SECTION 4 BASELINE CONDITIONS

What ecosystem elements exist in the study area?

The ecosystem elements in the Tukwila to Renton Project study area include wetland, aquatic, and wildlife habitats in which specific plants or animals naturally live, grow, and reproduce. These habitats provide the plants and animals in the study area with food, water, shelter, and living space. Habitats found in the study area are typically degraded when compared to natural conditions due to the urban nature of the study area; however, a large variety of plants and animals still occupy the various habitats found therein.

What are the characteristics of ecosystem elements located in the study area?

Wetlands

What wetlands occur in the study area?

Wetland biologists identified 22 wetlands totaling approximately 93.86 acres within the study area for the Tukwila to Renton Project. Of these 22 wetlands, 16 were previously delineated and mapped as part of the Renton Nickel Improvement Project (*Renton Nickel Improvement Project Wetlands Discipline Report*[23] and *Renton Nickel Improvement Project Wetlands Biology Report*[24]). The other six wetlands are newly identified and delineated wetlands specific to the Tukwila to Renton Project study area. Wetlands identified in the study area are typically associated with streams, hillside seeps, or drainage ditches that receive road runoff and convey stormwater.

How are wetlands identified in this report?

Wetlands in this report are described by location in sequence from west to east. Each wetland in the study area was assigned a number based on its location relative to the nearest I-405 or SR 167 milepost (MP), starting with I-405 MP 0.0 at the I-405 and I-5 interchange at the western end of the study area and

[23] *WSDOT, 2005a*

[24] *WSDOT, 2005b*

extending east to MP 4.1 immediately north of the I-405 and SR 169 interchange. The reach of SR 167 within the study area includes SR 167 MP 24.4 to MP 26.3. The wetland number also includes "L" if the wetland is located on the left (north) side of I-405 or the left (west) side of SR 167; "R" if it is located on the right (south) side of I-405 or the right (east) side of SR 167; and "M" if the wetland is located within the I-405 median. For example, a wetland found at the midpoint between MP 2 and MP 3 on the left side of I-405 would be Wetland 2.5L. A summary of the study area wetlands, their associated local and state ratings, and their buffers is presented in Exhibit 4-1.

Exhibit 4-1: Summary of Wetland Ratings in the Study Area

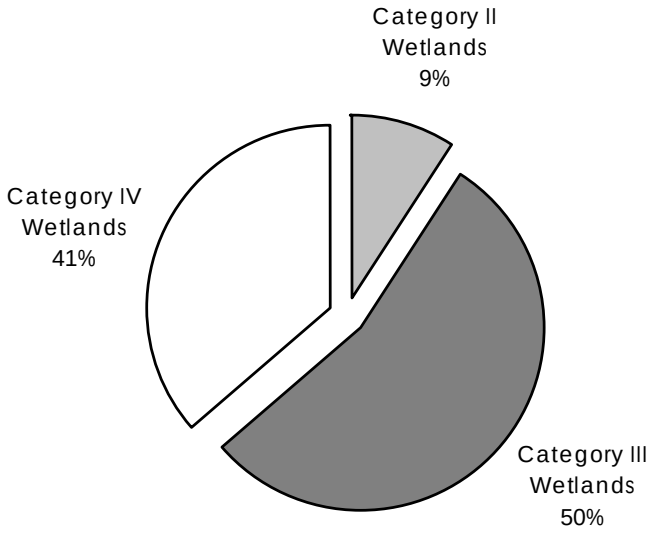
Wetland	Size (acres)	Cowardin Classification	State Rating (Ecology)	Local Rating	Local Jurisdiction Buffer Width (feet)
0.1R	0.05	Emergent	IV	Tukwila – 3	50
0.15R	0.52	Emergent	III	Tukwila – 2	80
0.25M	0.07	Emergent	IV	Tukwila – 3	50
0.3R	1.29	Forested	III	Tukwila – 2	80
0.4L	0.03	Emergent	IV	Tukwila – 3	50
0.6L	0.17	Scrub-shrub	IV	Tukwila – 3	50
0.9R	1.00	Scrub-shrub & Aquatic Bed	III	Tukwila – 2	80
2.2R-A	0.03	Scrub-shrub	IV	Renton – NR	0
2.2R-B	0.03	Scrub-shrub	IV	Renton – NR	0
2.31R	0.01	Emergent	IV	Renton – NR	0
2.6R	0.15	Scrub-shrub & Emergent	III	Renton – 3	25
2.7R	0.25	Scrub-shrub & Emergent	III	Renton – 3	25
2.81L	0.03	Emergent	IV	Renton – NR	0
2.81R	0.07	Scrub-shrub	II	Renton – 3	25
2.82R	0.38	Forested, Scrub-shrub, & Emergent	IV	Renton – 3	25
2.9L	1.05	Scrub-shrub	III	Renton – 3	25
3.0R	0.04	Scrub-shrub & Emergent	III	Renton – NR	0
24.7R	61.00*	Forested, Scrub-shrub, & Emergent	II	Renton – 1	100
25.0L	4.51	Forested	III	Renton – 3	25
25.5L	11.38*	Forested	III	Renton – 3	25
25.7L	0.30	Scrub-shrub	III	Renton – 3	25
25.8L	11.50	Scrub-shrub & Emergent	III	Renton – 3	25
Total	93.86				

City of Renton - Ecology Category III or IV wetlands less than 2,200 square feet (0.05 acre) are exempt from regulation under Renton Municipal Code (RMC) Critical Areas Regulations (RMC 4-3-50 B(7)). These wetlands are specified as "NR" in the above exhibit.

* These wetland sizes were approximated, as the majority of these wetlands are located outside of the study area. Only the portions of the wetlands within the study area were surveyed.

The wetland areas presented in Exhibit 4-1 represent the total area of wetlands delineated, not just those areas that will be affected by construction of the roadway improvements. Exhibit 4-2 visually presents the percentages of wetlands in the study area categorized using the Ecology rating system. Ecology's wetland rating field data forms are presented in Appendix C.

Exhibit 4-2: Percentage of Wetlands in the Study Area Categorized by Ecology Rating System



Wetland locations are shown on Exhibits 4-3 through 4-5.

