# 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 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 Modified LPA's effects on the 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 (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with ecosystems has been updated in this Draft SEIS to include:

- Species of interest (SOI[1]) lists have been updated with input from federal, state, and local resource management agencies and tribal resource staff.
- 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.
- 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.

Table 3.16-1 compares the impacts and benefits of the CRC LPA to those of the Modified LPA and identifies the reasons for the differences. Based on the analysis in this section, the effects of the Modified LPA would be similar to those of the CRC LPA.

[1] SOI is not a specific category of governmental or nongovernmental organization-designated species but refers to native species identified through tribal, local, state, and federal coordination as locally important due to their regulatory status, rarity, and/or special habitat considerations.

Table 3.16-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

| Technical Considerations | CRC LPA Effects as Identified in the 2011 Final EIS | Modified LPA Effects as Identified in this Section | Explanation of Differences |
|---|---|---|---|
| Permanent benthic habitat displacement (shallow and deep-water habitat) | • Approximately 0.21 acres of benthic habitat displacement from new bridges.<br>• Approximately 0.64 acres of benthic habitat restoration from bridge removal (benefit).<br>• Net restoration of approximately 0.43 acres of benthic habitat (benefit). | • Approximately 0.91 acres of benthic habitat displacement from new bridges.<br>• Approximately 1.04 acres of benthic habitat restoration from bridge removal (benefit).<br>• Net restoration of approximately 0.13 acres of benthic habitat (benefit). | • Bridge design updates and refined assumptions regarding construction impacts.<br>• Proposed removal of existing North Portland Harbor bridge would result in a greater quantity of benthic habitat restoration. |
| Permanent water-surface level overwater shading | • Approximately 1.34 acres of new shading at the water surface.<br>• Approximately 0.44 acre of surface-level shading removal (benefit).<br>• Approximately 0.91 acre of net increase in surface-level shading removal (benefit). | • Approximately 1.04 acres of new shading at the water surface. | • Refined design of Columbia River bridges' foundations.<br>• CRC LPA included removal of a portion of the existing dock at the Port of Vancouver's Terminal 1, which is not part of the Modified LPA. |
| Permanent elevated overwater shading | • Not quantified. | • Approximately 19.87 acres of elevated overwater shading from new bridges' decks.<br>• Approximately 11.65 acres of elevated shading removal (benefit).<br>• Net increase of approximately 8.22 acres of elevated overwater shading. | Elevated shading from bridges' decks was not quantified for the CRC LPA. |
| New Contributing Impervious Area (CIA) | • Approximately 41.5-acre increase in CIA compared to the No-Build Alternative.<br>• Treatment would be provided for all post-project CIA, most of which is currently untreated (benefit). | • Approximately 29.6-acre increase in CIA compared to the No-Build Alternative.<br>• Treatment would be provided for all post-project CIA (including adjacent non-project CIA that contributes stormwater to CIA associated with the project), most of which is currently untreated (benefit). | Changes in design. |
| Permanent and Temporary Impacts to Sensitive | • Permanent and temporary impacts to approximately:<br>– 33.7 acres of Priority Habitats in Washington | • Permanent loss of terrestrial habitats and vegetation, including approximately:<br>– 0.79 acres of riparian buffer in Washington | • Changes in design and changes in regulatory classifications for terrestrial habitats. |

| Technical Considerations | CRC LPA Effects as Identified in the 2011 Final EIS | Modified LPA Effects as Identified in this Section | Explanation of Differences |
|---|---|---|---|
| Terrestrial Habitats | – 117.7 acres of designated Critical Areas in the City of Vancouver<br>– 52.6 acres of lands designated Habitat Conservation Areas by Title 13 of Metro's Urban Growth Management Functional Plan<br>– 41.5 acres within City of Portland environmental zones (ezones) | – 0.15 acres of Biodiversity Area in Washington<br>– Less than 0.01 acres of mapped oak woodland in Washington<br>– 0.06 acres of wetland buffer in Washington<br>– 0.58 acres of wetland in Oregon<br>– 7.39 acres of wetland buffer in Oregon<br>– 1.12 acres of area designated as "High" value riparian/wildlife habitat, and 6.20 acres of area designated as "Medium" value riparian/wildlife habitat in Oregon<br>• Temporary disturbance of terrestrial habitats and vegetation, including approximately:<br>– 1.15 acres of riparian buffer in Washington<br>– 2.87 acres of Biodiversity Area in Washington<br>– 0.03 acres of mapped oak woodland in Washington<br>– 1.19 acres of wetland buffer in Washington<br>– 2.56 acres of wetland in Oregon<br>– 7.11 acres of wetland buffer in Oregon<br>– 4.60 acres of area designated as "High" value riparian/wildlife habitat, and 5.70 acres of area designated as "Medium" value riparian/wildlife habitat in Oregon | • CRC evaluated impacts by Metro's Title 13, which has been replaced by habitat designations in the City of Portland's NRI.<br>• CRC did not quantify areas of temporary disturbance separately from areas of permanent displacement. |
| Temporary Impacts to Aquatic Habitats during construction | • Approximately 1.81 acres temporary benthic habitat displacement. | • Approximately 2.06 acres temporary benthic habitat displacement. | Changes in design and refined assumptions regarding construction means and methods. |

| Technical Considerations | CRC LPA Effects as Identified in the 2011 Final EIS | Modified LPA Effects as Identified in this Section | Explanation of Differences |
|---|---|---|---|
| | • Approximately 9.04 acres temporary overwater shading.<br>• Handling and disturbance of fish during in-water work area isolation activities.<br>• Temporarily elevated turbidity, and potential for accidental introduction of pollutants or debris.<br>• Temporarily elevated underwater and terrestrial noise levels.<br>• Overwater lighting.<br>• Changes in avian predation pressure on juvenile salmonids. | • Approximately 15.61 acres temporary overwater shading.<br>• Handling and disturbance of fish during in-water work area isolation activities.<br>• Temporarily elevated turbidity, and potential for accidental introduction of pollutants or debris.<br>• Temporarily elevated underwater and terrestrial noise levels.<br>• Overwater lighting.<br>• Changes in avian predation pressure on juvenile salmonids. | |

Note: Data are approximate and rounded.
CIA = Contributing Impervious Area; CRC = Columbia River Crossing; EIS = Environmental Impact Statement; LPA = Locally Preferred Alternative; Metro = Oregon Metro; NRI = Natural Resource Inventory

## 3.16.2 Existing Conditions

This evaluation includes a primary and a secondary study area. Figure 3.16-1 shows the ecosystem's primary study area, and Figure 3.16-2 shows the secondary study area. The primary study area includes all areas that could experience direct long-term effects from the Modified LPA. The secondary study area is larger and includes all areas where construction-related (temporary) effects and indirect effects could occur. Where the more general term "study area" is used, it refers to both study areas.

The 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 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 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 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 study area includes 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.

