shift Auditory Injury to Marine Mammals

	Permanent Threshold Shift Onset Acoustic Thresholds (Received Level)	
Hearing Group	**Impulsive**	**Nonimpulsive**
Low-frequency cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$:199 dB
Mid-frequency cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
High-frequency cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$:155 dB	$L_{E,HF,24h}$: 173 dB
Phocid pinnipeds (underwater)	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$:185 dB	$L_{E,PW,24h}$: 201 dB
Otariid pinnipeds (underwater)	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB

Source: National Oceanic and Atmospheric Administration 2016

$L_{pk,flat}$ = Peak Sound Pressure Level (unweighted); $L_{E,24h}$ = Sound Exposure Level, Cumulative 24 hour; LF = Low Frequency; MF = Mid Frequency; HF = High Frequency; PW = Phocids in Water; OW = Otariids in Water

While the recent NMFS technical guidance on underwater noise impacts on marine mammals (National Oceanic and Atmospheric Administration 2016) provides guidance on injury impacts of noise on marine mammals, it does not provide revised guidance on noise impacts on behavior of marine mammals. Table 4 provides NMFS's interim sound threshold guidance for the potential onset of behavioral disturbance or harassment to marine mammals from nonimpulsive (vibratory) and impulsive (impact) pile driving.

Table 4. NMFS Underwater Sound Level Effect Thresholds for Behavioral Disturbance to Marine Mammals

Sound Source	Effect Threshold
Nonimpulsive	120 dB_{RMS}
Impulsive	160 dB_{RMS}

Source: National Oceanic and Atmospheric Administration Undated

dB_{RMS} = decibel root mean square

Because there is an extremely low probability of cetaceans (e.g. whales, and dolphins) using the study area, they are not assessed for underwater sound impacts of the Proposed Action. Pinnipeds (e.g., seals and sea lions) may be found in the aquatic study area during construction.

Diving Bird Underwater Noise Impact Thresholds

USFWS has established underwater noise level thresholds for behavioral change, auditory injury, and nonauditory injury (barotrauma) to the federally listed marbled murrelet (U.S. Fish and Wildlife Service 2011) (Table 5). The underwater effect threshold for behavioral disturbance is 150 decibels root mean square (dB_{RMS}); auditory injury is 202 decibels sound exposure level (dB_{SEL}); and nonauditory injury is 208 dB_{SEL}. Underwater noise below 150 dB_{SEL} does not cause injury and is recognized by USFWS as effectively quiet (Washington State Department of Transportation 2015).

While marbled murrelets are not found in the study area, the underwater noise thresholds provide some guidance on potential underwater noise impacts that could be useful for other diving birds in the study area. In the absence of any federal or state agency criteria for underwater noise impacts on diving birds, these marbled murrelet criteria were used to establish distances at which underwater noise due to impact pile driving may affect all diving birds in the aquatic study area. No vibratory pile-driving thresholds have been identified for marbled murrelet or other diving birds.

Table 5. USFWS Underwater Sound Level Effect Thresholds for Marbled Murrelets.

Effect Type	Effect Threshold
Behavioral disturbance	150 dB_{RMS}
Auditory injury	202 dB_{SEL}
Nonauditory injury (barotrauma)	208 dB_{SEL}

Source: U.S. Fish and Wildlife Service 2011
dB_{RMS} = decibel root mean square; dB_{SEL} = decibel sound exposure level

Underwater Noise Assessment Methods

The distance at which underwater noise is reduced to the noise level thresholds presented in Tables 3, 4 and 5 is calculated using the model currently preferred by USFWS and NMFS; the practical spreading loss model described by Thomsen et al. (2006). Up to four piles would be driven per day over an 8-hour period. Pile-driving duration and sound source levels measured during construction activities similar to those described for the Proposed Action (Table 6) provide the basis for calculating the distance at which construction-related noise no longer reaches the marine mammal and marbled murrelet noise impact thresholds. Sound attenuation devices would be used during impact pile driving and are predicted to reduce sound levels by up to 9 dB (Table 6) (Grette Associates 2014a). Attenuated sound levels are used in the calculation of the underwater distances at which murrelets and marine mammals may be affected. The calculated distances are presented in Section 3.1.1, *Construction: Direct Impacts*.

Table 6. Pile-Driving Duration (single pile) and Underwater Sound Source Levels (single strike) Used in Determining Acoustic Impacts

				Unattenuated[a]			Attenuated		
Pile-Driving Method	**Strikes**	**Minutes**	**Hours**	**dB_{peak}**	**dB_{RMS}**	**dB_{SEL}**	**dB_{peak}**	**dB_{RMS}**	**dB_{SEL}**
Vibratory driving	n/a	20	.3	n/a	181	n/a	n/a	n/a	n/a
Impact driving, per pile (including proofing if needed)	4030	120	2	217	201	185	208	192	176

Source: Grette Associates 2014a
Notes:
[a] All sound levels measures 10 meters from source
dB_{PEAK} = peak sound pressure; dB_{RMS} = decibel root mean square; dB_{SEL} = decibel sound exposure level

2.2 Existing Conditions

The existing environmental conditions related to wildlife in each study area are described below.

2.2.1 Terrestrial Habitat

Terrestrial habitats in the terrestrial direct impact study area are characterized by their main land cover classification and dominant form of vegetation and are described in the SEPA Vegetation Technical Report (ICF 2017b). Habitat types in the terrestrial direct impact study area include developed (disturbed), upland (forested, scrub-shrub, herbaceous, managed herbaceous, and riparian), and wetland (forested, scrub-shrub, and emergent).

Developed land includes areas where the majority of vegetation has been removed and replaced with pavement, buildings, or infrastructure associated with existing and historical industrial, agricultural, and recreational uses. Occasionally, scattered vegetation is present and typically consists of nonnative grasses, forbs, and shrubs. There is one vegetation type, disturbed, categorized in the developed areas.

Uplands include areas landward of the Columbia River levee with undeveloped vegetated areas that do not exhibit wetland characteristics. Vegetation within the uplands is categorized as forested, scrub-shrub, herbaceous, and managed herbaceous.

Wetlands include areas that exhibit the diagnostic wetland characteristics required by state and federal wetland delineation manuals (hydrophytic vegetation, hydric soils, and wetland hydrology). Wetland mapping and classifications were taken directly from the wetland delineation and determination work completed for the project area by Grette Associates (2014b, c, d, e,). Vegetation in the wetlands is categorized as forested, scrub-shrub, and emergent.

Riparian lands are uplands that include the areas along the shoreline of the Columbia River between the ordinary high water mark and the top of the Columbia River levee. Vegetation is categorized as forested, scrub-shrub, and herbaceous.

2.2.1.1 Project Area

The project area comprises a disturbed industrial site developed with roads and industrial buildings and relatively small and fragmented vegetated areas primarily in the western portion of the project area. Many of the surrounding areas are also highly disturbed. Of the undeveloped habitat areas on the project area, many are small and fragmented from other similar habitat patches. The largest contiguous areas of habitat are located on the west side of the project area and include an herbaceous wetland dominated by reed canarygrass and a forested wetland dominated by deciduous trees with an understory of shrubs and reed canarygrass. The highest quality habitat on the project area is a small forested area surrounding parallel drainage ditches, located in the southwest portion of the site. The habitat is characterized by deciduous trees along the banks of the ditches and abundant understory vegetation. In general, suitable wildlife habitat on the project area is degraded because of past industrial uses on the property. The patches of suitable habitat support foraging and cover for small to large mammals, foraging and nesting for birds, including waterfowl, raptors, and passerine birds, and foraging, breeding, and nesting for amphibians (Grette Associates 2014b, c, d, f).

2.2.1.2 Study Area

The project area for the Proposed Action is located along the north side of the Columbia River at river mile 63, within unincorporated Cowlitz County and adjacent to the City of Longview. In general, areas to the north-northeast and around to the southeast of the project area (in a clockwise direction) are already heavily developed by industrial, commercial, and residential land uses. These uses extend to the Cowlitz River and down along the Columbia River. Immediately upstream of the project area, the heavily developed shoreline lacks suitable habitat and wildlife species are not present. Because the project area is at the western edge of this development, wildlife dispersal or movement through the project area are unlikely because there is no suitable habitat in these developed areas for wildlife to disperse or move into. Existing conditions impede wildlife movement toward the City of Longview (upstream of the project area). Immediately downstream of the project area are uplands, wetlands, and riparian habitats, as well as disturbed areas. Habitat conditions for wildlife are less disturbed than in the project area. Immediately north of the project area is a triangular area of the Applicant's leased area bordered by Industrial Way to the south and Consolidated Diking Improvement District (CDID) #1 drainage ditches to the east and west. The habitat likely supports foraging and cover for small to large mammals (e.g., voles to deer); foraging and nesting for a variety of birds; and foraging, breeding, and refuge for amphibians and reptiles.

The terrestrial direct impact study area includes land both up- and down-stream of the project area, land north of Industrial Way, a strip of land between the project area and Columbia River, and a small portion of Lord Island (Figure 3). Upstream land is predominantly disturbed with heavy industrial development and wildlife is not present due to the lack of suitable habitat.

Predominant habitat types in the downstream portion of the terrestrial direct impact study area include disturbed areas, herbaceous and managed herbaceous upland habitats, herbaceous and managed herbaceous wetland habitats, and scrub-shrub or forested riparian habitat. Habitat support for wildlife is similar to that described for the project area and includes foraging and cover for small to large mammals, foraging and nesting for waterfowl, raptors, and passerine birds, and foraging, breeding, and nesting for amphibians.

North of Industrial Way, the landscape can be generally separated into three similar habitat areas that are separated by Consolidated Diking and Improvement District (CDID) #1 drainage ditches (Figure 3). To the northwest is Mount Solo, a forested ridge that is covered with a large area of contiguous native forest intermixed with rural residential areas and some light industrial uses. Smaller areas of scrub-shrub and managed herbaceous habitats are interspersed with the developed areas. Mount Solo is the largest contiguous forested upland habitat within 2 miles of the project area, and as such, is likely to support a greater diversity of wildlife—including small to large mammals, bird species (passerine, raptor, and owl), lizards, and snakes—than habitats on the project area.

Adjacent to the project area along the north side of Industrial Way is a triangular area bounded by CDID drainage ditches to the east and west. This area primarily contains herbaceous wetland habitat dominated by reed canarygrass. Other habitats, including forested and scrub-shrub wetlands and uplands (forested, scrub-shrub, and herbaceous) are small and isolated from other similar habitat types. A small portion of the site is disturbed. The habitat likely supports foraging and cover for small to large mammals; foraging and nesting for waterfowl, raptors, and passerine birds; and foraging, breeding, and refuge for amphibians and reptiles. Land to the east is largely disturbed by the Mint Farm Industrial Park, with few small areas of herbaceous or scrub-shrub habitat.

South of the project area, the terrestrial direct impact study area consists of a levee with managed herbaceous vegetation and riparian shoreline bordering the Columbia River. The riparian area is primarily forested and scrub-shrub habitat and likely provides foraging and cover for small and large mammals, foraging and nesting for passerine, waterfowl and raptor bird species, and foraging, breeding, and refuge for amphibians (Grette Associates 2014c).

A small portion of Lord Island is located in the terrestrial direct impact study area and is approximately 0.5 mile south of the project area. The island is located within the Columbia River and was previously used for dredged material disposal. Lord Island is primarily forested and connects downstream to Walker Island by a narrow band of sand. An embayment between the two islands contains a tidal marsh and shallows. This area provides foraging and resting habitat for waterfowl and has been previously documented as supporting significant numbers of wintering ducks and geese (Pacific Coast Joint Venture 1994). With the exception of several transmission towers, the island is undeveloped and contains wildlife habitat. Lord Island could support Columbia white tailed deer; however, no occurrences have been documented on the island (Washington Department of Fish and Wildlife 2014). Additional wildlife species supported by Lord Island include small mammals, birds (raptors and passerine), amphibians, and reptiles.

The study area for indirect impacts on terrestrial species and habitats along the rail corridors in Washington State consists of many habitat types, which broadly include lowland and montane forests, sagebrush prairie, and shrub-steppe. Various species of wildlife are associated with each of these terrestrial habitats.

2.2.2 Aquatic Habitat

The aquatic direct impact study area includes the Columbia River smaller areas of open water, including various surface and stormwater ditches and ponds, and wetlands throughout the project area created by the excavation of dredged materials in 2006. Ditches include those maintained by CDID #1 and privately owned stormwater ditches.

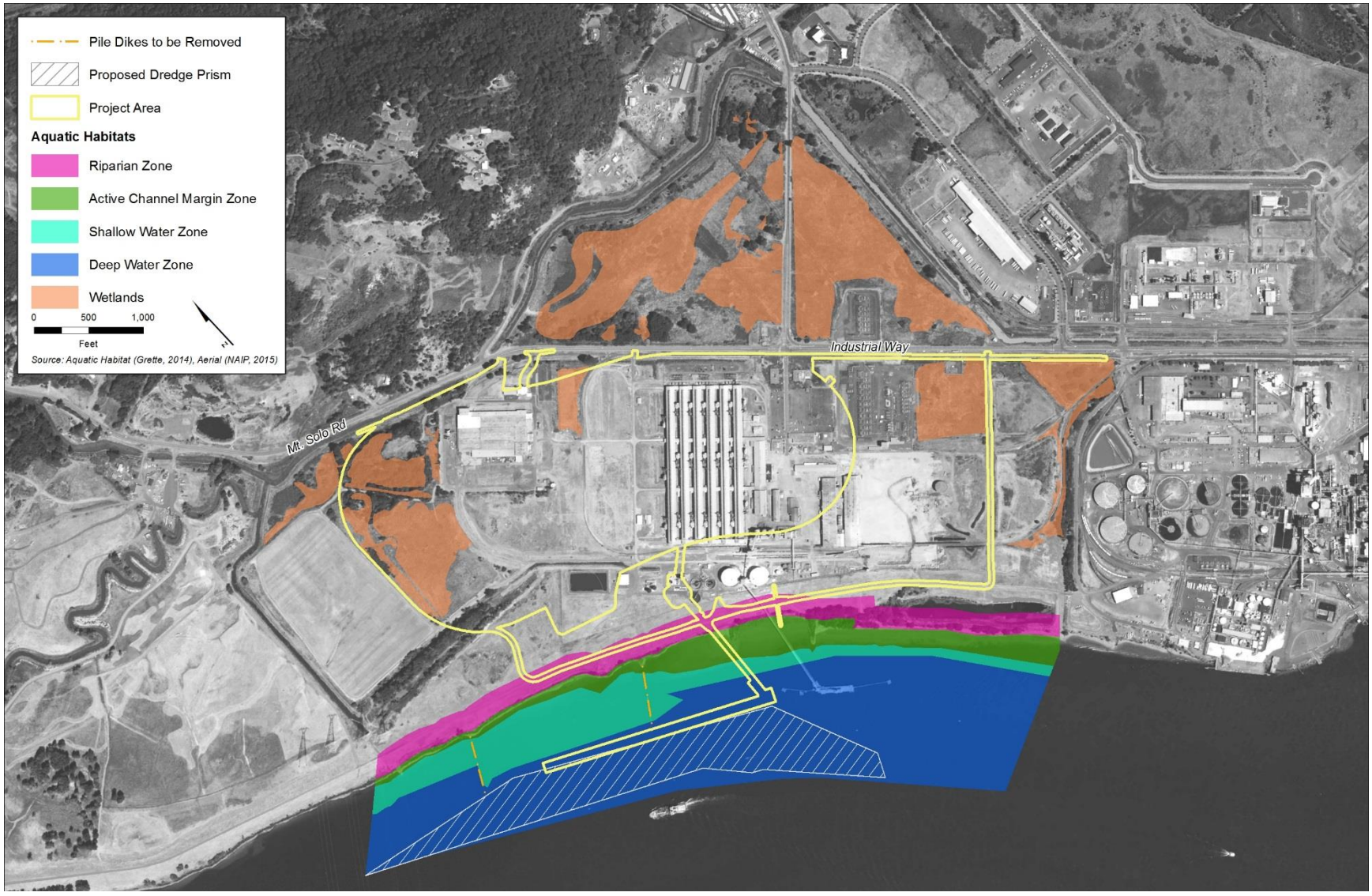
Aquatic habitat types in the Columbia River in the aquatic direct impact study area that could be affected by Proposed Action-related dredging and docks include the deepwater zone (deeper than -20 feet Columbia River Datum [CRD]), shallow-water zone (0 to -20 feet CRD), and the active channel margin (0 to +11.1 feet CRD) (Grette Associates 2014g).

The active channel margin includes the shoreline and nearshore edge habitat extending waterward from the ordinary high water mark of +11.1 feet CRD to 0 feet CRD. In general, the shoreline adjacent to the aquatic direct impact study area is sparsely vegetated and consists of sandy substrate with little organic matter (Grette Associates 2014h). The shoreline is highly modified by extensive dikes and riprap armoring with scattered large woody debris, bordered by the riparian zone.

The bottom structure of the shallow water zone consists primarily (90%) of flat or shallow sloping substrate, with some moderate slopes out to depths of about -20 feet CRD where the habitat becomes markedly steeper. There are two pile dikes and one overwater dock that extend into the shallow water zone (Figure 4). The substrates in the aquatic habitats consist primarily of silty river sand with little organic matter. Little to no aquatic vegetation is expected in the shallow water zone, however, sparse vegetation could exist in the upper elevations where light could penetrate, and flow is reduced. Conditions in the shallow-water portion of the in-water footprint are narrow and more

steeply sloped than the active channel margin and are, therefore, unlikely to support aquatic vegetation (Grette Associates 2014h).