Exhibit 4-3: Tukwila to Renton Project Wetlands Sheet 1

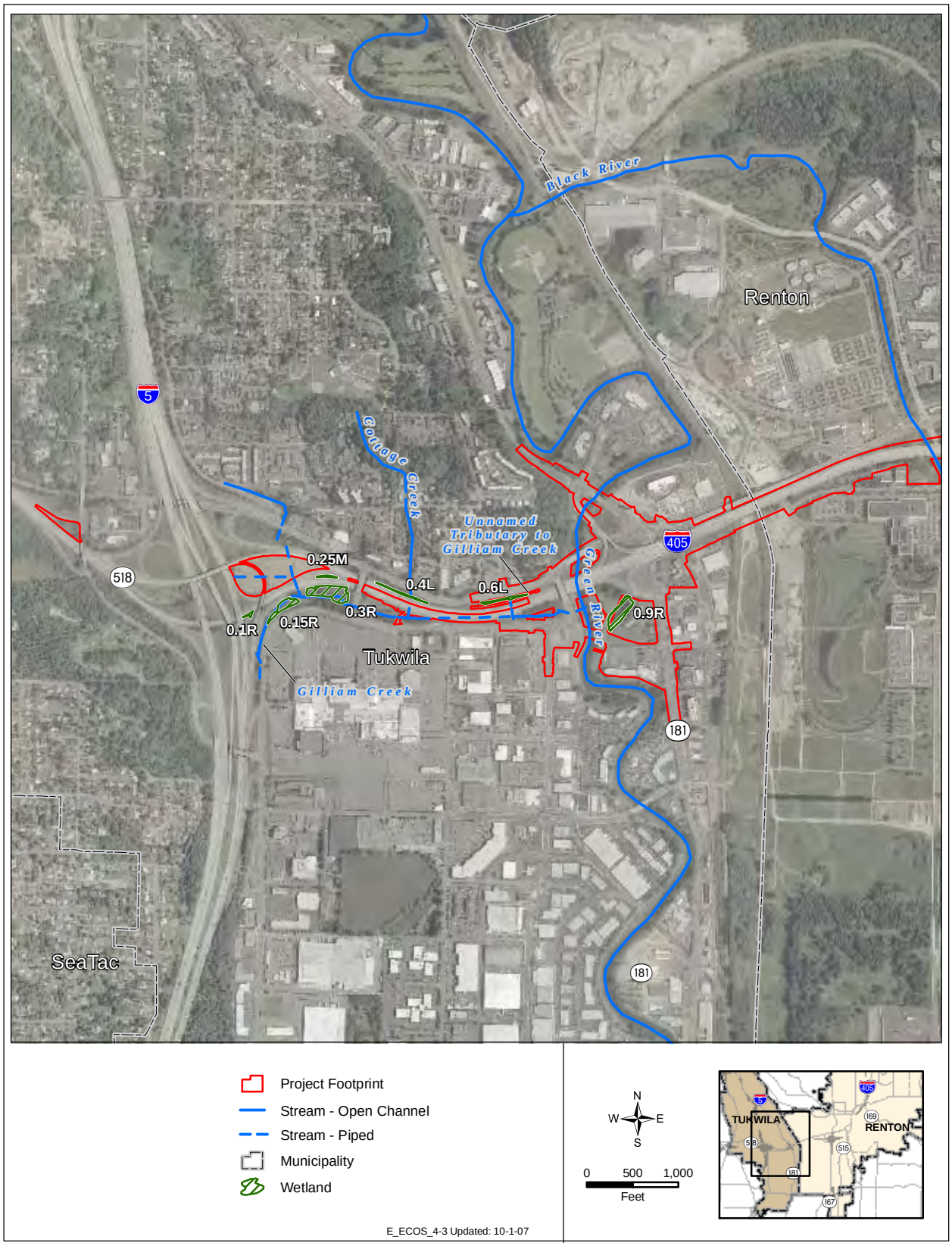


Exhibit 4-4: Tukwila to Renton Project Wetlands Sheet 2

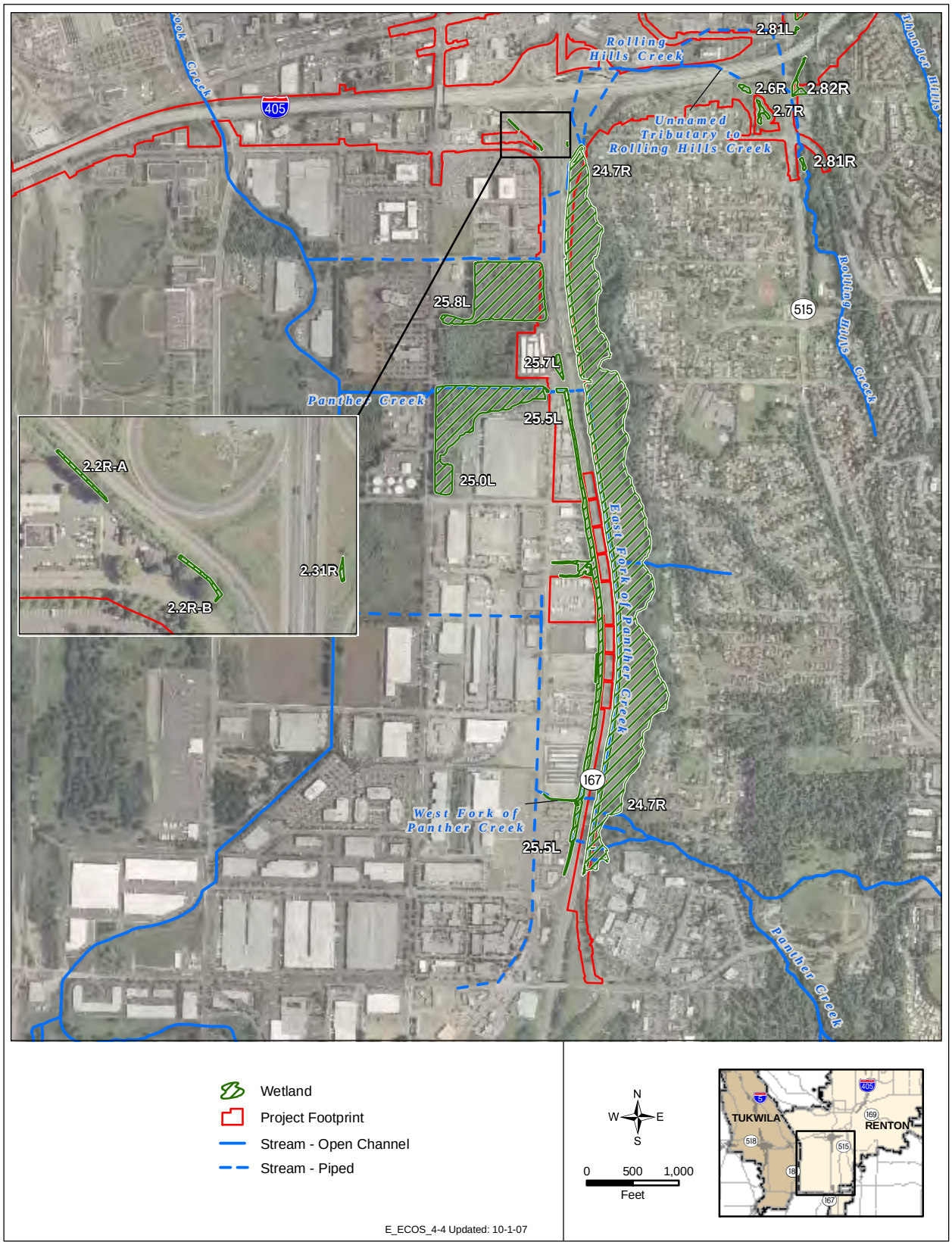


Exhibit 4-5: Tukwila to Renton Project Wetlands Sheet 3

Wetland Classification

Project biologists categorized the 22 wetlands in the study area using Ecology's rating system. Of these, nine wetlands (41 percent) were classified as Category IV; 11 (50 percent) wetlands as Category III; and two (9 percent) wetlands as Category II. No Category I wetlands were identified within the study area, as detailed in Exhibit 4-1.

Emergent Wetland Habitat Type (Wetland 25.8L near SR 167)

The local jurisdictions' guidelines were also used to categorize the wetlands in the study area. Of the 22 wetlands in the study area, seven are under Tukwila's jurisdiction and 15 are under Renton's jurisdiction.

According to the Tukwila Environmentally Sensitive Areas code,[25] four of the wetlands (57 percent) that occur within Tukwila's jurisdiction are Type 3 wetlands. The remaining three wetlands (43 percent) are Type 2 wetlands because they are connected to a watercourse that contains salmonids or are larger than 1 acre. There are no Type 1 wetlands in the study area within Tukwila.

Scrub-Shrub Wetland Habitat Type (Wetland 2.7R near I-405)

Of the 15 wetlands in the study area that occur within Renton, nine (60 percent) are considered to be Category 3 according to the Renton CAO.[26] These wetlands have undergone human-related hydrologic alterations such as ditching or channelization, thus qualifying them as Category 3. One wetland (Wetland 24.7R, associated with Panther Creek) is considered a Category 1 because it is over 10 acres and has three or more vegetation types (one of which is open water). The remaining five wetlands (23 percent) are considered exempt from City of Renton regulations because they are rated under Ecology's classification system as Category III or Category IV and are less than 2,200 square feet (0.05 acre). There are no Category 2 wetlands in the study area within Renton.

Forested Wetland Habitat Type (Wetland 25.5L near SR 167)

The study area spans three different drainage basins or watersheds: Green River, Springbrook Creek, and Cedar River. The Green River basin within the study area contains seven wetlands covering 3.13 acres. The Springbrook Creek basin contains the highest number of wetlands and the largest area of wetlands, with 15 wetlands covering 90.73 acres. No

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[25] *Tukwila, 2006*

[26] *Renton, 2005*

What is surface water drainage?

Surface water drainage is the conveyance of any above groundwater source such as a stream or ditch.

What is a surface hydrological connection?

A surface hydrological connection is when a wetland is linked to or associated with the water source of another system via surface water drainage such as a stream or ditch.

What is reed canarygrass?

Reed canarygrass is non-native and invasive mat forming grass that can reach up to 6 feet in height. This plant forms single species stands that displace diverse native wetland plant communities and prevent the re-establishment of native wetland plant communities. Reed canarygrass dominated wetlands support much lower diversity and numbers of native mammals, birds, amphibians, and macro invertebrates than more diverse native wetland plant communities.

wetlands occur in the portion of the Cedar River basin that lies within the study area. Exhibit 4-6 details the drainage basins in the study area.

The wetlands located within each drainage basin are described below.

Green River Basin

There are seven wetlands in the Green River basin within the study area, three Category III wetlands, Wetlands 0.15R, 0.3R, and 0.9R, and four Category IV wetlands, Wetlands 0.1R, 0.25M, 0.4L, and 0.6L, with a combined total area of 3.13 acres. All seven of the wetlands are located adjacent to I-405 or associated I-405 on- and off-ramps, receive water from surface water drainage and groundwater, and discharge to ditches, catch basins, or culverts. In addition, two of the wetlands, Wetlands 0.15R and 0.3R, have surface connections to Gilliam Creek: Wetland 0.6L has a connection to an unnamed tributary to Gilliam Creek, and Wetland 0.4L drains to a culvert associated with Cottage Creek. All the wetlands in the Green River basin discharge to streams, ditches, and pipes that flow to the Green River.

Of the seven wetlands in the Green River basin, five are under 1 acre in size and are dominated by reed canarygrass (*Phalaris arundinacea*). The remaining two wetlands are dominated by willow (*Salix ssp.*), with one wetland also having red alder (*Alnus rubra Bong.*) as a dominant species. The buffer areas associated with all of the wetlands include fill associated with roads and shrub, grass, and herbaceous habitats typically found in highway medians and right-of-way. Himalayan blackberry (*Rubus armeniacus*), a nonnative invasive species, is a common species in the wetland buffer in the study area. A summary of the wetlands located in the Green River basin and their characteristics are shown in Exhibit 4-7.