Figure 3.16-1. Ecosystems Primary Study Area

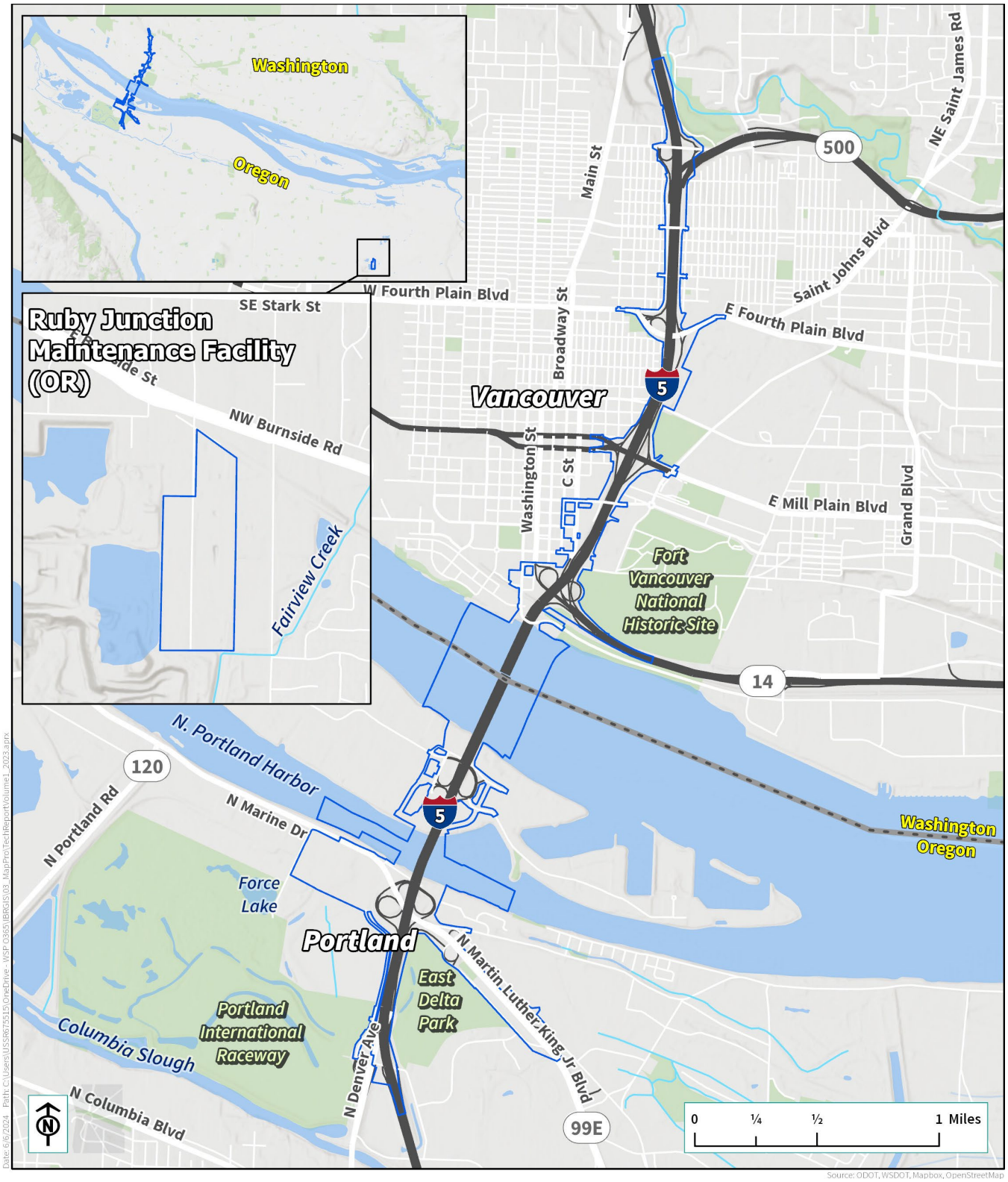
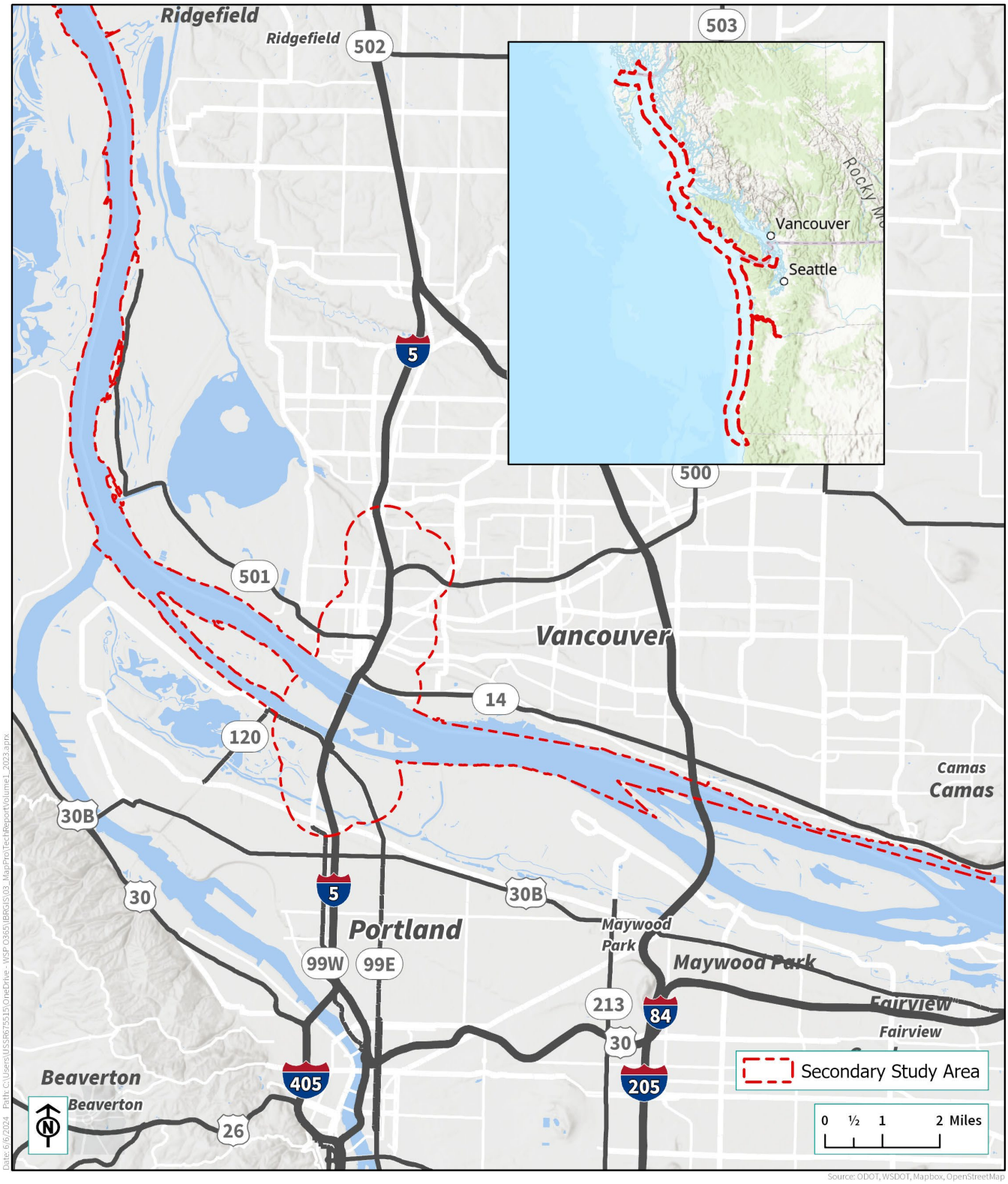


Figure 3.16-2. Ecosystems Secondary Study Area



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.