Figure 4. Aquatic Habitats



Benthic habitats in the deepwater zone are subjected to strong currents and reduced light penetration. Aquatic vegetation is not expected to occur in the deepwater zone and these areas are generally associated with low productivity.

Aquatic habitats of the Columbia River support pinnipeds, fish, birds, and a variety of invertebrates, many of which serve as forage for fish and bird species. Fish are discussed in the SEPA Fish Technical Report (ICF 2017a). Smaller freshwater areas in the aquatic direct impact study area, such as ponds and ditches, could support common species of invertebrates and amphibians and could be used by small mammals and birds.

Habitat in the aquatic indirect impact study area includes the open water of the Columbia River from the project area to the river mouth that vessels use where marine mammals could be affected by vessel traffic. Marine mammals that may be found along the vessel route include sea lions and seals, as described below in Section 3.1.3, *Operations: Direct Impacts*. The aquatic habitats along the navigation channel are deepwater habitats that are regularly dredged to depths for safe vessel passage.

2.2.3 Wildlife

Wildlife species includes terrestrial and marine mammals, birds, reptiles, amphibians, and invertebrates, including species that are currently protected or proposed for protection under the federal Endangered Species Act (ESA) or other federal and state regulations. Fish are discussed in the SEPA Fish Technical Report (ICF 2017a).

Based on the data sources described in Section 2.1.1, *Data Sources*, wildlife species likely to be found in the direct terrestrial impact study area include common species of birds, rodents, amphibians, reptiles, and invertebrates. Larger and highly mobile species of mammals that are habituated to developed environments may also be present in the study area, including coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and deer (*Odocoileus* sp.).

Wildlife species likely to be found in the aquatic direct impact study areas include common species of birds (waterfowl, raptors, shorebirds, marine birds, and passerine birds), California sea lions (*Zalophus californianus*), Steller sea lions (*Eumetopias jubatus*), harbor seals (*Phoca vitulina*), rodents, frogs, salamanders, snakes, lizards, and invertebrates.

Representative wildlife in the terrestrial indirect impact study area in Cowlitz County may include black-tailed deer, red fox, coyote, raccoon, striped skunk, beaver, Oregon and grey-tailed vole, red-tailed hawk, Cooper's hawk, Canada geese, mallard and northern pintail ducks, great blue heron, white-breasted nuthatch, chipping sparrow, and a variety of amphibians and reptiles (Commission for Environmental Cooperation 2011). A review of PHS data (Washington Department of Fish and Wildlife 2015a) for terrestrial habitats indicates small areas of oak woodlands in a few places along the rail line; species associated with this habitat include various woodpeckers, migrant birds, reptiles, invertebrates, and the western gray squirrel (Washington Department of Fish and Wildlife 1998). In addition, two osprey point locations are mapped within 300 feet of the rail line (Washington Department of Fish and Wildlife 2015a). No designated critical habitat for federally protected species under USFWS jurisdiction is mapped in the terrestrial environment near the rail line corridor(s) that would be used to transport coal in Cowlitz County. Beyond Cowlitz County, several ecoregions are found between the county and the Washington border, each with various representative wildlife species. These could include mule deer, pronghorn antelope, coyote, black-

tailed jackrabbit, ground squirrels, American kestrel, red-tailed hawk, western meadowlark, savanna sparrow, western diamondback rattlesnake, greater sage-grouse, sage sparrows, sage thrashers, pygmy rabbits, black-tailed deer, black bear, beaver, river otter, pileated woodpecker, northern goshawk, cougar, wolverine, yellow bellied marmot, bald and golden eagles, Cooper's hawk, and osprey, in addition to many other birds, mammals, reptiles, and insects (Commission for Environmental Cooperation 2011). The largest ecoregion has dry desert and steppe climates, marked by hot, dry summers and cold winters, and consists of shrub-steppe vegetation communities. Shrub-steppe communities can also support federally protected species, including the pygmy rabbit and Spalding's catchfly. WDFW considers shrub-steppe a priority habitat under the PHS program. PHS data (Washington Department of Fish and Wildlife 2015a) also indicate various priority habitats and species along the rail line study area beyond Cowlitz County, including talus slope and cliffs/bluffs habitats, bald eagle concentrations and breeding areas, and western pond turtle regular occurrence areas.

2.2.3.1 Site Visit Observations

During the December site visit, two Columbian black-tailed deer (*Odocoileus hemionus columbianus*) were observed in the forested wetland area (Wetland A) in the northwest portion of project area, and two nutrias (*Myocastor coypus*) were observed on the sloped bank of the CDID Ditch 10, on the north side of Industrial Way. Other signs of mammal presence were observed during both site visits, including several unidentified small mammal scats, a coyote scat along the dike road, a beaver (*Castor canadensis*)-chewed tree in the riparian habitat along the Columbia River, and an unidentified species of sea lion heard barking from the Columbia River channel.

Several common bird species were recorded in the terrestrial direct impact study area during the site visits, including red-winged blackbird (*Agelaius phoeniceus*), sparrows (*sp*.), robins (*Turdus migratoius*) and other songbirds, American coot (*Fulica Americana*), bufflehead (*Bucephala albeola*), mallards (*Anas platyrhnchos*) and other unidentified ducks, Canada geese (*Branta Canadensis*), cormorants (*sp*.), scaup (*sp*.), gulls (*sp*.), and great blue heron (*Ardea herodias*). A turkey vulture (*Cathartes aura*), red-tailed hawk, kestrel (*Falco sparverius*), and bald eagle (*Haliaeetus leucocephalus*) were observed flying overhead. During the December 2014 site visit, a small flock of Canada geese were observed grazing on wetland grasses in the project area, and several unoccupied raptor nests were observed in the forested habitat adjacent to the stormwater ditches on the southwest side of the project area and in an electrical tower near the west side of the dike road.

Grette Associates biologists conducted surveys for the federally threatened and state endangered streaked horned lark during the breeding season in 2013 (July 12, 2013) and 2014 (May 15, June 11, and July 10, 2014). The focus of these surveys was to detect the presence of streaked horned lark; however, other bird species were recorded during the surveys (Table 7). A few of the bird species recorded during these surveys are also special-status species, which are addressed in more detail in Section 2.2.3.2, *Special-Status Wildlife Species*. Surveys were conducted in all areas of suitable streaked horned lark breeding habitat on the west side of the project area and immediately adjacent land (Grette Associates 2014i). Streaked horned lark are discussed further in Section 2.2.3.2, *Special-Status Wildlife Species*.

Table 7. Bird Species Observed at Project Area during 2013–2014 Surveys

Common Name	Scientific Name
Osprey	*Pandion haliaetus*
Red-tailed hawk	*Buteo jamaicensis*
Bald eagle	*Haliaeetus leucocephalus*
Northern harrier	*Circus cyaneus*
Great blue heron	*Ardea Herodias*
Canada goose	*Branta Canadensis*
Mallard	*Anas platyrhynchus*
Turkey vulture	*Cathartes aura*
Killdeer	*Charadrius vociferous*
Sandpiper	Scolopacidae
Common raven	*Corvus corax*
American crow	*Corvus brachyrhynchos*
Brewer's blackbird	*Euphagus cyanocephalus*
Red-winged blackbird	*Agelaius phoeniceus*
American robin	*Turdus migratorius*
European starling	*Sturnus vulgaris*
Lesser goldfinch	*Carduelis psaltria*
American goldfinch	*Spinus tristis*
Common yellowthroat	*Geothlypis trichas*
White-crowned sparrow	*Zonotrichia leucocephalus*
Savannah sparrow	*Passerculus sandwicensis*
Vesper sparrow	*Pooecetes gramineus*
Song sparrow	*Melospiza melodia*
Mourning dove	*Zenaida macroura*
Rock dove	*Columba livia*
Barn swallow	*Hirundo rustica*
Violet-green swallow	*Tachycineta thalassina*
Tree swallow	*Tachycineta bicolor*
Cliff swallow	*Petrochelidon pyrrhonota*
Western bluebird	*Sialia Mexicana*
Swainson's thrush	*Catharus ustulatus*
Purple martin	*Progne subis*
Black phoebe	*Sayornis nigricans*

Notes:
Source: Grette Associates 2014h, i

Three species of pinnipeds could be present in the aquatic study areas: harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), and Steller sea lion (*Eumetopias jubatus*) (Jeffries et al. 2000). Because these marine mammals are all protected under the MMPA, they are described in more detail in Section 2.2.3.2, *Special-Status Wildlife Species*. Various bird species, including waterfowl, raptors, and shorebirds are supported by habitats in the aquatic study areas. Freshwater insects and other invertebrate species (i.e., mollusks, crayfish) inhabit the upper layers of the

benthos and provide forage for many species of fish and birds. Fish and their habitats, are discussed in the SEPA Fish Technical Report (ICF 2017a).

2.2.3.2 Special-Status Wildlife Species

Special-status wildlife species are those listed as threatened, endangered, proposed, or candidate species under the ESA or listed as a WDFW priority species.

Table 8 provides a list of special-status wildlife species that are likely to occur in the terrestrial direct impact study area or aquatic study areas. Some of the PHS listings are not for individuals of a species (PHS Criteria 1) but for vulnerable aggregations (PHS Criteria 2) of individuals, such as Western Washington nonbreeding concentrations. The likelihood of each species or vulnerable aggregation occurring in the terrestrial or aquatic study areas is listed as either *Yes* (known to occur), *Possibly* (likely to occur due to presence of suitable habitat but not documented), or *Unlikely* (individuals could occur in the study area but vulnerable aggregations are not documented in the PHS database) (Washington Department of Fish and Wildlife 2014). A listing of *No* does not mean individuals of that species could not occur in the terrestrial direct impact study area or aquatic study areas, it only signifies there are no documented vulnerable aggregations (the potential for individuals to occur in the terrestrial or aquatic study areas is provided in parenthesis).

A complete list of all special status species that could occur in Cowlitz County is located in Appendix A, *Special-Status Wildlife Species in Cowlitz County,* including species that do not occur or are unlikely to occur in the terrestrial direct impact study area or aquatic study areas.

Table 8. Special-Status Wildlife Species that Could Occur in the Study Area

Wildlife Species	Potential for Occurrence[a]	Potential Habitat	State Priority Species Criteria[b]	Federal Status[c]	State Status[d]
Mammals					
Columbian black-tailed deer (*Odocoileus hemionus columbianus*)	Yes	Species documented on project area. Limited habitat on project area. May use forested portions of terrestrial study area.	3	N/A	N/A
Columbian white-tailed deer (*Odocoilieus virginianus leucurus*)	Yes	Species documented on project area.[e] Limited forage and cover on project area. Suitable habitat available on Lord Island.	1	T	E
Harbor seal (*Phoca vitulina*)	Yes	Present in Columbia River	2	N/A	N/A
California sea lion (*Zalophus californianus*)	Yes	Present in Columbia River	2	N/A	N/A
Stellar Sea lion (*Eumetopias jubatus*)	Yes	Present in Columbia River	1, 2	SC	T

Wildlife Species	Potential for Occurrence[a]	Potential Habitat	State Priority Species Criteria[b]	Federal Status[c]	State Status[d]
Birds					
Streaked horned lark (*Eremophila alpestris strigata*)	Possibly	Not documented during surveys on project area. Potential suitable habitat on Lord Island.	1	T	E
Bald eagle (*Haliaeetus leucocephalus*)	Yes	Forested wetlands could provide roosting habitat. Suitable habitat on Lord Island.	1	SC	S
Peregrine falcon (*Falco peregrinus*)	Possibly	Potential foraging habitat	1	SC	S
Barrows Goldeneye (*Bucephala islandica*)	Possibly (Nonbreeding Concentrations Unlikely)	Open water	2, 3	N/A	N/A
Common Goldeneye (*Bucephala clangula*)	Possibly (Nonbreeding concentrations Unlikely[f])	Open water	2, 3	N/A	N/A
Bufflehead (*Bucephala albeola*)	Yes (Nonbreeding Concentrations Unlikely[f])	Open water	2, 3	N/A	N/A
Waterfowl concentrations	Yes	Suitable habitat documented in terrestrial and aquatic study areas.	2, 3	N/A	N/A
Vaux's swift (*Chaetura vauxi*)	Possibly	No large snags for nesting or roosting identified on project area but possible in terrestrial study area.	1	N/A	C
Pileated woodpecker (*Dryocopus pileatus*)	Possibly	Possible in forested habitat.	1	N/A	C
Purple martin (*Progne subis*)	Yes	Species documented in terrestrial study area, possible foraging habitat.	1	N/A	C

Notes:

[a] Potential for individuals to occur based on multiple sources, including PHS data, scientific literature, and agency documents; Potential for vulnerable aggregations based on PHS data only.

[b] State PHS Species Criteria
1 – State-listed or candidate species
2 – Vulnerable aggregation
3 – commercial, recreational, or tribal importance

[c] Federal Status under the U.S. Endangered Species Act
E = Endangered
T = Threatened
SC = Species of Concern

[d] State Status
E = Endangered

Wildlife Species	Potential for Occurrence[a]	Potential Habitat	State Priority Species Criteria[b]	Federal Status[c]	State Status[d]

T = Threatened
C = Candidate
S = Sensitive

e Grette Associates 2014h
f Western Washington Nonbreeding Concentrations
g Willapa Hills Audubon Society 2014

Terrestrial Mammals

Columbian White-Tailed Deer (*Odocoilieus virginianus leucurus*)

The Columbia River population of the Columbian white-tailed deer is a federally threatened and state endangered species. The Columbia River population is one of only two extant populations in the United States. The other, in Douglas County Oregon, was delisted by USFWS in 2003, when population recovery goals were attained. The Columbia River population inhabits the Lower Columbia River floodplain and islands within the river channel. The current range of the Columbian white-tailed deer overlaps with the terrestrial direct impact study area, including Barlow Point and Fisher, Walker, and Lord Islands (Washington Department of Fish and Wildlife 2013). The current population is estimated at 582 deer (Washington Department of Fish and Wildlife 2013).

WDFW has identified specific locations along the Columbia River for recovery (Washington Department of Fish and Wildlife 2013) of this population based on the availability of secure habitat. The nearest recovery location to the project area is the upper estuary islands downstream of Longview (Figure 3), which includes Fisher, Hump, Lord, and Walker Islands (Washington Department of Fish and Wildlife 2013). Lord Island is approximately 0.5 mile from the project area and is visible from and directly across the Columbia River channel. Although 66 Columbian white-tailed deer have been translocated to these islands to date, WDFW estimates the population on these four islands totals only 10 deer (Washington Department of Fish and Wildlife 2013).

Historically, the Columbia River population has inhabited the river bottomlands, where riparian habitat dominated by Sitka spruce, alder, cottonwood, and willow provided a desirable mix of cover and forage (U.S. Fish and Wildlife Service 1983). The Columbia River floodplain has been drastically altered from historic times, with diking, road building, and conversion of forestlands to pasturelands among the most prominent changes. Although deer will forage in maintained pastures (U.S. Fish and Wildlife Service 1983), studies on the Julia Butler Hanson National Wildlife Refuge in the 1970s show that deer preferred to forage where vegetation was over 70 centimeters high and rarely foraged greater than 250 meters from woodland cover (U.S. Fish and Wildlife Service 1983).

Because of its proximity to the upper estuary islands and Barlow Point, portions of the terrestrial direct impact study area could be occupied by the upper estuary islands subpopulation of Columbia River Columbian white-tailed deer. On the project area, cover habitat is limited to the forested wetland in the northwest portion of the site. Industrial Way separates this forested patch from other cover habitat within the terrestrial direct impact study area located further north. Most of the "forage" habitat on the project area and within the terrestrial direct impact study area consists of managed herbaceous habitat, where mowed grasses are less than 70 centimeters high. In spite of this, Columbian white-tailed deer have been observed on the project area (Grette Associates 2014h).

While the project area does not provide optimal habitat conditions, the presence of white-tailed deer on the site has been documented. Occurrences within the terrestrial direct impact study area have been documented in the PHS database (Washington Department of Fish and Wildlife 2014).

Columbian Black-tailed Deer (*Odocoileus hemionus columbianus*)

Unlike the endangered Columbian white-tailed deer that inhabit the river bottoms, Columbian black-tailed deer use upland slopes and closed-canopy coniferous forests. They require a mix of forest and openings for cover and forage, and browse on common shrubs and trees such as vine maple, red alder, and serviceberry (Washington Department of Fish and Wildlife 2014). Columbian black-tailed deer have been observed on the project area. The high level of human activity on the site, lack of well-distributed cover and forage areas, and general lack of preferred habitat (coniferous forest with brushy openings), indicate that the site could be used for travel, migration, and resting, but is not suitable for supporting a black-tailed deer population. The nearest black-tailed deer population documented by WDFW (as cited in Grette Associates 2014h) is 10 miles from the project area.

Birds

Streaked Horned Lark (*Eremophila alpestris strigata*)

The streaked horned lark is a federally threatened and state endangered species. The Pacific Northwest subspecies was once widespread throughout western Washington, Oregon, and British Columbia. Due primarily to habitat loss, this subspecies now breeds and winters over a fraction of its former range. USFWS estimated the overall population of streaked horned larks between 1,170 and 1,610 individuals, and listed the species as threatened on October 3, 2013 (U.S. Fish and Wildlife Service 2012, 2013).

