

3.16 Ecosystems

Ecosystems comprise communities of organisms and the habitat that supports those communities. Ecosystems can exist at varying scales, including smaller systems within larger ones. Both natural and human factors can affect ecosystems, and ecosystem health can affect the quality of human life.

The assessment of reasonably foreseeable effects in this section is based upon the temporal proximity parameters detailed in the Chapter 3 introduction, and the ecosystems primary and secondary study areas as described in Section 3.16.2.

The information presented in this section is based on the Ecosystems Technical Report. A Biological Assessment has also been prepared for compliance with Section 7 of the Endangered Species Act. In addition, Section 3.14, Water Quality and Hydrology, and Section 3.15, Wetlands and Other Waters, provide more information on the proposed Modified LPA's effects on the ecosystems primary study area's environment.

3.16.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision, as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment near the Interstate Bridge, community priorities, and regulations have changed, which necessitated design revisions and resulted in the proposed IBR Program Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with ecosystems has been updated in this Final SEIS to include:

- Species of interest (SOI)¹ lists have been updated based on information from federal, state, and local resource management agencies and tribes. Changes have included both increases and decreases in regulatory status, new listings of species and critical habitats, and removal of species and critical habitats from regulatory lists.
- SOI life history and habitat requirements have been updated to reflect changes in best available science.
- Species' presence, associated habitat types, and baseline habitat conditions have been updated as applicable.
- Supplemental field surveys have been conducted to validate or update baseline assumptions.
- Federal, state, local, and tribal regulations and policies regarding ecosystem management, evaluation of effects, and compensatory mitigation have been updated, or proposed² to be updated.
- Effects analyses have been updated to reflect changes in scientific understanding of certain events and pollutants (such as emerging research related to 6PPD-quinone in stormwater).
- Changes in the project footprint necessitated by changed conditions.

¹ SOI is not a category of a government regulated species or a nongovernmental organization designation. Rather it refers to a subset of native species that were identified (through tribal, local, state, and federal coordination) as warranting specific evaluation due to regulatory status, rarity, and/or special habitat considerations. The SOI lists are not intended to represent a comprehensive list of all species in the ecosystems primary and secondary study areas of particular cultural importance to tribes or that provide important ecological function.

² The U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NOAA Fisheries) proposed on November 21, 2025 to revise portions of the regulations for section 7 of the Endangered Species Act (ESA). These changes, as proposed, would not affect the ESA consultations conducted for the IBR Program.

3.16.2 Existing Conditions

This evaluation includes a primary and secondary study area. Figure 3.16-1 shows the ecosystems primary study area, and Figure 3.16-2 shows the secondary study area. The ecosystems primary study area includes all areas within the limits of the construction footprint for the Modified LPA. The ecosystems secondary study area is larger and includes all areas more remote effects are reasonably foreseeable to occur. 12-1-2

The ecosystems primary and secondary study areas include portions of the mainstem Columbia River, associated tributaries, and nearby terrestrial habitats on the Oregon and Washington sides of the Columbia River. The ecosystems secondary study area extends to include downstream portions of the Columbia River mainstem to the mouth, and offshore coastal waters between Northern California and Alaska. This section describes the condition of the ecosystems primary and secondary study area's aquatic, terrestrial, and botanical resource habitats and the species that use these habitats.

Aquatic Resources

This section describes aquatic resources (aquatic species and their habitat) in the ecosystems primary and secondary study areas, which include the Columbia Slough, the Columbia River and North Portland Harbor, Burnt Bridge Creek, Fairview Creek, and Pacific Ocean coastal waters.

Aquatic Habitat

Columbia Slough

The Columbia Slough is a slow-moving, low-gradient drainage canal that flows from Fairview Lake (east) to the Willamette River (west) and consists of upper, middle, and lower reaches. The ecosystems primary and secondary study areas include a portion of the lower reach. The lower Columbia Slough habitat supports a variety of aquatic species, including juvenile salmonids and other native and non-native fish species, freshwater shrimp, and crawfish. Anadromous fish (those that migrate from salt water to fresh water to spawn) can access a portion of the lower Columbia Slough up to an impassable levee at river mile 8.3.

The Columbia Slough is listed under 303(d) of the Clean Water Act for failing to meet water quality standards for aquatic weeds, high levels of iron, and biocriteria. In addition, water temperatures often exceed levels considered suitable for juvenile salmonids, particularly in summer. Channel alterations, water diversions, and upstream dams on the Willamette and Columbia Rivers have reduced the flow rate, resulting in excess sedimentation and high levels of heavy metal contaminants. The contaminated sediments impact the health and habitat of the benthic organisms living in and along the waterway, resulting in low biodiversity. Development has contributed to industrial and stormwater discharges, increased pollutant and turbidity levels, and decreased the oxygen available for fish within the waterway.

What are benthic organisms?

In freshwater biology, benthic organisms are organisms living along a river, stream, or lakebed. Types of benthic organisms found in the study area include some species of snails, shrimp, and crayfish, as well as larval lamprey.

Figure 3.16-1. Ecosystems Primary Study Area

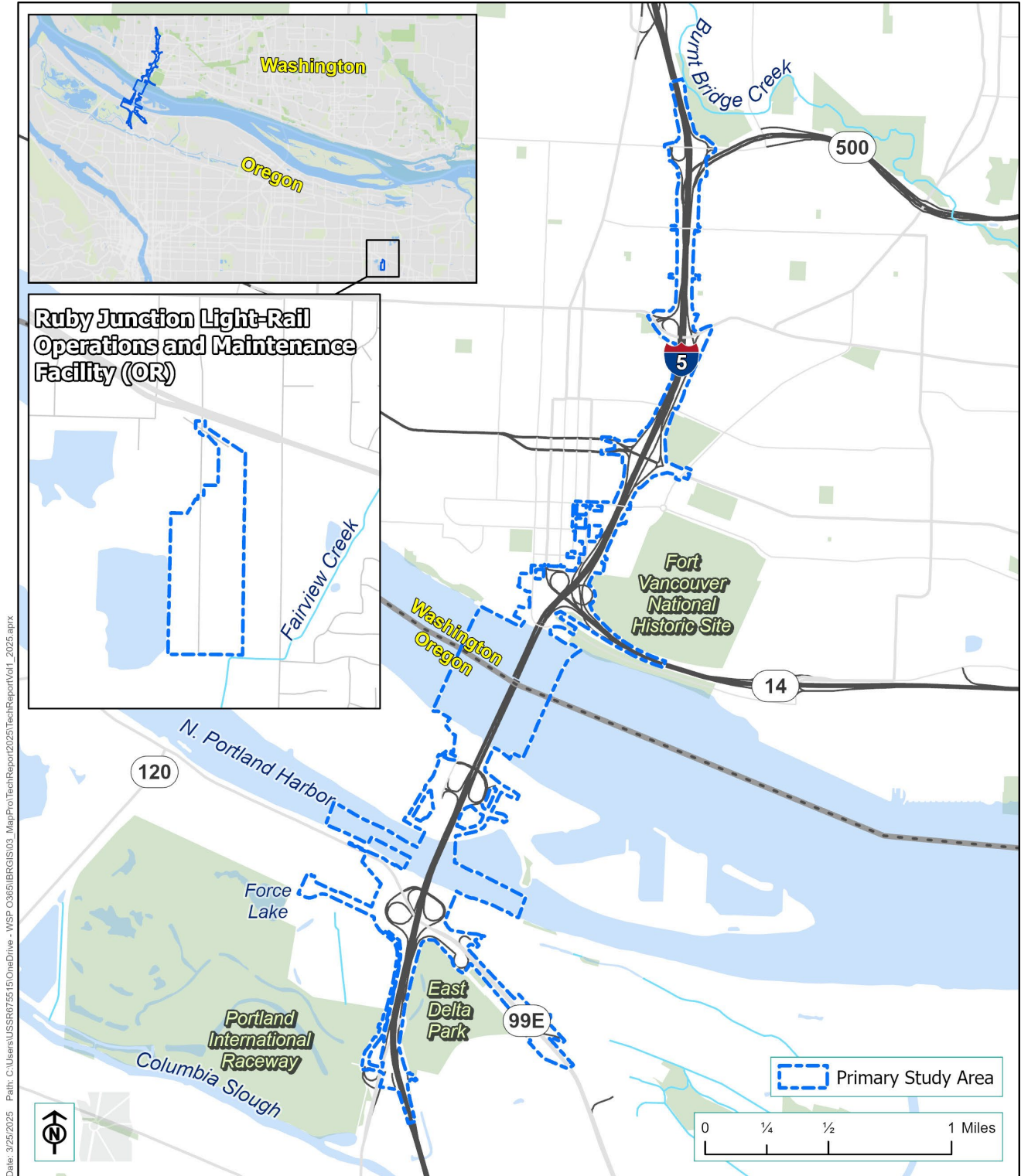
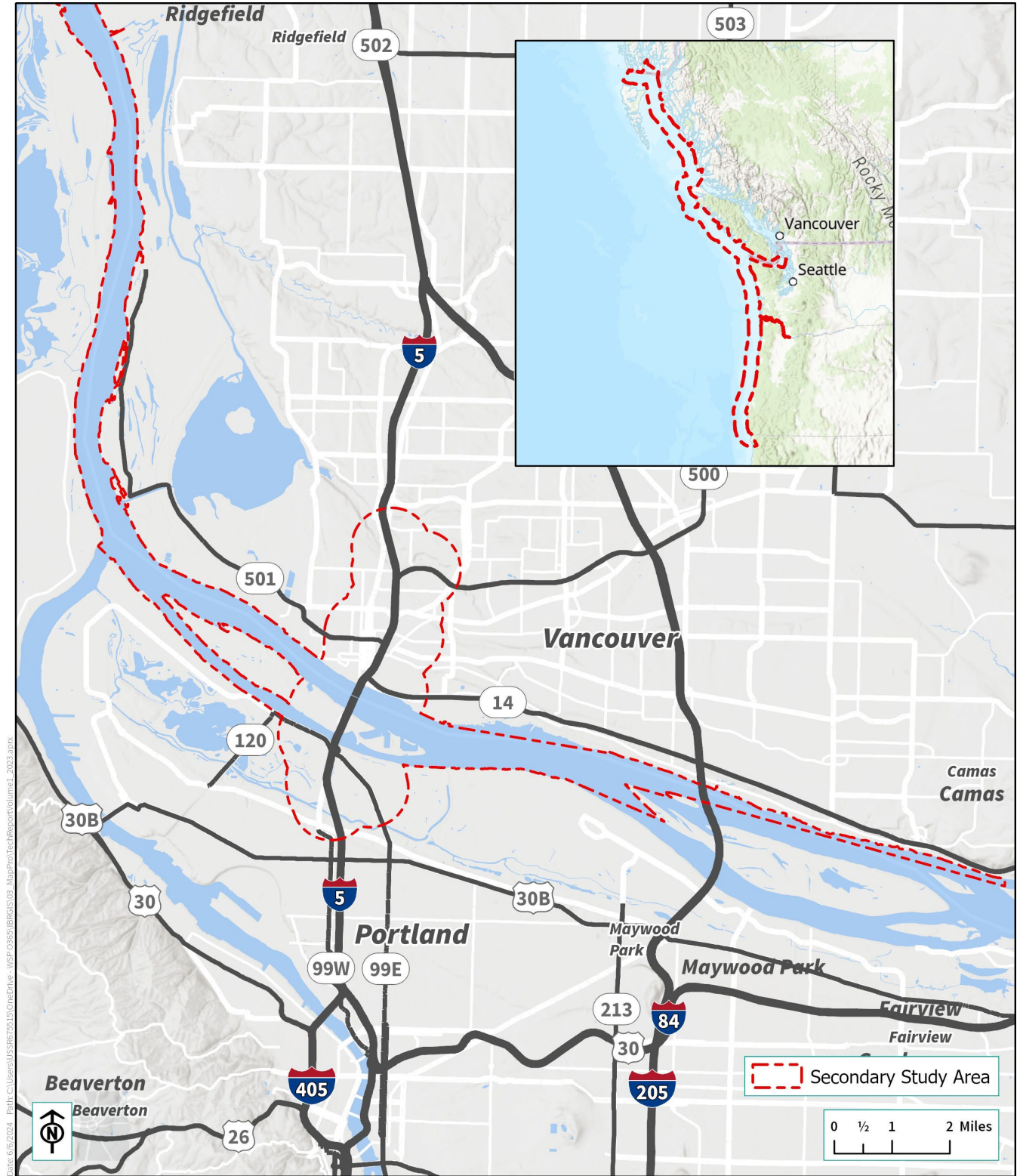


Figure 3.16-2. Ecosystems Secondary Study Area



Columbia River and North Portland Harbor

The ecosystems primary and secondary study areas are located within the lower Columbia River subbasin. The Columbia River and its tributaries form the dominant aquatic system in the Pacific Northwest. The 1,214-mile-long Columbia River drains 259,000 square miles of the northwestern U.S. and southern British Columbia, Canada, into the Pacific Ocean. There are more than 250 reservoirs and around 150 hydroelectric projects in the Columbia River Basin, including 18 mainstem dams on the Columbia and its main tributary, the Snake River. Saltwater intrusion from the Pacific Ocean extends approximately 23 miles upstream from the Columbia River mouth at Astoria. Coastal tides influence the flow rate and river level up to Bonneville Dam at river mile 146.1.

Within the ecosystems primary study area, the Columbia River is a highly managed waterbody whose flow is influenced primarily by upstream dams and also by Pacific Ocean tides. North Portland Harbor is a large side channel of the Columbia River located along the southern banks of Hayden Island. Developed uses of the river include commercial transport, power generation, irrigation, and recreation. The State of Washington, City of Vancouver, City of Portland, and Metro have designated the Columbia River and its shoreline as environmental zones subject to regulation.

Hydroelectric dams upstream impound water, raising the river's temperature and making fish passage more difficult by creating bottlenecks where predators have easy access to migrating salmon. Within the ecosystems primary study area in Oregon, the Columbia River/North Portland Harbor waters are 303(d)-listed for toxic chemicals such as polycyclic aromatic hydrocarbons (PAHs); polychlorinated biphenyl (PCBs), dichlorodiphenyltrichloroethane (DDT) metabolites (DDE 4,4') and arsenic (DEQ 2020). Within the ecosystems primary study area in Washington, the Columbia River is on the 303(d) list for temperature and PCBs (Ecology 2021). Within the ecosystems primary study area, water depths in the Columbia River range between approximately 0 and 50 feet, with an average depth of approximately 27 feet. The Columbia River federally authorized navigation channel is dredged to an average depth of about 43 feet. Water depths in North Portland Harbor range between 0 and 20 feet, with an average water depth of approximately 14 feet.