### *Columbia River and North Portland Harbor*

The study area is 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 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 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 primary study area in Washington, the Columbia River is on the 303(d) list for temperature and PCBs (Ecology 2021). Within the 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 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 study area 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 Maintenance Facility (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 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 primary study area could in turn affect the SRKW prey base that occurs within these waters in the 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 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 3.16-2 presents a list of aquatic SOI that may occur within the primary and/or secondary study areas.

Table 3.16-2. Aquatic Species of Interest Potentially Occurring within the 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 | *Oncorhynchus tshawytscha* | Lower Columbia River (LCR) ESU | LT; Critical Habitat | SC | 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 | LT; 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 | *Oncorhynchus keta* | Columbia River ESU | LT; Critical Habitat | S | Not listed; PHS | EFH; SGCN-OR; SGCN-WA |
| | Coho salmon | *Oncorhynchus kisutch* | LCR ESU | LT; Critical Habitat | E | Not listed; PHS | EFH; SGCN-OR; SGCN-WA |
| | Sockeye salmon | *Oncorhynchus nerka* | Snake River ESU | LE; Critical Habitat | Not listed | Not listed; PHS | EFH |
| | Steelhead | *Oncorhynchus mykiss* | LCR DPS | LT; Critical Habitat | S | C; PHS | EFH; SGCN-OR; 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] |
|---|---|---|---|---|---|---|---|
| **Fish** | | | 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 | *Oncorhynchus clarkii clarkii* | Southwestern Washington/ Columbia River Coastal DPS | Not listed | S | Not listed; PHS | SOC (USFWS-WA) SGCN-OR; SGCN-WA |
| | Bull trout | *Salvelinus confluentus* | Columbia River DPS | LT; Critical Habitat | SC | C; PHS | SGCN-OR; SGCN-WA |
| | Pacific eulachon | *Thaleichthys pacificus* | Southern DPS | LT; Critical Habitat | Not listed | Not listed; PHS | SGCN-OR; SGCN-WA |
| | North American green sturgeon | *Acipenser medirostris* | Southern DPS | LT; Critical Habitat | SC | Not listed; PHS | SGCN-OR; SGCN-WA |
| | White sturgeon | *Acipenser transmontanus* | N/A | Not listed | S | Not listed; PHS | SGCN-OR; SGCN-WA |
| | Pacific lamprey | *Entosphenus tridentata* | N/A | Not listed | S | Not listed; PHS | SOC (USFWS-WA); SOC (USFWS-OR); SGCN-OR; SGCN-WA |
| | River lamprey | *Lampetra ayresi* | N/A | Not listed | Not listed | C; PHS | SGCN-WA |
| | Leopard dace | *Rhinichthys falcatus* | 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] |
|---|---|---|---|---|---|---|---|
| **Marine Mammals** | Killer whale | *Orcinus orca* | Southern Resident DPS | LE; Critical Habitat | Not listed | LE; PHS | MMPA; SGCN-OR; SGCN-WA |
| | Steller sea lion | *Eumetopias jubatus* | Eastern DPS | Not listed | Not listed | Not listed; PHS | MMPA; SGCN-OR |
| | California sea lion | *Zalophus californianus* | N/A | Not listed | Not listed | Not listed; PHS | MMPA |
| | Harbor seal | *Phoca vitulina* | N/A | Not listed | Not listed | Not listed; PHS | MMPA; SGCN-OR |
| **Invertebrates** | Western ridged mussel | Gonidea angulata | N/A | Under review | Not listed | Not listed | SGCN-OR; SGCN-WA |
| | California floater | *Anodonta californiensis* | N/A | Not listed | Not listed | C; PHS | SGCN-OR; SGCN-WA |

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, 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 study area, 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 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 3.16-3 lists approximate acreages of terrestrial habitat types within the 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 wetland in the south and the Burnt Bridge Creek Greenway in the north. The Ruby Junction Maintenance Facility is not shown on Figure 3.16-3 because the area is entirely developed and classified as "Urban and Mixed Environs."

Table 3.16-3. Acres of Terrestrial Habitat Classification within the Primary and Secondary Study Areas

| Habitat Classification | Primary Study Area (acres) | 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*