The breeding range for this species historically ranged from southern British Columbia south through the Puget lowlands; Washington Coast; Lower Columbia River, Willamette, Rogue and Umpqua River valleys; and the Oregon Coast (U.S. Fish and Wildlife Service 2012). The streaked horned lark has been eliminated as a breeding species from at least half of that range. It is no longer found in southern British Columbia, the San Juan Islands, the northern Puget Trough, the Washington coast north of Grays Harbor, the Oregon coast, and the Rogue and Umpqua River valleys in Oregon (Pearson and Altman 2005; U.S. Fish and Wildlife Service 2012).

Historic breeding range consisted primarily of prairie and open coastal habitats (Pearson and Altman 2005). Over the past 150 years, prairie lands in Washington and Oregon have declined by 90% to 95% (U.S. Fish and Wildlife Service 2012). Streaked horned larks are now found nesting in both traditional and some nontraditional habitats, including agricultural fields, wetland mudflats, Christmas tree farms, gravel roads, airports, and dredge deposition sites in the Lower Columbia River (U.S. Fish and Wildlife Service 2012; Pearson and Altman 2005). Active establishment of territories and breeding occurs from late March until early August. During this time, streaked horned larks are susceptible to human activities that can jeopardize successful nesting. Human activities can disturb larks by causing them to become alert, fly, or directly destroy their nests. These activities include moving vehicles, gatherings of people and/or vehicles, fireworks, dog walking, flying model airplanes, construction activities, and mowing. Disruptive activities that keep larks away from their nests for more than one hour could result in nest abandonment. In general, activities occurring within approximately 100 feet (30 meters) are more likely to cause larks to flush than activities located farther away (Pearson and Altman 2005).

Streaked horned larks prefer wide-open spaces characterized by flat, treeless landscapes of 300 acres or more, sparse grass/forb vegetation, and few or no shrubs. They will use smaller habitat patches if there is an adjacent open landscape, such as agricultural fields or water (U.S. Fish and Wildlife Service 2012). In the Lower Columbia River, they were historically known to nest on sandy beaches and spits. Now, they can be found nesting on dredge spoil depositions, which provide the open expanses of bare ground preferred by this species. In the project area and the broader terrestrial direct impact study area, a few small areas containing potentially suitable habitat (low vegetative cover and no woody vegetation) are adjacent to the Columbia River: the closed Reynolds landfill and edges of roadbeds. These areas are regularly disturbed by maintenance (mowing) and operations (Grette Associates 2014h, 2014i).

Adult streaked horned larks feed mainly on grass and weed seeds, but could feed insects to their young (U.S. Fish and Wildlife Service 2012). They typically establish nests in areas of extensive bare ground next to a clump of bunchgrass (U.S. Fish and Wildlife Service 2012). Habitat within the terrestrial direct impact study area contains extensive areas of short (mowed) grass and forb vegetation, but relatively little bare ground and even less undisturbed vegetation as most of the grass/forb areas are maintained by mowing.

All critical habitat areas in the Lower Columbia River are downstream from the project area, with the exception of one area upriver. The closest designated critical habitat is on Crims Island, approximately 5 miles downstream of the project area. The only critical habitat upstream of the project area is on Sandy Island, Columbia County, Oregon at river mile 76, approximately 13 miles upriver (U.S. Fish and Wildlife Service 2012).

Grette Associates biologists conducted surveys for streaked horned larks in the project area during the breeding season in 2013 (July 12, 2013) and 2014 (May 15, June 11, and July 10, 2014). The surveys were conducted within the open, grassy areas that most closely resemble streaked horned lark habitat onsite. No streaked horned larks were observed during the surveys (Grette Associates 2014h, i). Standardized monitoring protocols were developed by WDFW for streaked horned larks, which require surveys on 3 separate days during the breeding season (Washington Department of Fish and Wildlife 2013).

Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles nest and forage for fish along the Lower Columbia River. They build their nests in the tops of large trees, typically using the nests year after year. Nests could weigh up to 0.5 ton and span 10 feet in diameter (U.S. Fish and Wildlife Service 2007). There are no documented bald eagle nests in the terrestrial direct impact study area and no suitable nesting habitat exists on the project area. The nearest documented nest sites are located approximately 2 miles downstream and 4 miles upstream of the project area (Washington Department of Fish and Wildlife 2014). The terrestrial direct impact study area provides foraging habitat for this species. Bald eagles could perch in riparian vegetation or manmade structures over the water to forage for fish. Salmon and other fish within the Columbia River provide an important source of food for this species. Lord Island also provides suitable habitat that could be used by bald eagles (Pacific Coast Joint Venture 1994).

Bald eagles were observed soaring over the terrestrial direct impact study area during the April 8, 2014 site visit. Bald eagles were also observed in the terrestrial direct impact study area during the July 12, 2013 streaked horned lark surveys (Grette Associates 2014h).

Peregrine Falcon (*Falco peregrinus*)

Peregrine falcons nest on cliff ledges but also use tall manmade structures such as bridges, overpasses, buildings, and power plants (Oregon Department of Transportation undated). They prey primarily on other birds, including songbirds, shorebirds, ducks, pigeons, and starlings (Washington Department of Fish and Wildlife 2013). The nearest documented nest location is approximately 3 miles south of the project area (Washington Department of Fish and Wildlife 2014). A study of peregrines nesting in quarries in Ireland found that peregrines will use industrial areas if nesting requirements are met and sufficient prey is available (Moore et al. 1997). Peregrine falcons nesting within a few miles of the project area could use the study area for foraging.

Waterfowl

Nonbreeding concentrations of Barrows goldeneye (*Bucephala islandica*), common goldeneye (*B. clangula*), and bufflehead (*B. albeola*) are considered priority species (vulnerable aggregation) by WDFW. A few individual bufflehead were observed resting on open water (both in wetlands and on the Columbia River) in the terrestrial direct impact study area during the April 8, 2013 site visit. However, within the terrestrial direct impact study area there are no vulnerable concentrations of waterfowl documented by WDFW in the PHS database (Washington Department of Fish and Wildlife 2014). The nearest documented vulnerable concentration is located approximately 0.25 mile north of the terrestrial direct impact study area. Lord Island and adjoining Walker Island support waterfowl and suitable habitat is located just outside of the study area in the tidal marsh area between the islands south of the sand spit (Pacific Coast Joint Venture 1994). This area provides foraging and resting habitat for waterfowl and has been previously documented as supporting significant numbers of wintering ducks and geese (Pacific Coast Joint Venture 1994). Within the terrestrial direct impact study area (Figure 3), Lord Island is documented in the PHS database as supporting nesting Canada goose (Washington Department of Fish and Wildlife 2014).

Purple Martin (*Progne subis*)

The purple martin is a state-listed species of concern. Purple martins were observed on the project area during the streaked horned lark surveys in July 2013 (Grette Associates 2014h). Several nest sites are documented in the Coal Creek Slough, approximately 3 to 4 miles downstream of the study area (Washington Department of Fish and Wildlife 2014). Purple martin nest in natural cavities found in tree snags and crevices, as well as in artificial nest boxes and gourds provided by humans for this purpose (Washington Department of Fish and Wildlife 2014). Nesting habitat is unlikely on the project area; however, other forested areas in the terrestrial direct impact study area could contain this habitat. Purple martins forage for insects while in flight and individuals could occasionally use the terrestrial direct impact study area for this purpose. However, they are more likely to use areas such as Coal Creek Slough, where insect concentrations would be more abundant in herbaceous wetlands, forests, or marshes (Grette Associates 2014h).

Vaux's Swift (*Chaetura vauxi*)

The Vaux's swift is a state candidate species. They are summer (June to mid-August) residents in Washington, migrating north to Washington during the spring (April to late May) and south during the fall (mid-August to late September). They spend winters in central Mexico, Central America, and Venezuela. The species has a strong association with old-growth coniferous forests, using large hollowed-out trees and snags for nesting and roosting. They spend the majority of their day foraging in the air for flying insects over forests, grasslands, and aquatic habitats (Washington Department of

Fish and Wildlife 2013). There is no suitable nesting or roosting habitat on the project area; however, other forested areas in the terrestrial direct impact study area could contain suitable habitat. Vaux's swifts may fly through the terrestrial direct impact study area during migrations or while foraging. They are commonly observed at the Mint Farm (Willapa Hills Audubon Society 2014) east of the study area (Figure 3).

Pileated Woodpecker (*Dryocopus pileatus*)

Pileated woodpeckers inhabit mature deciduous or mixed deciduous-coniferous forests. They are also found in younger forests containing scattered, large, dead trees or decaying, downed wood, and in suburban areas containing large trees and woodland patches. Dead wood is an important component of their habitat, including snags, stumps, and downed logs. They forage for insects in the bark and use snags or dead branches of live trees for nesting (Cornell Lab of Ornithology 2015). There is no suitable nesting habitat in the project area. Limited foraging habit could be available in the forested areas onsite. Forested portions of the terrestrial direct impact study area could contain suitable habitat for nesting and foraging.

Marine Mammals

Pinnipeds

Three species of pinniped are found in the Lower Columbia River in the aquatic study areas: California sea lions (*Zalophus californianus*), Steller sea lions (*Eumetopias jubatus*), and harbor seals (*Phoca vitulina*). Sea lions use the Lower Columbia River for foraging on fish and resting at haulout sites. Breeding areas (both mating rookeries and pupping sites) for California sea lions are located in California and Mexico. Only males are present in the Columbia River and primarily during the nonbreeding season, fall through spring (Jeffries et al. 2000). Steller sea lions in Washington come from rookeries in Oregon and British Columbia, but pupping sites have increased along the outer Washington Coast in recent years (Washington Department of Fish and Wildlife 2013). Breeding does not occur in the Columbia River, thus, Steller sea lions are primarily present during the nonbreeding season.

Since 2002, California and Steller sea lions have greatly increased in abundance below the Bonneville Dam, which is approximately 80 miles upstream of the study area. Migrating salmon and steelhead collect in a bottleneck below the dam, providing an abundant source of food for the sea lions (Washington Department of Fish and Wildlife 2013).

Sea lions use jetties, shoals, concrete slabs, rock rubble, marina floats, log booms, and other manmade structures as haulout sites along the Columbia River. Surveys conducted in the 1990s identified four haulout sites used by sea lions between the mouth of the Columbia River and its confluence with the Cowlitz River (Jeffries et al. 2000), which is approximately 4.5 miles upstream of the project area. There are no documented sea lion haulout sites in the aquatic direct impact study area, but individuals likely swim through the aquatic direct impact study area as they migrate up and down the Columbia River. The nearest California sea lion haulout site to the project area is near the mouth of the Cowlitz River (Washington Department of Fish and Wildlife 2014), approximately 1 mile upstream of the aquatic direct impact study area. The nearest Steller sea lion haulout site to the project area is approximately 48 miles downstream in the east mooring basin in Astoria, Oregon (Jeffries et al. 2000).

Harbor seals are the most numerous of the pinnipeds found in Washington waters. Like sea lions, they forage and rest along the Lower Columbia River, with dozens of haulout sites identified between the mouth of the river and the aquatic direct impact study area. Harbor seals use shoals, beaches, sandbars on islands, and the main shoreline as haulouts (Jeffries et al. 2000). There are no documented seal or sea lion haulout sites in the aquatic direct impact study area, but individuals swim through the aquatic direct impact study area as they migrate up and down the Columbia River. The nearest haulout site to the aquatic direct impact study area is approximately 1 mile upstream from the aquatic direct impact study area at Carroll Slough, near the confluence of the Columbia and Cowlitz Rivers (Washington Department of Fish and Wildlife 2014). Harbor seal breeding and pupping takes place in the Columbia River estuary and nursery areas are present downstream from the aquatic direct impact study area in Cathlamet Bay. Haulouts located further upriver are used primarily in the winter and spring (Jeffries et al. 2000).

Pinniped use and abundance in the aquatic direct impact study area is expected to vary seasonally as they transit between areas of known use at the mouth of the Columbia River, haulout sites upstream of the aquatic direct impact study area, and foraging areas farther upstream at the Bonneville Dam. For California sea lions, seasonal use is largely informed by the annual U.S. Army Corps of Engineers pinniped observation program at the Bonneville Dam during salmonid fish passage season (typically January through May, with some observations as early as August). This Corps program began in 2002 and is scheduled to end in 2016. California sea lions typically are not observed at the dam prior to January; they have been observed foraging below Bonneville Dam in very low numbers as early as August. Harbor seals are relatively rare at Bonneville Dam, but are known to haul out at a number of other locations upstream of the aquatic direct impact study area.

2.2.3.3 Rail and Vessel Corridors in Washington State

The indirect impact study area includes wildlife habitats along the railroad and vessel corridors in Washington State.

Rail Corridor

The BNSF main line rail corridor crosses diverse wildlife habitats in Washington State, including shrub-steppe, coniferous and deciduous forests, riparian forests, and agricultural lands. These habitats support a broad range of wildlife species, including reptiles, amphibians, small and large mammals, birds and insects. Several of these terrestrial wildlife species are listed as either threatened or endangered under the federal ESA. The existing conditions in the rail line study area are described for two areas: Cowlitz County and those portions of Washington State beyond Cowlitz County.

Cowlitz County

The terrestrial environment along the rail line includes a mix of natural habitats (forest, shrub, herbaceous upland), disturbed and developed areas (rural and urban areas), and agricultural areas. South of Longview and the confluence of the Cowlitz and Columbia Rivers, terrestrial vegetation and wildlife habitat conditions improve compared to the more industrial and urban character of the cities of Longview and Kelso. Here, there are some forested areas, wetlands, and ash mounds (associated with the eruption of Mount St. Helens in 1980 and subsequent dredging of the Cowlitz River to remove the mud and ash). South of the Kalama River near the town of Kalama, terrestrial conditions again revert to more industrial and urban land uses. From the town of Kalama south to

Martin Island, habitat conditions include areas of forests and wetland areas interspersed with rural development. From Martin Island south to the Cowlitz County-Clark County line, the BNSF rail corridor intersects primarily agricultural land and rural development, with the exception of the city of Woodland, which has some commercial, urban, and residential development.

Representative wildlife in the study area include black-tailed deer, red fox, coyote, raccoon, striped skunk, beaver, Oregon and grey-tailed vole, red-tailed hawk, Cooper's hawk, Canada geese, mallard and northern pintail ducks, great blue heron, white-breasted nuthatch, chipping sparrow, and a variety of amphibians and reptiles (Commission for Environmental Cooperation 2011). A review of PHS data (Washington Department of Fish and Wildlife 2015a) for terrestrial habitats indicates small areas of oak woodlands in a few places along the rail line. Species associated with this habitat include various woodpeckers, migrant birds, reptiles, invertebrates, and the western gray squirrel (Washington Department of Fish and Wildlife 1998). In addition, two osprey point locations are mapped within 300 feet of the rail line; no further information is provided (Washington Department of Fish and Wildlife 2015a). No designated critical habitat for federally protected species under the jurisdiction of USFWS is mapped in the terrestrial environment near the rail line corridor(s).

Washington State Beyond Cowlitz County

The vast majority of the rail study area beyond Cowlitz County is in the Columbia Plateau ecoregion (Commission for Environmental Cooperation 2011). This ecoregion has dry desert and steppe climates marked by hot, dry summers and cold winters, and consists of shrub-steppe vegetation communities. Vegetation is typically dominated by sagebrush, bitterbrush, bluebunch, needle-and thread, Idaho fescue, and Sandberg's bluegrass. Numerous annual and perennial flowers often grow in the spaces between the shrubs and bunchgrass. Shrub-steppe historically dominated the landscape of the ecoregion, but much of it has been degraded, fragmented, and isolated from other similar habitats due to conversion to croplands (Washington Department of Fish and Wildlife 2015b).

Representative wildlife of the Columbia Plateau include mule deer, pronghorn antelope (last reintroduced in 2011 at the Yakama Indian Reservation), coyote, black-tailed jackrabbit, ground squirrels, American kestrel, golden eagle, red-tailed hawk, western meadowlark, savanna sparrow, western diamondback rattlesnake, greater sage-grouse, sage sparrows, sage thrashers, and pygmy rabbits, in addition to many other birds, mammals, reptiles, and insects (Commission for Environmental Cooperation 2011 and Washington Department of Fish and Wildlife 2015b). Shrub-steppe communities can also support federally protected species, including the pygmy rabbit and Spalding's catchfly. The Washington Department of Fish and Wildlife also considers shrub-steppe a priority habitat under the PHS program.

The Cascades and Eastern Cascade Slopes and Foothills ecoregions make up a smaller area intersected by the rail study area and mostly coincide with Clark, Skamania, and Klickitat Counties. Typical vegetation in the Cascades ecoregion at lower elevations includes Douglas-fir, western hemlock, western red cedar, big leaf maple, and red alder; representative wildlife includes black-tailed deer, black bear, coyote, beaver, river otter, pileated woodpecker, and northern goshawk. Typical vegetation in the Eastern Cascades Slopes and Foothills ecoregion includes open forests of ponderosa pine and some lodgepole pine, with sagebrush and steppe vegetation at lower elevations. Representative wildlife species in this ecoregion include black bear, black-tailed deer, mule deer, cougar, wolverine, coyote, yellow-bellied marmot, bald and golden eagles, Cooper's hawk, and osprey (Commission for Environmental Cooperation 2011). PHS data (Washington Department of

Fish and Wildlife 2015a) indicate various priority habitats and species along the rail line study area, including talus slope and cliffs/bluffs habitats, bald eagle concentrations and breeding areas, and western pond turtle regular occurrence areas.