Shallow-water habitat is present in the ecosystems primary study area on both the Oregon and Washington sides of the river. It is influenced by flow and sediment input from tributaries and the mainstem river that eventually settles to form shoals and shallow flats. Juvenile salmonids in particular use this shallow-water habitat extensively for migrating, feeding, and holding. In general, rearing and outmigrating juveniles use shallow-water habitats more extensively, whereas adult fish rely on deeper-water habitats. The Columbia River also provides habitat for many non-anadromous native fish species, marine mammals, and benthic organisms, as well as substantial populations of non-native invasive species.

Burnt Bridge Creek

Burnt Bridge Creek flows through the city of Vancouver and is a direct tributary to Vancouver Lake, which drains into the lower Columbia River via Lake River. The creek drains one of the most heavily urbanized subbasins within Clark County and is 303(d)-listed within the ecosystems primary and secondary study areas for failing to meet water quality standards for temperatures, dissolved oxygen, fecal coliform bacteria, and pH (Ecology 2021). Physical habitat has been significantly modified throughout Burnt Bridge Creek, and habitat function has been diminished from historical conditions. The creek's upper reaches were historically a series of associated wetlands and marshes that have been filled, ditched, and drained. In addition, most of the tributary streams have been channelized or routed underground. However, the watershed has undergone significant restoration work in recent years to reconstruct side-channel wetland and floodplain areas and improve habitat. The creek provides suitable habitat for several salmonid species, as well as native resident fish species.

Fairview Creek

Fairview Creek is an urban creek that flows from spring-fed wetlands on the northeast side of Grant Butte in Gresham, Oregon, to Fairview Lake, a tributary to the eastern portion of the Columbia Slough. It passes close to the southeast corner of the Ruby Junction Light-Rail Operations and Maintenance Facility (OMF) (Figure 3.16-1). The creek has been physically changed by the construction of dikes and levees, channelization, and historical gravel mining activity. These activities have altered the creek's hydrology, increased sedimentation, and reduced water quality. The waterway is 303(d)-listed for failing to meet water quality standards for biocriteria. In recent decades, some restoration of stream and riparian habitat has occurred through land acquisitions, conservation easements, riparian planting projects, and installation of large woody debris and boulders.

Anadromous salmonids are not currently present in Fairview Creek because there is an impassable barrier between the lower and middle sections of the Columbia Slough, approximately 10 miles downstream of Fairview Creek. In addition, high temperatures and other conditions within the creek limit habitat suitability for anadromous salmonids, although the creek likely provides suitable habitat for resident native and introduced fish.

Pacific Coastal Waters

The ecosystems secondary study area includes marine waters off the Pacific coast where salmonid species from the Columbia River are available as prey for Southern Resident killer whales (SRKW), also known as orcas. This area encompasses the whale's entire coastal range from the mouth of the Columbia River and its plume, south as far as central California, and north as far as southeast Alaska. Effects on salmon and steelhead within the ecosystems primary study area could in turn affect the SRKW prey base that occurs within these waters in the ecosystems secondary study area. The diet of the SRKW is composed almost entirely of salmon, with adult male orcas needing approximately 325 pounds of salmon to meet their daily prey energy requirements. Although their diet tends to vary slightly throughout the year, including smaller amounts of salmon species such as coho, chum, and steelhead, about 80% of their total diet comes from Chinook salmon (SROTF 2018; Hanson et al. 2021).

The abundance of salmon has declined significantly since the late 1800s and early 1900s due to the compounded effects of harvest, habitat modifications, water-quality and water-quantity impacts, predation, and impacts to their own prey base (SROTF 2018). The Southern Resident Orca Task Force has identified impacts to prey availability—specifically, the availability of Chinook salmon—as a key threat to the recovery of the SRKW.

Aquatic Species of Interest

Approximately 20 aquatic SOI may be found within the ecosystems primary and secondary study areas. The term “species of interest” is not a specific regulatory category; it refers to native species identified as locally important due to their regulatory status, rarity, and/or special habitat considerations and coordinated with tribes and local, state, and federal agencies. This includes species listed under the federal Endangered Species Act (ESA), as well as other state and local designations. Table 3.16-1 presents a list of aquatic SOI that may occur within the ecosystems primary and/or secondary study areas.

Table 3.16-1. Aquatic Species of Interest Potentially Occurring within the Ecosystems Primary and/or Secondary Study Area

Species Type	Species Common Name	Species Scientific Name	ESU or DPS ^a	Federal ESA Status ^b	State Status (OR) ^c	State Status (WA) ^d	Other Special Regulatory Status ^e
Fish	Chinook salmon	<i>Oncorhynchus tshawytscha</i>	Lower Columbia River (LCR) ESU	LT; Critical Habitat	SC	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Middle Columbia River ESU	Not Listed	S	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Upper Willamette River (UWR) ESU	LT; Critical Habitat	SC	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Upper Columbia River (UCR) Spring-Run ESU	LE; Critical Habitat	SC	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Snake River Spring/ Summer-Run ESU	LT; Critical Habitat	LT	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Snake River Fall-Run ESU	LT; Critical Habitat	LT	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Chum salmon	<i>Oncorhynchus keta</i>	Columbia River ESU	LT; Critical Habitat	S
Coho salmon	<i>Oncorhynchus kisutch</i>	LCR ESU	LT; Critical Habitat	E	Not listed; PHS	EFH; SGCN-OR; SGCN-WA	
Sockeye salmon	<i>Oncorhynchus nerka</i>	Snake River ESU	LE; Critical Habitat	Not listed	Not listed; PHS	EFH	
Steelhead	<i>Oncorhynchus mykiss</i>	LCR DPS	LT; Critical Habitat	S	C; PHS	EFH; SGCN-OR; SGCN-WA	

Interstate Bridge Replacement Program

Species Type	Species Common Name	Species Scientific Name	ESU or DPS ^a	Federal ESA Status ^b	State Status (OR) ^c	State Status (WA) ^d	Other Special Regulatory Status ^e
Fish			Southwest Washington DPS	Not listed	S	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			UWR DPS	LT; Critical Habitat	S	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Middle Columbia River DPS	LT; Critical Habitat	S	C; PHS	EFH; SGCN-OR; SGCN-WA
			UCR DPS	LT; Critical Habitat	S	C; PHS	EFH; SGCN-OR; SGCN-WA
			Snake River Basin DPS	LT; Critical Habitat	S	C; PHS	EFH; SGCN-OR; SGCN-WA
	Cutthroat trout	<i>Oncorhynchus clarkii clarkii</i>	Southwestern Washington/ Columbia River Coastal DPS	Not listed	S	Not listed; PHS	SOC (USFWS-WA) SGCN-OR; SGCN-WA
	Bull trout	<i>Salvelinus confluentus</i>	Columbia River DPS	LT; Critical Habitat	SC	C; PHS	SGCN-OR; SGCN-WA
	Pacific eulachon	<i>Thaleichthys pacificus</i>	Southern DPS	LT; Critical Habitat	Not listed	Not listed; PHS	SGCN-OR; SGCN-WA
	North American green sturgeon	<i>Acipenser medirostris</i>	Southern DPS	LT; Critical Habitat	SC	Not listed; PHS	SGCN-OR; SGCN-WA
	White sturgeon	<i>Acipenser transmontanus</i>	N/A	Not listed	S	Not listed; PHS	SGCN-OR; SGCN-WA
	Pacific lamprey	<i>Entosphenus tridentata</i>	N/A	Not listed	S	Not listed; PHS	SOC (USFWS-WA); SOC (USFWS-OR); SGCN-OR; SGCN-WA
	River lamprey	<i>Lampetra ayresi</i>	N/A	Not listed	Not listed	C; PHS	SGCN-WA

Species Type	Species Common Name	Species Scientific Name	ESU or DPS ^a	Federal ESA Status ^b	State Status (OR) ^c	State Status (WA) ^d	Other Special Regulatory Status ^e
	Leopard dace	<i>Rhinichthys falcatus</i>	N/A	Not listed	Not listed	C; PHS	SGCN-WA
Marine Mammals	Killer whale	<i>Orcinus orca</i>	Southern Resident DPS	LE; Critical Habitat	Not listed	LE; PHS	MMPA; SGCN-OR; SGCN-WA
	Steller sea lion	<i>Eumetopias jubatus</i>	Eastern DPS	Not listed	Not listed	Not listed; PHS	MMPA; SGCN-OR
	California sea lion	<i>Zalophus californianus</i>	N/A	Not listed	Not listed	Not listed; PHS	MMPA
	Harbor seal	<i>Phoca vitulina</i>	N/A	Not listed	Not listed	Not listed; PHS	MMPA; SGCN-OR
Invertebrates	Western ridged mussel	<i>Gonidea angulata</i>	N/A	Under review	Not listed	Not listed	SGCN-OR; SGCN-WA
	California floater	<i>Anodonta californiensis</i>	N/A	Not listed	Not listed	C; PHS	SGCN-OR; SGCN-WA
	Sunflower sea star	<i>Pycnopodia helianthoides</i>	N/A	PT	Not listed	Not listed	Not listed

- a DPS = distinct population segment; ESU = evolutionarily significant unit; N/A = not applicable
- b ESA = Endangered Species Act; Federal status: LT = Listed Threatened; LE = Listed Endangered; PT = Proposed Threatened; Not listed = No status designated; Critical Habitat = designated critical habitat (NOAA Fisheries n.d.; USFWS 2021a).
- c Oregon State status: LT = Listed Threatened; S=Sensitive; SC = Sensitive Critical; Not listed = No status designated (OCS 2016; ODFW 2021a; 2021b).
- d Washington State status: C = Candidate; Not listed = No State Status; PHS = WDFW priority habitats and species (WDFW 2022, 2023).
- e Other Special Regulatory Status: EFH = Essential Fish Habitat designated; SOC=Federal Species of Concern; MMPA = Marine Mammal Protection Act; SGCN-OR = Species of Greatest Conservation Need in Oregon (OCS 2016); SGCN-WA = Species of Greatest Conservation Need in Washington (WDFW 2015)

Terrestrial Resources

This section describes “terrestrial resources” in the ecosystems primary and secondary study areas, which includes non-aquatic habitats and wildlife species that these habitats support, including birds, mammals, amphibians, reptiles, and insects.

Terrestrial Habitat

Terrestrial habitats within the ecosystems primary and secondary study areas are generally small and fragmented and have been modified from their historical conditions. Nevertheless, these areas provide habitat for various native mammals, birds, amphibians, and reptiles.

Table 3.16-2 lists approximate acreages of terrestrial habitat types within the ecosystems primary and secondary study areas. Figure 3.16-3 shows the approximate extent and location of these habitat types. The predominant habitat type is the “Urban and Mixed Environs” classification, interspersed with small, isolated patches of wetland or forest habitats. The most intact terrestrial habitat areas adjoin the Vanport Wetlands in

the south and the Burnt Bridge Creek Greenway in the north. The Ruby Junction Light-Rail OMF is not shown on Figure 3.16-3 because the area is entirely developed and classified as “Urban and Mixed Environs.”

Table 3.16-2. Acres of Terrestrial Habitat Classification within the Ecosystems Primary and Secondary Study Areas

Habitat Classification	Ecosystems Primary Study Area (acres)	Ecosystems Secondary Study Area (acres)	Total Area (acres)
Urban and Mixed Environs	396	4,518	4,914
Agriculture, Pasture, and Mixed Environs	0.3	141	141
Westside Riparian – Wetlands	17	608	625
Herbaceous Wetlands	0.3	74	74
Westside Lowlands Conifer – Hardwood Forest	1.3	122	123
Westside Oak and Dry Douglas Fir Forest and Woodlands	<0.1	53	53
Total	415	5,516	5,930

Urban and Mixed Environs

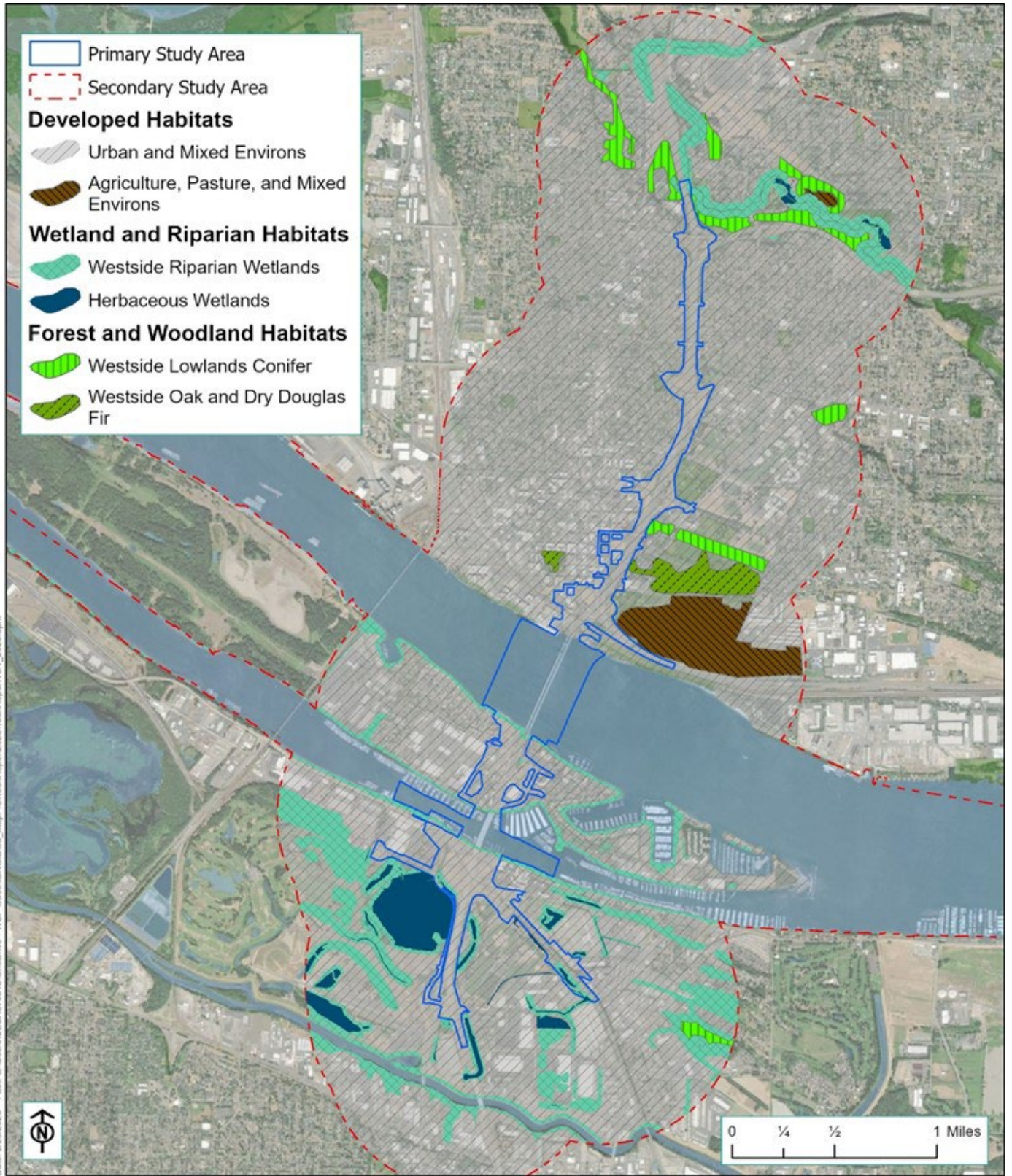
Although urban environments are usually considered to provide relatively low-quality habitat, some terrestrial wildlife species have adapted to these conditions. For example, bridges and other structures can provide nesting and perching habitat for certain migratory bird species. Examples of SOI associated with this habitat type include bald eagle, peregrine falcon, other migratory bird species, *Myotis* bats, Townsend’s big-eared bat, and monarch butterfly. Because the ecosystems primary and secondary study areas are highly urbanized, suitable habitat for wildlife is fragmented, and passage is restricted. I-5 and other roads serve as barriers to passage and are unsuitable and dangerous corridors for most terrestrial wildlife.