Exhibit 4-6: Drainage Basin Boundaries within the Study Area

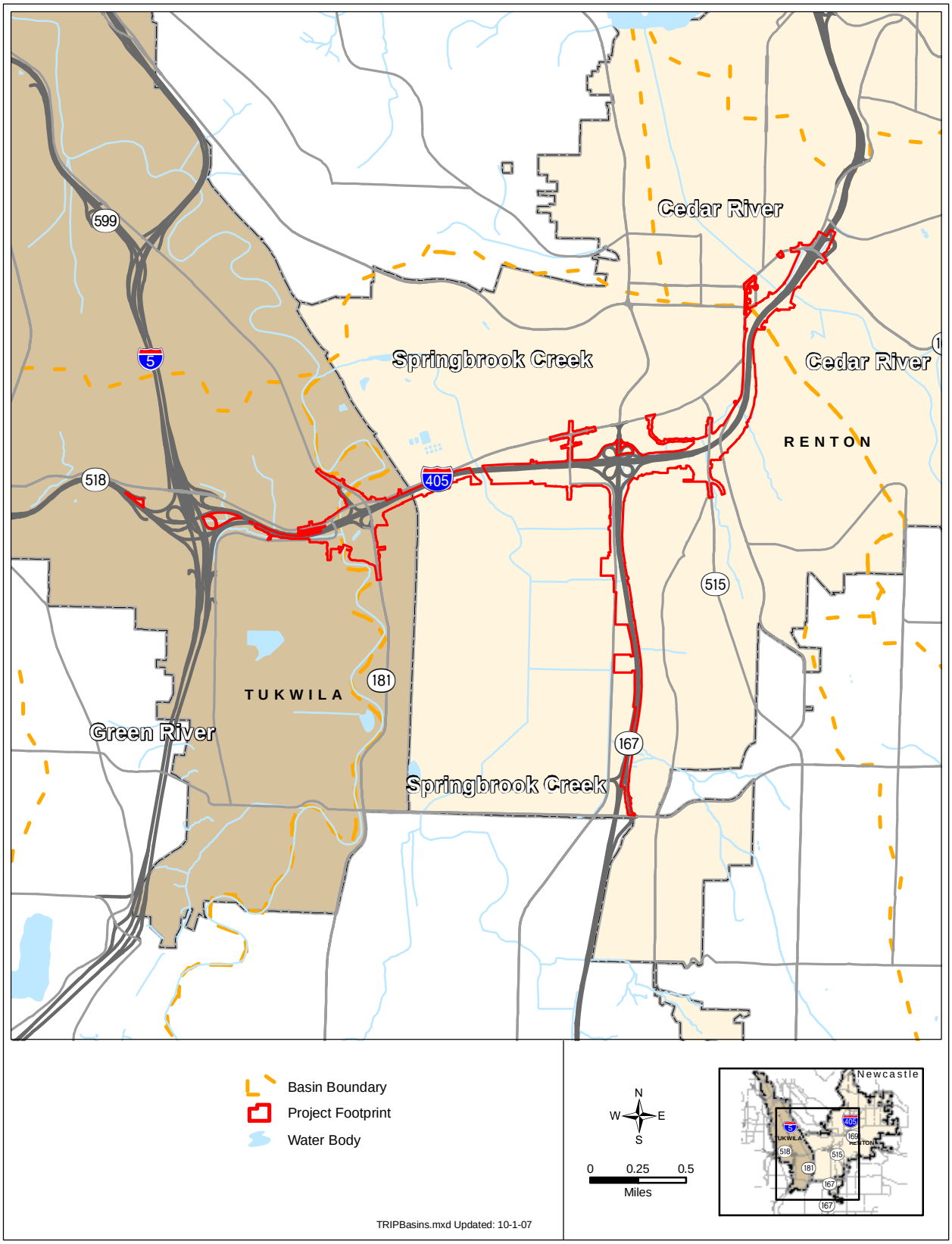


Exhibit 4-7: Summary of Wetlands Located within the Green River Basin

Wetland	Size (acres)	Cowardin Classification	Characteristics
0.1R	0.05	Emergent	Depression dominated by reed canarygrass, soft rush (*Juncus effusus*), and bentgrass (*Agrostis stolonifera*); located in the southeast portion of the I-405/I-5 interchange
0.15R	0.52	Emergent	Depression associated with Gilliam Creek dominated by reed canarygrass; located south of I-5 NB to I-405 NB ramp
0.25M	0.07	Emergent	Maintained swale dominated by reed canarygrass; located between I-405 NB lanes and the HOV on-ramp to I-5 NB
0.3R	1.29	Forested	Ponded depression associated with Gilliam Creek dominated by willow and red cedar (*Thuja plicata*); located south of I-5 NB to I-405 NB ramp and west of 61st Avenue S.
0.4L	0.03	Emergent	Narrow depression that drains into a culvert associated with Cottage Creek dominated by reed canarygrass, common cattail (*Typha latifolia*), and bentgrass; located between I-405 SB lanes and Southcenter Boulevard
0.6L	0.17	Scrub-shrub	Narrow depression that flows to Gilliam Creek via culverts beneath I-405; dominated by reed canarygrass, black cottonwood (*Populus balsamifera ssp. trichocarpa*), willow, and soft rush; located between I-405 SB lanes and Southcenter Boulevard
0.9R	1.00	Aquatic bed and scrub-shrub	Depression with scrub-shrub wetland along perimeter that was the former main channel of the Green River; dominated by willow, located south of the I-405 and SR 181 interchange and east of the Green River
Total	3.13		

NB = northbound; SB = southbound

What is an aquatic bed wetland?

An aquatic bed wetland is a wetland with its surface waters dominated by plants that grow and form a continuous vegetated cover principally on or at the surface. Aquatic bed wetlands have vegetation cover that is greater than 80 percent of the wetland.

Springbrook Creek Basin

Two-thirds of the wetland study area is within the Springbrook Creek Basin. This portion of the study area contains the highest number of wetlands—15 wetlands, with a combined area of approximately 90.73 acres. There are eight

Category III wetlands, Wetlands 2.6R, 2.7R, 2.9L, 3.0R, 25.0L, 25.5L, 25.7L, and 25.8L; five Category IV wetlands, Wetlands 2.2R-A, 2.2R-B, 2.31R, 2.81L, and 2.82R; and two Category II wetlands, Wetlands 2.81R and 24.7R. Wetland 24.7R is the largest and the most significant wetland in the study area—the Panther Creek Wetlands.

All 15 of the wetlands are located adjacent to I-405 or associated I-405 on- and off-ramps, receive water from surface water drainage and groundwater, and discharge to ditches, catch basins, culverts, or streams. Two of the wetlands, Wetlands 2.6R and 2.7R, are associated with an unnamed tributary to Rolling Hills Creek. Wetland 2.81R is associated with Rolling Hills Creek, Wetland 2.9L with Thunder Hills Creek, and Wetland 3.0R with an unnamed tributary to Thunder Hills Creek. Wetlands 24.7R, 25.0L, and 25.5L are associated with Panther Creek.

Of the 15 wetlands in the Springbrook Creek basin, two-thirds are under 1 acre in size and are primarily dominated by reed canarygrass. The remaining wetlands typically contain a greater variety of wetland tree and shrub species associated with forested and scrub-shrub wetland classification types, respectively. The buffer areas associated with these wetlands include fill associated with roads and shrub, grass, and herbaceous habitat typically found in highway medians and right-of-way. A summary of the wetlands located in the Springbrook Creek basin and their characteristics are shown in Exhibit 4-8.