Vessel Corridor

Habitat in the aquatic indirect aquatic impact study area includes the open water of the Columbia River from the project area to the river mouth. Marine mammals that could be affected by vessel traffic along this route include sea lions and seals. The aquatic habitats along the navigation channel are deepwater habitats that are regularly dredged to depths for safe vessel passage.

Chapter 3
Impacts

This chapter describes the impacts on wildlife that would result from construction and operation of the Proposed Action or the ongoing activities of the No-Action Alternative.

The following design features and best management practices (BMPs) that the Applicant has documented would be part of the project and have been considered when evaluating potential impacts of the Proposed Action.

- The Applicant would design the trestle to be long and narrow and at a height above ordinary high water to minimize shading in shallow water areas. From shore, the trestle would measure 24 feet in width for 700 feet, and 51 feet in width for the final 150 feet. The top of the deck would be +22 feet CRD and the bottom of the deck +19.5 feet CRD. Therefore, the bottom of the deck would be more than 8 feet above ordinary high water. This design would minimize overall impacts in shallow water, including impacts on habitat connectivity along the shoreline.
- The Applicant would locate Docks 2 and 3 entirely in deepwater habitat to distance the structure and coal export terminal activities from shallow water areas.
- The Applicant would locate the berthing area at depths of at least -20 feet CRD to avoid habitat conversion from shallow to deep water during dredging.
- The Applicant would locate the berthing area in deep water closer to the navigation channel to minimize the scope of future maintenance dredging.
- The Applicant would direct project lighting downward or at structures, and would incorporate shielding to avoid spillage of light into aquatic areas.
- The Applicant would include a pinpoint light source at the end of the shiploading boom, aimed straight down into the ship hold area to avoid a broader beam that could cause light spillage.
- The Applicant would remove the piles slowly to minimize sediment disturbance and turbidity in the water column.
- Prior to pile extraction, the Applicant would break the friction between the pile and substrate to minimize sediment disturbance.

3.1 Proposed Action

The following construction activities could affect wildlife.

- Permanent removal of habitat and wildlife mortality in terrestrial and aquatic habitats associated with clearing and construction of the coal export terminal.
- Wildlife displacement and mortality associated with clearing and construction of the coal export terminal.
- Noise and visual impacts on terrestrial and aquatic wildlife associated with operation of construction equipment, general construction related noise and pile driving.
- Spills and leaks associated with construction equipment and materials.

The following operation activities could affect wildlife.

- Noise impacts on wildlife associated with operations such as train movements, transfer of coal, and general industrial operations.
- Spills and leaks from trains, vehicles, or equipment.
- Vessel strikes of marine mammals.
- Underwater vessel noise impacts on pinnipeds and diving birds.
- Removal of habitat during maintenance dredging impacting wildlife and habitat.
- Coal dust deposition affecting terrestrial, wetland, and aquatic habitats and wildlife.

3.1.1 Construction: Direct Impacts

Construction of the Proposed Action would result in the following direct impacts.

3.1.1.1 Permanent Impacts on Terrestrial Habitat and Wildlife

Permanently Remove Habitat and Cause Associated Wildlife Mortality

Construction of the Proposed Action would result in the permanent loss of terrestrial wildlife habitat in the study area. The Proposed Action would remove 201.50 terrestrial acres of habitat during construction grading and clearing activities (Figure 5). The majority (151.14 acres) of these impacts would occur in previously developed lands in which industrial buildings, pavement, and infrastructure currently exist with scattered areas of vegetation surrounding the developed areas, or sparsely vegetated areas that previously served as material storage or disposal sites associated with past industrial uses of the property. In general, these lands provide degraded wildlife habitats that do not support wildlife. Patches of potentially suitable upland habitat in the undeveloped areas in the western portion of the project area could support foraging and cover for some wildlife, including the Columbian white-tailed deer.

Construction of the Proposed Action would result in the permanent loss of upland (26.26 acres) containing forested, herbaceous, managed herbaceous, and scrub-shrub vegetation and a small area (0.05 acre) of forested riparian habitat; and wetland (24.10 acres) habitats (Table 9). Animals inhabiting these areas could be displaced to other habitats outside of the project area and mortality of some less mobile individual species could occur. Highly mobile wildlife species, such as larger mammals and birds, would likely leave the terrestrial study area during construction activities. Some mortality of less mobile species could occur, such as burrowing mammals, reptiles, amphibians and insects. Typically, these species reproduce rapidly and any losses due to mortality would not be expected to affect the viability or fitness of the species at the population scale.

Figure 5. Existing Land and Vegetation Cover Types Affected during Construction

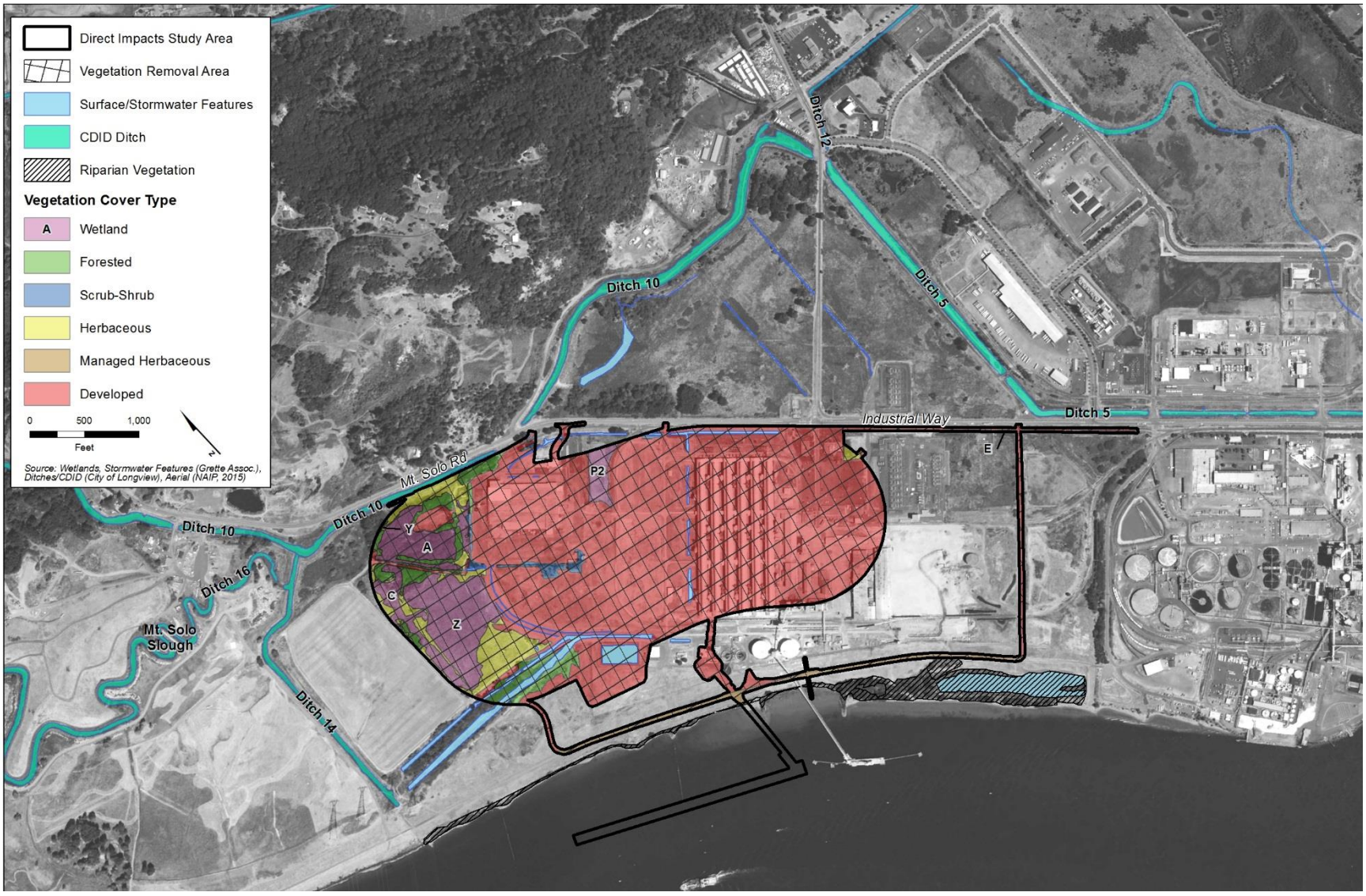


Table 9. Permanent Direct Impacts by Terrestrial Habitat Type in the Project Area

Land Cover Category	Vegetation Cover Type	Impacts in Project Area (Acres)[b]
Developed land	**Developed land total**	**151.14**
Upland	*Forested*	*8.90* [c]
	Scrub-shrub	*2.11*
	Herbaceous	*10.88*
	Managed herbaceous	*4.37*
	Upland total	**26.26**
Wetlands	**Wetlands total[a]**	**24.10**
Total		**201.50**

Notes:
[a] For a detailed discussion of wetland impacts refer to the SEPA Vegetation Technical Report.
[b] These are direct impacts on vegetation in the 212-acre project area, which includes the 190 acre terminal plus additional elements (e.g., access roads, docks, and rail line).
[c] Includes 0.05 acre of riparian forest.

3.1.1.2 Temporary Impacts on Terrestrial Habitat and Wildlife

Construction of the Proposed Action could temporarily affect wildlife habitat adjacent to the project area, including riparian vegetation along the shoreline of the Columbia River. Temporary disturbance could occur through soil disturbance, stockpiling, and erosion. These disturbances could temporarily increase total suspended sediments in the Columbia River and freshwater ditches on and adjacent to the project area. The potential for these types of impacts would be avoided or greatly reduced given protective measures to guard against these risks, including construction best management practices, avoidance and minimization measures, and regulatory requirements, such as those associated with 401 Water Quality Certification and hydraulic project approval that would be required for the Proposed Action. The SEPA Water Quality Technical Report (ICF 2017c) includes a detailed discussion on the potential impacts on water quality associated with Proposed Action.

Cause Wildlife Displacement or Mortality

Construction of the Proposed Action would be limited to the project area. Wildlife in the project area could be at risk of displacement and/or direct mortality during construction activities. Wildlife present in the indirect impact study area during construction could be displaced from increased human activity, elevated noise levels, and/or ground-disturbing activities. Wildlife could also be directly injured or killed due to a collision with construction vehicles or equipment, placement of construction materials on the ground, or ground disturbance such as preloading activities.

Approximately 75% or 151 acres of the terrestrial habitat in the project area is currently developed and wildlife would likely not be present in these areas due to the lack of suitable habitat, but wildlife could be present in the indirect impact study area. Areas around the project area could provide suitable habitat, although there are large areas where habitat has been degraded. The risk of displacement or mortality would be temporary, lasting for the duration of construction (approximately 6 years). Although construction could displace wildlife in the indirect impact study area, most wildlife species are mobile, and construction activities would be temporary. Less mobile species such as burrowing mammals, reptiles, amphibians, and

insects, may be more susceptible. Because these potential mortality impacts would only occur during construction and these species would be able to reproduce rapidly and in adjacent suitable habitats, the losses due to mortality would not be expected to affect the viability or fitness of the species on the population scale. The Proposed Action would be consistent with the general character and land uses of surrounding areas, particularly the shoreline in the study area. Other heavy industrial sites are located along the shoreline to the east of the project area. Overall, the potential displacement or mortality of wildlife during construction would not be expected to have a measurable affect to wildlife species at the population scale or in terms of overall population fitness.

Result in Construction Noise and Visual Impacts on Wildlife

Construction-related noise and human presence at the project area could affect wildlife in the aquatic and terrestrial study areas during construction activities. While wildlife in and around the terrestrial and aquatic study area are likely habituated to human activity and noise levels associated with industrial and developed areas, noise levels at the project area would increase above ambient levels for the duration of construction, especially during impact pile-driving activities associated with dock and trestle construction. Wildlife species exhibit different hearing ranges and all wildlife do not respond the same way to similar sound sources or levels. Even within a species, individuals do not necessarily respond the same way. Wildlife response to sounds depends on numerous complicated factors, including noise level, frequency, distance and event duration, equipment type and conditions, frequency of noise events over time, slope, topography, weather conditions, previous exposure to similar noises, hearing sensitivity, reproductive status, time of day, behavior during the noise event, and the animal's location relative to the noise source (Delaney and Grubb 2003 in Washington State Department of Transportation 2015). Therefore, an animal's reaction to elevated noise levels could range from mild disturbance with little or no reaction to escape behavior, which would displace individuals by forcing them to abandon the area of elevated noise levels, potentially resulting in significant impairment or disruption of normal behavioral patterns. Such displacement and disruption of behavior could reduce productivity and survival of individuals as the individual would likely expend more energy relocating to new suitable habitat, and would be less familiar with new habitat areas and at an increased risk of predation, potentially limiting survival of individual adults or offspring (e.g., abandoning young). These impacts would be exacerbated where there is no adjacent or nearby suitable habitat that is easily accessible. In addition, visible construction equipment, materials, and an increase in infrastructure could cause displacement because some species would avoid areas within the line-of-sight of construction equipment operations.

Dredging and the associated noise could affect birds, including streaked horned larks, during the nesting season. There are no studies that specifically identify noise level sensitivities of the streaked horned lark. Noise sensitivity studies have been conducted for the marbled murrelet. These studies found that marbled murrelets are very sensitive to underwater noise such as pile driving and prolonged terrestrial noise that lasts longer than 10 to 15 minutes (Mountain Loop Conservancy 2010). Little information is available on the impacts of noise on birds. Shorebird sensitivities are more closely related to those of sea lions because they spend most of their time above water and generally stay in the shallow water while hunting (Science Applications International Corporation 2011). Dredging related activities have been shown to generate noise

of 72 decibels in commercial or industrial areas (Epsilon Associates 2006). Terrestrial noise levels in this range could disturb birds but would not be expected to result in injury.

Additionally, construction-related noise impacts and the presence of construction equipment and materials would be temporary, lasting the estimated 6 years required for project construction. In addition, there is a lower density of development to the northwest of the study area where connectivity to other potentially suitable wildlife habitat exists, and where wildlife could relocate during and after construction. Given that the wildlife present in the study area are likely habituated to noise levels associated with industrial areas and are generally mobile, it is anticipated that construction-related noise would affect individuals of a species, but would not affect a species' whole population or the overall fitness of a population.

3.1.1.3 Aquatic Habitat and Wildlife Impacts

The following section describes potential impacts on aquatic habitat and wildlife.

Remove and Alter Aquatic Habitat and Impacts on Aquatic Wildlife

Construction of the Proposed Action would result in the physical alteration and removal of aquatic habitat in the Columbia River and open freshwater areas (e.g., ditches) located in the project area.

Construction of the Proposed Action would result in the permanent loss of approximately 5.17 acres of aquatic habitat (ditches and ponds) throughout the terrestrial habitats of the project area. These open areas of freshwater and wetlands support common species of amphibians and could be used by small mammals and birds. Mammals and birds are highly mobile species and are expected to leave the vicinity during construction activities. Some mortality of amphibians could occur; however, these species typically reproduce rapidly and any losses due to mortality would not be expected to affect the viability or fitness of the species' populations.

Habitat in the Columbia River would be permanently altered and removed by the placement of piles. Of the 630, 36-inch-diameter steel piles required for the trestle and docks, 610 would be placed below the ordinary high water mark, permanently removing an area equivalent to 0.10 acre (4,312 square feet) of benthic habitat. The majority of this habitat is located in deep water (Grette Associates 2014g). The placement of piles would displace benthic habitat and the areas within each pile footprint would cease to contribute toward primary or secondary productivity. Individual pile footprints would be relatively small (7.07 square feet) and would be spaced throughout the dock and trestle footprint.

Creosote-treated piles would be removed from the deepest portions of two existing timber pile dikes. The piles would be removed using vibratory extraction as feasible, or cut, pull and cap methods, depending on the condition of the piles (Grette Associates 2014k). In total, approximately 225 lineal feet of the levees would be removed. Overall, removing creosote-treated woodpiles from the Columbia River could result in an improvement in water quality, as most remaining creosote in those piles would be removed from the aquatic environment. However, removing the piles could result in temporary increases in suspended sediments, short-term water contamination, and long-term sediment contamination from creosote released during extraction. Creosote contains a mixture 200 to 250 compounds, with primary components composed of polycyclic aromatic hydrocarbons (PAHs) (Brooks 1997; National

Marine Fisheries Service 2009). PAHs are known to be toxic to aquatic organisms including invertebrates and fish and can cause sublethal and lethal effects (Eisler 1987; Brooks 1997).

Creosote and associated chemicals, particularly those that are water-soluble and that persist in the water column are known to bioconcentrate in many aquatic invertebrates (Eisler 1987; Brooks 1997). This could expose higher trophic level species such as fish, birds, and pinnipeds to creosote/PAH compounds through the food chain. Many vertebrates, including fish, however, metabolize PAHs and excrete them, reducing the potential risk to higher trophic-level species (Varanasi et al. 1989 in National Marine Fisheries Service 2009; Strauss 2006 in National Marine Fisheries Service 2009).

Most of the components of creosote are heavier than water and sink in the water column. PAHs from creosote accumulate in sediments and are likely to persist at the site of pile removal or wherever they settle until they degrade (National Marine Fisheries Service 2009). However, PAHs from sediment are less bioavailable to aquatic species and thus these organisms are not likely to bioaccumulate PAHs from sediments (Brooks 1997).

Over the long term, the source of creosote would be removed or capped by the sediment falling into the hole left by the extracted pile. Water quality would improve, the concentration of creosote in the sediment would be expected to decrease, and the potential pathway of exposure for wildlife through contamination of prey would be reduced.