Agriculture, Pasture, and Mixed Environs

The south end of the Fort Vancouver National Historic Site and the west end of the Pearson Field is a mowed/maintained pasture that falls more closely within the “Agriculture, Pasture, and Mixed Environs” habitat type. This habitat type includes unimproved pastures, predominantly grassland sites and often abandoned fields that have little or no active management such as irrigation, fertilization, or herbicide applications (Johnson and O’Neil 2001). The “Agriculture, Pasture, and Mixed Environs” habitat type is used by a wide diversity of native species, particularly birds and small mammals. These areas also provide excellent foraging opportunities for raptors and other birds of prey. They are also prone to invasion by exotic species, due to their relatively high level of disturbance.

Examples of SOI associated with this habitat type include streaked horned lark, bald eagle, peregrine falcon, other migratory birds, *Myotis* bats, and Townsend’s big-eared bat (Johnson and O’Neil 2001).

Figure 3.16-3. Habitat Classifications within the Ecosystems Primary and Secondary Study Areas



Wetland and Riparian Habitat

Wetland and riparian habitats within the ecosystems primary and secondary study areas are fragmented and disturbed from their natural condition, though they continue to provide habitat functions. There are narrow bands of riparian habitat adjacent to surface waters, including the Columbia River, North Portland Harbor, Columbia Slough, Burnt Bridge Creek, and Fairview Creek.

Herbaceous wetlands are present in the Vanport wetland system south of the Expo Center, immediately surrounding the open water pond/wetland system east of I-5 near Delta Park and east of I-5 along Whitaker Road. Herbaceous wetlands provide many habitat functions that are similar to forested and shrub-dominated wetlands. In general, they provide habitat for a variety of wildlife adapted to wetlands and riparian areas within an urban environment, including a variety of small mammals, amphibians, reptiles, migratory birds, waterfowl, and raptors. Examples of SOI associated with this habitat type include bald eagle, peregrine falcon, purple martin, other migratory birds, *Myotis* bats, Townsend’s big-eared bat, pond turtles, painted turtles, and northern red-legged frog.

Forest and Woodland Habitat

Within the ecosystems primary and secondary study areas, the “Westside Lowlands Conifer – Hardwood Forest” habitat type is limited to small, isolated patches associated with Burnt Bridge Creek. These areas provide limited habitat function due to their isolated and fragmented nature. However, the habitat may provide for migratory birds’ nests, and raptors may perch and use these areas for foraging in adjacent habitats. Examples of SOI associated with this habitat type include the bald eagle, peregrine falcon, other migratory birds, *Myotis* bats, and Townsend’s big-eared bat.

The “Westside Oak and Dry Douglas Fir Forest and Woodlands” habitat type occurs in two small patches within the ecosystems primary and secondary study areas, one in the northern portion of Esther Short Park and one at the Fort Vancouver National Historic Site. These areas generally provide a similar suite of habitat functions as “Westside Lowlands Conifer – Hardwood Forest” habitats. However, oak woodlands can provide some unique functions due to their relative rarity in the landscape and their different structural composition.

Terrestrial Species of Interest

Table 3.16-3 presents a list of terrestrial SOI, including birds, mammals, amphibians/reptiles, and insects, that may occur within the ecosystems primary and secondary study areas, along with their regulatory status.

Table 3.16-3. Terrestrial Species of Interest Potentially Occurring within the Ecosystems Primary and Secondary Study Area

	Species Common Name	Species Scientific Name	Federal Status ^a	State Status (OR) ^b	State Status (WA) ^c	Other Special Regulatory Status ^d
Birds	Streaked horned lark	<i>Eremophila alpestris strigata</i>	LT; Critical Habitat	SC	LE; PHS	MBTA; SGCN-OR; SGCN-WA
	Bald eagle	<i>Haliaeetus leucocephalus</i>	Not listed	Not listed	Not listed	BGEPA; MBTA; SGCN-WA
	Peregrine falcon	<i>Falco peregrinus anatum</i>	Not listed	S	Not listed	MBTA; SGCN-OR; SGCN-WA

	Species Common Name	Species Scientific Name	Federal Status ^a	State Status (OR) ^b	State Status (WA) ^c	Other Special Regulatory Status ^d
	Purple martin	<i>Progne subis</i>	Not listed	SC	Not listed	MBTA; SGCN-OR; SGCN-WA
	Willow flycatcher	<i>Empidonax traillii</i>	Not listed	SC	Not listed	MBTA; SGCN-OR
	Common loon	<i>Gavia immer</i>	Not listed	Not listed	S; PHS	MBTA; SGCN-WA
	Great blue heron	<i>Ardea Herodias</i>	Not listed	Not listed	PHS	MBTA
	Other migratory birds	Multiple Species	N/A	N/A	N/A	MBTA
Mammals	Columbian white-tailed deer	<i>Odocoileus virginianus ssp. Leucurus</i>	LT	S	LT; PHS	SGCN-OR; SGCN-WA
	Long-legged myotis	<i>Myotis volans</i>	Not listed	S	Not listed; PHS ^e	SGCN-OR
	Fringed myotis	<i>Myotis thysanodes</i>	Not listed	S	Not listed; PHS ^e	SGCN-OR
	Long-eared myotis	<i>Myotis evotis</i>	Not listed	Not listed	Not listed; PHS ^e	SGCN-OR
	Townsend’s big-eared bat	<i>Corynorhinus townsendii</i>	Not listed	SC	C; PHS	SGCN-OR; SGCN-WA
	Silver-haired bat	<i>Lasionycteris noctivagans</i>	Not listed	S	Not listed; Candidate	SGCN-OR; SGCN-WA
Reptiles and Amphibians	Western pond turtle	<i>Actinemys marmorata</i>	Not listed	S	LE; PHS	SGCN-OR; SGCN-WA
	Painted turtle	<i>Chrysemys picta</i>	Not listed	SC	Not listed	SGCN-OR; SGCN-WA
	Northern red-legged frog	<i>Rana aurora</i>	Not listed	S	Not listed	SGCN-OR; SGCN-WA
Insects	Monarch butterfly	<i>Danaus plexippus</i>	C	Not listed	Not listed	N/A

- a Federal ESA status: LT = Listed Threatened, LE = Listed Endangered, C = Candidate, Not listed = No status designated; Critical Habitat = designated critical habitat (NOAA Fisheries 2021; USFWS 2021a).
- b Oregon State status: LT = Listed Threatened, LE = Listed Endangered, S=Sensitive, SC = Sensitive Critical, Not listed = No status designated (ODFW 2021a, 2021b).
- c Washington State status: LT = Listed Threatened, LE = Listed Endangered, S=Sensitive, C=Candidate, PHS = WDFW priority habitat species; (WDFW 2022, 2023).
- d Other Special Regulatory Status: SOC=Federal Species of Concern; PHS = Priority Habitats and Species; BGEPA = Bald and Golden Eagle Protection Act; MBTA = Migratory Bird Treaty Act; SGCN-OR = Species of Greatest Conservation Need in Oregon (OCS 2016); SGCN-WA = Species of Greatest Conservation Need in Washington (WDFW 2015); N/A = Not Applicable
- e Roosting concentrations of *Myotis* bats are considered Priority Species by WDFW, where they occur.

Botanical Resources

Botanical Species of Interest

Table 3.16-4 lists the botanical SOI, their protection status, and suitable habitat that may occur in the ecosystems primary study area. Most habitats within the ecosystems primary study area have low suitability for these species, and they have not been documented in the ecosystems primary study area.

For purposes of this assessment, the species identified as botanical SOI are primarily rare, sensitive, or threatened species that have the potential to occur within the ecosystems primary study area or within the vicinity. The list of botanical SOI does not represent a comprehensive list of all species that reside in the ecosystems primary study area, are of cultural importance to tribes, or provide important ecological function.

Table 3.16-4. Botanical Species of Interest Potentially Occurring within the Ecosystems Primary Study Area

Species Common Name	Species Scientific Name	Federal Status ^a	State Status (OR) ^b	State Status (WA) ^c	Habitat Suitability in Ecosystems Primary Study Area	Typical Flowering Window
Golden paintbrush	<i>Castilleja levisecta</i>	Not listed	E	T	Low – Agriculture, Pasture and Mixed Environs	April–June
Kincaid’s lupine	<i>Lupinus oregonus</i>	T	T	T	Low – Agriculture, Pasture and Mixed Environs	April–June
Nelson’s checkermallow	<i>Sidalcea nelsoniana</i>	Not listed	T	E	Low – Agriculture, Pasture and Mixed Environs	Late May–July
Willamette Daisy	<i>Erigeron decumbens</i>	E	E	Not listed	Low – Agriculture, Pasture and Mixed Environs	June–July
Tall bugbane	<i>Actaea elata var. elata</i>	Not listed	Not listed	S	Low – Westside Riparian – Wetlands and Westside Lowlands Conifer – Hardwood Forest	May–August
Small-flowered trillium	<i>Trillium albidum ssp. Parviflorum</i>	Not listed	Not listed	S	Low – Westside Riparian – Wetlands and Westside Lowlands Conifer – Hardwood Forest	March–May
Western ladies-tresses	<i>Spiranthes porrifolia</i>	Not listed	Not listed	S	Low – Herbaceous Wetlands and Westside Riparian – Wetlands	May–August

Species Common Name	Species Scientific Name	Federal Status ^a	State Status (OR) ^b	State Status (WA) ^c	Habitat Suitability in Ecosystems Primary Study Area	Typical Flowering Window
Columbia cress	<i>Rorippa columbiae</i>	Not Listed	C	T	Low – Herbaceous Wetlands and Westside Riparian – Wetlands	April–October

a Federal Endangered Species Act status: C = Candidate; E = Endangered; Not listed = No status designated; P = Proposed; SOC = Species of Concern; T = Threatened (USFWS 2021b).

b Oregon State status: E = Endangered; Not listed = No status designated; T = Threatened, S=Sensitive; SC = Sensitive Critical (ORBIC 2021).

c Washington State status: C=Candidate; E = Endangered; PHS = Washington State priority species; S=Sensitive; T = Threatened, (WNHP 2021)

Noxious Weeds

Table 3.16-5 identifies 14 species of noxious weeds known or expected to occur within the ecosystems primary study area. Noxious weeds are defined at the state level by the Oregon State Weed Board and the Washington State Noxious Weed Control Board. No noxious weeds designated under state law as requiring eradication are known or expected to occur within the ecosystems primary study area.

Table 3.16-5. Noxious Weed Species Occurring within the Ecosystems Primary Study Area

Botanical Name	Common Name
<i>Centaurea × gerstlaueri</i> (<i>Centaurea pratensis</i>)	Meadow knapweed
<i>Cirsium arvense</i>	Canada thistle
<i>Cirsium vulgare</i>	Bull thistle
<i>Clematis vitalba</i>	Old man's beard
<i>Conium maculatum</i>	Poison hemlock
<i>Convolvulus arvensis</i>	Field bindweed
<i>Cytisus scoparius</i>	Scotch broom
<i>Daucus carota</i>	Wild carrot
<i>Geranium robertianum</i>	Herb-Robert's
<i>Hedera helix</i>	English ivy
<i>Hypericum perforatum</i>	St. John's wort
<i>Phalaris arundinacea</i>	Reed canarygrass or Ribbongrass
<i>Fallopia japonica</i>	Japanese knotweed
<i>Rubus armeniacus</i>	Himalayan blackberry

Federal, State, and Local Habitat Designations

Federal, state, and local regulatory frameworks designate important and/or protected habitat for ecosystem resources within the ecosystems primary and secondary study areas. Table 3.16-6 summarizes these designations. Note that many of these designated areas overlap. For example, the open water habitat within the Columbia River is designated critical habitat for several species of ESA-listed fish, essential fish habitat for Pacific salmon, a Washington Department of Fish and Wildlife (WDFW) priority habitat, a designated Critical Area in the city of Vancouver, and a Portland environmental overlay zone (ezone).

Table 3.16-6. Federal, State, and Local Habitat Designations within the Ecosystems Primary and Secondary Study Areas

	Agency	Limits of Jurisdiction	Resource Designation	Description
Federal	NOAA Fisheries and USFWS	U.S.	Critical Habitat for ESA-listed species	Specific geographic areas contain features essential to the conservation of an endangered or threatened species and may require special management and protection.
	NOAA Fisheries	U.S.	Essential Fish Habitat	Waters and substrate that are necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH has been designated for three categories of fish: Pacific salmon, groundfish, and coastal pelagic species.
Oregon	Oregon DSL and ODFW	Oregon – Statewide	Habitats of Conservation Concern	Habitats of conservation concern within Oregon that provide important benefits to OCS Strategy Species. Eleven Strategy Habitats have been designated.
	City of Portland	City of Portland	Environmental Overlay Zones	Establishes Environmental Protection zones and Environmental Conservation zones in Portland to protect important natural resource areas.
	Metro	Multnomah, Clackamas, and Washington Counties	Habitat Conservation Areas	Classifies regionally significant fish and wildlife habitat as Habitat Conservation Areas. Separate categories exist for Riparian and Upland Wildlife habitats.
Washington	WDFW	Washington – Statewide	Priority Habitats	Specifically designated habitat types that have been determined to have unique or significant value. WDFW has designated 20 priority habitats within the state.
	Ecology	Washington - Statewide	Shoreline Management Areas	The Shoreline Management Act defines certain waterbodies as “Shorelines of the State,” and local jurisdictions establish shoreline management areas in which development activities are regulated.