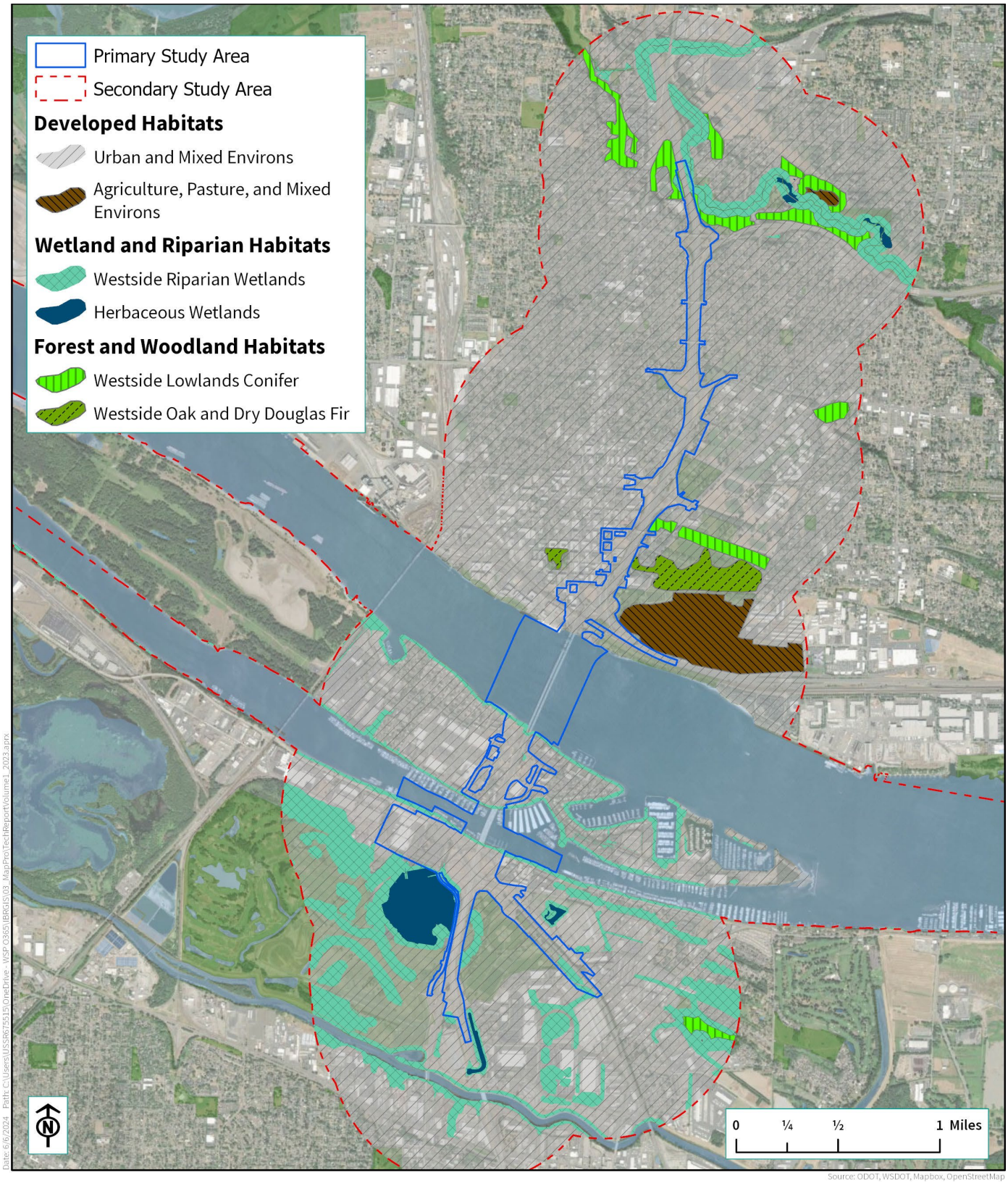
Although urban environments are usually considered to provide relatively low-quality habitat, some terrestrial wildlife species have adapted to these conditions. For example, bridges and other structures can provide nesting and perching habitat for certain migratory bird species. Examples of SOI associated 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 study area is 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 Primary and Secondary Study Areas



### *Wetland and Riparian Habitat*

Wetland and riparian habitats within the study area 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 study area, 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 study area, 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 3.16-4 presents a list of terrestrial SOI, including birds, mammals, amphibians/reptiles, and insects, that may occur within the study areas, along with their regulatory status.

Table 3.16-4. Terrestrial Species of Interest Potentially Occurring within the 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 | *Eremophila alpestris strigata* | LT; Critical Habitat | SC | LE; PHS | MBTA; SGCN-OR; SGCN-WA |
| | Bald eagle | *Haliaeetus leucocephalus* | Not listed | Not listed | Not listed | BGEPA; MBTA; SGCN-WA |
| | Peregrine falcon | *Falco peregrinus anatum* | 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 | *Progne subis* | Not listed | SC | Not listed | MBTA; SGCN-OR; SGCN-WA |
| | Willow flycatcher | *Empidonax traillii* | Not listed | SC | Not listed | MBTA; SGCN-OR |
| | Common loon | *Gavia immer* | Not listed | Not listed | S; PHS | MBTA; SGCN-WA |
| | Great blue heron | *Ardea Herodias* | Not listed | Not listed | PHS | MBTA |
| | Other migratory birds | Multiple Species | N/A | N/A | N/A | MBTA |
| **Mammals** | Columbian white-tailed deer | *Odocoileus virginianus ssp. Leucurus* | LT | S | LT; PHS | SGCN-OR; SGCN-WA |
| | Long-legged myotis | *Myotis volans* | Not listed | S | Not listed; PHS [e] | SGCN-OR |
| | Fringed myotis | *Myotis thysanodes* | Not listed | S | Not listed; PHS [e] | SGCN-OR |
| | Long-eared myotis | *Myotis evotis* | Not listed | Not listed | Not listed; PHS [e] | SGCN-OR |
| | Townsend's big-eared bat | *Corynorhinus townsendii* | Not listed | SC | C; PHS | SGCN-OR; SGCN-WA |
| | Silver-haired bat | *Lasionycteris noctivagans* | Not listed | S | Not listed; Candidate | SGCN-OR; SGCN-WA |
| **Reptiles and Amphibians** | Western pond turtle | *Actinemys marmorata* | Not listed | S | LE; PHS | SGCN-OR; SGCN-WA |
| | Painted turtle | *Chrysemys picta* | Not listed | SC | Not listed | SGCN-OR; SGCN-WA |
| | Northern red-legged frog | *Rana aurora* | Not listed | S | Not listed | 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] |
|---|---|---|---|---|---|---|
| **Insects** | Monarch butterfly | *Danaus plexippus* | 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 3.16-5 lists the botanical SOI, their protection status, and suitable habitat that may occur in the primary study area. Most habitats within the study area have low suitability for these species, and they have not been documented in the primary study area.

Table 3.16-5. Botanical Species of Interest Potentially Occurring within the Primary Study Area

| Species Common Name | Species Scientific Name | Federal Status [a] | State Status (OR) [b] | State Status (WA) [c] | Habitat Suitability in Primary Study Area | Typical Flowering Window |
|---|---|---|---|---|---|---|
| Golden paintbrush | *Castilleja levisecta* | T | E | T | Low – Agriculture, Pasture and Mixed Environs | April–June |
| Kincaid's lupine | *Lupinus oreganus* | T | T | T | Low – Agriculture, Pasture and Mixed Environs | April–June |
| Nelson's checkermallow | *Sidalcea nelsoniana* | T | T | E | Low – Agriculture, Pasture and Mixed Environs | Late May–July |
| Willamette Daisy | *Erigeron decumbens* | E | E | Not listed | Low – Agriculture, Pasture and Mixed Environs | June–July |

| Species Common Name | Species Scientific Name | Federal Status [a] | State Status (OR) [b] | State Status (WA) [c] | Habitat Suitability in Primary Study Area | Typical Flowering Window |
|---|---|---|---|---|---|---|
| Tall bugbane | *Actaea elata var. elata* | Not listed | Not listed | S | Low – Westside Riparian – Wetlands and Westside Lowlands Conifer – Hardwood Forest | May–August |
| Small-flowered trillium | *Trillium albidum ssp. Parviflorum* | Not listed | Not listed | S | Low – Westside Riparian – Wetlands and Westside Lowlands Conifer – Hardwood Forest | March–May |
| Western ladies-tresses | *Spiranthes porrifolia* | Not listed | Not listed | S | Low – Herbaceous Wetlands and Westside Riparian – Wetlands | May–August |
| Columbia cress | *Rorippa columbiae* | 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 3.16-6 identifies 14 species of noxious weeds known or expected to occur within the 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 primary study area.