Dredging would permanently alter a 48-acre area of deepwater habitat (below -20 feet CRD) by removing approximately 500,000 cubic yards of benthic sediment to achieve a depth of -43 feet CRD, with a 2-foot overdredge allowance. Within the proposed dredge prism (i.e., extent of dredged area) (Figure 2), the amount of deepening would vary based on existing depths, from no removal up to a depth of approximately 16 feet of removal. The majority of the area of the proposed dredge prism is at or below a depth of -31 feet CRD. It is anticipated that sediment within the dredge prism for Docks 2 and 3 would be deemed suitable for flow-lane disposal or beneficial use in the Columbia River based on past sediment sampling near the project area. However, prior to obtaining permits for the Proposed Action, including dredging permits, the Applicant would conduct site-specific sediment sampling to characterize the proposed dredge prism and ensure compliance with the Dredged Materials Management Plan (Grette Associates 2014g, j). This flow lane disposal area would likely be located within an area of approximately 80 to 110 acres between approximately river miles 60 and 66 (Figure 3).

The majority of benthic, epibenthic, and infaunal organisms are nonmotile or slow moving and become entrained during dredging. Benthic, epibenthic, and infaunal organisms in the proposed dredge prism above -43 feet CRD would be removed during dredging, likely resulting in mortality. These organisms often serve as prey for larger animal species. Most of the habitat in the proposed dredge prism is in deep water where benthic productivity is expected to be low relative to shallower habitat. Deep-water channels are subjected to higher water velocities, which periodically scour bottom sediments, limiting the standing crop of invertebrates and the buildup of detritus and fine materials that support these invertebrates (McCabe et al. 1997). Dredging activities are not typically associated with long-term reductions in the availability of prey resources and impacts on benthic productivity are expected to be temporary. Benthic organisms typically recolonize disturbed areas within 30 to 45 days. Disturbed habitats are

expected to return to reference conditions with rapid recolonization by benthic organisms (McCabe et al. 1996).

Dredging activities could affect pinnipeds. In *A Review of Impacts of Marine Dredging Activities on Marine Mammals*, Todd et al. (2014) states that potential direct impacts on marine mammals include collisions, turbidity, and noise. Collisions between dredging vessels and pinnipeds are possible but unlikely to occur given the slow speeds of dredging vessels. Information on turbidity is limited; however, existing research indicates that dredge-related turbidity is not likely to cause substantial impacts on pinnipeds since they often inhabit naturally turbid or dark environments and are likely to use senses in addition to their vision (Todd et al. 2014). Noise could cause masking and behavioral changes but is unlikely to cause auditory damage to pinnipeds (Todd et al. 2014). Dredging would be conducted using a clamshell dredger; however, a hydraulic dredger could also be used (Grette Associates 2014k). Sound pressure levels (SPLs) can vary widely, based on dredger type, operations stage, or environmental conditions (Todd et al. 2014). The operations stage is an important component of noise levels produced by a clamshell (grab) dredger. Dickerson et al. (2001) measured the entire clamshell dredge process at increasing distances from the dredge operation. The loudest measurement, 124 dB_{RMS}, was recorded at a distance of 518 feet from the dredge operation. This measurement is consistent with SPLs that could result in behavioral changes in pinnipeds, but likely would not cause auditory damage. Hydraulic dredges typically produce higher SPLs than clamshell dredges but these SPLs would be unlikely to reach levels that could cause auditory damage (Central Dredging Association 2011; Todd et al. 2014).

Result in Underwater Construction Noise Impacts on Pinnipeds

Potential impacts on pinnipeds in the Columbia River may occur due to underwater noise generated during in-water installation of the trestle and dock piles. Construction of the trestle and dock could include both vibratory pile driving for installation and impact pile driving for proofing. For purposes of this analysis, it is assumed that pile-driving activities would occur during approved in-water work windows. Based on in-water work windows established by NMFS, USFWS, and WDFW for the protection of other aquatic species, in-water pile installation could occur from September 1 to February 28 for vibratory pile driving and September 1 through December 31 for impact pile driving. Actual dates of pile-driving activities would be outlined in permits issued for the project from both the Corps and WDFW. Pile installation and the applicable work window(s) would be provisioned in the hydraulic project approval. Pile installation would occur over two in-water work window construction periods, due to the number of in-water piles required for the dock and trestle. To reduce underwater sound pressure levels from impact pile-driving operations, a confined bubble curtain system or similar noise attenuation technology would be used.

Whether or not in-water pile driving would affect pinnipeds depends on timing of pile driving and whether pinnipeds are in the aquatic study area during this time. Impact pile driving is proposed from September 1 through December 31, which would be prior to the beginning of seasonal use of the study area by California sea lions and harbor seals; it is unlikely that individuals would be present during impact pile driving. Steller sea lions have been observed at the Bonneville Dam from September through December, but in low numbers. Eleven individuals were observed from October through December 2011 (Stansell et al. 2012); no regular

observations were reported in October through December 2012. Therefore, individual Steller sea lions could be transiting through the aquatic study area during pile-driving activities.

Grette Associates (2014a) assessed the direct effects of in-water pile driving on marine mammals at the project area in its Millennium Coal Export Terminal Docks 2 and 3 and Associated Trestle: Direct Effects of Construction, Pile Driving and Marine Mammals report. Multiple sources were reviewed for comparable reference of underwater sounds levels during vibratory and impact installation of the 36-inch-diameter steel piles, including sound level data on pile installations compiled by the Washington State Department of Transportation (WSDOT), Caltrans, Port of Seattle, Port of Kalama, and the Columbia River Crossing (CRC) Test Pile Project. After reviewing all applicable information, sound levels from the CRC 48-inch-diameter test pile were selected as reference levels for the 36-inch-diameter steel pile proposed for the project area. While these piles are larger than those proposed, the proximity of the CRC site to the project area (less than 50 miles apart) and similar conditions are expected to be more comparable than more distance locations elsewhere in Washington and California. Using these reference levels provides for a liberal assessment of impacts due to sound (i.e., estimating at the high end for impact area), and therefore, presents a conservative evaluation that is protective of marine mammals because it considers relatively louder sounds, and therefore, larger potential impact areas than other reference values.

Cause an Injury to Pinnipeds from Impact Pile Driving

PTS auditory injury could affect Phocid pinnipeds (e.g., harbor seals) within 15,220 feet of active impact pile driving without sound attenuation in place. PTS auditory injury could affect Otariid pinnipeds (e.g., sea lions) within 1,109 feet of active impact pile driving without sound attenuation in place (Table 10). With implementation of a bubble curtain to attenuate noise levels during impact pile driving, sound would be reduced by at least 9 decibels at the source, which would decrease the distance to Phocid and Otariid PTS injury to 3,822 feet and 279 feet, respectively (Table 10). Because the Columbia River is approximately 3,281 feet wide at the point where pile driving would occur, and the aquatic impact study area extends 5.1 miles upstream of the project area and 2.1 miles downstream of the project area, pinnipeds could use a large area of the river in the aquatic impact study area to avoid exposure to underwater noise reaching PTS injury levels.

Based on the seasonal use patterns for California sea lion, Steller sea lion, and harbor seals in the study area and based on the proposed work window for in-water impact pile installation (September 1 through December 31), the presence of individual pinniped species during impact pile driving would be unlikely. In addition, the distances reported in Table 10 assume pinnipeds would be exposed to 8 hours of elevated noise during a day of pile driving. Given the adherence to in-water work windows, the use of bubble curtains to reduce noise and the potential impact distance, and the ability of pinnipeds to travel outside the area of elevated underwater noise thereby reducing the duration of their exposure, the three pinniped species that could be present are unlikely to experience PTS auditory injury.

Table 10. Distance from Impact Pile Driving to NMFS Underwater Sound Level Effect Thresholds for Injury to Marine Mammals

Hearing Group	Impulsive (impact: no attenuation)	Impulsive (impact: attenuation)
Phocid Pinnipeds (PW) (Underwater)	$L_{pk,flat:}$ 218 dB at **30 feet** $L_{E,PW,24h:}$185 dB at **15,220**	$L_{pk,flat:}$ 218 dB at **7 feet** $L_{E,PW,24h:}$185 dB at **3,822 feet**
Otariid Pinnipeds (OW) (Underwater)	$L_{pk,flat:}$ 232 dB at **3 feet** $L_{E,OW,24h:}$ 203 dB at **1,109 feet**	$L_{pk,flat:}$ 232 dB at **1 foot** $L_{E,OW,24h:}$ 203 dB at **279 feet**

dB = decibels

Cause a Behavioral Disturbance to Pinnipeds from Impact Pile Driving

Behavioral disturbance could affect both Phocid and Otariid pinnipeds up to 17,756 feet from impact pile-driving activities in the absence of sound attenuation devices. With implementation of a bubble curtain to attenuate noise levels during impact pile driving, sound levels would be reduced by 9 decibels at the source, which would decrease the distance to pinniped behavioral disturbance to 4,459 feet from pile-driving activities (Table 11).

Table 11. Distance from Impact Pile Driving to NMFS Underwater Sound Level Effect Thresholds for Behavioral Disturbance to Marine Mammals

Sound Source	Distance to Behavioral Disturbance (impact: no attenuation)	Distance to Behavioral Disturbance (impact: attenuation)
Impulsive	17,756 feet	4,459 feet

The NMFS 160 dB_{RMS} effect threshold for behavioral disturbance due to impulsive sound is a generalized threshold for use in analysis of potential effects on all marine mammals (cetaceans and pinnipeds) due to underwater noise. According to Southall et al. (2007), there is limited potential for pinnipeds exposed to multiple pulses between approximately 150 and 180 dB_{RMS} to respond with avoidance. The majority of individual documented behavioral responses at these levels are related to alert or orientation response, which could result in changes or interruption in feeding or diving, to cessation of vocalizations, to temporary displacement from habitat.

Based on the seasonal use patterns for California sea lion, Steller sea lion and harbor seals in the study area, presence of individuals of these species during impact pile driving would be unlikely. Steller sea lions are known to occur in the study are during the period when impact pile driving would occur, (September through December) but in very low numbers. In the event these pinnipeds pass through the study area during impact pile driving, they would be exposed to sound in excess of the behavioral disturbance threshold. However, it is so unlikely that California sea lions or harbor seals would be transiting through the area on their way to upstream locations such as haulouts or the Bonneville Dam that few, if any, individuals would be expected to experience sound in excess of the behavioral disturbance threshold. A relatively small number of Steller sea lions (likely less than 20 (Stansell et al 2010, 2012)) could experience sound in excess of the behavioral disturbance threshold.

The relatively few Steller sea lions that could experience pulsed sound above the behavioral disturbance threshold are not expected to exhibit behavioral changes. Based on an average

swim speed of approximately 3 meters per second (Stelle et al. 2000), a Steller sea lion would traverse the study area in approximately 30 minutes (assuming pile driving at any or all locations). Based on observations of swimming speeds in the Columbia River determined through telemetry, this speed could be somewhat high, particularly during upstream migration (Brown et al. 2011). However, even for speeds at the low end of those reported by Brown et al. (2011) (more than 1 meter per second), it is expected that the study area would be traversed in less than 2 hours. The lower-end estimates from Brown et al. (2011) are applicable to California sea lions and have been applied to harbor seals as well. For all three species, additional alert or orientation responses over the duration of the construction period would not be expected to impede transit through the area or otherwise significantly disrupt behavioral patterns. In the unlikely event a significant disruption of behavior were to occur to an individual during pile driving, effects could range from startle responses to changes or interruption in feeding or diving, to cessation of vocalizations, to temporary displacement from habitat.

Cause an Injury to Pinnipeds from Vibratory Pile Driving

PTS auditory injury could affect Phocid pinnipeds (e.g., harbor seals) within 331 feet of active vibratory pile driving. PTS auditory injury could affect Otariid pinnipeds (e.g., sea lions) within 23 feet of active vibratory pile driving (Table 12). Because the Columbia River is approximately 3,281 feet wide at the point where pile driving would occur, there would be a wide area of the river that pinnipeds could utilize in the aquatic impact study area and avoid exposure to the area where underwater noise reaching PTS injury levels may occur.

Based on the seasonal use patterns for California sea lions, Steller sea lions, and harbor seals in the study area and based on the proposed work window for in-water vibratory pile installation, the presence of individual pinniped species during vibratory pile driving would be unlikely. In addition, the distances reported in Table 12 assume pinnipeds would be exposed to 1.2 hours of elevated noise during a day of vibratory pile driving (four piles per day, 20 minutes per pile). Given the adherence to in-water work windows, the short impact distance, and the ability of pinnipeds to travel outside the area of elevated underwater noise, thereby reducing the duration of their exposure, the three pinniped species that could be present are unlikely to experience PTS auditory injury due to vibratory pile driving.

Table 12. Distance from Vibratory Pile Driving to NMFS Underwater Sound Level Effect Thresholds for Injury to Marine Mammals.

Hearing Group	Nonimpulsive (vibratory)
Phocid Pinnipeds (PW) (Underwater)	$L_{E,PW,24h}$: 201 dB at **331 feet**
Otariid Pinnipeds (OW) (Underwater)	$L_{E,OW,24h}$: 219 dB at **23 feet**

dB = decibels

Cause a Behavioral Disturbance to Pinnipeds from Vibratory Pile Driving

Behavioral disturbance could affect both Phocid and Otariid pinnipeds up to 5.1 miles upstream and 2.1 miles downstream from the project area from vibratory pile driving. These disturbance distances are defined by bends in the Columbia River that effectively intercept the underwater noise that would otherwise result in the disturbance area extending 72 miles. Sound travels in

straight lines, and can only travel up to the distances of these river bends. Therefore, behavioral disturbance from vibratory pile driving could only occur within this area (see Aquatic Direct Impact Study Area in Figure 3). Sound attenuation devices are not applicable to vibratory pile driving methods so no reduction in noise level is anticipated. Based on seasonal use patterns of the study area by pinnipeds and the proposed in-water work window for pile installation, pinnipeds are unlikely to be present during pile driving.

Vibratory pile driving could occur during much or all of each working day during the September 1 through February 28 in-water work window. The contractor would determine sequencing and the need for multiple pile-driving rigs. It is possible that vibratory pile driving could occur at any time during the approved in-water work window (September 1 through February 28), and it could be continuous during working days (Monday through Friday), particularly if multiple pile-driving rigs are operating. However, even considering multiple pile-driving rigs, given variable subsurface conditions there would be days where periods of vibratory pile driving would be shorter and/or discontinuous throughout the working day. Therefore, it is possible that some or all of the pinnipeds transiting through the study area would not experience behavioral disturbance from vibratory pile driving.

Aside from the vibratory pile-driving schedule and sequence of events during the in-water work window, individual California sea lions, Steller sea lions, and harbor seals are considered unlikely to be present during much of the vibratory pile-driving period, based on their typical occurrence and the in-water pile-driving construction timing. This would minimize the likelihood that individual pinnipeds would experience sound in excess of the 120 dB_{RMS} behavioral disturbance threshold for continuous pile-driving sound. However, some California sea lions and harbor seals are expected to pass through the study area during the latter part of the vibratory driving period (mid-January through February) on their way to upstream haulouts and the Bonneville Dam. Steller sea lions could pass through the study area throughout the vibratory pile-driving period, but in relatively small numbers (fewer than 20) prior to January 1, with increasing numbers possible thereafter.

NMFS applies the 120 dB_{RMS} behavioral disturbance threshold for continuous sound to all marine mammals. As noted in Southall et al. (2007), the 120 dB_{RMS} value is primarily based on data from two field studies observing the response of baleen whales (gray and bowhead whales) to continuous industrial sound (e.g., drilling or icebreaking). Southall et al. (2007) also states the effects of continuous sound exposures on pinnipeds are poorly understood, and existing data do not indicate strong behavioral responses to sounds between 90 and 140 dB_{RMS}. As such, the application of the 120 dB_{RMS} threshold for pinnipeds is considered a conservative analysis that is protective of the species.

The assertion that the 120 dB_{RMS} is considered conservative could be further supported by observed responses of sea lions, including Steller sea lions, to auditory deterrence devices (ADDs) employed at the Bonneville Dam (Stansell et al. 2010). The ADDs were installed in 2008 at most of the fishway entrances to deter pinniped foraging in these areas. Each ADD consisted of an Airmar decibel Plus II acoustic deterrent system emitting a 205 dB sound in the 15-kilohertz (kHz) frequency range, placed within the tailrace of the dam (Stansell et al. 2010). The ADDs are marketed as pinniped deterrents and are set to a frequency within the range of greatest hearing sensitivity for pinnipeds. Steller sea lion hearing sensitivity peaks between 1 and 16 kHz for males and between 16 and 25 kHz for females (Kastelein et al. 2005 in Grette

2014a). California sea lion hearing sensitivity peaks between 1 and 28 kHz with a peak at 16 kHz (Schusterman et al. 1972). Harbor seal hearing sensitivity peaks between approximately 10 and 40 kHz (Mohl 1968 in Richardson et al. 1995).

The ADDs were left on continuously for the entirety of the 2008 observation season (January through May), turned on or off randomly in 2009, and on or off for random 2-day periods in 2010 to mitigate against habituation (Stansell et al. 2010). According to observations, the ADDs had no detectable effect on sea lions when they were on continuously in 2008 or when they were randomly on or off in 2009 and 2010. Pinnipeds have been observed each year since 2008 swimming and foraging within 20 feet of the active ADDs, and many of the same individuals present in 2008 returned the following 2 years. Due to the ineffectiveness of the ADDs as deterrents at the Bonneville Dam, the investigators recommended discontinuing their use (Stansell et al. 2010).