	Agency	Limits of Jurisdiction	Resource Designation	Description
	City of Vancouver	City of Vancouver	Critical Areas Ordinance	The Growth Management Act requires all cities and counties in Washington to adopt regulations protecting “critical areas” to preserve the natural environment, wildlife habitat, and sources of fresh drinking water. Five categories are defined, including FHWCA. The City of Vancouver has a CAO that defines and regulates development activities within FHWCA.

CAO = Critical Areas Ordinance; DSL = Department of State Lands; Ecology = Washington Department of Ecology; EFH = essential fish habitat; ESA = Endangered Species Act; Metro = Oregon Metro; NOAA Fisheries = North American Oceanic and Atmospheric Administration Fisheries Service; ODFW = Oregon Department of Fish and Wildlife; USFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife

3.16.3 Long-Term Benefits and Reasonably Foreseeable Effects

Long-term benefits and reasonably foreseeable effects on ecosystems is were assessed for the ecosystems primary and secondary study areas described in Section 3.16.2, and the temporal scope described in the Chapter 3 introduction.

Table 3.16-7 summarizes the ecosystem effects of the Modified LPA, including design options, and the No-Build Alternative, followed by a discussion of the effects.

Table 3.16-7. Long-term Ecosystems Benefits and Effects

0	1	2: IBR Program Recommended Design Options	3	4	5
Effect	No-Build Alternative	Modified LPA with Single-Level Fixed-Span Bridge Configuration, ^a One Auxiliary Lane, with C Street Ramps, Centered I-5, and All Five Park and Rides	Modified LPA with Single-Level Fixed-Span Bridge Configuration, ^a Two Auxiliary Lanes, with C Street Ramps, Centered I-5, and All Five Park and Rides	Modified LPA with Double-Deck Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramps, Centered I-5, and All Five Park and Rides	Modified LPA with Single-Level Movable-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramps, Centered I-5, and All Five Park and Rides
Aquatic resources (total net change compared to the existing condition)	<ul style="list-style-type: none"> Continued benthic habitat impacts from existing bridges: 1.04 acres Continued benthic habitat impacts of overwater shading (Elevated Deck) from existing bridges: 11.65 acres Continued impacts from untreated stormwater from approximately 156.4 acres of existing CIA Potential for habitat impacts due to maintenance and operation 	<ul style="list-style-type: none"> Benthic habitat effect: -0.16 acres (net restoration) Overwater Shading (Water Surface): +1.24 acres Overwater Shading (Elevated Deck): +9.09 acres Beneficial effect of stormwater treatment for all post-project CIA, including approximately 156.4 acres of existing impervious area that is currently untreated 	<ul style="list-style-type: none"> Benthic habitat effect: -0.22 acres (net restoration) Overwater Shading (Water Surface): +3.9 acres (+12.99 acres compared to the existing condition) Beneficial effect of stormwater treatment for all post-project CIA, including approximately 156.4 acres of existing impervious area that is currently untreated 	<ul style="list-style-type: none"> Benthic habitat effect: -0.21 acres (net restoration) Overwater Shading (Water Surface): +1.05 acres Overwater Shading (Elevated Deck): +8.22 acres Beneficial effect of stormwater treatment for all post-project CIA, including approximately 156.4 acres of existing impervious area that is currently untreated 	<ul style="list-style-type: none"> Benthic habitat effect: +0.07 acres (net habitat loss) Overwater Shading (Water Surface): +1.58 acres Overwater Shading (Elevated Deck): +13.23 acres Beneficial effect of stormwater treatment for all post-project CIA, including approximately 156.4 acres of existing impervious area that is currently untreated
Permanent impacts to terrestrial resources in Oregon (acres)	<ul style="list-style-type: none"> Potential for water quality and vegetation impacts due to maintenance and operation 	<ul style="list-style-type: none"> “High” wildlife/riparian value habitats: 3.25 acres “Medium” wildlife/riparian value habitats: 7.67 acres Wetlands: 0.25 acres Wetland Buffers: 5.69 acres 	<ul style="list-style-type: none"> “High” wildlife/riparian value habitats: 3.25 acres “Medium” wildlife/riparian value habitats: 7.67 acres Wetlands: 0.25 acres Wetland Buffers: 5.69 acres 	<ul style="list-style-type: none"> “High” wildlife/riparian value habitats: 3.25 acres “Medium” wildlife/riparian value habitats: 7.67 acres Wetlands: 0.25 acres Wetland Buffers: 5.69 acres 	<ul style="list-style-type: none"> “High” wildlife/riparian value habitats: 3.25 acres “Medium” wildlife/riparian value habitats: 7.67 acres Wetlands: 0.25 acres Wetland Buffers: 5.69 acres

0 Effect	1 No-Build Alternative	2: IBR Program Recommended Design Options Modified LPA with Single-Level Fixed-Span Bridge Configuration, ^a One Auxiliary Lane, with C Street Ramps, Centered I-5, and All Five Park and Rides	3 Modified LPA with Single-Level Fixed-Span Bridge Configuration, ^a <u>Two Auxiliary Lanes</u> , with C Street Ramps, Centered I-5, and All Five Park and Rides	4 Modified LPA with <u>Double-Deck Fixed-Span Bridge Configuration</u> , One Auxiliary Lane, with C Street Ramps, Centered I-5, and All Five Park and Rides	5 Modified LPA with <u>Single-Level Movable-Span Bridge Configuration</u> , One Auxiliary Lane, with C Street Ramps, Centered I-5, and All Five Park and Rides
Permanent impacts to terrestrial resources in Washington (acres)	<ul style="list-style-type: none"> Potential for water quality and vegetation impacts due to maintenance and operation 	<ul style="list-style-type: none"> Riparian buffers: 0.28 acres Biodiversity Areas: 0.06 acres Oak Woodlands: <0.01 acres Wetlands: 0 Wetland Buffers: 0 	<ul style="list-style-type: none"> Riparian buffers: 0.28 acres Biodiversity Areas: 0.06 acres Oak Woodlands: <0.01 acres Wetlands: 0 Wetland Buffers: 0 	<ul style="list-style-type: none"> Riparian buffers: 0.28 acres Biodiversity Areas: 0.06 acres Oak Woodlands: <0.01 acres Wetlands: 0 Wetland Buffers: 0 	<ul style="list-style-type: none"> Riparian buffers: 0.28 acres Biodiversity Areas: 0.06 acres Oak Woodlands: <0.01 acres Wetlands: 0 Wetland Buffers: 0

Note: The underlined design options shown in columns 3 through 5 identify the specific effects on ecosystems for that particular design option compared to the Modified LPA with Recommended Design Options (column 2). For example, the effects of two auxiliary lanes (column 3) would occur with any other combination of the C Street ramps, I-5 alignment, bridge configuration, and park and ride design options.

^a The long-term effects associated with the single-level fixed-span bridge configuration design option would be the same for all bridge types, unless otherwise specified.

CIA = contributing impervious area; I-5 = Interstate 5; IBR = Interstate Bridge Replacement; LPA = Locally Preferred Alternative

No-Build Alternative

Under the No-Build Alternative, the existing Interstate Bridge, North Portland Harbor bridge, and I-5 interchanges would remain. Regular and intermittent maintenance activities would continue to be required, which have the potential to result in long-term impacts to aquatic and terrestrial species and habitats, including potential impacts to birds nesting on the existing Interstate Bridge. Stormwater from impervious surfaces within the ecosystems primary study area would continue to enter aquatic habitat surface waters largely untreated.

Modified LPA

The subsections below describe the reasonably foreseeable long-term effects that would occur of with the Modified LPA with the single-level fixed-span bridge configuration and one auxiliary lane design options. As described in Chapter 2, several design options are being evaluated as part of the proposed Modified LPA. Where impacts would differ associated with a design option, a comparison of the impacts associated with each design option is provided. The with or without C-Street ramp design option, I-5 westward shift or centered design option, and the park and rides evaluated as part of the Modified LPA would not result in different levels or types of reasonably foreseeable long-term effects to ecosystem resources and are, therefore, not specifically addressed further.

As described in Chapter 2, the construction activities associated with the Modified LPA would likely require both temporary and permanent modifications to portions of the Portland Metro Levee System, which is a system of federal flood control levees located along the south bank of the Columbia River within the ecosystems primary study area. Such modifications may include activities to restore temporarily disturbed portions of the levees, or permanent modifications where proposed infrastructure would intersect with the existing levees, or where access to the levees would change as a result of reconfiguration of the roadways. Modifications may include improvements to existing levee function if such improvements are requested or required. Modifications or improvements would be coordinated for consistency with the planned future condition of the levees under the Levee Ready Columbia project. The assessment of reasonably foreseeable long-term effects to ecosystem resources associated with the proposed Modified LPA presented below includes those associated with potential reconstruction of, or modifications to, the federal levee system.

Aquatic Resources

Under the Modified LPA, bridge removal and replacement would result in direct permanent impacts to sensitive aquatic habitats and riverbanks associated with the Columbia River and North Portland Harbor. These impacts would include physical alteration of benthic habitat and changes in overwater shading. The Modified LPA would not directly impact or displace aquatic habitat in Burnt Bridge Creek, the Columbia Slough, or Fairview Creek. Table 3.16-8 summarizes the reasonably foreseeable permanent aquatic habitat effects associated with the Modified LPA.

Table 3.16-8. Reasonably Foreseeable Permanent Benthic Habitat and Overwater Shading Aquatic Effects Summary

Impact Type to Columbia River and North Portland Harbor	IBR Program Recommended Design Option:			Restored Area from Removal of Existing Bridge (acres)	Total Net Change (acres)
	Single-Level Fixed-Span Bridge Configuration (acres)	Double-Deck Fixed-Span Bridge Configuration (acres)	Single-Level Movable-Span Bridge Configuration (acres)		
Benthic Habitat Loss	0.88	0.83	1.11	-1.04	<ul style="list-style-type: none"> • Double-deck fixed-span: -0.21 • Single-level fixed-span: -0.16 • Single-level movable-span: +0.07
Overwater Shading (Water Surface)	1.24	1.05	1.58	0.00	<ul style="list-style-type: none"> • Double-deck fixed-span: +1.05 • Single-level fixed-span: +1.24 • Single-level movable-span: +1.58 acres
Overwater Shading (Elevated Deck) ^a	20.74	19.87	20.74	-11.65	<ul style="list-style-type: none"> • Double-deck fixed-span: +8.22 • Single-level fixed-span: +9.09 • Single-level movable-span: +9.09

a The addition of a second auxiliary lane in each direction would increase the amount of elevated overwater shading by approximately 4.8 acres compared to one auxiliary lane.

IBR = Interstate Bridge Replacement Program

Benthic Habitat Impacts

For the Modified LPA with the single-level fixed-span bridge configuration with one auxiliary lane design options, in-water piers to support the new Columbia River and North Portland Harbor bridges would displace approximately 0.88 acres of benthic habitat. Removal of the existing Interstate Bridge, including their underwater support structures, would result in the restoration of approximately 1.04 acre of benthic habitat. Thus, the Modified LPA with the single-level fixed-span bridge configuration design option would result in a net restoration of approximately 0.16 acres of benthic habitat. Though the Modified LPA with the double-deck fixed-span bridge configuration design option would require the same number of drilled shafts as the single-level fixed-span bridge configuration design option, it would displace approximately 0.83 acres of benthic habitat (approximately 0.05 acres less than the single-level fixed span bridge configuration design option). This is because the cofferdam concrete seals required to construct the nearshore shaft caps for the single-level fixed span bridge configuration design option would be slightly larger. The Modified LPA with the single-level movable-span bridge configuration design option would require 36 more drilled shafts than the single-

level fixed-span bridge configuration design option, resulting in a total benthic impact of 1.11 acres and a 0.07-acre net reduction in benthic habitat. The existing Interstate Bridge would remain in place during construction of the new Columbia River bridges; once the new bridges have been constructed the existing Interstate Bridge would be demolished.

Changes to benthic habitats could affect a variety of aquatic species, including:

- Adult and juvenile salmon, steelhead, and bull trout
- Adult green sturgeon
- Adult and juvenile white sturgeon,
- Adult, juvenile, and larval Pacific eulachon, Pacific lamprey, and river lamprey
- Adult and juvenile native resident fish (e.g., sculpins, threespine sticklebacks, dace, and suckers)
- Freshwater invertebrates

However, the extent of the effect would be minor, given the relatively small area that would be affected and the net area that would be restored by the Modified LPA.

The addition of a second auxiliary lane in each direction would not change the amount of benthic habitat impact compared to the one auxiliary lane option.

Overwater Shading Impacts

In addition to the reasonably foreseeable effects to benthic habitat, the Modified LPA's new bridges would increase the area of shading over the Columbia River and North Portland Harbor. Shading from overwater structures can affect the growth of aquatic vegetation, reduce habitat suitability for salmon and other native fish, and create habitat for species that prey on juvenile salmonids. The amount and duration of the reasonably foreseeable effects can vary with the height of the overwater structures (increased structure height diminishes the intensity of shading by providing a greater distance for light to diffuse and refract around the bridges' decks); the orientation of the structure (a north-south-oriented structure creates a shadow that moves throughout the day); the density of piling or drilled shafts supporting the structure (an open structure supported by widely-spaced drilled shafts allows light to penetrate beneath the structure); and the material and reflectivity of the structure (concrete and steel are lighter and more reflective of ambient light than darker materials such as timber piles).

The structures with the greatest potential for overwater shading at the water's surface are the shaft caps for the new Columbia River bridges. The Modified LPA with the single-level fixed-span bridge configuration design option would result in a total of approximately 1.24 acres of shading at the Columbia River water surface. The Modified LPA with the single-level fixed-span bridge configuration design option would require larger drilled shaft caps and would result in an increase of approximately 0.19 acres more shading at the Columbia River water surface than the Modified LPA with the double-deck fixed bridge configuration design option. The Modified LPA with the single-level movable-span bridge configuration design option would also require larger drilled shaft caps and would result in increased shading at the Columbia River water surface. The shaft caps for the movable spans would result in an increase of approximately 1.58 acres of shading at the Columbia River water surface. For all bridge configuration design options, these shaded areas would be small relative to the amount of available habitat in the vicinity, and salmonids and other aquatic species would have access to suitable habitats outside the shaded areas. Therefore, the increased shading is not expected to have an appreciable effect on habitat function. The North Portland Harbor bridges would not have shaft caps at the water's surface and would therefore not result in overwater shading at the water's surface.