Exhibit 4-8: Summary of Wetlands Located within the Springbrook Creek Basin

Wetland	Size (acres)	Cowardin Classification	Characteristics
2.2R-A	0.03	Scrub-shrub	Narrow ditch-shaped wetland dominated by reed canarygrass and Himalayan blackberry; located south of NB I-405 to SB SR 167 on-ramp
2.2R-B	0.03	Scrub-shrub	Narrow ditch-shaped wetland dominated by reed canarygrass and Himalayan blackberry; located south of NB I-405 to SB SR 167 on-ramp
2.31R	0.01	Emergent	Depression dominated by reed canarygrass; located in I-405/SR 167 cloverleaf interchange
2.6R	0.15	Scrub-shrub and Emergent	Riverine wetland associated with the unnamed tributary to Rolling Hills Creek via culverts; dominated by reed canarygrass, common cattail, skunk cabbage (*Lysichitum americanum*), red-osier dogwood (*Cornus stolonifera*), and Himalayan blackberry; located between Smithers Avenue S and Whitworth Avenue S
2.7R	0.25	Scrub-shrub and Emergent	Depression associated with the unnamed tributary to Rolling Hills Creek via culverts; dominated by small-fruited bulrush (*Scirpus microcarpus*), reed canarygrass, common cattail, Pacific willow, and Himalayan blackberry; located between Talbot Road S and Smithers Avenue S
2.81L	0.03	Emergent	Depression dominated by reed canarygrass and Himalayan blackberry; located east of Talbot Road
2.81R	0.07	Scrub-shrub	Riverine wetland associated with Rolling Hills Creek; dominated by salmonberry (*Rubus spectabilis*); located between Talbot Road S and S Puget Drive
2.82R	0.38	Forested, Scrub-shrub, and Emergent	Slope wetland dominated by lady fern, reed canarygrass, red alder, willow, and Himalayan blackberry; located south of I-405 between Talbot and Benson Roads
2.9L	1.05	Scrub-shrub	Depression and seep wetland associated with Thunder Hills Creek during high flow events; dominated by reed canarygrass, common cattail, Pacific willow, and Himalayan blackberry; located between Talbot and Benson Roads
3.0R	0.04	Scrub-shrub and Emergent	Riverine wetland associated with the unnamed tributary to Thunder Hills Creek; dominated by red alder and reed canarygrass; located in a forested area east of northbound I-405 adjacent to the unnamed tributary to Thunder Hills Creek
24.7R	61.00*	Forested, Scrub-shrub, and Emergent	Large wetland complex associated with Panther Creek dominated by reed canarygrass, red-osier dogwood, Himalayan blackberry, willow, red alder, and black cottonwood; located east of SR 167 and south of I-405
25.0L	4.51	Forested	Narrow depression associated with Panther Creek; dominated by reed canarygrass, Himalayan blackberry, Pacific willow, and black cottonwood; located between SR 167 and East Valley Road
25.5L	11.38*	Forested	Large wetland system associated with Panther Creek that also that receives stormwater runoff from several culverts; dominated by reed canarygrass, red-osier dogwood, spirea (*Spiraea douglasii*), and Pacific willow; located between East Valley Road and Lind Avenue SW
25.7L	0.30	Scrub-shrub	Narrow ditch-shaped wetland dominated by reed canarygrass, Himalayan blackberry, and willow; located between SR 167 and East Valley Rd
25.8L	11.50	Scrub-shrub and Emergent	Large wetland system that receives stormwater runoff from several culverts; dominated by reed canarygrass, common cattail, and willow; located between East Valley Road and Lind Avenue SW
TOTAL	90.73*		

NB = northbound; SB = southbound

* These wetland sizes were approximated, as the majority of the area associated with these wetlands is located outside of the study area. Only the portions of the wetlands within the study area were surveyed.

Cedar River Basin

No wetlands occur in the portion of the Cedar River basin that lies within the study area (see Exhibits 4-5 and 4-6).

Aquatic Resources

The Tukwila to Renton Project is primarily located in the lower Green River subwatershed of the Green/Duwamish River watershed (Water Resource Inventory Area [WRIA] 9) with the northernmost extent of the project extending into the Renton reach of the Cedar River subwatershed in the Lake Washington Watershed (WRIA 8).

The rivers and streams in WRIA 9 that are crossed by I-405 or are otherwise in the vicinity of the study area are Gilliam Creek, an unnamed tributary to Gilliam Creek, Cottage Creek, the Green River, Springbrook Creek, Panther Creek, Rolling Hills Creek, an unnamed tributary to Rolling Hills Creek, Thunder Hills Creek, and an unnamed tributary to Thunder Hills Creek. Two waterbodies in WRIA 8 are within the study area: the Cedar River and an unnamed tributary to the Cedar River. The locations of all of the waterbodies in the vicinity of the study area are shown in Exhibits 4-9, 4-10, and 4-11.

Habitat conditions in these waterbodies within the study area are described in further detail below. For more information on the waterbodies themselves, see the *Water Resources Discipline Report*[27] for this project.

What are watersheds and subwatersheds?

A watershed is the region of land that drains into a specified body of water, such as a river, lake, sea, or ocean. Rain that falls anywhere within a given body of water's watershed will eventually drain into that body of water.

A subwatershed is a smaller watershed located within a larger watershed.

What is a Water Resource Inventory Area (WRIA)?

Washington State is divided into 62 WRIAs for water and aquatic-resource management issues. A WRIA may include more than one watershed. However, the terms "WRIA" and "watershed" are frequently used interchangeably.

[27] *WSDOT, 2007b*

Exhibit 4-9: Aquatic Resource Locations from I-5 / I-405 Interchange to the Green River

Exhibit 4-10: Aquatic Resource Locations Along SR 167

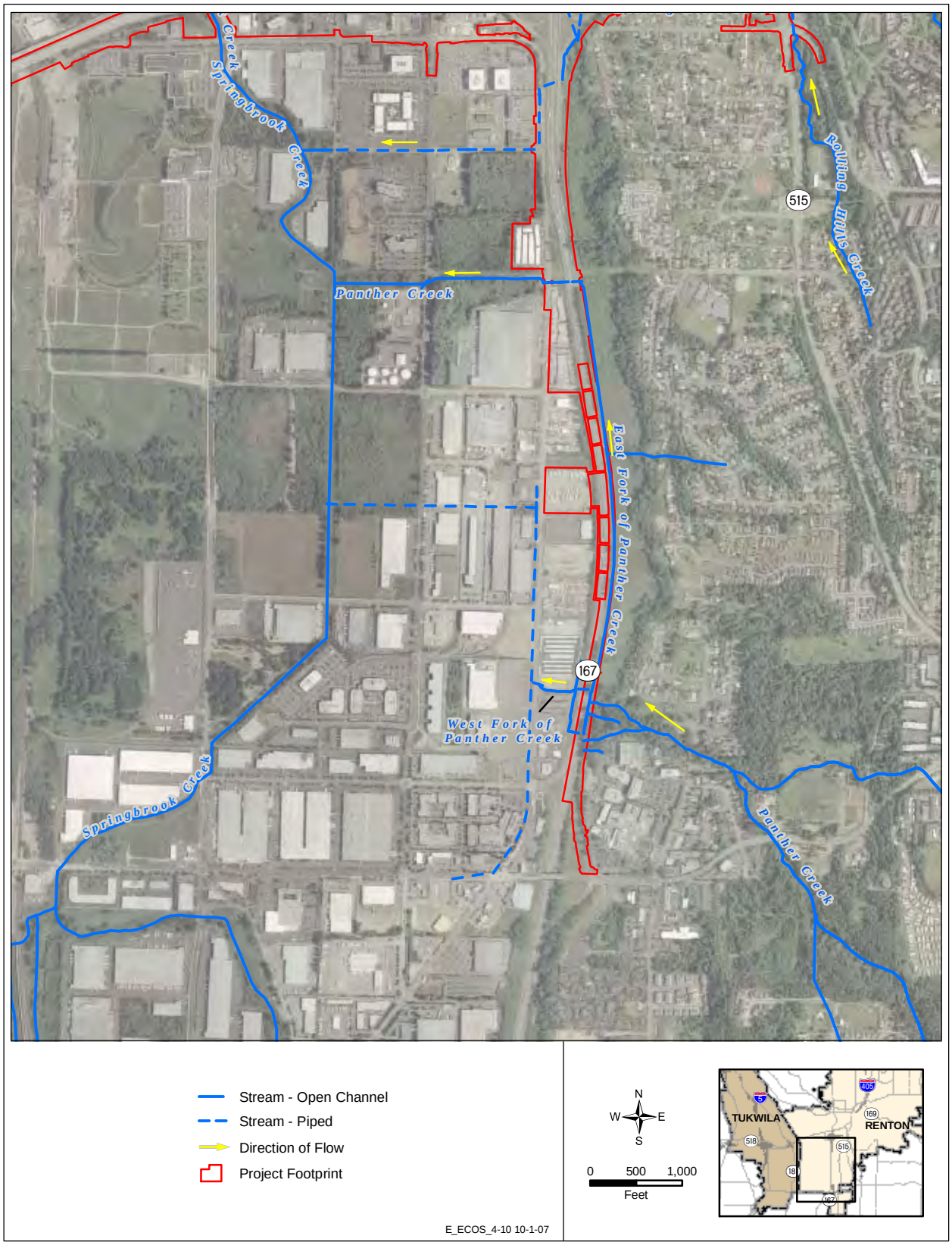
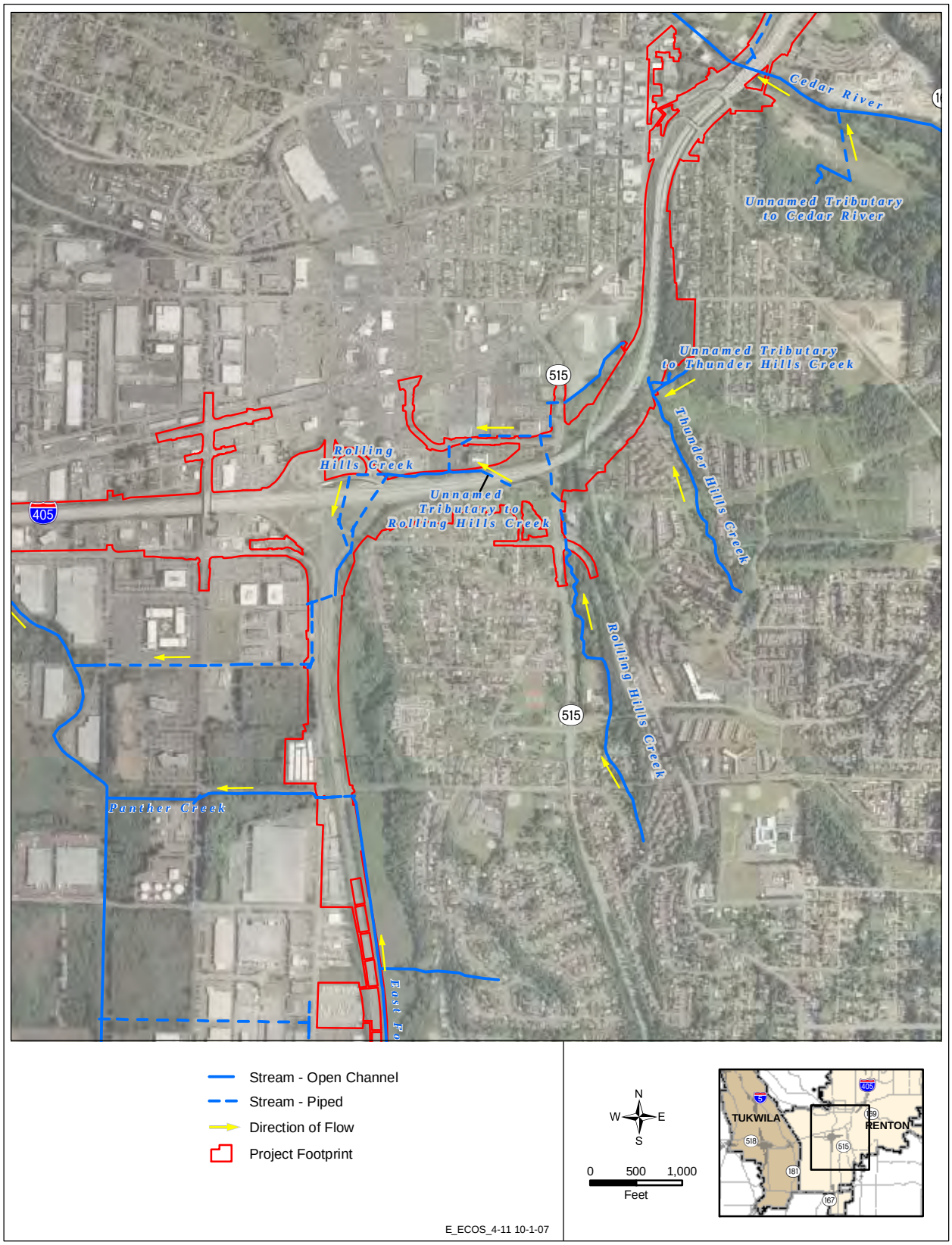