Table 3.16-6. Noxious Weed Species Occurring within the Primary Study Area

| Botanical Name | Common Name |
|---|---|
| *Centaurea × gerstlaueri* (*Centaurea pratensis)* | Meadow knapweed |
| *Cirsium arvense* | Canada thistle |
| *Cirsium vulgare* | Bull thistle |
| *Clematis vitalba* | Old man's beard |
| *Conium maculatum* | Poison hemlock |
| *Convolvulus arvensis* | Field bindweed |
| *Cytisus scoparius* | Scotch broom |
| *Daucus carota* | Wild carrot |
| *Geranium robertianum* | Herb-Robert's |
| *Hedera helix* | English ivy |
| *Hypericum perforatum* | St. John's wort |
| *Phalaris arundinacea* | Reed canarygrass or Ribbongrass |
| *Fallopia japonica* | Japanese knotweed |
| *Rubus armeniacus* | 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 study areas. Table 3.16-7 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 3.16-7. Federal, State, and Local Habitat Designations within the 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. |

| | Agency | Limits of Jurisdiction | Resource Designation | Description |
|---|---|---|---|---|
| **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. 11 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. |
| | 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 fish and wildlife habitat conservation areas (FHWCAs). The City of Vancouver has a CAO that defines and regulates development activities within FHWCAs. |

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 Effects

Table 3.16-8 summarizes the ecosystem effects of the Modified LPA, including design options, and the No-Build Alternative, followed by a discussion of the effects.

Table 3.16-8. Summary of Ecosystems Effects from the Modified LPA, Including Design Options, and No-Build Alternative

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Effect Category | No-Build Alternative | Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options | Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5, all Park-and-Ride Site Options | Modified LPA with Single-Level Fixed-Span Configuration, [a] One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options | Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options | Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5, all Park-and-Ride Site Options |
| Aquatic resources (total net change compared to the existing condition) | • Continued impacts from untreated stormwater from approximately 156.4 acres of existing CIA.<br>• Potential for injury and habitat degradation in the case of a bridge failure. | • Benthic habitat impact: -0.13 acres (net restoration).<br>• Overwater Shading (Water Surface): +1.04 acres.<br>• Overwater Shading (Elevated Deck): +8.22 acres.<br>• Beneficial effect of stormwater treatment for all post-project CIA, including approximately 156.4 acres of existing impervious area that is currently untreated. | • Similar to effects listed in Column 3, except would result in a greater amount of elevated overwater shading.<br>• Overwater Shading (Elevated Deck): +13.02 acres. | • Benthic habitat impact: +0.03 acres.<br>• Overwater Shading (Water Surface): +1.41 acres.<br>• Overwater Shading (Elevated Deck): +10.78 acres. | • Benthic habitat impact: +0.07 acres of in-water area.<br>• Overwater Shading (Water Surface): +1.58 acres.<br>• Overwater Shading (Elevated Deck): +10.78 acres. | • Same as effects listed in Column 3. |
| Permanent impacts to terrestrial resources in Oregon (acres) | • Potential for injury and habitat degradation in the case of a bridge failure. | • “High” wildlife/riparian value habitats: 1.12.<br>• “Medium” wildlife/riparian value habitats: 6.20.<br>• Wetlands: 0.58.<br>• Wetland Buffers: 7.39. | • Same as effects listed in Column 3. | • Same as effects listed in Column 3. | • Same as effects listed in Column 3. | • Similar to effects listed in Column 3, except would slightly reduce impervious surface. |
| Permanent impacts to terrestrial resources in Washington (acres) | • Potential for injury and habitat degradation in the case of a bridge failure. | • Riparian buffers: 0.79.<br>• Biodiversity Areas: 0.15.<br>• Oak Woodlands: <0.01.<br>• Wetlands: 0.<br>• Wetland Buffers: 0.06. | • Same as effects listed in Column 3. | • Same as effects listed in Column 3. | • Same as effects listed in Column 3. | • Same as effects listed in Column 3. |

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

## 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 primary study area would continue to enter aquatic habitat surface waters largely untreated. If a major earthquake event occurred that resulted in the existing Interstate Bridge over the Columbia River failing or collapsing, fish and wildlife species in the immediate vicinity and in aquatic habitats both upstream and downstream could be struck by falling debris and injured or killed. Fallen debris would also diminish habitat suitability and contribute chemical contaminants that could affect aquatic species and habitats upstream and downstream of the bridge.

## Modified LPA

The subsections below describe the long-term impacts that would occur with the Modified LPA. As described in Chapter 2, several design options are being evaluated as part of the 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 option, I-5 mainline westward shift or centered option, and the park and ride site options evaluated as part of the Modified LPA would not result in different levels or types of 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 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 long-term effects to ecosystem resources associated with the 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 in 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 3.16-9 summarizes the permanent aquatic habitat impacts associated with the Modified LPA.

Table 3.16-9. Permanent Benthic Habitat and Overwater Shading Aquatic Impacts Summary

| Impact to Columbia River and North Portland Harbor | Double-Deck Fixed-Span Configuration (acres) | Single-Level Fixed-Span Configuration (acres) [a] | Single-Level Movable-Span Configuration (acres) | Restored Area from Removal of Existing Bridge (acres) | Total Net Change (acres) |
|---|---|---|---|---|---|
| Benthic Habitat Loss | 0.91 | 1.07 | 1.11 | -1.04 | • Double-deck fixed-span: -0.13<br>• Single-level fixed-span: +0.03<br>• Single-level movable-span: +0.07 |
| Overwater Shading (Water Surface) | 1.04 | 1.41 | 1.58 | 0.00 | • Double-deck fixed-span: +1.04<br>• Single-level fixed-span: +1.41<br>• Single-level movable-span: +1.58 acres. |
| Overwater Shading (Elevated Deck) [b] | 19.87 | 24.13 | 24.13 | -11.65 | • Double-deck fixed-span: +8.22<br>• Single-level fixed-span: +10.78<br>• Single-level movable-span: +10.78 |

a The permanent benthic habitat and overwater shading impacts associated with the single-level fixed-span configuration would be the same for all bridge types.

b 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.

### *Benthic Habitat Impacts*

For the Modified LPA with the double-deck fixed-span configuration, in-water piers to support the new Columbia River and North Portland Harbor bridges would displace approximately 0.91 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 double-deck fixed-span configuration would result in a net restoration of approximately 0.13 acres of benthic habitat. The Modified LPA with the single-level fixed-span configuration would require 24 more drilled shafts than the double-deck fixed-span configuration, which would result in a greater benthic impact of 1.07 acres and a 0.03-acre net reduction in benthic habitat. The Modified LPA with the single-level movable span configuration would require 36 more drilled shafts than the double-deck fixed-span configuration, resulting in a total benthic impact of 1.11 acres and a 0.07-acre net reduction in benthic habitat. It is important to note that 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, white sturgeon, 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 benthic habitat impact compared to the one auxiliary lane option.