The pinnipeds' reactions to the ADDs employed at Bonneville Dam illustrates that the environmental context plays a significant role on whether or not pinnipeds react to continuous noise. The noise from ADDs was well above both the documented pinniped hearing thresholds and the established threshold of potentially disturbing continuous sound. While the ADDs have been effectively used as a pinniped deterrent elsewhere, the acoustic deterrent was not enough to dissuade the animals from the abundant foraging opportunity at Bonneville Dam.

The results of the ADDs employed at Bonneville Dam strongly suggest that sea lions can habituate to high levels of continuous sound. Sound from vibratory pile driving is conservatively estimated to be 181 dB_{RMS} (170 dB_{RMS} could be more typical). The ADDs used at Bonneville Dam emitted sound at 205 decibels at the source (not specified as dB_{RMS}, dB_{SEL}) or decibels peak. However, since the ADDs emit continuous sound, dB_{RMS} should be a comparable metric). A modeled comparison of these sound levels determined that sound from vibratory pile driving is expected to be of comparable loudness to that emitted by the ADDs at Bonneville Dam. Other characteristics including frequencies could be different, but the ADDs targeted the most sensitive frequencies for pinnipeds and were still not effective deterrents at the Bonneville Dam.

California sea lions, Steller sea lions, and harbor seals would pass through the study area during the period proposed for vibratory pile driving with increasing numbers toward the end of the vibratory pile in-water work window. Individuals within 5.1 miles (26,928 feet) of vibratory pile driving upstream and 2.1 miles (11,088 feet) downstream of the project area would experience elevated sound levels. As discussed above, based on Southall et al. (2007), pinnipeds do not typically elicit strong behavioral responses to continuous sound between 90 and 140 dB_{RMS}. While not included in the detailed behavioral analysis, Southall et al. (2007) also discuss a number of studies that suggest a high tolerance of and/or limited behavioral changes by pinnipeds to sounds from underwater drilling, ADDs, and other continuous sources in the field. Stansell et al. (2012) observed that Steller sea lions did not avoid areas ensonified by ADDs and were observed foraging within 20 feet of the ADDs. Those ADDs emitted sound at levels comparable to what is expected during vibratory pile driving, and were frequency-specific to target peak sensitivity for pinniped hearing. Taken together, these findings suggest that a strong behavioral response such as absolute avoidance of the entire area of elevated sound is unlikely during vibratory pile driving, even with the relatively long time-period (September 1 through February 28) and daily duration proposed over the two in-water construction seasons. Even if an individual were to avoid the area of elevated sound initially, it would be expected to move

through the study area eventually, either once acclimated to the sound or once pile driving has ceased. Vibratory pile driving is not expected to affect the ability of, or the likelihood for, individual California sea lions, Steller sea lions, or harbor seals to transit through the study area or to reach other upstream areas and the Bonneville Dam.

Result in Underwater Noise Impacts on Diving Birds

Although hearing range and sensitivity have been measured in many terrestrial birds, little is known of diving bird hearing. Most published literature on bird hearing focuses on terrestrial birds and their ability to hear in air (U.S. Navy 2014). There is little published literature on hearing abilities of birds underwater, and the manner in which birds could use sound underwater is unclear (Dooling and Therrien 2012 in U.S. Navy 2014). In fact, there are no measurements of underwater hearing ability in any diving birds (Therrien et al. 2011 in U.S. Navy 2014). Diving birds may not hear as well underwater, compared to other (nonavian) terrestrial species, based on adaptations to protect their ears from pressure changes (Dooling and Therrien 2012 in U.S. Navy 2014).

Potential impacts on diving birds in the Columbia River are most likely to occur when underwater noise is generated during in-water installation of the trestle and dock piles. Specifically, impact pile driving would generate the loudest and most intense underwater noise during construction.

USFWS has provided underwater noise impact thresholds for impact pile driving for the federally listed marbled murrelet. While marbled murrelets are unlikely to be found in the study area, the underwater noise thresholds provide some guidance on potential underwater noise impacts that could be useful for other diving birds that could be in the study area.

USFWS recognizes a behavioral threshold of 150 dB_{RMS}, an auditory injury threshold of 202 dB_{SEL}, and a nonauditory injury (barotrauma) threshold of 208 dB_{SEL} (Table 13). Underwater noise below 150 dB_{SEL} does not cause injury (Washington State Department of Transportation 2015).

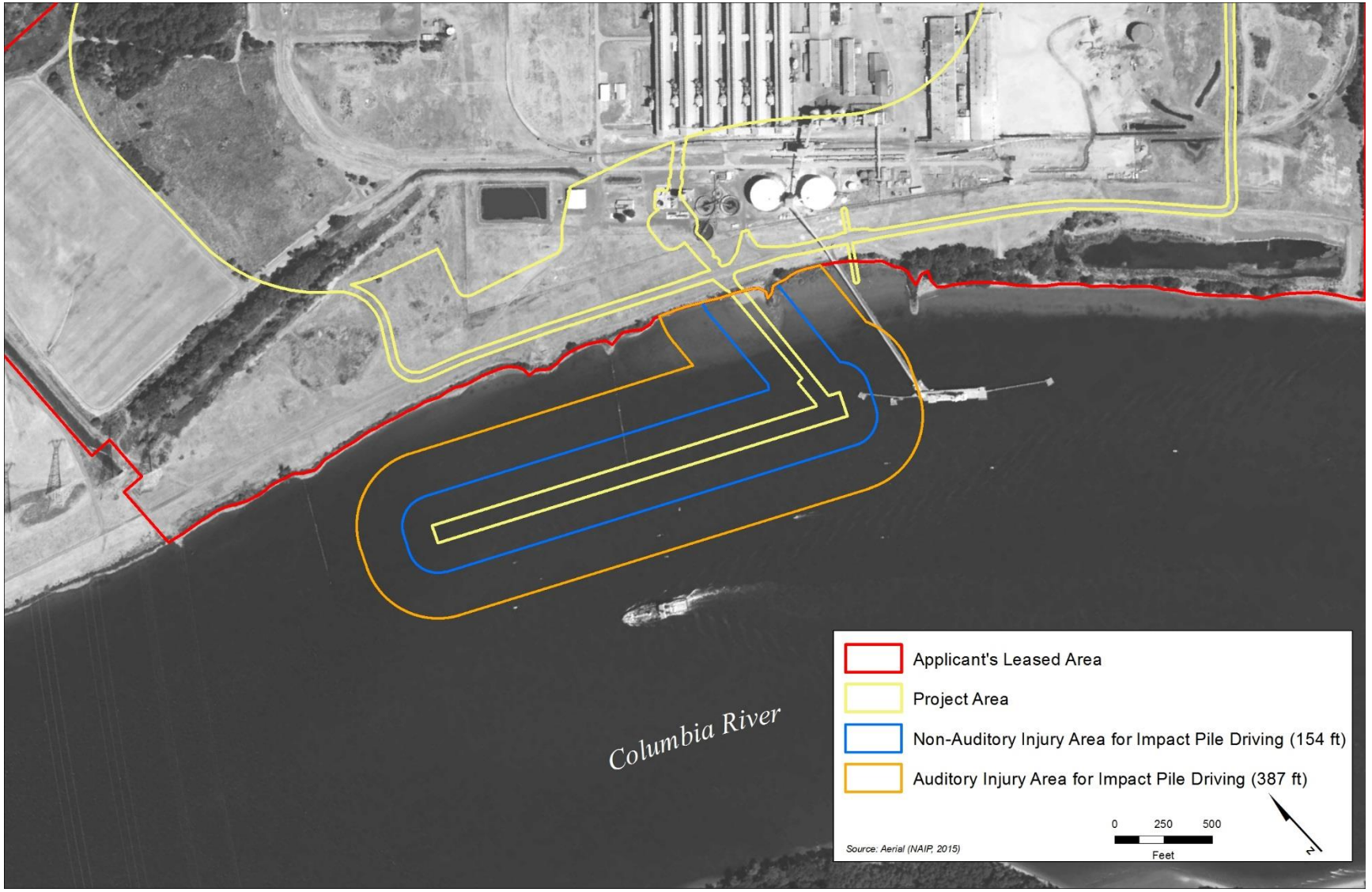
Based on noise levels provided in Table 5 and assuming noise attenuation devices will reduce sound source levels by 9 dB, marbled murrelet behavioral disturbance may occur at distances less than 20,701 feet, auditory injury may occur at distances less than 387 feet, and barotrauma injury may occur at distances less than 154 feet (Table 13, Figure 6).

Table 13. Distances to Potential Impact on Diving Birds from Impact Pile Driving.

Effect Type	Effect Distance
Behavioral disturbance	20,701 feet[a]
Auditory injury	387 feet
Nonauditory injury (barotrauma)	154 feet

[a] This distance is restricted to line-of-site downstream of the project area and would extend to only 11,088 feet (2.1 miles)

Figure 6. Potential Injury Impact Area for Diving Birds due to Impact Pile Driving



The reaction of a diving bird exposed to underwater noise levels above 150 dB_{RMS} (but below 202 dB_{SEL}) could range from mild disturbance to escape behavior. This would displace individuals by forcing them to abandon the area of elevated noise levels, potentially resulting in impairment or disruption of normal behavioral patterns. Such displacement and disruption of behavior could interrupt feeding and diving and reduce productivity and survival of individuals, as the individual would likely expend more energy relocating to a new area. However, pile-driving noise impacts would be temporary, occurring over 2 years and during the approved in-water work window. It is not anticipated that underwater impact pile-driving noise would affect the overall fitness of diving bird populations.

Result in Spills and Leaks

Construction activities would occur on land as well as in and over waters of the Columbia River. During all construction related activities there is the potential risk of temporary water quality impacts resulting from the release of hazardous materials such as fuels, lubricants, hydraulic fluids, or other construction-related chemicals. These materials could enter surface waters of the Columbia River or drainage ditches located near the project area. Such spills could affect aquatic habitat or wildlife, including pinnipeds, waterfowl, or terrestrial wildlife that could be near the discharge point, resulting in toxic acute or subacute impacts that could affect the respiration, growth, or reproduction of these species. Over-water and in-water work increases this risk as well as the potential for construction debris or materials to enter the Columbia River. The potential for these types of impacts would be avoided or greatly reduced given protective measures to guard against these risks, including: construction best management practices, avoidance and minimization measures, in-water work restrictions, and regulatory requirements, such as those associated with 401 Water Quality Certification and the spill prevention, control, and countermeasure plan. The SEPA Water Quality Technical Report (ICF 2017c) includes a detailed discussion on the potential impacts on water quality associated with the Proposed Action.

3.1.2 Construction: Indirect Impacts

Construction of the Proposed Action would not result in indirect impacts on wildlife or wildlife habitat because construction of the coal export terminal would be limited to the project area.

3.1.3 Operations: Direct Impacts

Operation of the Proposed Action would result in the following direct impacts.

Affect Wildlife as a Result of Noise

Operation of the Proposed Action could result in increased noise from movement of trains, transfer of coal from train to stockpile areas to vessels, and general industrial operations, which could affect wildlife in a manner similar to that described for construction noise. Increased operations noises could affect wildlife by causing disturbance or avoidance behaviors. Wildlife in the terrestrial study area are likely habituated to noise levels associated with industrial and developed areas, and operations noises associated with the Proposed Action are anticipated to be comparable to existing noises associated with the ongoing industrial operations in the study area. Given that the species present in the terrestrial study area are likely habituated to elevated

noise levels associated with industrial areas and are generally mobile, it is anticipated that operations noise associated with the Proposed Action would not have a measurable impact on wildlife species within the terrestrial study area.

Result in Spills and Leaks

Routine operations could result in spills or leaks at the project area from vehicles, trains, or equipment that could affect water quality and the condition of aquatic habitat in the Columbia River and drainage ditches located in the aquatic study area. Potential impacts on wildlife and wildlife habitat are similar to those described for construction leaks and spills. Personnel training, oil discharge prevention briefings, and implementation of prevention and control measures, as required under the Spill Prevention, Control and Countermeasure Regulation (40 CFR 112) would guard against these risks, greatly reducing the potential for these types of impacts. Further information is contained in the SEPA Water Quality Technical Report (ICF 2017c) and SEPA Hazardous Materials Technical Report (ICF 2017d).

Produce Coal Dust

Coal dust and fugitive coal particles could be generated during operation of the Proposed Action through the movement of coal onto the project area, around the project area, and onto vessels. Coal dust could also become airborne from the large stockpiles located in the site.

The potential extent and deposition rate of coal dust particles less than 75 microns in diameter was modeled as part of the analysis conducted relative to air quality, and human health during the preparation of the Environmental Impact Statement. See the SEPA Air Quality Technical Report for additional details (ICF 2017e). Based on the models, the highest rate of coal dust deposition would be expected in the immediate area surrounding the coal export terminal, but smaller particles would also be expected to deposit in a zone extending around and downwind of the terminal. Deposition rates could range from 1.99 grams per square meter per year (g/m^2/year) adjacent to the coal export terminal, gradually declining to less than 0.1 g/m^2/year within a few thousand feet from the terminal and 0.01 g/m^2/year approximately 2.4 miles from the terminal. Refer to the SEPA Coal Technical Report (ICF 2017f).

Based on the models, the zone of deposition would extend primarily northwest of the project area and over the Columbia River, encompassing forested hills, riparian habitat along the shoreline, and extending across the Columbia River to Lord and Walker islands. Deposition rates of less than 0.1 g/m^2/year are projected to occur over the forested habitats of Lord Island in the study area (Figure 3), with declining concentrations across the island and to the south and west toward Walker Island.

Although concerns regarding coal dust are commonly expressed relative to air quality and human health concerns, wind-born coal could affect wildlife through physical or toxicological means. In general, there is a paucity of peer-reviewed scientific literature examining the potential effects of coal dust on wildlife, in particular, on terrestrial wildlife. More research has been conducted on potential effects of coal dust on aquatic organisms. Potential physical effects of coal dust have been well documented; however, documentation on potential toxic effects on aquatic organisms is lacking.

Ahrens and Morrisey (2005) conducted a literature review on the biological effects of unburnt coal in the marine environment. The following discussion is distilled from that review. Coal

particles could affect aquatic wildlife in a manner comparable to any form of suspended particulates. Impacts could include tissue abrasion, smothering, obstruction or damage to feeding or respiratory organs, and other effects resulting from reduced quantity or quality of light. Another manner in which coal could affect aquatic wildlife is through coal leachates. Unburnt coal can be a source of acidity, salinity, trace metals, hydrocarbons, chemical oxygen demand, and potentially macronutrients if they leach from the coal matrix into aquatic habitats. Toxic constituents of coal include PAHs and trace metals, which are present in coal in variable amounts and combinations dependent on the type of coal. The coal type, along with mineral impurities in the coal and environmental conditions determine whether these compounds can be leached from the coal. Some PAHs are known to be toxic to aquatic animals and humans.

Metals and PAHs could also leach from coal to the pore water of sediments and be ingested by benthic-feeding organisms, providing a mechanism for subsequent ingestion by other organisms throughout the food chain. However, the low aqueous extractability and bioavailability of the contaminants minimizes the potentially toxic effects. The coal anticipated to be exported from the coal export terminal is alkaline and low in sulfur and trace metals. The conditions to produce concentrations in pore waters are not present in a dynamic riverine environment. This would further support the view of Ahrens and Morrisey (2005) that the bioavailability of such toxins would likely be low.

In summary, fugitive coal dust from operation of the Proposed Action is not expected to increase suspended solids in the Columbia River to the point that there would be a demonstrable effect on aquatic wildlife and fish distribution, abundance, or survival. Additionally, the potential risk for exposure to toxic chemicals contained in coal (e.g., PAHs and trace metals) would be relatively low as these chemicals tend to be bound in the matrix structure and not quickly or easily leached. Particles would likely be transported downstream and either carried out to sea or distributed over a sufficiently broad area as not to be problematic. Coal dust accumulation within the area is expected to be below the trigger level for sensitive areas, as indicated in the SEPA Coal Technical Report (ICF 2017f). Sensitive areas, as defined by New Zealand Trigger Levels referenced in the SEPA Coal Technical Report typically include areas with significant residential development. Over the long term, coal dust could accumulate in the terrestrial study area; however, predicting the extent to which wind and rain would further disperse coal dust is unknown. Refer to the SEPA Vegetation Technical Report for information related to coal dust impacts on vegetation (ICF 2017b).

Affect Wildlife from a Spill of Coal

Direct impacts on the natural environment from a coal spill during operation of the Proposed Action could occur. Direct impacts resulting from a spill during coal handling at the coal export terminal would likely be minor because the amount of coal that could be spilled would be relatively small. Also, impacts would be minor because of the absence of terrestrial and aquatic environments in the project area and the contained nature and design features of the terminal (e.g., enclosed over-water belt conveyors, transfer towers, and shiploaders). Potential physical and chemical effects of a coal release on the aquatic and terrestrial environments adjacent to the coal export terminal are described below.