Exhibit 4-11: Aquatic Resource Locations from SR 167/I-405 Interchange to SR 169/I-405 Interchange



In general, the rivers and streams in the Tukwila to Renton Project study area have been highly altered from their natural states to accommodate residential, commercial, and industrial land uses. This alteration has included bank hardening, such as installing riprap and placing streams in concrete channels; reducing or removing streamside vegetation; straightening stream channels; and removing in-stream habitat. These alterations have also resulted in loss of the historic floodplains associated with most of these waterbodies. Significant changes have occurred in the vegetation surrounding these waterbodies. What was once predominantly mature native vegetation has been replaced by a mix of immature native vegetation and non-native invasive plant species.

What are non-native invasive plant species?

Non-native invasive plant species are plant species that do not naturally grow in a particular area, but thrive once introduced. These plants are characteristically adaptable, aggressive, and have a high reproductive capacity. Their vigor, combined with a lack of natural enemies, often leads to a sudden increase in non-native plant populations.

All native species of salmonids can be found in the study area, including Chinook (*Oncorhynchus tschawytscha*), coho (*O. kisutch*), chum (*O. keta*), pink (*O. gorbuscha*), and sockeye salmon (*O. nerka*); steelhead trout (*O. mykiss*); and sea-run cutthroat trout (*O. clarki clarki*). In addition, bull trout (*Salvelinus confluentus*), Dolly Varden (*S. malma*) (hereafter referenced synonymously with bull trout), and resident cutthroat trout (*O. clarki*) are known to use the waterbodies in the study area. Anadromous salmonid species primarily use the rivers and streams in the study area for upstream and downstream migration and rearing. The study area also contains limited spawning habitat for Chinook, coho, pink, sockeye, and chum salmon, and steelhead. Resident cutthroat trout use the study area for all life stages.

What are anadromous and resident fish?

Anadromous fish are born in freshwater streams, rivers, or lakes, spend their adult phase in the ocean, and return to their natal waters to spawn.

Resident fish spend their entire lives in freshwater systems and do not migrate into saltwater environments.

Other fish species likely to be found in the study area include threespine stickleback (*Gasterosteus aculeatus)*, longnose dace (*Rhinichthys cataractae*), speckled dace *(R. osculus)*, longfin smelt (*Spirinchus thaleichthys*), prickly sculpin (*Cottus asper),* riffle sculpin *(C. gulosus)*, reticulated sculpin *(C. perplexus*), shorthead sculpin *(C. confuses*), torrent sculpin *(C. rhotheus*), largescale sucker (*Catostomus macrocheilus*), pacific lamprey *(Lampetra tridentate)*, river lamprey *(L. ayresi)*, and western brook lamprey *(L. richardsoni)*.[28] Exhibits 4-12 and 4-13 detail the anadromous and resident fish species known to occur in the individual streams and rivers in the study area.

[28] *Wydoski and Whitney, 2003*

Exhibit 4-12: Anadromous Fish Species Known or Presumed to be in the Study Area[29]

	Fish Species								
	Chinook Salmon	Coho Salmon	Pink Salmon	Sockeye Salmon	Chum Salmon	Steelhead Trout	Bull Trout	Sea-Run Cutthroat	Pacific Lamprey
Gilliam Creek	√	√				√		√	√
Cottage Creek									
Unnamed Tributary to Gilliam Creek									
Green River	√	√	√	√	√	√	√	√	√
Springbrook Creek	√	√				√			
Panther Creek	√	√				√			
Rolling Hills Creek									
Unnamed Tributary to Rolling Hills Creek									
Thunder Hills Creek									
Unnamed Tributary to Thunder Hills Creek									
Cedar River	√	√		√		√	√		
Unnamed Tributary to Cedar River									

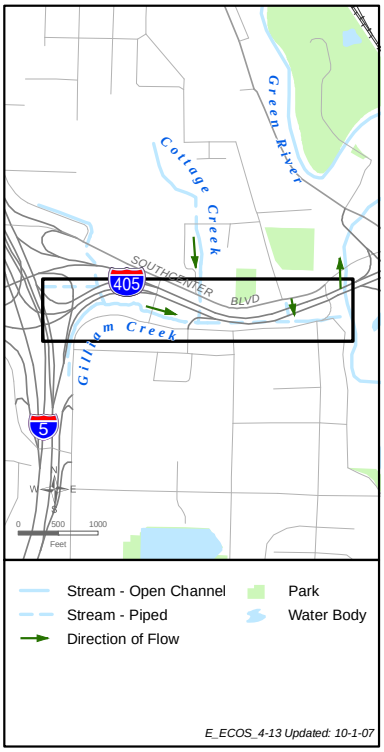
[29] *Anchor, 2005; Kerwin, J. 2001; Kerwin et all, 2000; WDFW, 2006; WDFW 2004; Wydoski and Whitney 2003*

Exhibit 4-13: Resident Fish Species Known or Presumed to be in the Study Area[30]

	Fish Species								
	Cutthroat Trout	River Lamprey	Western Brook Lamprey	Sculpin	Longnose Dace	Speckled Dace	Largescale Sucker	Threespine Stickleback	Longfin Smelt
Gilliam Creek	√	√	√	√	√	√	√	√	
Cottage Creek	√		√	√	√	√	√	√	
Unnamed Tributary to Gilliam Creek									
Green River	√	√	√	√		√	√	√	
Springbrook Creek	√		√	√		√	√	√	
Panther Creek	√		√	√	√	√	√	√	
Rolling Hills Creek	√		√	√	√	√		√	
Unnamed Tributary to Rolling Hills Creek				√				√	
Thunder Hills Creek	√		√	√				√	
Unnamed Tributary to Thunder Hills Creek									
Cedar River	√	√	√	√		√	√	√	√
Unnamed Tributary to Cedar River	√			√				√	

[30] *Anchor, 2005; Kerwin, J. 2001; Kerwin et all, 2000; WDFW, 2006; WDFW 2004; Wydoski and Whitney 2003*

Exhibit 4-14: Gilliam Creek



Gilliam Creek

Cottage Creek

Other native species found in the study area include several species of crayfish, frogs, salamanders, freshwater clams, and freshwater mussels.

The habitat characteristics for the waterbodies listed below are specific to the areas of the waterbodies located within the proximity of the study area. Summaries of the stream surveys performed for this project can be found in Appendix B.

Gilliam Creek

Gilliam Creek flows easterly, parallel to I-405, between I-405 and Tukwila Parkway, as depicted in Exhibit 4-14. Beginning on the east side of the I-5 right-of-way, Gilliam Creek alternately flows between open channel and culverted sections to its confluence with the Green River, through a 108-inch flap gate owned by the City of Tukwila that is located at approximately Green River mile (RM) 12.7.[31] The flap gate and an associated splash pad on the downstream end of the culvert are complete barriers to fish passage when the flap gate is closed.