The replacement bridges would result in new elevated overwater shading from the bridges' decks and removal of elevated overwater shading from the existing bridge decks. However, with any of the bridge

configuration design options, the height of the bridges' decks would minimize the potential for elevated overwater shading to result in reduced habitat function. The new Columbia River and North Portland Harbor bridges with the Modified LPA with the single-level fixed-span bridge configuration and one auxiliary lane design options would create approximately 20.74 acres of new elevated overwater shading as a result of the proposed bridge decking, and the removal of the existing bridge would reduce elevated overwater coverage by approximately 11.65 acres, for a net increase of approximately 9.09 acres of elevated overwater coverage. The Modified LPA with the single-level movable-span bridge configuration design option would result in the same approximately 9.09 acre net increase in elevated overwater shading. The Modified LPA with the double-deck fixed-span bridge configuration design option would create approximately 20.74 acres of new elevated overwater shading, which upon removal of the existing bridge would result in a net increase of approximately 8.22 acres (approximately 0.89 acres less net increase than the single level design options).

The addition of a second auxiliary lane in each direction would not change the amount of surface-water shading but would increase the amount of elevated overwater shading by approximately 4.8 acres compared to the one auxiliary lane option.

Floodplain Fill

Removal or placement of material within a floodplain can affect aquatic habitat by affecting peak and base flow conditions. While the Modified LPA would require both removal and placement of material below the 100-year floodplain elevation, its location on the Columbia River, where flows are regulated in part by upstream dams, makes the potential for changes in flow less pronounced. While specific volumes have not yet been calculated, it is anticipated that the net change in fill within the regulatory floodplain would be relatively small due to local code requirements. In 2024, the City of Portland updated its building code and zoning code that apply to development within floodplains. The updates are intended in part to bring the City's code into compliance with the recommendations of the 2016 Federal Emergency Management Agency (FEMA) National Flood Insurance Program BO that was issued by NOAA Fisheries in 2016. The cities of Fairview and Vancouver also regulate cut and fill activities within the floodplain through their environmental approval process. Pursuant to Executive Order 11988, a Location Hydraulic Study would be conducted to evaluate potential impacts to the floodplain, and to document the impacts, mitigation measures, alternatives, and findings following the provisions of 23 CFR Part 650A.

The Modified LPA would also require both removal and placement of material within the functional floodplain, which is the portion of the regulatory floodplain that is below the ordinary high-water mark (OHWM). Specific quantities have only been estimated at this time and would depend substantially on final design and permitting details. It is estimated that the Modified LPA would install up to approximately 62,400 cubic yards of new material within the functional floodplain of the Columbia River and North Portland Harbor and would remove approximately 13,250 cubic yards of existing material from within the functional floodplain. It is estimated, therefore, that the Modified LPA would result in a net increase of up to approximately 55,000 cubic yards of material within the functional floodplain. Most of this volume would be associated with the pile shaft caps for the Columbia River bridges, which are approximately 20 feet thick, and most of which would be below the OHWM elevation. Despite this increase, the Modified LPA would fully comply with applicable requirements to maintain floodplain function as described above and would maintain floodplain function and hydrologic processes at the site.

Given the limited extent of functioning floodplain within the footprint of the proposed Modified LPA, and the regulatory requirements to balance cut and fill within the floodplain and to maintain or improve floodplain function, the effects on floodplain function from construction of the Modified LPA are expected to be minimal.

Hydraulic Shadowing

Piers and other structures in the water can create areas of reduced water velocity immediately downstream of the structure. This phenomenon is referred to as a hydraulic shadow. Hydraulic shadowing may affect habitat suitability for native fish by creating low-velocity eddies that have the potential to increase exposure to predation, interfere with movement patterns, and alter sediment transport. Increased hydraulic shadowing may also benefit some fish by creating areas where they can rest during periods of high flow.

The Modified LPA, with any of the bridge configuration design options, would create a hydraulic shadow extending up to approximately 1,600 feet downstream of each pier, with velocities in the range of 0 to 3 feet per second. The hydraulic shadow of the North Portland Harbor bridges would extend up to approximately 400 feet downstream of each pier, with velocities ranging from 0 to 2 feet per second. Although the length of the hydraulic shadow would increase compared to the existing conditions, the change to aquatic habitat suitability for native fish would be minor. In both cases, the area that would be affected by the hydraulic shadow is a relatively small area and the range of water velocities found in the hydraulic shadow are within the range fish encounter in the natural environment.

Stormwater Effects

The Modified LPA would install new impervious surfaces and rebuild existing impervious surfaces, which could contribute pollutants to stormwater and affect water quality and water quantity in the Columbia River, North Portland Harbor, Columbia Slough, Fairview Creek, and Burnt Bridge Creek. Stormwater runoff from roads and highways contains pollutants that can be toxic to aquatic life, even at very low concentrations. Pollutants commonly occurring in stormwater runoff include suspended solids, nutrients, oil and grease, agricultural chemicals, dissolved metals, and other organic chemicals. There is emerging research related to 6PPD-quinone, a chemical in tires, which has been linked to mortality of coho salmon under certain conditions (Tian et al. 2021) and may also be negatively affecting other aquatic species including Chinook salmon and steelhead (Brinkmann et al. 2022; Lo et al. 2023). However, among the Pacific salmonid species, coho salmon are the most sensitive to 6PPD-quinone and the most exposed to pollutants in urban stormwater runoff, given their habitat preference for small, lowland streams (Ecology 2022).

Table 3.16-9 compares the increase in contributing impervious area (CIA), which could potentially increase the amount of pollutants entering stormwater, for each bridge configuration of the Modified LPA. The Modified LPA with the single-level fixed-span bridge configuration design option would add approximately 32.9 acres of CIA but would treat or infiltrate 207.2 acres of CIA. The Modified LPA with the single-level movable-span bridge configuration design option would also increase the CIA by 32.9 acres. The Modified LPA with the double-deck fixed span bridge configuration design option would add approximately 29.6 acres of CIA (a decrease of approximately 3.3 acres compared to the single-level bridge configuration design options). The addition of a second auxiliary lane in each direction would increase the amount of post-project CIA by approximately 3.9 acres under each bridge configuration design option compared to the one auxiliary lane option.

Water quality treatment would be provided for all post-project CIA, including approximately 156.4 acres of existing impervious area that is currently untreated. This would represent treatment of over six times the area of net new CIA associated with the Modified LPA. The net effect on water quality and aquatic habitat would be a substantial net improvement for all design options compared to the No-Build Alternative. See Section 3.14, Water Quality and Hydrology, for additional information.

Table 3.16-9. Post-Project Increase in Contributing Impervious Area

	IBR Program Recommended Design Option: Single-Level Fixed-Span Bridge Configuration ^a	Double-Deck Fixed- Span Bridge Configuration	Single-Level Movable- Span Bridge Configuration
Increase in Contributing Impervious Area (acres) ^b	32.9	29.6	32.9

a The increase in contributing impervious area would be the same for all bridge types.

b The addition of a second auxiliary lane in each direction would increase the amount of post-project contributing impervious area by approximately 3.9 acres under each bridge design option compared to the one auxiliary lane option.

The Modified LPA with the single-level movable-span bridge configuration design option would also require grease and other lubricants for the maintenance and operation of the lift span, which poses a potential risk that these substances could enter surface waters. However, the bridges would be operated in a manner that is compliant with applicable state water quality standards, and appropriate best management practices (BMPs) would be employed to maintain compliance with these requirements.

Overwater Lighting

Artificial light sources on overwater structures can affect fish and other aquatic species, including delayed migration and increased exposure to predation. The Modified LPA would install permanent lighting on the replacement bridges and would remove a source of overwater lighting on the existing bridge. The Modified LPA, with any of the bridge configuration design options, is not expected to result in an increase in the amount of light on the water's surface. Permanent lighting for the bridges' decks would use directional, shielded lighting to control glare and direct light onto the bridges' decks to the extent practicable. The bridges' decks with the Modified LPA would also be solid surfaces, which would reduce the amount of light illuminating the water's surface compared to the existing bridge.

Changes in Predation Pressure

The Columbia River and North Portland Harbor bridges may affect the amount or intensity of avian (bird), piscine, and pinniped predation on salmonids and other aquatic species in the vicinity of these bridges.

One way in which bridges can affect predation pressure is that they can modify migratory behavior. Individuals may be forced to move into areas where they are at a higher risk of predation. Juvenile salmonids, which typically prefer to migrate in nearshore habitats, may be forced to move into deeper water by the presence of a structure; this may increase their exposure to predation by piscivorous fish (Nowak and Quinn 2002; Fresh et al. 2001).

Structures themselves may also provide suitable habitat for certain predatory species. For instance, structures may provide surfaces where avian predators can perch or where marine mammals can haul out.

Avian predation of juvenile salmonids is a limiting factor for salmon recovery in the Columbia River Basin. Other species subject to avian predation include adult and juvenile Pacific eulachon and lamprey. The existing Interstate Bridge and North Portland Harbor bridge provide perching opportunities for fish-eating birds such as Caspian terns, double-crested cormorants, and various gull species, though there is no evidence these species use the bridges extensively. The Modified LPA, with any of the bridge configuration design options, may reduce the potential for avian predation. While the steel superstructure of the existing Interstate Bridge provide opportunities for birds to perch, the new Columbia River bridges would likely provide

relatively fewer overhead perching opportunities. However, this would depend in part on the final design of the superstructure. Perching opportunity on the replacement North Portland Harbor bridges would be comparable to that on the existing North Portland Harbor bridge, though it could be slightly higher given the increase in the total number of structures.

Pinniped predation is another substantial threat to the migrating salmon and steelhead populations on the Columbia River. Steller sea lions, California sea lions, and harbor seals make regular seasonal migrations into the Columbia River to feed on salmon, steelhead, eulachon, lamprey, and sturgeon. Populations of these species have increased substantially in the past 30 years, resulting in a comparable increase in the predation pressure on these aquatic species.

Currently, pinnipeds do not haul out extensively within the ecosystems primary and secondary study areas because the existing bridges do not provide suitable areas. The potential for pinnipeds to haul out on the Columbia River and North Portland Harbor bridges is expected to be comparable to the haul-out potential associated with the existing bridges. However, the Columbia River bridges would have shaft caps at the water's surface, and depending on how the shaft caps are designed, they could provide new haul-out opportunities for pinnipeds under certain conditions. The extent of effects to predation pressure would depend on whether the caps are suitable for hauling out and the extent to which pinnipeds elect to haul out on the caps. To the extent practicable, the shaft caps will be designed to prevent or discourage hauling out by pinnipeds, and the extent of increased pinniped predation pressure from the new bridges is expected to be minimal.

Prey Base for Southern Resident Killer Whales

Impacts on juvenile and adult salmon and steelhead and their habitat resulting from the Modified LPA could have a reasonably foreseeable effect on the food source for the ESA-listed SRKW. However, given the large numbers of fish in the Columbia River, the temporary nature of loss of individual fish in relation to the long-term beneficial effects on fish habitat that would result from mitigation and conservation measures, construction of the proposed Modified LPA is not expected to have measurable effects on the distribution or abundance of potential food sources for the SRKW.

Changes in Land Use

The proposed Modified LPA also has the potential to affect how traffic moves through the ecosystems primary and secondary study areas. The tolling program could cause some drivers to seek an alternate crossing at the I-205 bridge. If enough vehicles were to divert to an alternate route, this could result in effects such as changes in the distribution of stormwater pollutants. The Oregon Metro/Southwest Washington Regional Transportation Commission 2018 Regional Transportation Plan Regional Travel Demand Model was run for both the No-Build Alternative and the Modified LPA, which indicates that the Modified LPA would result in an approximately 2% shift in the relative distribution of crossings at the I-205 bridge (see Section 3.1, Transportation for more information). The model also indicates that improvements in transit would likely result in an approximately 1% decrease in the total number of vehicle miles travelled per weekday in the Portland Metropolitan region. These relatively minor changes would not result in measurable indirect effects on aquatic ecosystem resources.

Terrestrial Resources

As summarized in Table 3.16-10, the Modified LPA would result in the loss of small quantities of sensitive terrestrial habitats. The habitat designations shown in Table 3.16-10 overlap and are not cumulative. The amount of terrestrial habitat loss would be the same with one or two auxiliary lanes and all of the bridge configuration design options.

The Modified LPA would also restore terrestrial areas that are currently displaced by existing infrastructure (the existing bridges and roadways). While a specific restoration plan has not yet been developed, these areas would be restored consistent with federal, state, and local regulatory requirements, and would provide new terrestrial habitat function.

Table 3.16-10. Permanent Loss of Sensitive Terrestrial Habitats

Sensitive Terrestrial Habitat (Oregon)	Permanent Loss of Sensitive Terrestrial Habitat (acres)
“High” wildlife/riparian value habitats	3.25
“Medium” wildlife/riparian value habitats	7.67
Wetlands	0.25
Wetland Buffers	5.69
Sensitive Terrestrial Habitat (Washington)	Permanent Loss of Sensitive Terrestrial Habitat (acres)
Riparian Buffers	0.28
Biodiversity Areas	0.06
Oak Woodlands	<0.01
Wetlands	0
Wetland Buffers	0

Sensitive Terrestrial Habitats in Oregon

In Oregon, the Modified LPA would result in a permanent loss of approximately 10.92 acres of terrestrial habitats identified as having a “high” or “medium” combined wildlife/riparian value in Portland’s Natural Resource Inventory (NRI). Most of the impacts would occur within disturbed terrestrial riparian habitats on the shorelines of Hayden Island, on the south shoreline of North Portland Harbor, near the Vanport wetland, and in a partially forested area south of Martin Luther King, Jr. Boulevard. The Modified LPA with the single-level fixed-span bridge configuration with one auxiliary lane design options would also result in approximately 0.25 acres of permanent wetland fill, and approximately 5.69 acres of wetland buffer impact in Oregon, within areas designated as having “high” or “medium” wildlife/riparian value in Portland’s NRI.

The Modified LPA would require the removal of trees. Tree removal reduces habitat complexity, can affect water temperature, and reduces the potential for large woody debris (an important component of fish habitat) to accumulate. Riparian areas adjacent to the Columbia River and North Portland Harbor in Oregon are armored with riprap and provide little riparian function. The Modified LPA would likely require removal of some trees that have established along the riprapped banks. Some tree removal would also be required in areas mapped as having “high” or “medium” combined wildlife/riparian value in Portland’s NRI, primarily associated with wetlands and adjacent buffer areas. Tree removal within the City of Portland would be conducted consistent with the City’s Title 11 Tree Ordinance.

Sensitive Terrestrial Habitats in Washington

In Washington, permanent loss of sensitive terrestrial habitats would be minimal, as Modified LPA improvements would occur largely within a developed transportation corridor. In addition, the proposed Modified LPA has been designed to avoid encroaching into sensitive resources, to the extent practicable.