### *Overwater Shading Impacts*

In addition to affecting 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 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 double-deck fixed-span configuration would result in a total of approximately 1.04 acres of shading at the Columbia River water surface. The Modified LPA with the single-level fixed-span configuration would require larger drilled shaft caps and would result in an increase of approximately 1.41 acres of shading at the Columbia River water surface. The Modified LPA with the single-level movable-span configuration 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 configurations, 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 configurations, 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 double-deck fixed-span configuration would have a total of approximately 19.87 acres of new elevated overwater shading, and the removal of the existing bridge would reduce elevated overwater coverage by approximately 11.65 acres, for a net increase of approximately 8.22 acres of elevated overwater coverage. Compared to the Modified LPA with the double-deck fixed-span configuration, the Modified LPA with the single-level fixed-span configuration would increase elevated overwater shading by 4 acres, and the Modified LPA with the single-level movable-span configuration would increase elevated overwater shading by approximately 5 acres.

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 Code of Federal Regulations 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 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 Columbia River bridge configurations, 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 3.16-10 compares the increase in contributing impervious area (CIA), which could potentially increase the amount of pollutants entering stormwater, for each configuration of the Modified LPA. The Modified LPA with the double-deck fixed-span configuration would add approximately 29.6 acres of CIA but would treat or infiltrate 207.2 acres of CIA. The Modified LPA with the single-level fixed-span and single-level movable-span configurations would increase the CIA by 32.9 acres (an increase of approximately 3.3 acres compared to the double-deck configuration). 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 configuration 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 3.16-10. Post-Project Increase in Contributing Impervious Area

| | Double-Deck Fixed-Span Configuration | Single-Level Fixed-Span Configuration [a] | Single-Level Movable-Span Configuration |
|---|---|---|---|
| Increase in Contributing Impervious Area (acres) [b] | 29.6 | 32.9 | 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 configuration 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 configurations, 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.

### *Avian (Bird) Predation*

Avian (bird) 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 configurations, 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.

## ***Terrestrial Resources***

As summarized in Table 3.16-11, the Modified LPA would result in the loss of small quantities of sensitive terrestrial habitats. The habitat designations shown in Table 3.16-11 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 design configurations.

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 3.16-11. Permanent Loss of Sensitive Terrestrial Habitats

| Sensitive Terrestrial Habitat (Oregon) | Permanent Loss of Sensitive Terrestrial Habitat (acres) |
|---|---|
| "High" wildlife/riparian value habitats | 1.12 |
| "Medium" wildlife/riparian value habitats | 6.20 |
| Wetlands | 0.58 |
| Wetland Buffers | 7.39 |
| **Sensitive Terrestrial Habitat (Washington)** | |
| Riparian Buffers | 0.79 |
| Biodiversity Areas | 0.15 |
| Oak Woodlands | <0.01 |
| Wetlands | 0 |
| Wetland Buffers | 0.06 |

### *Sensitive Terrestrial Habitats in Oregon*

In Oregon, the Modified LPA would result in a permanent loss of approximately 7.32 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 would also result in approximately 0.58 acre of permanent wetland fill, and approximately 7.39 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 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 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 0.79 acres of riparian buffers, 0.15 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. Some of this 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 migratory birds, such as nest removal, would 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 study area. Providing an alternate nesting structure would greatly reduce the potential nesting impact.

### *Terrestrial Wildlife Passage*

Terrestrial wildlife passage is severely limited in the 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.

### ***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.

## 3.16.4 Temporary Effects

### 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 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 (the C-Street ramp options, I-5 mainline westward shift options, and the two park and ride site options) would not result in different levels or types of short-term effects to ecosystem resources, and these design options are not specifically 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.

### *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 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 and 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 3.16-12 provides a summary of these temporary aquatic habitat impacts.

In the Columbia River, the Modified LPA with the double-deck fixed-span configuration would temporarily displace approximately 1.52 acres of benthic habitat, with about 86% of these effects from cofferdams during construction and demolition. The Modified LPA with the single-level fixed-span configuration and the Modified LPA with the single-level movable-span configuration would have similar temporary effects, generally, however these two single-level design options would have approximately 0.42 acres more benthic in-water area temporarily displaced within cofferdams. This increase in acreage of temporary benthic habitat impact would not, however, result in a different net effect on ecosystems compared to the Modified LPA with the double-deck fixed-span bridge configuration. 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.

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.

Table 3.16-12. 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 | 0.01 | 0 |
| Suspended Shaft Cap Isolation System | 0 | 0.25 | - | - |
| Sheet Pile Cofferdams (Construction) | 0.44 | 0 | - | - |
| Sheet Pile Cofferdams (Demolition) | 0.86 | 0 | - | - |
| Drilled Shaft Isolation Casings | - | - | 0.24 | 0 |
| Barges and Barge Mooring Piles (Construction) | 0.01 | 2.75 | 0.02 | 2.41 |
| Barges and Barge Mooring Piles (Demolition) | 0.01 | 0.65 | 0.01 | 0.53 |
| **Total** | **1.52** | **7.89** | **0.40** | **7.72** |

### *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 both during and after the installation of 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 wastes 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 configurations, 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 configurations, 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 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 study area for adult and outmigrating juvenile salmon, steelhead, and bull trout. Temporary lighting would not constitute a complete 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, 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 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 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.

NOAA Fisheries has established specific decibel level thresholds for 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). A disturbance threshold has also been established for levels of underwater noise during impact pile driving that could cause disturbance but would not result in injury.

Impact pile driving during construction of the Modified LPA would result in noise levels that would temporarily exceed these injury and disturbance 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 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 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 study area in relatively high numbers; therefore, the vessels to be used in the construction of the Modified LPA do not represent a new noise source, only a potential increase in the frequency and duration of this type of activity.

### *Avian Predation*

Construction of the Modified LPA is not expected to have an appreciable effect on avian predation pressure on juvenile salmonids, Pacific eulachon, lamprey, or other native fish. 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. It is therefore possible that avian predation pressure could temporarily increase to some extent within the 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 3.16-13 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.

Table 3.16-13. Temporary Disturbance of Sensitive Terrestrial Habitats

| | Terrestrial Habitat | Temporary Disturbance of Sensitive Terrestrial Habitat (acres) |
|---|---|---|
| **Oregon** | “High” riparian/wildlife value habitats | 4.6 |
| | “Medium” riparian/wildlife value habitats | 5.7 |
| | Wetlands | 2.56 |
| | Wetland Buffers | 7.11 |
| **Washington** | Riparian Buffers | 1.15 |
| | Biodiversity Areas | 2.87 |
| | Oak Woodlands | 0.03 |
| | Wetlands | 0 |
| | Wetland Buffers | 1.19 |

### *Sensitive Terrestrial Habitats in Oregon*

In Oregon, construction of the Modified LPA would result in temporary disturbance of approximately 2.56 acres of wetland, 7.11 acres of wetland buffer, and approximately 10.3 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 1.15 acres of riparian buffers, approximately 2.87 acres of a designated biodiversity area, approximately 0.03 acres of priority oak woodland habitat and approximately 1.19 acres of wetland buffer in Washington. 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 habitat. However, the only area affected would be a grassy shoulder adjacent to I-5. No oak trees or vegetation would be removed within this location, and there would be no loss of oak woodland habitat function in this location.