Gilliam Creek has been highly modified throughout the study area. The creek is primarily contained within a straight, concrete-lined, incised, trapezoidal channel, and contains little in-stream structure. It has a narrow stream buffer with some native coniferous and deciduous trees and shrubs, but the stream buffer is dominated by non-native plant species including Himalayan blackberry, Scot's broom (*Cytisus scoparius)*, and reed canarygrass. Two wetlands (Wetlands 0.15R and 0.3R – each with an Ecology wetland rating of III and a City of Tukwila rating of 2) associated with Gilliam Creek provide limited refugia for fish during high flows and provide rearing habitat for juvenile salmonids.

The Gilliam Creek watershed contains a high percentage of impervious surface due to the surrounding commercial, residential, and industrial land uses. Because of this heavily urbanized condition, peak runoff flow rates are high and the runoff from this area contains relatively high concentrations of a variety of pollutants.[32]

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[31] *Anchor, 2005*

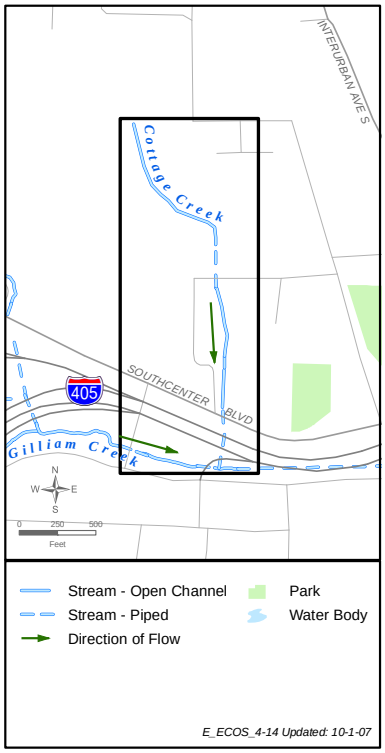
[32] *Tukwila, 2001*

Cottage Creek

Cottage Creek is a tributary to Gilliam Creek located to the north of I-405 in the city of Tukwila. Exhibit 4-15 is a map of Cottage Creek. The creek flows southerly from the hillside, under Southcenter Boulevard via a culvert, daylights for approximately 12 linear feet immediately north of I-405, flows under I-405 via another culvert, and confluences with Gilliam Creek via a stormwater outfall.

In total, 80 square feet of Cottage Creek are located in the I-405 right-of-way. The upstream end of Cottage Creek (north of Southcenter Boulevard) is located approximately 500 feet to the north of the portion of Cottage Creek in the I-405 right-of-way. Immediately upstream of the section of Cottage Creek in the I-405 right-of-way, a natural outcrop exists that prevents fish passage.[33]

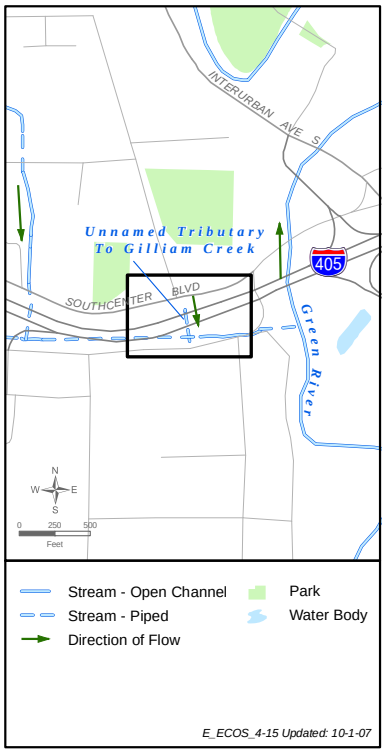
Exhibit 4-15: Cottage Creek



Unnamed Tributary to Gilliam Creek

An unnamed tributary to Gilliam Creek flows into Gilliam Creek via a culvert immediately east of where Gilliam Creek daylights before its confluence with the Green River. Exhibit 4-16 is a map of the unnamed tributary to Gilliam Creek. This tributary has no open channel at its confluence with Gilliam Creek. The only other portion of this stream located in the study area is an approximately 50-foot section that daylights into, and flows through, a small riparian wetland (Wetland 0.6L) immediately north of I-405. In this area, the stream has a small stream buffer and little in-stream habitat. No additional open channel habitat associated with this tributary is located within 0.25 mile of the project footprint.

Exhibit 4-16: Unnamed Tributary to Gilliam Creek



Green River

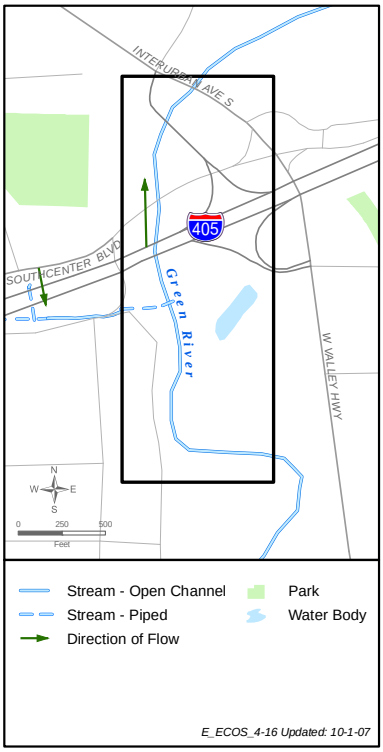
The Green River flows under I-405, Southcenter Boulevard, the I-405 southbound off-ramp to SR 181, and SR 181 between approximately RMs 12.7 and 12.8. The Green River in the study area is depicted in Exhibit 4-17. In this area, the Green River is completely contained within a dike system maintained and regulated by the Green River Flood Control Zone District. Flow levels in this reach of the Green River are primarily dictated by controlled releases from the Howard

[33] *WSDOT, 2007a*

What does it mean when a stream daylights?

Daylighting of a stream occurs when the stream flows from a below ground area into an above-ground open channel.

Exhibit 4-17: Green River



What is Ecology's 2004 303(d) list?

Ecology's 2004 303(d) list is a list of waterbodies in Washington State that exceed water quality criteria. The development of Ecology's 2004 303(d) list is mandated by the Clean Water Act.

Hansen Dam (HHD), although the river is also tidally influenced in the study area.

Riparian vegetation within this reach of the Green River consists primarily of non-native invasive plant species including Himalayan blackberry, reed canarygrass, and Scot's broom, though some native deciduous and coniferous trees and shrubs are found infrequently along the river banks. The Green River in the study area lacks in-stream habitat features including LWD and, due to the composition of the riparian vegetation, it also lacks opportunities for future woody debris recruitment. The mainstem riparian habitat in the lower Green River subwatershed is not in good condition and is not considered to be functioning properly based on the National Marine Fisheries Service (NMFS) criteria.[34] Also, the Green River is listed on Ecology's 2004 303(d) list in this area for temperature, fecal coliform, and dissolved oxygen (DO).

Several historic events and land use trends have combined to have a profound effect on the hydrology of the Green River. These include five large engineering projects:

- Construction of flood control levees in the late 1800s
- Diversion of the White River in 1911
- Construction of Tacoma Water's Headworks Diversion Dam in 1911
- Diversion of the Cedar/Black River in 1916
- Construction of the HHD in 1962

More recently, urban development in the lower basin has resulted in substantial increases in stormwater runoff from small tributary streams. This, in turn, has contributed to larger and more frequent peak flows during the winter and reduced recharge of shallow aquifers that formerly sustained flows during the late summer and fall. The overall effect of development on flows in the lower mainstem of the Green River from approximately RM 11 to RM 42 is difficult to discern due to the overwhelming changes in flow resulting from the historic diversions and channelization, and the construction of the HHD.[35]

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[34] *NMFS, 1996*

[35] *Kerwin and Nelson, 2000*

The lower Green River is used by all native salmonids for upstream and downstream migration and rearing. Chinook, coho, pink, sockeye, and chum salmon and steelhead trout are known to spawn in this reach of the Green River, though spawning habitat is limited.[36] Pacific and river lamprey are also present in the Green River, but little information is available on their present status.[37]

What are levees and revetments?

Levees are raised embankments along the edge of a river channel, often constructed by humans living in low-lying areas as protection against flooding.

Revetments are facings of stone, concrete, or even such materials as tires, placed on a riverbank or levee to protect it from erosion.

Springbrook Creek

Springbrook Creek is located east of the mainstem Green River, within the city of Renton. It flows into the Black River through the Black River Pump Station (BRPS), and subsequently into the Green River approximately 1,000 feet downstream of the BRPS. Exhibit 4-18 depicts Springbrook Creek.

Green River upstream of study area

Riparian vegetation surrounding Springbrook Creek is a mixture of alder (*Alnus spp*.), willow, Himalayan blackberry, and sedges. Conifers are almost non-existent and, in those areas where shade is absent, reed canarygrass is abundant. Within this creek, riparian habitat does not meet the NMFS criteria for properly functioning habitat and is a limiting factor to natural salmonid production.[38]

Springbrook Creek is listed on Ecology's 2004 303(d) List for fecal coliform and DO.