A coal spill could have physical effects on aquatic environments, including abrasion, smothering, diminished photosynthesis, altered sediment texture and stability, reduced availability of light, temporary loss of habitat, and diminished respiration and feeding for aquatic organisms. The

magnitude of these potential impacts would depend on the amount and size of coal particles suspended in the water, duration of coal exposure, and existing water clarity (Ahrens and Morrisey 2005). Therefore, the circumstances of a coal spill, the existing conditions of a particular aquatic environment (e.g., pond, stream, wetland), and the physical effects on aquatic organisms and habitat from a coal spill would vary. Similarly, cleanup of coal released into the aquatic environment could result in temporary impacts on habitat, such as smothering, altering sediment composition, temporary loss of habitat, and diminished respiration and feeding for aquatic organisms. The recovery time required for aquatic resources would depend on the amount of coal spill and the extent and duration of cleanup efforts, as well as the environment in which the incident occurred. It is unlikely that coal handling in the upland portions of the coal export terminal would result in a spill of coal that would affect the Columbia River. This is unlikely because the rail loop and stockpile areas would be contained. Other areas adjacent to the coal export terminal are separated from the Columbia River by an existing levee, which would prevent coal from being conveyed from upland areas adjacent to the rail loop to the Columbia River. Coal could be spilled during shiploading operations because of human error or equipment malfunction. However, such a spill would likely result in a limited release of coal into the environment due to safeguards to prevent such operational errors, such as start-up alarms, dock containment measures to contain spillage/ rainfall/ runoff, and enclosed shiploaders.

The chemical effects on aquatic organisms and habitats would depend on the circumstances of a coal spill and the existing conditions of a particular aquatic environment (e.g., stream, lake, wetland). Some research suggests that physical effects are likely to be more harmful than the chemical effects (Ahrens and Morrisey 2005).

A coal train derailment and coal spill in Burnaby, British Columbia, in 2014, and subsequent cleanup and monitoring efforts provide some insight into the potential impacts of coal spilled in the aquatic environment. Findings from spill response and cleanup found there were potentially minor impacts in the coal spill study area, and that these impacts were restricted to a localized area (Borealis Environmental Consulting 2015).

3.1.4 Operations: Indirect Impacts

Impacts indirectly associated with proposed operation of the Proposed Action could occur as a result of project related vessel traffic in the Columbia River within the indirect impact study area. These impacts include vessel strikes and underwater vessel noise impacts on pinnipeds. Periodic maintenance dredging could result in removal of habitat and associated impacts on pinnipeds and aquatic invertebrates as well as noise impacts on birds. Coal dust could indirectly affect terrestrial and aquatic wildlife. The potential risk of a vessel related spill is discussed in the SEPA Vessel Transportation Technical Report (ICF 2017g) Operation of the Proposed Action would result in the following indirect impacts.

Result in Vessel Strike Impacts on Pinnipeds

Increased vessel traffic related to operations at the project area could increase the risk of vessel collisions with pinnipeds in the indirect impact study area. Most available research and literature on marine mammal vessel strikes is associated with vessel-whale collisions at sea. Compared to pinnipeds, whales are typically much larger, slower moving, and therefore, are assumed more vulnerable to vessel strikes. Vessel strikes on marine mammals are usually described as massive blunt force trauma (Geraci and Lounsbury 1993 in Horning and Mellish

2009), but are considered extremely rare for pinnipeds (Andersen et al. 2007 in Horning and Mellish 2009). The blunt force trauma that results from a marine mammal collision with a vessel can result in death or injury. Blunt force trauma to marine mammals can include, but are not limited to, bone fractures, organ damage, and internal hemorrhages (National Oceanic Atmospheric Administration 2008). There are cases in which small marine mammals survive strikes but sustain injuries and disfigurement to dorsal fins and other body parts (National Oceanic and Atmospheric Administration 2008); in Sarasota Bay, Wells and Scott (1997) (in National Oceanic Atmospheric Administration 2008) documented four cases of vessel strikes on bottlenose dolphins in which all four animals survived the strike.

Laist et al. (2001) examined collisions between vessels and whales by examining historical records and computerized stranding databases for evidence of vessel strikes, and concluded that larger vessels and higher vessel speeds can increase the risk of collisions. Even though pinnipeds are generally smaller and more agile than whales, it is reasonable to assume that vessel size and speed would also be a factor in the risk of collisions with pinnipeds. Laist et al. (2001) found that the most lethal and serious injuries to whales are caused by vessels 262 feet or longer, and by vessels traveling above 14 knots (16 miles per hour). Vessels accessing the project area would likely be larger than 262 feet, but typical transit speeds would be much less than 14 knots in the study area. Vessel speeds in the Columbia River are typically 12 knots, slowing to about 8 knots when passing moored vessels (ICF 2017g). In the indirect study area around the project area, the speed would likely be even slower as there would likely be a "no wake zone" around the vessel mooring area.

In summary, the potential for a pinniped strike with a vessel in the indirect study area would depend on many factors, including time of year, vessel type, vessel size, pinniped species, vessel location, vessel speed, and location of animal relative to vessel. The behavior of a pinniped in the path of an approaching vessel in the study area is uncertain, but it is likely that an individual would have the ability to avoid and swim away from the vessel. In addition, pinniped vessel strikes are rare; thousands of vessels transit the Columbia River every year. A small number of documented pinniped deaths are attributed to vessel strikes. For example, the *U.S. Pacific Marine Mammal Stock Assessments: 2015* (National Oceanic Atmospheric Administration 2016) for the Pacific Coast documented two harbor seals (Oregon/Washington Coast stock) killed by boats between 2007 and 2011 and 13 California sea lions killed by boats between 2008 and 2012. Pinnipeds in the Columbia River would also likely be habituated to existing Columbia River vessel traffic (estimated to be 3,185 vessels per year between 2021 and 2023), and vessel speed in the indirect impact study area would be less than 14 knots. Therefore, the potential risk for a vessel collision with a pinniped in the indirect study area would be low.

Result in Underwater Vessel Noise Impacts on Pinnipeds

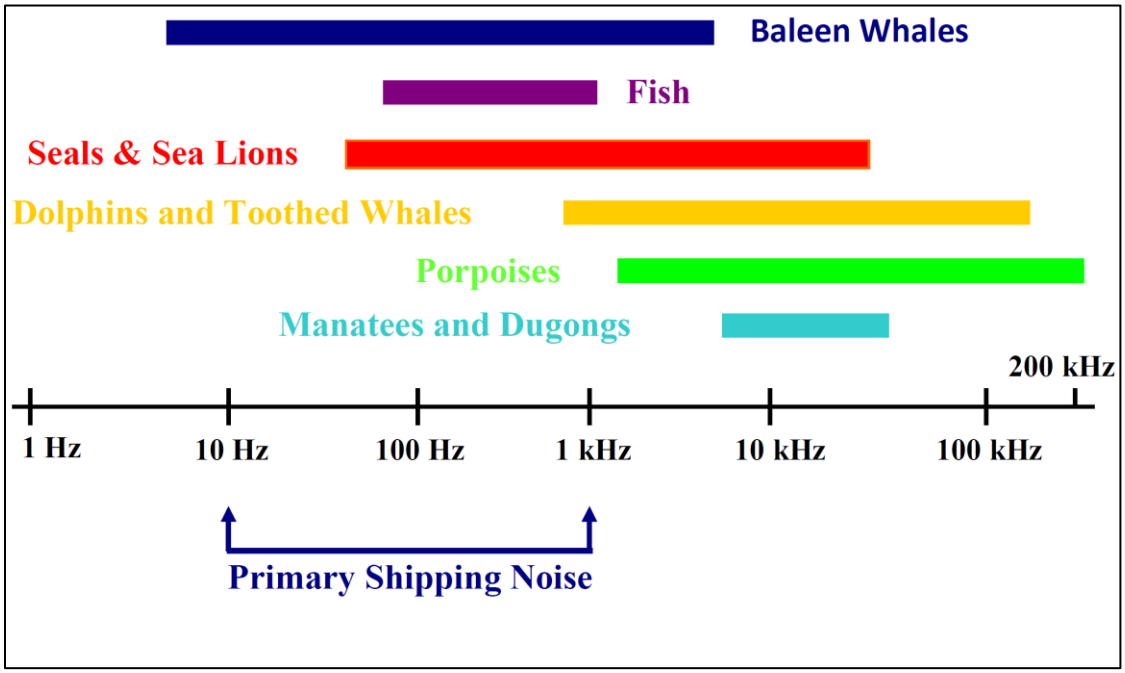
Increased vessel traffic related to operation of the Proposed Action contributes to underwater noise generated by existing ship traffic in the Columbia River. Ships generate noise primarily by propeller cavitation, propulsion machinery, hydraulic flow over the hull, and flexing of the hull (Marine Mammal Commission 2007). Studies in the Salish Sea have shown that the greater the ship size, the greater the underwater source level due to cavitation; however, tug vessels exhibit greater source noise levels underwater while performing activities such as berthing or accelerating a ship (Hemmera Envirochem Inc., SMRU Canada Ltd., and JASCO Applied Sciences (Canada) Ltd., 2014). While this information is from studies in the Salish Sea, noise levels from vessels would be similar in the Columbia River. Depending on the type of noise and ambient

noise conditions, underwater noise generated by vessels could affect marine mammals because they rely on sound as a means of communication, for finding food and mates, and for detecting predators. Increasing background noise levels could decrease communication ranges and modify behavior as well as induce stress responses (Wright 2008).

Operation of the Proposed Action at full build-out would result in approximately 840 additional vessel transits per year within the Columbia River compared to approximately 3,099 vessels that are estimated would transit the Lower Columbia River annually in 2028 (approximate timeframe for full build-out). With the project, total vessel transits per year would be approximately 3,939 (3,099 + 840). The 840 Proposed Action-related vessel traffic represents approximately 21% of the expected total vessel traffic volume in the Lower Columbia River per year. See the SEPA Vessel Transportation Technical Report for additional information on vessel traffic resulting from the Proposed Action (ICF 2017g).

Underwater noise frequencies associated with shipping vessels typically range between 10 Hertz (Hz) and 1 kHz (Wright 2008) (Chart 1), but most ships produce noise primarily in the low frequency range (up to 100 Hz) (Marine Mammal Commission 2007). Additionally, tugboats, the vessels that would be used to assist vessels in docking and departing the project area, typically produce less near-surface sounds than other vessels. This is not because they are quieter but because the propellers of a typical tugboat are recessed to protect the propeller from damage in case of grounding. With the propeller in this position, the sound rays from the propellers are blocked by the hull. Thus, the propeller noise cannot be heard ahead of the tug (University of Rhode Island 2015).

Chart 1. Frequency Relationship between Marine Animals Sounds and Sounds from Shipping



Source: Wright 2008.

As shown in Chart 1, several groups of marine animals hear sound within and outside of the primary shipping noise frequency range. Sea lions have been shown to be sensitive to a fairly wide range of mid frequencies (approximately 1 to 30 kHz) while seals are generally capable of

hearing across a wider range of low to mid sound frequencies (approximately 0.2 to 50 kHz) (National Oceanic and Atmospheric Administration 2005). Steller sea lion hearing sensitivity peaks between 1 kHz and 16 kHz for males and 16 kHz and 25 kHz for females (Kastelein et al. 2005 in Grette Associates 2014a); California sea lion hearing sensitivity peaks between 1 kHz and 28 kHz with a peak at 16 kHz (Schusterman et al. 1972 in Grette Associates 2014a); harbor seal hearing sensitivity peaks between approximately 10 kHz and 40 kHz (Mohl 1968 in Richardson et al. 1995 in Grette Associates 2014a). Comparing these pinnipeds' hearing frequency ranges with the shipping noise frequency range, underwater noise generated by ships in the study area would generally be outside of the peak sensitive hearing frequencies for Steller sea lion, California sea lion, and harbor seal; and potentially outside the full range of their sensitive hearing frequencies given that most ships produce noise primarily in the low frequency range (up to 100 Hz). In addition, pinnipeds that migrate through the study area would likely be habituated to ship noise because ship traffic on the Lower Columbia River is relatively frequent; between 2021 and 2023, it is estimated that a total of 3,185 vessels (this includes the estimated 840 vessels accessing the project area annually) would transit the Lower Columbia River annually (ICF 2017g). Marine mammals have adapted to varying levels of natural sound, and the adaptive mechanisms could allow them to function normally in the presence of many anthropogenic sounds. The unknown variable is when introduced sounds could exceed the adaptive capacity of marine mammals and thus pose a threat to individual animals or their populations (Marine Mammal Commission 2007).

In the event a pinniped were in the study area during the transit of a ship to or from the project area and if the underwater noise frequency of a particular ship were within the frequency range in which the pinniped is sensitive, there could be potential affects to the individual. Research has suggested that the primary auditory effect of vessel noise on marine animals is the masking of biologically significant sounds (National Oceanic and Atmospheric Administration 2005), which can affect communications between individuals. Complex behavioral responses to the same noise source can range from mild to severe and can vary among species and individuals, making it challenging to characterize impacts of shipping noise on marine mammal species (Ellison et al. 2012 in Joint Working Group on Vessel Strikes and Acoustic Impacts 2012). The effects of underwater noise exposure on marine organisms have been generally characterized by the following range of physical and behavioral responses (Richardson et al. 1995 in Bureau of Ocean Energy Management 2012), although it would not be anticipated that ship noise would cause all of these responses given the low frequency of underwater ship noise and the higher frequencies that Steller sea lion, California sea lion, and harbor seal are most sensitive. Additionally, it would be difficult to measure the effect that could be caused by the increase in vessel traffic associated with the project, as compared to the overall vessel traffic that would occur in the Columbia River.

- **Behavioral reactions.** Range from brief startle responses to changes or interruptions in feeding, diving, or respiratory patterns, to cessation of vocalizations, to temporary or permanent displacement from habitat.
- **Masking.** Reduction in ability to detect communication or other relevant sound signals due to elevated levels of background noise.
- **Temporary threshold shift.** Temporary, recoverable reduction in hearing sensitivity caused by exposure to sound.

- **Permanent threshold shift.** Permanent, irreversible reduction in hearing sensitivity due to damage or injury to ear structures caused by prolonged exposure to sound or temporary exposure to very intense sound.
- **Nonauditory physiological effects.** Effects of sound exposure on tissues in nonauditory systems either through direct exposure or because of changes in behavior (e.g., resonance of respiratory cavities or growth of gas bubbles in body fluids).

The effects of increased vessel noise associated with project related vessels on pinnipeds in the study area would depend on many factors, including vessel size and type, existing vessel traffic in Columbia River, ambient underwater noise, time of year, species of pinniped, vessel location, and location of animal relative to vessel and the intervening environment. Given that the peak hearing sensitivity frequencies of Steller sea lion, California sea lion, and harbor seal are generally outside of the noise frequencies generated by vessels and because these species would likely be habituated to existing Columbia River vessel generated noise levels, it is likely that any response to project related vessel noise would be relatively minimal, and could in fact be indistinguishable from the response of pinnipeds to Columbia River vessel traffic in general.

Remove Habitat during Maintenance Dredging and Cause Associated Impacts on Wildlife

Maintenance dredging would likely be required on a multiyear basis or following extreme flow conditions; however it could be needed as frequently as every year to maintain required depths at Docks 2 and 3 and to access the navigation channel, especially in the years following the initial dredging work (WorleyParsons 2012).

Sediment accretion in the proposed dredge prism would most likely occur because of bedload transport due to river currents, and local scour and sediment redistribution resulting from propeller wash. Hydrodynamic modeling and sediment transport analysis was conducted for the proposed Docks 2 and 3 berthing/navigation basin. Sedimentation is complex in a newly dredged basin. Specific morphologic data is unavailable for the proposed new dredging basin; therefore the rate of accretion can only be estimated roughly. Based on current accretion estimates, rough estimates for annual accretion height is approximately 0.16 feet (0.07 to 0.26 feet range) and annual accretion volume is approximately 11,675 yd^3 (4,670 to 23,350 y^3 range). Maintenance dredging would likely be required on a multiyear basis or following occasions with extreme flow events. Small scale maintenance dredging could be needed more frequently, especially in the early years following the initial dredging work when higher than normal accretion is more likely (WorleyParsons 2012).

Impacts on the benthic invertebrate community would be similar to those described for initial dredging associated with construction activities (Section 3.1.1, *Construction: Direct Impacts*). Compared to the initial dredging effort, maintenance dredging would remove a small amount of material, including benthic, epibenthic, and infaunal organisms, resulting in some mortality of invertebrate organisms and temporary disruption of benthic productivity. Habitat within the proposed dredge prism is in deep water where benthic productivity is expected to be low compared to shallow water habitats (McCabe et al. 1997). As mentioned in Section 3.1.1, *Construction: Direct Impacts*, benthic organisms typically recolonize disturbed areas in 30 to 45 days following disturbance. Thus, should dredging occur annually, it would not prevent recolonization of the benthic habitat.

Maintenance related dredging activities could affect pinnipeds in a similar manner as was described for initial dredging associated with construction activities in Section 3.1.1, *Construction: Direct Impacts*. Pinnipeds could be affected by colliding with dredging vessels, increased turbidity, and noise associated with dredging activities (Todd et al. 2014). Collisions between dredging vessels and pinnipeds are possible but unlikely to occur given the slow speeds of dredging vessels (Todd et al. 2014). Turbidity is unlikely to cause substantial impacts on pinnipeds since they often inhabit naturally turbid or dark environments and are likely to use other senses in addition to their vision to locate potential hazards and prey (Todd et al. 2014). Noise could cause masking and behavioral changes in pinnipeds but is unlikely to cause auditory damage (Central Dredging Association 2011; Dickerson et al. 2001; Todd et al. 2014).

Cause Noise Impacts from Maintenance Dredging

Potential noise impacts from maintenance dredging would be similar to those described for dredging in Section 3.1.1, *Construction: Direct Impacts*.