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.

### *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 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 Modified LPA.

## 3.16.5 Indirect Effects

### No-Build Alternative

No indirect effects are anticipated to result from the No-Build Alternative.

### Modified LPA

#### *Changes in Land Use and Traffic*

Transportation system changes can have different types and degrees of effects on land use, including increased growth and changes in land use patterns. These effects can result in indirect effects on ecosystem resources by increasing the amount, rate, or location of development.

As described in Section 3.4.4, the Modified LPA 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 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 the potential loss of habitat and impervious surface throughout the region.

Applicable federal, state, and local environmental regulations would minimize impacts from any such development or redevelopment activities. Local regulations require the avoidance and minimization of impacts to sensitive resources, including shorelines, wetlands, and riparian habitats. As such, indirect changes in land use patterns are not expected to result in adverse effects to ecosystem resources.

The Modified LPA also has the potential to affect how traffic moves through the study area. 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. A 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. 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 ecosystem resources.

#### *Prey Base for Southern Resident Killer Whales*

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

### *Federal Navigation Channel Dredging*

Within the vicinity of the Interstate Bridge, there are four federally authorized navigation projects on the Columbia River: three federally authorized navigation channels that pass beneath the Interstate Bridge (the primary navigation channel, barge channel, and alternate barge channel) and the federally authorized Upper Vancouver Turning Basin located immediately downstream of the Interstate Bridge.

The federal navigation projects would be maintained with the Modified LPA. However, the primary navigation channel would be swapped with the existing barge channel, which would move the primary navigation channel closer to the center of the river than its current location. No changes are proposed to authorized or maintained channel depths, and no dredging is proposed or reasonably certain to occur as a result of the Modified LPA. The existing bathymetry at the locations of the proposed channels provide sufficient depth. Therefore, the reconfiguration of the navigation channels that would occur under the Modified LPA is not expected to result in adverse indirect effects to ecosystem resources.

## 3.16.6 Potential Avoidance, Minimization, and Mitigation Measures

The design of the proposed Columbia River bridges has been modified to avoid and minimize impacts. Examples of these modifications include reducing the number of in-water piers, timing restrictions on in-water work, enhancement of the proposed stormwater treatment to exceed regulatory minimums, and configuration changes to avoid and minimize impacts to sensitive aquatic and terrestrial habitats. It is anticipated that the Biological Opinion that will be issued by the National Marine Fisheries Service (NMFS) would include additional conservation measures (reasonable and prudent measures) and terms and conditions that are necessary and appropriate to minimize the effects from the incidental take of listed fish.

Construction methods have also been refined to avoid long-term impacts, such as developing an alternative shaft cap isolation system for four of the Columbia River bridges' piers, which would avoid the need for cofferdams and concrete seals in these locations.

### Long-Term Effects

#### *Regulatory Requirements*

- Provide stormwater quality and quantity treatment that meets or exceeds applicable regulatory requirements for all post-project CIA.

#### *Program-Specific Mitigation*

- Avoid and minimize long-term impacts to ecosystem resources in final design to the extent practicable.
- Provide compensatory mitigation for unavoidable impacts to ecosystem resources, consistent with applicable federal, state, and local regulatory requirements.
- 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.
- Provide an alternate nesting structure, either on the new Columbia River bridges or within the vicinity, to offset removal of an existing peregrine falcon nest from demolition of the existing Interstate Bridge.

## Temporary Effects

### *Regulatory Requirements*

The following impact avoidance and minimization measures would be implemented as regulatory requirements to avoid and minimize potential effects to ecosystem resources.

**General Measures and Conditions**

- Perform all work according to the requirements and conditions of the regulatory permits that are issued for the Modified LPA.
- Require contractor to prepare a Water Quality Protection and Monitoring Plan (WQPMP) to satisfy the monitoring and reporting requirements of the 401 Water Quality Certifications that are ultimately issued for the project. The WQPMP would be provided to NOAA Fisheries for review and approval prior to implementation. The WQPMP would identify the timing and methodology for water-quality sampling during construction of the Modified LPA, as well as methods of implementation and reporting. If, in the future, a standard water-quality monitoring plan is adopted by ODOT and/or WSDOT, this plan, with the agreement of NOAA Fisheries, may replace the contractor plan.
- In compliance with ODOT and WSDOT policy and construction administration practice in Oregon and Washington, have one or more Department of Transportation inspectors on site during construction. The role of the inspector(s) would be to monitor compliance with contract and permit requirements.
- If in-water dredging is required outside of a cofferdam, use a clamshell bucket. Dredging and handling and disposal of dredged materials shall be conducted consistent with the requirements and conditions of the regulatory permits issued for the Modified LPA.
- Prohibit work barges from grounding out.
- Dispose of excess or waste materials in an appropriate manner consistent with applicable local, state, and federal regulations; do not dispose of or abandon waste materials waterward of the OHWM or allow them to enter waters of the state.
- All pumps must employ a fish screen that meets the following specifications:
    - 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 millimeters [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.

**Spill Prevention/Pollution Control Measures**

- Require contractor to prepare a spill prevention, control, and countermeasure (SPCC) plan and pollution control plan (PCP) prior to beginning construction. These plans would be provided to NOAA Fisheries for review and approval. The SPCC plan and PCP would identify the appropriate spill containment materials; as well as the means and methods of implementation, response, and reporting. All elements of the SPCC plan and PCP would be available at the project site at all times. For additional detail, consult ODOT Standard Specification 00290.00 to 00290.90.

- Require contractor to designate at least one employee as the erosion and spill control (ESC) lead. The ESC lead would be responsible for the implementation of the SPCC plan and PCP.
- Maintain applicable spill response equipment and material designated in the SPCC plan and PCP at the job site.
- With the exception of barges and stationary large equipment (cranes, oscillators) operating from barges or work platforms, 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.
- Clean and inspect all equipment to be used for construction activities prior to arriving at the project site, to ensure no potentially hazardous materials are exposed, no leaks are present, free of noxious weeds, and the equipment is functioning properly. Daily inspection and cleanup procedures would be identified.
- Should a leak be detected on heavy equipment used for the project, immediately remove the equipment from the area, and do not use again until adequately repaired. Where off-site repair is not practicable, the SPCC plan and PCP would document measures to be implemented to prevent and/or contain accidental spills in the work/repair area to ensure no contaminants escape containment to surface waters and cause a violation of applicable water-quality standards.
- Operate construction equipment 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 portions of the streambank above the OHWM. Barges and support vessels would be operated in the water.
- Provide suitable containment measures for all equipment (including barges, work decks, stationary power equipment, and storage facilities) in the SPCC plan and PCP to prevent and/or contain accidental spills to ensure that no contaminants escape containment to surface waters and cause a violation of applicable water-quality standards.
- 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.
- Process water generated on site from construction, demolition or washing activities would be contained and treated to meet applicable water-quality standards before entering or reentering surface waters.
- Do not conduct paving, chip sealing, or stripe painting activities during periods of rain or wet weather.
- In the SPCC plan and PCP, establish a concrete truck chute cleanout area to properly contain wet concrete as part of ODOT Standard Specification 00290.30(a).