Though not in the immediate study area, the BRPS is a significant fish passage barrier to upstream and downstream fish migration. The purposes of this structure are to control outflows from the Black River, prevent flows on the Green River from backing up into the Black River/Springbrook Creek floodplain during floods, and to provide a means of releasing flood flows from the Black River/Springbrook Creek system when the Green River is at a high river stage. The BRPS is currently operated and maintained by King County Surface Water Management.[39]

Springbrook Creek

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[36] *Kerwin and Nelson, 2000*

[37] *U.S. Army Corps of Engineers, 2001*

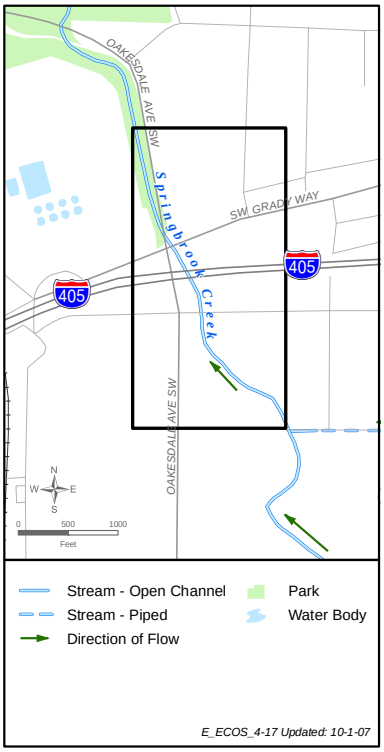
[38] *Kerwin and Nelson, 2000*

[39] *Kerwin and Nelson, 2000*

What is peak flow versus base flow?

Peak flow refers to a specific period of time when the discharge of a stream or river is at its highest point. Base flow refers to the volume of flow in a stream or river during dry conditions, as opposed to conditions influenced by storm runoff.

Exhibit 4-18: Springbrook Creek



The facility is not equipped to handle downstream migrating adult steelhead trout or Chinook salmon. Adult steelhead and Chinook salmon that move upstream past the BRPS cannot exit the Springbrook Creek subbasin, as portions of the downstream fish passage facility contain entrance fish ports and associated piping that are undersized for these species.[40] Once there, many adult Chinook are believed to experience high levels of stress or be killed outright prior to successful spawning.[41]

The BRPS also has a downstream passage facility that is operated from early April to mid-June each year, for approximately 8 hours per day, Monday through Friday. Fish attempting to move downstream outside of that operational window are either prevented from exiting the Springbrook system or must pass through the unscreened large pumps (if operational). Juvenile Chinook emerge and begin moving downstream in the Middle Green River system as early as February.[42] Consequently, early downstream migrants would be prevented from exiting the Springbrook system. The existing screens and their placement at the BRPS do not meet current NMFS screening criteria.[43]

Despite the fish passage limitations of the BRPS, Springbrook Creek is used by coho and Chinook salmon and steelhead trout for spawning and rearing.[44]

Panther Creek and the Panther Creek Wetlands

Panther Creek enters the study area on the east side of SR 167 immediately north of the SW 41st Street interchange. At SR 167, Panther Creek splits into two forks, hereafter referred to as the west and east forks of Panther Creek. Exhibit 4-19 depicts Panther Creek and the locations of the east and west forks. The flow in Panther Creek past the forks is divided into the east and west forks in an approximately 2/3 to 1/3 ratio, respectively.[45]

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[40] *Kerwin and Nelson, 2000*

[41] *Kerwin and Nelson, 2000*

[42] *Jeanes and Hilgert, 2000*

[43] *Kerwin and Nelson, 2000*

[44] *Kerwin and Nelson, 2000*

[45] *Masters, 2005*

The west fork of Panther Creek flows underneath SR 167 via two culverts. These two culverts are barriers to fish passage due to the water velocity in the culverts during high water flows.[46] Once the creek has crossed SR 167, it flows into an open channel between two businesses and ultimately into a system of culverts beginning at East Valley Road. This system of culverts eventually outlets to Springbrook Creek. The east fork of Panther Creek flows northerly along the east side of SR 167 through the Panther Creek Wetlands for approximately 1 mile. It then enters a fish ladder owned by the City of Renton.

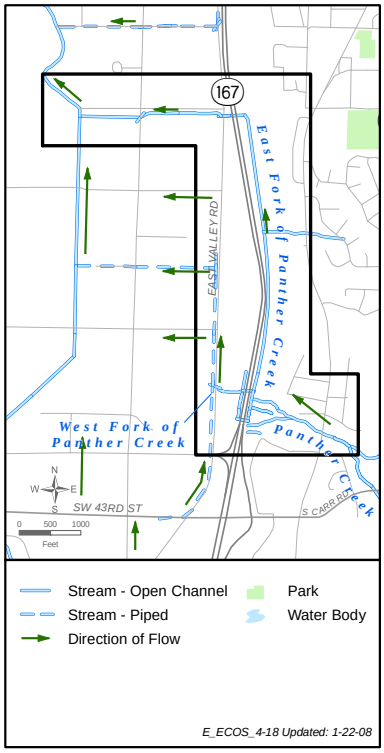
At the end of the fish ladder, Panther Creek flows into a culvert under SR 167, daylights between SR 167 and East Valley Road, and enters another culvert that directs the flow under East Valley Road. On the west side of East Valley Road, Panther Creek outlets into a large wetland complex and maintains a distinct channel through the wetland complex. As with the west fork, the east fork of Panther Creek ultimately flows into Springbrook Creek.

The reach of Panther Creek immediately upstream of the east and west forks flows through a largely native, deciduous tree-dominated forest that contains some invasive species, primarily Himalayan blackberry. The stream channel in this location is connected with its floodplain (not incised) and has a large stream buffer, but has a limited amount of in-stream cover.

The northerly flowing portion of the west fork of Panther Creek flows through a large patch of reed canarygrass with no other vegetation apparent. When this fork turns westerly, it flows into and through a managed bioswale until it flows into a city stormwater system under East Valley Road. The bioswale is completely vegetated with upland landscaping grasses. The west fork of Panther Creek is entirely channelized, has no native riparian canopy, and completely lacks in-stream structure.

The east fork of Panther Creek flows for approximately 400 feet to where it flows into a patch of reed canarygrass that is part of the Panther Creek wetland complex. Once the creek enters the patch of reed canarygrass, the creek's main channel

Exhibit 4-19: Panther Creek



What is a fish ladder?

Fish ladders are structures on or around artificial barriers (such as dams and weirs) to facilitate fishes' natural migration. Most fish ladders enable fish to pass around the barriers by swimming and leaping up a series of relatively low steps (hence the term ladder) into the waters on the other side.

Panther Creek fish ladder

[46] *WSDOT, 2007a*

is no longer visible. Flow continues through the reed canarygrass patch for approximately 500 feet to where the main channel of Panther Creek becomes visible once again. The east fork of Panther Creek then flows immediately alongside SR 167 in a defined channel with a narrow, deciduous canopy to where it enters the fish ladder.

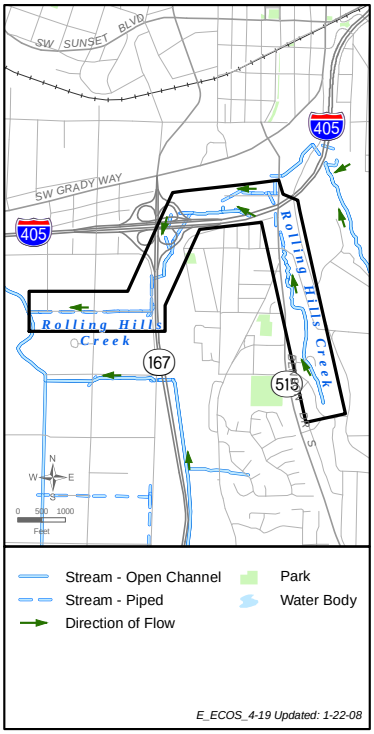
What is refugia habitat?

Refugia habitat is an area of a stream that provides shelter or safety for aquatic species.

After flowing into the fish ladder and under SR 167 and East Valley Road, Panther Creek enters a wetland (Wetland 25.0L) containing forested vegetation. Panther Creek continues through this wetland to where it flows into Springbrook Creek. The east fork of Panther Creek has a limited stream buffer and canopy and contains limited in-stream habitat. Panther Creek is expected to be used by coho and Chinook salmon and cutthroat and steelhead trout as rearing habitat because of its association with Springbrook Creek. There is little salmonid spawning habitat in Panther Creek throughout most of the study area; however, there may be a small amount of suitable coho salmon, steelhead, or cutthroat trout spawning habitat within the study area east (upstream) of where Panther Creek divides into the east and west forks.

There are three significant wetland complexes associated with Panther Creek: the Panther Creek Wetland (Wetland 24.7R), and two associated wetlands located along the west side of SR 167 (Wetlands 25.0L and 25.5L). Juvenile salmonids, especially coho salmon, use wetlands as rearing and refugia habitat. Due to the size and complexity of these wetlands, they provide the largest contiguous area of wetland salmonid rearing and refugia habitat in the study area.