The Modified LPA would result in a permanent loss of approximately 0.28 acres of riparian buffers, 0.06 acres of a designated biodiversity area, 0.01 acres of area mapped as oak woodland, and 0.06 acres of wetland

buffer in Washington. Most of the loss would occur within terrestrial riparian habitat associated with Burnt Bridge Creek. While this riparian habitat is mostly disturbed vegetation on a sloping embankment between I-5 and NE Leverich Park Way some tree removal adjacent to Burnt Bridge Creek would be required. Tree removal (when required) and installation of replacement trees would be conducted consistent with applicable regulatory requirements, including the City of Vancouver's Tree, Vegetation, and Soil Conservation ordinance (VMC 20.770). Some of the riparian buffer may be able to be restored and/or enhanced, and net unavoidable impact would be offset through compensatory mitigation.

Nesting Bird and Roosting Bat Habitat

The Modified LPA would require the removal of both natural features (trees and vegetation) and human-made structures (the existing bridges) that provide documented or potentially suitable habitat for nesting birds and roosting bats. Activities with the potential to disturb nesting birds or roosting bats, such as the removal of potential nesting or bat roosting structures, would be conducted consistent with applicable requirements of state wildlife agencies and with ODOT and WSDOT protocols for managing these species during construction.

Activities with the potential to disturb nesting migratory birds, such as nest removal, would also be conducted consistent with the provisions of the Migratory Bird Treaty Act (MBTA), which requires that nests of migratory birds be removed only when nests are inactive. However, the loss of a specific nesting structure could still be significant, particularly if similar replacement structures are not available.

The Modified LPA would require the removal of the existing Interstate Bridge, which has been a peregrine falcon nest site since 2001. Its removal would eliminate a suitable nesting structure and, while there are likely alternate nesting sites in the vicinity, could appreciably disrupt peregrine breeding, foraging, and/or nesting activity. Peregrines that use the existing Interstate Bridge would be forced either to find alternative nesting structures in the vicinity of the bridge or move outside of the ecosystems primary and secondary study areas. Providing an alternate nesting structure would greatly reduce the potential nesting impact.

Terrestrial Wildlife Passage

Terrestrial wildlife passage is severely limited in the ecosystems primary study area due to the highly developed urban setting. The existing shoreline and riparian areas are narrow and provide limited suitable passage and habitat function for terrestrial species. Under the Modified LPA, landside piers for the Columbia River bridges may continue to obstruct wildlife movement along the shoreline, though this may be offset by the removal of the existing landside bridge piers. Options for improving wildlife passage are limited, given the developed nature of the corridor. Design efforts to avoid and minimize impacts to riparian habitat, would likely maintain or improve terrestrial wildlife passage in the long term.

Changes in Land Use

As described in Section 3.4.4, the proposed Modified LPA with any design options is likely to facilitate denser urban development as provided in local and regional land use plans, particularly in areas with new light rail transit service. The proposed new station areas in downtown Vancouver and Hayden Island are within a highly developed corridor, where habitat for terrestrial species is of limited quantity and quality. Because the proposed Modified LPA is expected to encourage more compact development and/or redevelopment within existing urban areas that have limited terrestrial resources and habitat, it is likely to reduce development pressure at the edges of the urban area and thereby reduce any loss of terrestrial habitat function.

Botanical Resources

The Modified LPA would have limited permanent vegetation removal, as construction activities would primarily occur within disturbed areas adjacent to existing roadway infrastructure. The Modified LPA would permanently remove native vegetation within a few relatively small areas of functioning riparian and wetland habitats. This removal would be avoided and minimized to the extent practicable through project design, and

consistent with federal, state, and local regulations. Compensatory mitigation would offset the net loss in habitat function. The net result is expected to increase habitat quality for botanical resources.

No botanical SOI are known or expected to occur within the areas that would be permanently disturbed. Therefore, the Modified LPA would not impact botanical SOI species.

Mitigation Approach for Aquatic, Habitat, Wetland and Floodplain Resources

As described in Section 2.2.10 Off-site Mitigation Sites, unavoidable impacts to natural resources including fish and wildlife species and their habitats, wetlands, surface waters, floodplains, and other regulated habitat features, as a result of the Modified LPA would be mitigated at three off-site mitigation sites. Applicable federal, state, and local regulatory frameworks require mitigation sequencing that includes avoidance and minimization of impacts, and compensatory mitigation to achieve “no net loss” of the resource or its functions. Mitigation must fully offset the impacts of the Modified LPA and achieve this “no net loss” standard. The IBR Program utilizes two functional assessment tools to evaluate habitat functions and values both prior to and following construction activities. These tools are a Habitat Equivalency Analysis (HEA) and the Stream Function Assessment Method (SFAM). Results from the functional assessment tools support the determination of mitigation requirements for natural resource impacts from the construction. Both SFAM and HEA are used for compliance with Section 404 of the Clean Water Act to inform compensatory mitigation decisions for the USACE, as well as for state and local regulatory agencies (e.g., Oregon Department of Fish and Wildlife, Washington State Department of Fish and Wildlife, Oregon Department of State Lands, Washington State Department of Ecology, City of Portland, and City of Vancouver).

Compensatory mitigation for unavoidable impacts to aquatic and terrestrial habitats and species in Washington is anticipated to be provided through the purchase of credits from the proposed Wapato Valley Mitigation and Conservation Bank. Compensatory mitigation for unavoidable impacts to wetlands, and aquatic and terrestrial habitats and species in Oregon, is anticipated to be partially compensated through the purchase of advance mitigation credits at ODOT’s proposed Columbia Bottomlands Advance Mitigation/Conservation Site, and partially through the purchase and protection under conservation easement of a site on West Hayden Island.

3.16.4 Temporary Reasonably Foreseeable Effects

Temporary reasonably foreseeable effects on ecosystems were assessed for the ecosystems primary and secondary study areas described in Section 3.16.2, and for the temporal scope described in the Chapter 3 introduction.

Mitigation Terms

Compensatory mitigation: A key part of mitigation that involves compensating for unavoidable losses by restoring, establishing, enhancing, or preserving similar resources elsewhere for “no net loss” of the resources or functions.

On-site mitigation: occurs on the same site or very close to where the impact is taking place.

Off-site mitigation: occurs at a different location than where the impact is taking place.

In-kind mitigation: Replacing or substituting resources with those of the same type and kind as those being impacted.

Out-of-kind mitigation: Replacing the impacted resource with a different, but ecologically similar, resource.

In-lieu fee mitigation: Paying a fee to a mitigation bank or other entity that will use the funds to implement mitigation projects.

No-Build Alternative

The No-Build Alternative would not have construction-related temporary effects.

Under the No-Build Alternative, the existing Interstate Bridge and roadways would continue to require regular, intermittent maintenance activities, which have the potential to disturb aquatic and terrestrial species and habitats. Potential impacts from maintenance activities include temporarily impaired water quality, temporary underwater and/or terrestrial noise, and temporary vegetation impacts.

Maintenance activities could potentially impact birds nesting on the existing Interstate Bridge or within the vicinity. Activities with the potential to impact nesting migratory birds, such as nest removal, would be conducted consistent with the provisions of the MBTA which requires that nests of migratory birds be removed only at times when nests are inactive. Active nests (those with live eggs and/or viable chicks) are to be left undisturbed until they are no longer active.

Typical construction BMPs would likely be implemented during maintenance activities to minimize impacts to fish and wildlife species and habitats.

Modified LPA

The subsections below describe the short-term impacts that would occur associated with the Modified LPA, including potential modifications to the Portland Metro Levee System. As described in Chapter 2, several design options are being evaluated as part of the proposed Modified LPA. Where impacts would differ associated with one or more of the design options, the subsections below provide a comparison of the impacts associated with each design option.

Certain design options that are being evaluated as part of the Modified LPA (i.e., the addition of a second auxiliary lane, the C-Street ramp design option, I-5 mainline design option, and the park and rides) would not result in different levels or types of short-term effects to ecosystem resources. Therefore, these design options are not specifically addressed further in this section. The different bridge configuration design options would result in different levels and types of short-term effects to ecosystem resources and are addressed further in this section.

Aquatic Resources

In-water construction activities related to construction of the new bridges and demolition of the existing bridges within the Columbia River and North Portland Harbor could temporarily affect aquatic species and their habitats. This could include temporary disturbance of benthic habitat, overwater shading from work structures, work area isolation and fish salvage, water-quality impairment from turbidity or contaminants, overwater construction lighting, hydroacoustic events, and disturbance or displacement of individuals.

There would also be temporary effects to aquatic habitats and species associated with the period of time when the new Columbia River bridges are being constructed and the existing bridges have not yet been removed. The temporary effects would be greater when both bridge structures are standing and would include disturbance of benthic habitat and overwater shading from both bridge structures.

In-Water Work Timing

To minimize impacts to aquatic species and their habitats, certain work within the Columbia River and North Portland Harbor would have defined timing restrictions. Between 2005 and 2011, a set of project-specific in-water work timing restrictions were developed for the CRC LPA through extensive coordination with regulatory agencies, tribal partners, and other interested parties. These work timing restrictions were reviewed with agencies, tribes, and other interested parties in several meetings between 2022 and 2023 for the proposed Modified LPA. Based on the outcome of these discussions, it was concluded that the timing restrictions that were developed for the CRC LPA were likely also the preferred windows to apply to

construction of the Modified LPA. The following timing restrictions have therefore been proposed for the construction of the Modified LPA.

- Impact pile driving would be confined to September 15 through April 15 of each year.
- In-water debris removal with a bucket dredge would be confined to November 1 through February 28 of each year.

All other in-water and overwater construction activities would be conducted year-round and in compliance with permit conditions.

Temporary Benthic Habitat Impacts and Overwater Shading

In the Columbia River and North Portland Harbor, temporary impacts to benthic habitat and temporary overwater shading would result from the installation of temporary work platforms, bridges and piers, temporary isolation systems, cofferdams, casings, barges, and temporary piles associated with these structures. These temporary features are necessary to support construction and would be designed by a contractor after a contract is awarded. Table 3.16-11 provides a summary of these temporary aquatic habitat impacts.

In the Columbia River, the Modified LPA with the single-level fixed-span bridge configuration design option would temporarily displace approximately 1.49 acres of benthic habitat, with about 85% of these effects from cofferdams during construction and demolition. The Modified LPA with the double-deck fixed-span bridge configuration design option and the Modified LPA with the single-level movable-span bridge configuration design option would have similar temporary effects, generally; however, the double-deck fixed-span bridge configuration design option would have approximately 0.05 acres less benthic in-water area temporarily displaced within cofferdams, while the single-level movable-span bridge configuration design option would have approximately 0.02 acres more benthic in-water area temporarily displaced within cofferdams. These slight differences in acreage of temporary benthic habitat impact would not, however, result in a detectably different net effect on ecosystems compared to the Modified LPA with the single-level fixed-span bridge configuration design option.

Overwater shading in the Columbia River is estimated to temporarily affect approximately 7.89 acres, with approximately half of these temporary effects resulting from temporary work platforms, bridges, and piers, and half resulting from barges. The temporary work structures are expected to be the same for each bridge configuration and design option.

In North Portland Harbor, approximately 0.40 acres of benthic habitat would be temporarily displaced, with approximately 60% of these effects resulting from drilled shaft isolation casings. Overwater shading in North Portland Harbor would temporarily affect approximately 7.72 acres, of which 62% would be due to temporary work platforms, bridges, and bents. The temporary work structures are expected to be the same for each bridge configuration and design option.

Table 3.16-11. Temporary Aquatic Habitat Impacts Summary

Temporary In-Water and Overwater Work Elements	Columbia River Temporary Benthic Impact (acres)	Columbia River Temporary Overwater Shading (acres)	North Portland Harbor Temporary Benthic Impact (acres)	North Portland Harbor Temporary Overwater Shading (acres)
Work Platforms/ Bridges/Piers and Associated Piles	0.18	4.23	0.13	4.78
Other Temporary Piles	0.01	-	0.01	-

Temporary In-Water and Overwater Work Elements	Columbia River Temporary Benthic Impact (acres)	Columbia River Temporary Overwater Shading (acres)	North Portland Harbor Temporary Benthic Impact (acres)	North Portland Harbor Temporary Overwater Shading (acres)
Suspended Shaft Cap Isolation System	-	0.25	-	-
Sheet Pile Cofferdams (Construction)	0.41	-	-	-
Sheet Pile Cofferdams (Demolition)	0.86	-	-	-
Drilled Shaft Isolation Casings	-	-	0.24	-
Barges and Barge Mooring Piles (Construction)	0.01	2.75	0.02	2.41
Barges and Barge Mooring Piles (Demolition)	0.02	0.65	0.01	0.53
Total	1.49	7.89	0.40	7.72

Note: “-“ indicates that a given work element does not result in a given effect, or is not present in a given location

Work Area Isolation and Fish Salvage

Certain in-water work activities would need to be isolated from the active flow of the Columbia River and North Portland Harbor, either for construction purposes or to reduce potential effects on fish and aquatic habitats. Areas that would be isolated in this manner include drilled shaft isolation casings and temporary sheet pile cofferdams. Sheet pile cofferdams for construction of Piers 2 and 7, and the drilled shaft isolation casings in North Portland Harbor, would be dewatered to provide a work area for construction. Sheet pile cofferdams for demolition of the existing Interstate Bridge (if used) would not be dewatered. Regardless of whether they are de-watered or not, isolation of in-water work areas would temporarily disturb benthic habitats and would temporarily limit access to these areas for fish.

Fish salvage would be conducted as part of the process of installing the sheet pile cofferdams (those for construction and for demolition) to remove fish from within the isolated work area. Since the drilled shaft isolation casings would be screened prior to installation, fish salvage would not be required within these structures prior to dewatering. These fish salvage operations would involve capture, direct handling, and transporting of fish, resulting in some risk that the process may harass, injure, or kill individual fish. Similarly, mortality is likely if a fish remains trapped in an isolated work area during construction.

Temporary Impacts to Water Quality

Water quality can be temporarily affected during both in-water and upland construction activities through the accidental release of construction materials or waste to the water or through the disturbance of sediment which generates turbidity. Upland ground-disturbing activities can also lead to erosion, causing turbidity in adjacent waterbodies.

Construction of the Modified LPA, with any of the bridge configuration design options, would likely result in temporary, localized turbidity during in-water work in the Columbia River and North Portland Harbor from activities such as pile installation and removal, drilled shaft casing installation and removal, upland ground

improvements, cofferdam installation and removal, and barge operations. Construction of the Modified LPA, with any of the bridge configuration design options, has the potential to result in the release of chemical and/or debris into surface waters from sources such as overwater construction work, concrete installation, spills of fuels or other chemicals, upland ground improvements, and demolition of the existing bridge.