**Site Erosion/Sediment Control Measures**

- Require contractor to prepare and implement a temporary erosion and sediment control plan (TESCP) to minimize impacts associated with clearing, vegetation removal, grading, filling, compaction, or excavation. The BMPs identified in the TESCP would be used to control sediments from all vegetation removal or ground-disturbing activities. Additional temporary control measures may be required beyond those described in the TESCP if it appears pollution or erosion may result from weather, nature of the materials or progress on the work. For additional detail, consult ODOT Standard Specifications 00280.00 to 00280.90.
- As part of the TESCP, delineate clearing limits with orange barrier fencing wherever clearing is proposed in 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. Location would be specified in the field, based upon site conditions and the TESCP. For additional silt fence detail, consult ODOT Standard Specification 00280.16(c).

- Require contractor to designate at least one employee as the ESC lead. The ESC lead would be responsible for the implementation of the SPCC plan and PCP and would also be responsible for ensuring compliance with all local, state, and federal erosion and sediment control requirements.
- All TESCP measures would be inspected and maintained as required by applicable permit requirements. Contractor would also conduct maintenance and repair of TESCP measures as described in ODOT Standard Specifications 00280.60 to 00280.70.
- For landward construction and demolition, 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.
- Complete excavation activities under dry or dewatered conditions where practicable. All surface water flowing toward the excavation would be diverted through utilization of cofferdams and/or berms. Cofferdams and berms must be constructed of sandbags, clean rock, steel sheeting, or other non-erodible material.
- Limit bank shaping to the extent as shown on the approved grading plans. Minor adjustments made in the field would occur only after engineer's review and approval.
- Install biodegradable erosion control blankets on areas of ground-disturbing activities on steep slopes (1V:3H or steeper) that are susceptible to erosion and within 150 feet of surface waters. Areas of ground-disturbing activities that do not fit the above criteria would implement erosion control measures as identified in the approved TESCP. For additional erosion control blanket detail, consult ODOT Standard Specification 00280.14I.
- Cover erodible materials (material capable of being displaced and transported by rain, wind or surface water runoff) temporarily stored or stockpiled for use in project activities to prevent sediments from being washed from the storage area to surface waters. Temporary storage or stockpiles must follow measures as described in ODOT Standard Specification 00280.42.
- Stabilize all exposed soils as directed in measures prescribed in the TESCP. Hydro-seed all bare soil areas following grading activities and revegetate all temporarily disturbed areas with native vegetation indigenous to the location. For additional details, consult ODOT Standard Specifications 01030.00 to 01030.90.
- Where site conditions support vegetative growth, plant native vegetation indigenous to the location in areas temporarily disturbed by construction activities. Revegetation of construction easements and other areas would occur after the project is completed. Trees would be planted when consistent with highway safety standards. Riparian vegetation would be replanted with species native to geographic region. Planted vegetation would be maintained and monitored to meet regulatory permit requirements. For additional detail, consult ODOT Standard Specifications 01040.00 to 01040.90.

**Pile Installation and Removal Best Management Practices**

- Use a vibratory hammer to drive steel piles to the maximum extent practicable, to minimize noise levels.

- Conduct impact pile driving below the OHWM 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.
- No more than two impact pile drivers would be operated simultaneously within the same waterbody channel.
- Employ a bubble curtain or other similarly effective noise attenuation device during all impact pile driving conducted in water depths greater than 2 feet (0.67 meters).
- Develop and implement a hydroacoustic monitoring plan, based on the template developed by the Fisheries Hydroacoustic Working Group, in coordination with FHWA and FTA to confirm the effectiveness of the noise attenuation devices and that predicted noise levels adequately capture the area of the potential onset of injury. The plan would be provided to NOAA Fisheries for review and approval prior to any impact pile-driving activity commencing.
- Prepare a marine mammal monitoring plan and establish injury protection zones for marine mammals.
- Install cones or other anti-perching devices on open-ended pipe piles to discourage perching by piscivorous birds.
- Remove temporary piles with a vibratory hammer, or by direct pulling, and prohibit intentionally breaking by twisting or bending.
- In the event that a temporary pile cannot be removed, cut or press the pile 3 feet below the mudline. At locations where hazardous materials are present or adjacent to utilities, temporary piles may be cut off at the mud line with underwater torches, if such activity would not conflict with navigation elements.

**Work Area Isolation and Fish Salvage Best Management Practices**

- Develop a Temporary Water Management Plan, consistent with the requirements of ODOT Special Provision Section 00245.03, and provide to NOAA Fisheries for review and approval prior to any work area isolation of fish salvage activities.
- Install cofferdams and isolation casings in a manner that minimizes fish entrapment. Sheet piles would be installed from upstream to downstream, lowered slowly until contact with the substrate.
- Screen drilled shaft isolation casings at the bottom, to minimize potential for fish entrapment during installation. Screen shall have maximum openings of approximately 3/32 inch (2.38 mm) measured on a diagonal (NOAA Fisheries 2022).
- Conduct fish salvage according to the best practices established in the biological opinion for ODOT's Federal Aid Highway Programmatic consultation.
- Have a qualified fishery biologist[2] conduct and supervise fish capture and release activity to minimize risk of injury to fish.
- Prepare a fish salvage report and submit to NOAA Fisheries, U.S. Fish and Wildlife Service (USFWS), Oregon Department of Fish and Wildlife (ODFW), and WDFW following project completion.

[2] The qualified biologist shall have a bachelor's degree in biology, fisheries, or equivalent and a minimum of 2 years of experience identifying northwest fish and aquatic species. If electrofishing is required, the lead biologist shall be competent with electrofishing procedures and have completed at least 100 hours of fish salvage following NOAA Fisheries, USFWS, ODFW, and/or WDFW fish salvage/fish removal protocols.

- 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. Attempts to seine and/or net fish would precede the use of electrofishing equipment.
- If electrofishing must be used, conduct consistent with NOAA Fisheries "Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act" (NOAA Fisheries 2000), or most recent version.

**Work Area Lighting BMPs**

- Conduct construction activities consistent with local, state and federal permit restrictions for allowable work hours. If work occurs at night, temporary lighting may be required to provide better visibility for driver and worker safety. If temporary lighting is required, contractor would use directional lighting with shielded luminaries to control glare and direct light onto work area, not surface waters.

### *Program-Specific Mitigation*

- Avoid and minimize short-term impacts to ecosystem resources in final design to the extent practicable.
- Restore temporarily disturbed terrestrial habitats consistent with applicable regulatory requirements.
- Provide compensatory mitigation for unavoidable impacts to ecosystem resources, consistent with applicable federal, state, and local regulatory requirements.
- 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.