Spill Coal during Rail Transport

The magnitude of the potential indirect impact from a coal spill on the aquatic and terrestrial environments would be similar to those described in Section 3.1.3, *Operations: Direct Impacts*, and would depend on the location of the spill, the volume of the spill, and success of efforts to contain and clean up the spill, none of which can be predicted.

The potential impact of a coal spill from a Proposed Action-related train is directly related to the probability of a Proposed Action-related train incident occurring. In Cowlitz County, the predicted number of loaded coal train incidents is approximately one every 2 years. The predicted number of loaded coal train incidents in Washington State is approximately five per year.

Not every incident of a loaded coal train would necessarily result in a rail car derailment or a coal spill. A train incident could involve one or multiple rail cars and could include derailment in certain circumstances. The size and speed of the train and the terrain at the location of an incident would influence whether the incident resulted in a coal spill that could have impacts on wildlife. A broad range of spill sizes from a partial rail car to multiple rail cars could occur because of a Proposed Action-related train incident.

Additionally, containment and cleanup efforts for coal spills from a rail incident factor into the potential impact on the environment. It is expected that coal spills in the terrestrial and built environments would be easier to contain and clean up than spills in an aquatic environment. Spills on land could have a quicker response time and cleanup in some locations because they are more visible and accessible to cleanup equipment compared to spills into aquatic environments.

Potential physical and chemical effects of a coal release into aquatic and terrestrial environments would be the same or similar to those described in Section 3.1.3, *Operations: Direct Impacts*.

Interfere with Wildlife along Rail Corridors in Washington State

Increased rail traffic associated with the Proposed Action could result in an increase in train strikes of wildlife species along the rail corridor.

Dorsey (2011) found that some wildlife use railroads for movements, which could be considered a positive impact. Wildlife move on or along railroads while foraging, accessing critical resources (e.g., water), migrating, and dispersing. Wildlife move along railroads for three main reasons.

- Railroads are often aligned with high-quality habitats and natural movement corridors (e.g., valley bottoms and mountain passes).
- Foods (i.e., edge vegetation, carrion from strikes, and spilled agricultural grains) are available along rights-of-way or on the railbed.
- The flat rail bed provides an easily traversable route particularly where railroad beds could offer a relatively snow-free travel path.

However, Dorsey (2011) indicated that various factors are likely to contribute to the frequency of wildlife and rail interactions and the potential for train strikes and wildlife mortality. For example, train speed, rail alignment, and train volume as well as wildlife abundance, behavior, and habitat quality and use (i.e., migration or foraging) along rail corridors could individually, or in combination, affect the likelihood and frequency of train strikes of wildlife. The relative abundance of wildlife along a railroad could be the primary factor affecting strikes rates (Dorsey 2011), although Kusta et al. (2014) did not find abundance of roe deer in the Czech Republic and train strikes to be correlated. Dorsey (2011) cited several studies that have documented more herbivore than carnivore mortalities from train strikes, which reflects their relatively greater abundance in most landscapes. Although Dorsey (2011) points out that foods found on and along railroads could also be a factor affecting strikes by increasing the time wildlife spend directly on or adjacent to railroads. Foods found along railroads could consist of natural vegetation, carrion and agricultural products spilled from train cars.

Overall, the Proposed Action would increase the number of trains traveling through Washington State by approximately 16 trains per day at full build-out (8 loaded trains arriving and 8 empty trains leaving each day). This increase in train traffic through Washington State would increase the risk of wildlife strikes by trains.

3.2 No-Action Alternative

Under the No- Action Alternative, the Applicant would not construct the Proposed Action. Current operations would continue, and the existing bulk product terminal site would be expanded. However, any expansion would only include activities that would not require a permit from the U.S. Army Corps of Engineers or a shoreline permit; thus, no impacts on aquatic habitats would occur as a result of an expansion of the existing bulk product terminal. New construction, demolition, or related activities to expand the bulk terminal could occur on previously developed upland portions of the project area. This could affect upland areas and terrestrial habitats that provide suitable wildlife habitat. The specific extent cannot be determined, as the specific build-out is undefined for the No-Action Alternative.

It is assumed that growth in the region would continue, which would allow continued operation of the coal export terminal and the adjacent bulk terminal site within the 20-year analysis period (2018–2038). Cleanup activities, relative to past industrial uses, would continue to occur. This could affect developed areas and associated disturbed upland habitats. Vessel traffic volumes are expected

to continue and any aquatic wildlife disturbance or injury associated with vessel movements would continue at levels similar to current conditions; however, no additional measurable impact on aquatic wildlife or their habitat would be expected to occur under the No-Action Alternative because no in-water work would occur.

Chapter 4
Required Permits

The Proposed Action would require the following permits related to wildlife.

- **Endangered Species Act Consultation.** The Proposed Action could result in impacts on wildlife species or designated critical habitats protected under the ESA. In accordance with Section 7(a)(2) of the ESA, as amended, any action that requires federal authorization or funding, or is carried out by a federal agency must undergo consultation with the USFWS and/or NMFS to ensure the action is not likely to jeopardize the continued existence of any listed threatened or endangered animal species or result in the destruction or adverse modification of designated critical habitat. Since the proposed project could affect listed species, a Section 7 consultation with NMFS and USFWS is required under the ESA. A biological assessment (BA) would be prepared and submitted to the federal lead for consultation with NMFS and USFWS. NMFS and USFWS would issue biological opinions containing their conclusions on the effects of the Proposed Action on ESA-listed species and critical habitats.
- **Clean Water Act Authorization, Section 404.** Construction and implementation of the Proposed Action would result in impacts on waters of the United States, including wetlands. Because impacts would exceed 0.5 acre, Individual authorization from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act and appropriate compensatory mitigation for the acres and functions of the impacted wetlands would be required.
- **Marine Mammal Protection Act.** The Proposed Action would require pile driving, which could result in harassment, or "take," of marine mammals protected under the MMPA of 1972, as amended. The most likely occurring marine mammals are sea lions and harbor seals. In accordance with the MMPA, either an Incidental Harassment Authorization (IHA) or Letter of Authorization (LOA) would be required from NMFS, which could grant incidental "take" of small numbers of marine mammals under certain circumstances.
- **Local Critical Areas and Construction Permits.** The Proposed Action would also require local permits related to clearing and grading of the site and relative to impacts on regulated critical areas. Chapter 19.15 of the Cowlitz County Code regulates activities within and adjacent to critical areas and in so doing regulates vegetation occurring in wetlands and their buffers, fish and wildlife habitat conservation areas (including streams and their buffers), frequently flooded areas, and geological hazard areas. Cowlitz County would issue a Fill and Grade Permit, and would review the proposed project for consistency with the County's critical areas ordinance.
- **Hydraulic Project Approval.** The Proposed Action would require a hydraulic project approval from WDFW because project elements would affect and cross the shoreline of the Columbia River. The hydraulic project approval would consider effects on riparian and shoreline or bank vegetation in issuance and conditions of the permit, including for the installation of the proposed docks and piles, as well as for interior culverts or other crossings of drainage features.
- **Clean Water Act, Section 401 Water Quality Certification.** The Proposed Action would result in the construction and operation of a coal export terminal that would discharge into the navigable waters and would require a Clean Water Act, Section 401 water quality certification. This certification is administered by Ecology

The following measures were identified by the Applicant as measures that would be implemented during construction and/or operations. These measures are assumed conditions or requirements of permits that would be issued for the Proposed Action. These measures were considered when evaluated the potential impacts.

- While the Applicant would plan to limit construction for an 8- to 10-hour day, 5 days per week, on occasion, dredging could occur 7 days per week to complete work within specific fish windows.
- The Applicant would limit the impact of turbidity to a defined mixing zone and would otherwise comply with WAC 173-201A.
- The Applicant would not stockpile dredged material on the river bottom surface.
- The Applicant would contain all dredged material in a barge prior to flow-lane disposal; dredged material would not be stockpiled on the riverbed.
- During hydraulic dredging, the Applicant would not operate the hydraulic pumps unless the dredge intake is within 3 feet of the bottom.
- The Applicant would remove any floating oil, sheen, or debris within the work area as necessary to prevent loss of materials from the site. The contractor would be responsible for retrieval of any floating oil, sheen, or debris from the work area and any damages resulting from the loss.
- For material being transported to flow-lane disposal sites, the Applicant would remove all debris (larger than 2 feet in any dimension) from the dredged sediment prior to disposal. Similar-sized debris floating in the dredging or disposal area would also be removed.
- The Applicant would dispose materials to the flow lane using a bottom-dump barge or hopper dredge. These systems release material below the surface, minimizing surface turbidity.
- The Applicant would limit all construction activities to daylight hours to ensure that construction noise levels would be controlled and within local and state noise limits.
- The Applicant would install and maintain a noise monitoring station at an appropriate location on or near the site boundary to create 24-hour per day noise record during construction. The measurements would be recorded and monitored on a real time basis, and the contractor would take actions to halt or alter construction activities that exceed noise levels.
- To reduce the sound along the rail line, the Applicant would work with the Longview Switching Company to convert both the Oregon Way and Industrial Way crossings to quiet crossings and would fund such improvements to the rail line as necessary to achieve this mitigation.
- The Applicant would plan construction for an 8- to 10-hour day, 5 days per week. On occasion, it could be necessary to work 6 or 7 days per week depending on the nature of the task. For example, dredging could occur 7 days per week to complete work within specific fish windows.
- The Applicant would use activity-specific work windows designed to minimize specific impact mechanisms that could affect individual species (or populations within those species) of concern. These proposed work windows would protect species of concern while providing feasible construction periods for the in-water portion of construction over a 2-year schedule.
- The Applicant would conduct impact pile driving using a confined bubble curtain or similar sound attenuation system capable of achieving approximately 9 decibels of sound attenuation.

- Where possible, the Applicant would keep extraction equipment out of the water to avoid "pinching" pile below the water line in order to minimize creosote release during extraction.
- During pile removal and pile driving, the Applicant would place a containment boom around the perimeter of the work area to capture wood debris and other materials released into the waters because of construction activities. The Applicant would collect all accumulated debris and dispose of it upland at an approved disposal site. The contractor would deploy absorbent pads should any sheen be observed.
- The Applicant would provide a containment basin on the work surface on the barge deck or pier for piles and any sediment removed during pulling. The Applicant would dispose of any sediment collected in the containment basin at an appropriate upland facility, as with all components of the basin (e.g., straw bales, geotextile fabric) and all pile removed.
- Upon removal from substrate, the Applicant would move the pile expeditiously from the water into the containment basin. The contractor would not shake, hose, strip, or scrape the pile, nor leave it hanging to drip or any other action intended to clean or remove adhering material from the pile.
- The Applicant would dispose of all piles removed at an appropriate upland facility.
- The Applicant would prepare a mitigation plan in coordination with the Corps, Ecology, and Cowlitz County to address impacts on wetlands and aquatic habitats. Mitigation actions could be implemented at one or several locations to ensure that a wide range of ecological functions is provided to offset identified, unavoidable impacts of the Proposed Action. The mitigation actions could include Applicant-sponsored mitigation actions or use of credits from existing or proposed mitigation banks

Chapter 5
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Appendix A

Special-Status Wildlife Species in Cowlitz County

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Special-Status Wildlife Species in Cowlitz County

Table A-1. Special-Status Wildlife Species that Could Occur in Cowlitz County, Washington

Common Name	Scientific Name	Element of Concern	Potential for Occurrence in the Study Area	Potential for Habitat in the Study Area
Mammals				
Columbian black-tailed deer	*Odocoileus hemionus columbianus*	Individuals	Yes	Documented on the project area
Columbian white-tailed deer	*Odocoilieus virginianus leucurus*	Individuals	Yes	Documented on the project area[a]
Harbor seal (*Phoca vitulina*)	*Phoca vitulina*	Individuals	Yes	Present in Columbia River
California sea lion	*Zalophus californianus*	Individuals	Yes	Present in Columbia River
Stellar Sea lion	*Eumetopias jubatus*	Individuals	Yes	Present in Columbia River
Big brown bat	*Eptesicus fuscus*	Roosting concentrations	Unlikely	No suitable habitat identified
Myotis bats	*Myotis spp.*	Roosting concentrations	Unlikely	No suitable habitat identified
Pallid bat	*Antrozous pallidus*	Roosting concentrations	Unlikely	No suitable habitat identified
Townsends big-eared bat	*Corynorhinus townsendii*	Individuals	Unlikely	No suitable habitat identified
Fisher	*Martes pennant*	Individuals	No	No suitable habitat identified
Marten	*Martes Americana*	Individuals	No	No suitable habitat identified
Wolverine	*Gulo gulo*	Individuals	No	No suitable habitat identified
Elk	*Cervus elaphus*	Individuals	Unlikely	No suitable habitat identified
Birds				
Western grebe	*Aechmophorus occidentalis*	Individuals	Unlikely	Open water
Marbled murrelet	*Brachyramphus marmoratus*	Individuals	No	No suitable habitat identified
Yellow-billed cuckoo	*Coccyzus americanus*	Individuals	Unlikely, extremely rare	Very limited habitat

Common Name	Scientific Name	Element of Concern	Potential for Occurrence in the Study Area	Potential for Habitat in the Study Area
Streaked horned lark	*Eremophila alpestris strigata*	Individuals	Possibly	Not documented on project area; other areas of potential habitat in study area not surveyed
Great-blue heron	*Ardea herodias*	Breeding colony	No (individuals documented on project site)	No breeding habitat documented in study area
Cavity nesting ducks	N/A	Breeding areas	No	No breeding habitat documented in study area
Barrows Goldeneye	*Bucephala islandica*	Western Washington nonbreeding concentrations	Unlikely	Open water
Common Goldeneye	*Bucephala clangula*	Western Washington nonbreeding concentrations	Unlikely	Open water
Bufflehead	*Bucephala albeola*	Western Washington non-breeding concentrations	Unlikely	Open water
Harlequin duck	*Histrionicus histrionicus*	Breeding areas and regular concentrations in salt water	No	No open salt water; no suitable breeding habitat identified
Tundra swan	*Cygnus columbianus*	Regular concentrations	No	No suitable habitat identified
Trumpeter swan	*Cygnus buccinators*	Individuals	No	No suitable habitat identified
Waterfowl concentrations	N/A	Significant breeding areas, regular winter concentrations	Unlikely	Suitable habitat not likely to support large concentrations
Bald eagle	*Haliaeetus leucocephalus*	Breeding areas, communal roosts, regular concentrations	Possibly (individuals documented flying over the project area)	No breeding habitat identified; forested wetland could provide roosting habitat.
Golden eagle	*Aquila chrysaetos*	Breeding and foraging areas	Unlikely	Not found in lowland industrial areas
Northern goshawk	*Accipiter gentilis*	Breeding areas	No	No suitable habitat identified

Common Name	Scientific Name	Element of Concern	Potential for Occurrence in the Study Area	Potential for Habitat in the Study Area
Peregrine falcon	*Falco peregrinus*	Breeding areas; regular occurrences	Possibly	Potential foraging habitat
Sooty grouse	*Dendragapus fuliginosus*	Breeding areas; regular concentrations	No	No suitable habitat identified
Wild turkey	*Meleagris galiopavo*	Individuals	Unlikely	No suitable habitat identified
Sandhill Crane	*Grus Canadensis*	Breeding areas, regular concentrations, migration staging areas	Unlikely	No suitable habitat for breeding or congregating.
Plovers	Charadridae	Western Washington nonbreeding concentrations	Unlikely	Suitable habitat is limited
Waders/Sandpipers	Scolopacidae	Western Washington nonbreeding concentrations	Unlikely	Suitable habitat is limited
Phalaropes	Phalaropodidae	Western Washington nonbreeding concentrations	Unlikely	Suitable habitat is limited
Band-tailed pigeon	*Columba fasciata*	Regular concentrations, occupied mineral sites	No	No known habitat on the project area
Spotted owl	*Strix occidentalis*	Individuals	No	No suitable habitat on the project area
Vaux's swift	*Chaetura vauxi*	Breeding areas, communal roosts	Possibly	No large snags for breeding or roosting on the project site; known sightings at Mint Farm Industrial Park[b]
Pileated woodpecker	*Dryocopus pileatus*	Breeding areas	Unlikely (individuals possibly)	Breeding habitat component unlikely at the project area
Purple martin	*Progne subis*	Breeding and feeding areas	Yes	Species presence documented on the project area[a]
Slender-billed white-breasted nuthatch	*Sitta carolinensus*	Individuals	Unlikely	Lack of mature deciduous forest on the project area

Common Name	Scientific Name	Element of Concern	Potential for Occurrence in the Study Area	Potential for Habitat in the Study Area
Amphibians				
Western toad	*Bufo boreas*	Individuals	Unlikely, recently extirpated from local range	Species is uncommon; No large natural ponds for breeding on the project site and unlikely in study area
Dunn's salamander	*Plethodon dunii*	Individuals	No	No suitable habitat on the project area and unlikely in study area
Van Dyke's salamander	*Plethodon vandykii*	Individuals	No	No suitable habitat on the project area and unlikely in study area
Cascade torrent salamander	*Rhyacotriton cascadae*	Individuals	No	No suitable habitat on the project area and unlikely in study area
Larch mountain salamander	*Plethodon larselli*	Individuals	No	No suitable habitat on the project area and unlikely in study area
Reptiles				
Western pond turtle	*Actinemys marmorata*	Individuals	No	No suitable habitat on the project area and unlikely in study area

[a] Grette Associates 2014
[b] Willapa Hills Audubon Society 2014

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