The Modified LPA would require avoidance and minimization measures, including a spill prevention, control, and countermeasures plan, pollution control plan, and an erosion and sediment control plan. A Water Quality Protection and Monitoring Plan would also be required to satisfy 401 Water Quality Certifications monitoring and reporting requirements. Construction of the proposed Modified LPA would comply with permit requirements.

Temporary water quality impacts during construction could result in behavioral responses from fish or other aquatic species, including temporary avoidance and reduced foraging abilities. These types of responses have been documented in fish at very low turbidity levels. Since construction activities may occur year-round, all species and life stages of fish in the Columbia River and North Portland Harbor could be exposed to reduced water quality conditions. The extent and duration of exposure to elevated levels of turbidity are expected to be limited and short term, and the minimization measures identified in Section 3.16.5 that would be implemented would be sufficient to minimize effects.

Temporary Overwater Lighting

Temporary overwater lighting would be required throughout construction and demolition to provide adequate lighting for barges, work platforms/bridges, construction of the replacement bridges' decks, and demolition of the existing structures. Overwater lighting associated with temporary work structures may affect migratory movement and/or increase predation pressure within the ecosystems primary study area for adult and outmigrating juvenile salmon, steelhead, and bull trout. Temporary lighting would not constitute a complete physical barrier to migrating juvenile fish; however, migrating juvenile salmonids, Pacific eulachon, Pacific lamprey, river lamprey, and other native resident fish that gather under light sources could be exposed to a higher risk of predation. Overwater lighting is not known to affect green or white sturgeon, given their preference for deep-water habitats. Similarly, seals and sea lions are not expected to significantly alter their behavior or movement in response to temporary overwater lighting.

Elevated Underwater Noise

Temporarily elevated underwater noise can alter behavior, cause physical injury or increase mortality in aquatic species, depending on the intensity and characteristics of the sound, the distance from the noise source, the location in the water column, and other factors. The primary sources of underwater noise associated with the proposed Modified LPA are impact pile driving, vibratory pile driving, drilled shaft oscillation, and noise from vessels.

Impact Pile Driving

Impact pile driving is the loudest potential underwater noise source that would be required for construction of the Modified LPA. The proposed Modified LPA has been designed to minimize the likelihood of impacts resulting from pile installation activities. Pile installation would be performed to the greatest extent possible using a vibratory hammer, though piles may need to be driven to final tip elevation or proofed, as necessary, with an impact hammer. Proofing is the process of striking piles with an impact hammer to verify their load-bearing capacity. A bubble curtain would be implemented during all in-water impact pile driving to reduce the extent of underwater noise generated.

Specific decibel level thresholds have been established for evaluating injury and disturbance from underwater noise associated with impact pile driving. Injury thresholds have been established for noise from a single pile strike (peak thresholds) and for exposure to noise from multiple strikes over a period of time (cumulative

thresholds). NOAA Fisheries also applies a behavioral threshold as an indicator for when noise during impact pile driving may disrupt normal behavioral patterns.

Impact pile driving during construction of the Modified LPA would result in noise levels that would temporarily exceed these injury and behavioral thresholds within portions of the Columbia River and North Portland Harbor, and exposed fish may have an increase in lethal and sublethal injuries. The extent of the injury would depend on several factors, including the size of the fish, duration of exposure, proximity to the source (the pile being driven), and size of the pile.

All species and life stages of salmon, steelhead, eulachon, lamprey, green sturgeon, white sturgeon, and other resident fish would be subject to potential injury and disturbance if present during impact pile driving. Bull trout would not be affected by impact pile driving because they are not expected to be present in the area where construction-related underwater noise could occur.

Impact pile driving can also affect marine mammals. Steller and California sea lions and harbor seals could potentially be exposed to elevated noise levels during pile driving that could result in injury or harassment. Harassment of marine mammals is regulated under the Marine Mammal Protection Act, and appropriate authorization would be secured in the form of a Letter of Authorization. A marine mammal monitoring plan would also be developed and implemented to avoid and minimize the extent of any unavoidable harassment of marine mammals during impact pile driving.

Vibratory Pile Driving, Drilled Shaft Oscillation, and Wiresaw Operation

Noise generated during vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw does not generally result in injury to fish but can result in behavioral effects such as startling, momentary disruption in feeding, or avoidance of the area. Depending on site conditions, behavioral effects may be more significant with consequences for survival and reproduction. For example, avoidance of the ecosystems primary study area could cause delays in feeding or migration that could in turn affect spawning or outmigration success.

All species and life stages of salmon, steelhead, eulachon, lamprey, green sturgeon, white sturgeon, and other resident fish that use aquatic habitats within the Columbia River and North Portland Harbor could be exposed to these effects when they are present in the portion of the ecosystems primary and secondary study areas where underwater noise would be elevated during vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw. Bull trout would not be affected by noise from these activities, because they are not expected to be present in the area where construction-related underwater noise could occur.

Adult and/or juvenile fish present within the area where underwater noise would be temporarily elevated during vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw may be exposed to levels of underwater noise that could result in behavioral disturbance. This activity is unlikely to injure fish or significantly interfere with behaviors such as migration, rearing, or foraging. Thus, vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw are not likely to adversely affect these species.

Noise associated with vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw can also affect marine mammals. Steller and California sea lions and harbor seals could potentially be exposed to elevated noise levels during these activities that could result in harassment. Appropriate authorization under the Marine Mammal Protection Act would be secured in the form of a Letter of Authorization. A marine mammal monitoring plan would also be developed and implemented to avoid and minimize the extent of any unavoidable harassment of marine mammals during impact vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw.

Vessel Noise

Various types of vessels, including barges, tugboats, and small craft, would be present during construction. These vessels would move and operate within the Columbia River and North Portland Harbor on a year-round basis. Such vessels already use this portion of the ecosystems primary and secondary study areas in relatively high numbers; therefore, the vessels to be used in the construction of the proposed Modified LPA do not represent a new noise source, only a potential increase in the frequency and duration of this type of activity.

Changes in Predation Pressure

Construction of the Modified LPA may affect the extent of avian, piscine, or pinniped predation pressure on juvenile salmonids, Pacific eulachon, lamprey, or other native fish. Predation pressure may temporarily be greater in magnitude during construction because temporary structures would be installed close to the water's surface, creating more pronounced shading effects and potentially providing opportunities for birds to perch, or for pinnipeds to haul out on during periods of non-use. Temporary overwater structures are not likely to attract large concentrations of avian predators, compared to such features as nesting islands, water impoundments, or dam tailraces. However, avian predators are known to congregate on overwater structures, and construction of the Modified LPA would temporarily increase the number of available perches.

Temporary overwater structures may also attract piscivorous fish species that prey on juvenile salmon. The shading caused by structures near to the water's surface provides these species with a competitive advantage over juvenile salmonids. Juvenile salmonids generally avoid these shaded areas but may be unable to do so when structures are placed over their preferred nearshore migratory corridors. It is therefore possible that avian, piscine, or pinniped predation pressure could temporarily increase to some extent within the ecosystems primary study area.

Terrestrial Resources

Construction activities associated with the Modified LPA would result in temporary disturbance of terrestrial habitats in Oregon and Washington. This could include vegetation removal, grading, or other forms of temporary access and construction activities. Table 3.16-12 summarizes the approximate area of each resource that may be temporarily disturbed. Note that the habitat designations differ by state as a result of differing regulatory frameworks and resource inventories. In some cases, the habitat designations also overlap, so the quantities are not cumulative.

There would also be temporary effects to terrestrial habitats and species (including botanical species) include temporary displacement of sensitive terrestrial habitats, in-air acoustic impacts, obstacles to terrestrial wildlife passage, and disturbance or displacement of individuals.

Table 3.16-12. Temporary Disturbance of Sensitive Terrestrial Habitats

	Terrestrial Habitat	Temporary Disturbance of Sensitive Terrestrial Habitat (acres)
Oregon	"High" riparian/wildlife value habitats	5.58
	"Medium" riparian/wildlife value habitats	4.96
	Wetlands	1.67
	Wetland Buffers	4.44

	Terrestrial Habitat	Temporary Disturbance of Sensitive Terrestrial Habitat (acres)
Washington	Riparian Buffers	0.62
	Biodiversity Areas	0.97
	Oak Woodlands	0.03
	Wetlands	0
	Wetland Buffers	0

Sensitive Terrestrial Habitats in Oregon

In Oregon, construction of the Modified LPA would result in temporary disturbance of approximately 1.67 acres of wetland, 4.44 acres of wetland buffer, and approximately 10.54 acres of habitat identified as having a “high” or “medium” combined wildlife/riparian value in Portland’s NRI. This would occur primarily within disturbed terrestrial riparian habitats on the shorelines of Hayden Island, on the south shoreline of North Portland Harbor, near the Vanport wetland, and in a partially forested area south of Martin Luther King Jr. Boulevard.

Construction of the Modified LPA would include revegetating temporarily disturbed riparian areas and other sensitive habitats in Oregon consistent with federal, state, and local regulations, for no net loss of habitat function.

Sensitive Terrestrial Habitats in Washington

In Washington construction of the Modified LPA would result in temporary disturbance of approximately 0.62 acres of riparian buffers, approximately 0.97 acres of a designated biodiversity area, and approximately 0.03 acres of priority oak woodland habitat. These habitat designations overlap and are not cumulative. No impacts to wetlands or wetland buffers in Washington are anticipated. This would primarily occur within terrestrial riparian habitat associated with Burnt Bridge Creek, which provides only moderate habitat function, as it is immediately adjacent to I-5. Construction of the Modified LPA would also disturb a small portion of an area designated as priority oak woodland. However, the only area affected would be a grassy shoulder adjacent to I-5. No mature oak trees would be removed within this location, and the extent of the impact to oak woodland resources would be insignificant.

Construction of the Modified LPA would include revegetating temporarily disturbed riparian areas and other sensitive habitats in Washington consistent with federal, state, and local regulations, for no net loss of habitat function in the long term.

Terrestrial Noise and Disturbance

Terrestrial noise, lights, vegetation removal, and other roadway and transit construction disturbances could negatively affect the breeding, foraging, and dispersal of terrestrial species such as raccoons, bats, reptiles, and other terrestrial wildlife. Temporarily elevated noise can result in a range of potential wildlife reactions, which can include altered vocal behavior, changes in vigilance and foraging behavior, and changes in body condition. These responses could in turn result in increased energy expenditure or movement into less desirable locations with potentially greater exposure to predation. Lights used for nighttime work could disturb nocturnal animals such as owls or bats or disrupt the flight patterns of night-migrating birds.

To minimize impacts to migratory birds, all activities would be conducted consistent with the MBTA. Although the existing Interstate Bridge does not provide ideal roosting habitat for bats, several bat species that may pass near and use them for temporary roosting could be affected by construction disturbance. Short-term

effects on raccoons, bats, reptiles, and other terrestrial wildlife could also result from temporary vegetation clearing.

Terrestrial Wildlife Passage

Construction equipment mobilization, storage, and use on or near riverbanks may temporarily affect wildlife passage. Wildlife species could alter their behavior to avoid construction activities, which in turn could increase the risks of human-wildlife conflicts and wildlife mortality.

Botanical Resources

Temporary vegetation disturbance associated with the construction of the proposed Modified LPA are expected to be relatively minor and to occur primarily within disturbed areas adjacent to existing roadway infrastructure. The Modified LPA would temporarily disturb native vegetation within a few relatively small areas of functioning riparian and wetland habitats. Disturbance would be avoided and minimized to the extent practicable through project design and consistent with applicable federal, state, and local regulations. Compensatory mitigation would offset the net loss in habitat function.

No botanical SOI are known or expected to occur within the areas that would be temporarily disturbed. Therefore, botanical SOI are not expected to be impacted by the construction of the proposed Modified LPA.

3.16.5 Intentionally Left Blank

3.16.6 Avoidance, Minimization, and Mitigation Measures

Table 3.16-13 lists temporary and long-term avoidance and minimization measures. Table 3.16-14 lists temporary and long-term mitigation measures.

Avoidance, minimization, and mitigation measures for water quality and hydrology impacts that could potentially affect ecosystems are described in Section 6.14 and are not included in the tables below.

Table 3.16-13. Avoidance and Minimization Measures

Temporary or Long-Term	Impact Type	Avoidance and Minimization Measure
Temporary	Disruption to aquatic, terrestrial, and botanical resources during construction	ODOT and WSDOT will coordinate with the contractor to perform all construction activities according to the requirements and conditions of the regulatory permits that are issued for the Modified LPA.
		In compliance with ODOT and WSDOT policy and construction administration practice in Oregon and Washington, ODOT and WSDOT will have one or more state Department of Transportation inspectors on site during construction. The role of the inspector(s) will be to monitor compliance with contract and permit requirements.
Temporary	Release of construction materials or waste, or sediment disturbance, that affects aquatic ecosystems during construction	ODOT and WSDOT will prepare a Water Quality Monitoring and Protection Plan (WQMPP) to satisfy the monitoring and reporting requirements of the 401 Water Quality Certifications that would ultimately be issued for the project. The WQMPP will be provided to applicable agencies for review and approval prior to implementation. The WQMPP will identify the timing and methodology for water-quality sampling during construction of the Modified LPA, as well as methods of implementation and reporting.

Interstate Bridge Replacement Program

Temporary or Long-Term	Impact Type	Avoidance and Minimization Measure
Temporary	Disruption to aquatic ecosystems along the Columbia River bottom	ODOT and WSDOT will coordinate with the contractor to prohibit work barges from grounding out.
Temporary	Contamination of aquatic ecosystems during construction	Dispose of excess or waste materials in an appropriate manner consistent with applicable local, state, and federal regulations, do not dispose of or abandon waterward of the ordinary high water mark (OHWM) or allow to enter waters of the state.
Temporary	Fish in the Columbia River impacted by pumps during construction	<p>ODOT and WSDOT will coordinate with the contractor to confirm that all pumps employ a fish screen that meets the following specifications:</p> <ul style="list-style-type: none"> • An automated cleaning device with a minimum effective surface area of 2.5 square feet per cubic foot per second and a nominal maximum approach velocity of 0.4 feet per second, or no automated cleaning device, a minimum effective surface area of 1 square foot per cubic foot per second and a nominal maximum approach rate of 0.2 feet per second; and • A round or square screen mesh that is no larger than 0.094 inches (2.38 mm) in the narrow dimension, or any other shape that is no larger than 0.069 inches (1.75 mm) in the narrow dimension; and • Each fish screen must be installed, operated, and maintained according to NOAA Fisheries fish screen criteria.
Temporary	Erosion and sediment disturbance to aquatic and terrestrial ecosystems during construction	ODOT and WSDOT will coordinate with the contractor to designate at least one employee as the erosion and sediment control (ESC) lead. The ESC lead will be responsible for the implementation of the SPCC plan and PCP.
Temporary	Contamination of aquatic and terrestrial ecosystems from a spill of hazardous materials during construction	ODOT and WSDOT will coordinate with the contractor to maintain applicable spill response equipment and material designated in the SPCC plan and PCP at the job site.
Temporary	Contamination of aquatic ecosystems from a spill of hazardous materials during construction	With the exception of barges and stationary large equipment (cranes, oscillators) operating from barges or work platforms, ODOT and WSDOT will coordinate with the contractor to fuel and maintain equipment at least 150 feet from the OHWM of any waterbody using secondary containment to minimize potential for spills or leaks entering the waterway.

Temporary or Long-Term	Impact Type	Avoidance and Minimization Measure
Temporary	Contamination of aquatic or terrestrial ecosystems from hazardous materials leaking from construction equipment during construction	<p>ODOT and WSDOT will coordinate with the contractor to implement inspection and cleanup procedures identified in the SPCC plan and PCP. All equipment to be used for construction activities will be cleaned and inspected prior to arriving at the project site, to confirm no potentially hazardous materials are exposed, no leaks are present, free of noxious weeds (or other invasive plants or animals), and the equipment is functioning properly. Should a leak be detected on heavy equipment used for the project, ODOT and WSDOT will coordinate with the contractor to immediately remove the equipment from the area, and not use again until adequately repaired</p> <hr/> <p>Where off-site repair for heavy equipment leakage is not practicable, ODOT and WSDOT will coordinate with the contractor to prepare the SPCC plan and PCP to document measures to be implemented to prevent and/or contain accidental spills in the work/repair area to confirm no contaminants escape containment to surface waters and cause a violation of applicable water-quality standards.</p>
Temporary	Contamination of aquatic ecosystems from construction equipment during construction	<p>ODOT and WSDOT will coordinate with the contractor to confirm that only barges and support vessels will be operated in the water. Other construction equipment will be operated from on top of floating barges, from the decks of temporary work bridges and platforms, the decks of the existing or replacement bridges, or from areas above the OHWM.</p> <hr/> <p>ODOT and WSDOT will coordinate with the contractor to provide suitable containment measures for all equipment (including barges, work decks, stationary power equipment, and storage facilities) consistent with the SPCC plan and PCP to prevent and/or contain accidental spills to confirm no contaminants escape containment to surface waters and cause a violation of applicable water-quality standards.</p>
Temporary	Disruption to aquatic ecosystems by in-water construction structures during high-water events	ODOT and WSDOT will coordinate with the contractor to design and install temporary work bridges and platforms, cofferdams, and drilled shaft isolation casings consistent with the ODOT Hydraulics Manual, which establishes criteria to avoid these structures being overtopped during high-water events.
Temporary	Contamination of aquatic and terrestrial ecosystems from construction runoff	ODOT and WSDOT will coordinate with the contractor to require that process water generated on site from construction, demolition, or washing activities will be contained and treated to meet applicable water-quality standards before entering or reentering surface waters.
Temporary	Contamination of aquatic and terrestrial ecosystems from paving, chip sealing, or painting activities during rain or wet weather	ODOT and WSDOT will coordinate with the contractor to confirm that paving, chip sealing, or stripe painting activities will not be conducted during periods of rain or wet weather.

Temporary or Long-Term	Impact Type	Avoidance and Minimization Measure
Temporary	Contamination of aquatic or terrestrial ecosystems from the cleaning of concrete equipment	ODOT and WSDOT will coordinate with the contractor to establish a concrete truck chute cleanout area consistent with SPCC plan and PCP to properly contain wet concrete as part of ODOT Standard Specification 00290.30(a).
Temporary	Vegetation clearing and erosion disrupts the ecosystem function and habitat of wetland and streams during construction	In compliance with ESCP, ODOT and WSDOT will coordinate with the contractor to delineate clearing limits by installing orange barrier fencing prior to vegetation clearing within or adjacent to a stream/wetland or its buffer and install perimeter protection/silt fence as needed to protect surface waters and other critical areas. For additional silt fence detail, consult ODOT Standard Specification 00280.16(c).
Temporary	Disruption to aquatic, terrestrial, and botanical resources from damage to protection measures during construction	ODOT and WSDOT will coordinate with the contractor to inspect, maintain, and repair the ESCP measure as described in applicable permit requirements and ODOT Standard Specifications 00280.60 to 00280.70.
Temporary	Chemical and/or debris releases affect the ecosystem function and habitat of surface waters during construction	For landward construction and demolition, ODOT and WSDOT will coordinate with the contractor to locate project staging and material storage areas a minimum of 150 feet from surface waters, in currently developed areas such as parking lots or managed fields, unless a site visit by an ODOT/WSDOT biologist determines (and an ODOT/NOAA Fisheries liaison confirms) that the topographic features or other site characteristics allow for site use closer to the edge of surface waters.
Temporary	Erosion and sediment disturbance of aquatic ecosystems during construction	ODOT and WSDOT will coordinate with the contractor to complete excavation activities under dry or dewatered conditions where practicable. Where dewatering requires the use of Cofferdams and/or berms, these structures will be constructed of sandbags, clean rock, steel sheeting, or other non-erodible material.
Temporary	Damage to river bank and aquatic ecosystem function and habitat during construction	ODOT and WSDOT will coordinate with the contractor to limit bank shaping to the extent as shown on the approved grading plans. Minor adjustments made in the field will occur only after engineer's review and approval.
Temporary	Potential for non-degradable debris from erosion and sediment control materials entering aquatic ecosystems during construction	ODOT and WSDOT will coordinate with the contractor to install bio-degradable erosion control blankets on areas of disturbed ground with slopes of 1V:3H or steeper and within 150 feet of surface waters. For additional erosion control blanket detail, consult ODOT Standard Specification 00280.14I.
Temporary	Erosion and sediment disturbance to surface water ecosystem function and habitat during construction	ODOT and WSDOT will coordinate with the contractor to cover erodible materials (material capable of being displaced and transported by rain, wind or surface water runoff) as prescribed in the ESCP to prevent sediments from being washed from the storage area to surface waters. For additional detail, consult, ODOT Standard Specification 00280.42.

Temporary or Long-Term	Impact Type	Avoidance and Minimization Measure
Temporary	High noise and vibration levels associated with vibratory hammer operations affect aquatic and terrestrial species during construction	ODOT and WSDOT will coordinate with the contractor to use a vibratory hammer to drive steel piles to the maximum extent practicable, to minimize noise levels.
Temporary	High noise and vibration levels associated with impact pile driving activities below the OHWM affect aquatic species during construction	ODOT and WSDOT will coordinate with the contractor to conduct impact pile driving below the OHWM only between September 15 and April 15. Vibratory pile installation and removal (as well as certain other in-water construction activities) may occur on a year-round basis, provided they are conducted in compliance with all regulatory approvals.
Temporary	High noise and vibration levels associated with impact pile driver affect aquatic species during construction	ODOT and WSDOT will coordinate with the contractor to operate no more than two impact pile drivers simultaneously within the same waterbody channel.
		ODOT and WSDOT will coordinate with the contractor to employ a bubble curtain or other similarly effective noise attenuation device during all impact pile driving conducted in water depths greater than 0.67 meters (2 feet).
Temporary	High noise levels associated with impact pile driving affect aquatic species during construction	ODOT and WSDOT will coordinate with the contractor to develop and implement a hydroacoustic monitoring plan, to allow the predicted noise attenuation levels and the effectiveness of the noise attenuation devices to be field verified. ODOT and WSDOT will develop the plan based on the template developed by the Fisheries Hydroacoustic Working Group, in coordination with FHWA and FTA. ODOT and WSDOT will provide the plan to NOAA Fisheries for review and approval prior to any impact pile-driving activity commencing.
Temporary	Disruption to marine mammals during construction	ODOT and WSDOT will coordinate with the contractor to implement the marine mammal monitoring plan as required by the Letter of Authorization issued by NOAA's Office of Protected Resources.
Temporary	Predation from piscivorous birds perching on temporary work structures	ODOT and WSDOT will coordinate with the state wildlife agencies and contractor to determine and install appropriate deterrents or other anti-perching devices on temporary work structures and open-ended pipe piles to discourage perching by piscivorous birds. ODOT and WSDOT will require that the contractor monitor and manage temporary work structures to not allow for extensive perching by piscivorous birds, including during periods of non-use.

Temporary or Long-Term	Impact Type	Avoidance and Minimization Measure
Temporary	Contamination of aquatic or terrestrial ecosystems from release of demolition waste during construction	<p>ODOT and WSDOT will coordinate with the contractor to remove temporary piles with a vibratory hammer, or by direct pulling, and prohibit the intentionally breaking of piles by twisting or bending.</p> <hr/> <p>In the event a temporary pile cannot be removed, ODOT and WSDOT will direct the contractor to cut or press the pile 3 feet below the mudline. At locations where hazardous materials are present or adjacent to utilities, ODOT and WSDOT may allow the contractor to cut the temporary piles at the mud line with underwater torches, if ODOT and WSDOT determine that such activity would not conflict with navigation elements.</p>
Temporary	Potential loss of fish during fish salvage	<p>ODOT and WSDOT will coordinate with the contractor to develop and implement a Temporary Water Management Plan, consistent with the requirements of ODOT Special Provision Section 00245.03. ODOT and WSDOT will coordinate with the contractor to provide the Temporary Water Management Plan to NOAA Fisheries for review and approval prior to any work area isolation or fish salvage activities.</p> <hr/> <p>ODOT and WSDOT will coordinate with the contractor to install cofferdams and isolation casings in a manner that minimizes fish entrapment and install sheet piles from upstream to downstream, lowering the sheet piles slowly until they make contact with the substrate.</p> <hr/> <p>ODOT and WSDOT will coordinate with the contractor to install screens (3/32 inch (2.38 mm) inch on a diagonal) at the bottom of drilled shaft isolation casings prior to installation, to minimize potential for fish entrapment during installation.</p> <hr/> <p>ODOT and WSDOT will coordinate with the contractor to conduct fish salvage according to the best practices established in the Biological Opinion for ODOT’s Federal-Aid Highway Programmatic consultation.</p> <hr/> <p>ODOT and WSDOT, in coordination with the contractor, will have a qualified fishery biologist conduct and supervise fish capture and release activity to minimize risk of injury to fish.</p> <hr/> <p>ODOT and WSDOT will prepare a fish salvage report and submit to NOAA Fisheries, USFWS, ODFW, and WDFW following project completion.</p> <hr/> <p>ODOT and WSDOT will coordinate with the contractor to make a reasonable effort to capture ESA-listed fish known or likely to be present in an in- water isolated work area using methods that minimize the risk of injury.</p> <hr/> <p>If electrofishing must be used, ODOT and WSDOT will coordinate with the contractor to conduct consistent with NOAA Fisheries “Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act” (NOAA Fisheries 2000), or most recent version.</p>

Temporary or Long-Term	Impact Type	Avoidance and Minimization Measure
Temporary	Disturbance to aquatic and terrestrial ecosystems during construction	ODOT and WSDOT will avoid and minimize short-term impacts to ecosystem resources in final design to the extent practicable.
Temporary	Increased noise levels, light, and glare on aquatic and terrestrial ecosystems and surrounding neighboring viewers during nighttime construction	ODOT and WSDOT will coordinate with the contractor to conduct construction activities consistent with local, state and federal permit restrictions for allowable work hours. If temporary lighting is required, contractors will use directional lighting with shielded luminaries to control glare and direct light onto work area, not surface waters, or sensitive neighboring viewers.
Long-Term	Contamination of aquatic or terrestrial ecosystems from potential increase in pollutants entering stormwater	ODOT and WSDOT will provide stormwater quality and quantity treatment that meets or exceeds applicable regulatory requirements for all post-project Contributing Impervious Area.
Long-Term	Disturbance to aquatic and terrestrial resources	ODOT and WSDOT will avoid and minimize long-term impacts to ecosystem resources in final design to the extent practicable.

ESA = Endangered Species Act; ESCP = erosion and sediment control plan; FHWA = Federal Highway Administration; FTA = Federal Transit Agency; LPA = Locally Preferred Alternative; mm = millimeters; NOAA = National Oceanic and Atmospheric Administration; ODFW = Oregon Department of Fish and Wildlife; ODOT = Oregon Department of Transportation; OHWM = ordinary high water mark; PCP = pollution control plan; SPCC = spill prevention, control, and countermeasures; USFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife; WSDOT = Washington State Department of Transportation

Table 3.16-14. Mitigation Measures

Temporary or Long-Term	Impact Type	Mitigation Measure
Temporary	Disruption to terrestrial habitats during construction	ODOT and WSDOT will coordinate with the contractor to restore temporarily disturbed terrestrial habitats consistent with applicable regulatory requirements.
Temporary	Disruption to aquatic, terrestrial, and botanical ecosystems during construction	ODOT and WSDOT will provide compensatory mitigation for unavoidable impacts to ecosystem resources, consistent with applicable federal, state, and local regulatory requirements.
Temporary	Disruption to migratory bird nesting during construction	ODOT and WSDOT will coordinate with the contractor to conduct activities with the potential to impact nesting migratory birds, such as nest removal, consistent with the provisions of the MBTA, which requires nests of migratory birds to be removed only at times when nests are inactive.
Long-Term	Disruption to aquatic, terrestrial, and botanical resources	ODOT and WSDOT will provide compensatory mitigation for unavoidable impacts to ecosystem resources, consistent with applicable federal, state, and local regulatory requirements.

Interstate Bridge Replacement Program

Temporary or Long-Term	Impact Type	Mitigation Measure
Long-Term	Loss of function of aquatic or terrestrial ecosystem resources	ODOT and WSDOT will prepare a compensatory mitigation plan that satisfies applicable federal, state, and local regulatory requirements, and that demonstrates no net loss of function of ecosystem resources.
Long-Term	Removal of existing peregrine falcon nest	ODOT and WSDOT will design and coordinate with the contractor to install an alternate nesting structure within the vicinity, to offset removal of an existing peregrine falcon nest from demolition of the existing Interstate Bridge, as and where feasible.
Long-Term	Predation from avian perching and nesting on the shaft caps and replacement bridge structure	ODOT and WSDOT will coordinate with WDFW and ODFW during final bridge design for recommendations to reduce the potential for and/or extent of pinniped and avian perching on the shaft caps and avian nesting and perching on the replacement bridge structure. ODOT and WSDOT will evaluate recommendations for feasibility and incorporate them into final design to the extent practicable.

MBTA = Migratory Bird Treaty Act; ODFW = Oregon Department of Fish and Wildlife; ODOT = Oregon Department of Transportation; WDFW = Washington Department of Fish and Wildlife; WSDOT = Washington State Department of Transportation