Exhibit 4-20: Rolling Hills Creek



Rolling Hills Creek and an Unnamed Tributary to Rolling Hills Creek

The headwaters of Rolling Hills Creek flow from the Rolling Hills subbasin located south of I-405. From its headwaters, Rolling Hills Creek eventually flows northward between Talbot Road and S Puget Drive and into the study area approximately 400 feet south of the Talbot Road, S Puget Drive, and South 15th Street intersection. From this intersection, Rolling Hills Creek flows through a series of culverts under several commercial parking lots to where it ultimately daylights on the north side of I-405 into an open channel between I-405 and a parking lot associated with several local businesses including the Renton Cinema 8 and Triton Tower One. The creek then flows southerly in a culvert

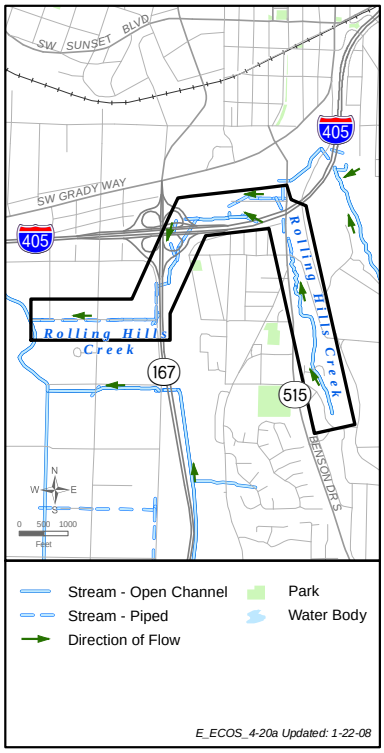
Rolling Hills Creek typical reach

under the I-405/SR 167 Interchange, into an open channel that runs parallel to the NB SR 167 ramp to NB I-405 for approximately 520 feet, under SR 167 and local streets, that eventually outlets to Springbrook Creek. During high flow events, a portion of the flow from the section of Rolling Hills Creek between I-405 and the parking lot associated with the Renton Cinema 8 and Triton Tower One is directed into an overflow culvert that also flows southerly under the I-405/SR 167 Interchange. The culverts under the I-405/SR 167 Interchange act as fish passage barriers due to the water velocity in the culverts during high water flows.[47] Exhibit 4-20 depicts Rolling Hills Creek.

Rolling Hills Tributary at confluence with Rolling Hills Creek

An unnamed tributary to Rolling Hills Creek originates from a wetland (Wetland 2.6R) located within the powerline corridor on the hillside to the south of I-405. Based on its configuration, this wetland was once likely the historic main channel of Rolling Hills Creek. The unnamed tributary daylights from a culvert on the north side of I-405 behind the Triton Tower One building and flows westerly to where it confluences with Rolling Hills Creek in the location where Rolling Hills Creek daylights between I-405 and the parking lot associated with the Renton Cinema 8 and Triton Tower One. Exhibit 4-21 depicts the unnamed tributary to Rolling Hills Creek.

Exhibit 4-21: Unnamed Tributary to Rolling Hills Creek



Rolling Hills Creek has been highly modified throughout the study area. The upstream reaches (south of I-405) of Rolling Hills Creek have a mature deciduous riparian canopy with a greater diversity of native plant species than the downstream reaches; however, Himalayan blackberry and other non-native plant species are still prevalent throughout the upper reaches. Rolling Hills Creek's upstream reach has a larger floodplain than the lower reach, but still has only limited opportunity to meander due to the width of the floodplain. In addition, two concrete dams are located in the upstream reach within the study area. The first dam spans the entire channel width and is located approximately 40 feet upstream of the Talbot Road, S Puget Drive, and S 15th Street intersection. The second dam is located approximately 300 feet upstream of the first dam. The second dam is derelict, has been breached to allow water flow, and does not impede ordinary streamflow.

[47] *WSDOT, 2007a*

Upper Rolling Hills Creek notch in historical dam

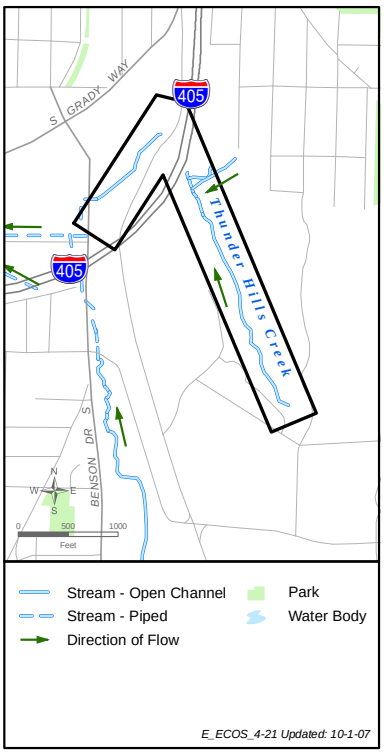
After crossing under the I-405/SR 167 Interchange (downstream of the streams' confluence), Rolling Hills Creek flows into a deeply incised channel until it enters the culvert under SR 167. Throughout these downstream areas, the creek and its unnamed tributary have little to no in-stream structure, and narrow stream buffers comprised of immature deciduous trees, shrubs, and non-native plant species including Himalayan blackberry and reed canarygrass.

No anadromous fish species are reported to occur in Rolling Hills Creek or its unnamed tributary.[48]

Thunder Hills Creek

The headwaters of Thunder Hills Creek are located to the southeast of I-405. Exhibit 4-22 depicts Thunder Hills Creek. Upstream of I-405, Thunder Hills Creek is contained in an incised channel with an intact stream buffer along the east side of the creek and a buffer of varying widths (from 0 to approximately 20 feet wide) along the west side of the creek. At the downstream end of this upper section, Thunder Hills Creek flows under I-405 and daylights into a concrete outfall located directly behind Sam's Club. The culvert under I-405 acts as a complete upstream fish passage barrier due to the water velocity in the culvert during high water flows.[49]

Exhibit 4-22: Thunder Hills Creek



After daylighting at the outfall, Thunder Hills Creek confluences with water flowing from a historic, now abandoned coal mine. There is a noticeably sulfurous smell from the water originating from the coal mine at this confluence.[50] From the confluence, the flow from Thunder Hills Creek and the coal mine runoff enters a three-sided concrete flume and flows along the southeast edge of the Sam's Club parking lot. The flume outlets into a wetland complex immediately east of Talbot Road S and north of I-405. The creek then flows west under Talbot Road, into a series of culverts and under several parking lots to where it daylights in the location where Rolling Hills Creek daylights between I-405 and a parking lot.

Thunder Hills Creek downstream flume west of I-405

[48] *King County DNR, 2004*

[49] *WSDOT, 2007a*

[50] *Anchor, 2005*

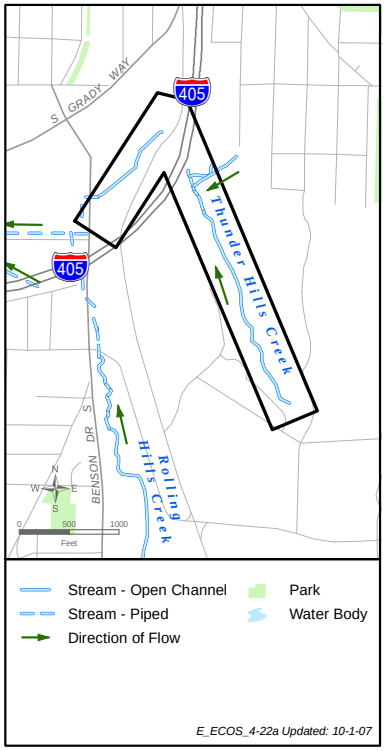
As stated above, the lower portion of Thunder Hills Creek flows through a three-sided concrete flume and has no natural channel. There is almost no vegetative cover over the stream. Most of the stream bed is concrete, with sporadic patches of gravel located along the length of the stream.

Thunder Hills Creek Tributary

Unnamed Tributary to Thunder Hills Creek

The headwaters of the unnamed tributary to Thunder Hills Creek are located to the east of I-405 on the southwestern slope of Renton Hill. Exhibit 4-23 depicts the unnamed tributary to Thunder Hills Creek. The unnamed tributary to Thunder Hills Creek has year-round low flow originating from neighborhood storm drains, culverts, hillside seeps, and several seasonal drainages located along the hillside that drain during rain events. The main channel of the unnamed tributary to Thunder Hills Creek flows east to west off the hillside for 1,200 feet, enters a low gradient wetland, turns south, parallels I-405 for approximately 400 feet, and then flows west again for 300 feet down a steep gradient under an existing powerline corridor. Prior to the confluence with Thunder Hills Creek, the unnamed tributary sheet flows down a very steep sandstone outcrop. The sandstone outcrop acts as a complete natural barrier to fish passage.

Exhibit 4-23: Unnamed Tributary to Thunder Hills Creek



No anadromous fish species are expected to occur in the unnamed tributary to Thunder Hills Creek due to the sandstone outcrop. In addition, it is unlikely that resident fish would be found in the unnamed tributary to Thunder Hills Creek due to low flows and infiltration that result in temporal dewatering and associated isolation of significant portions of the creek during summer months.

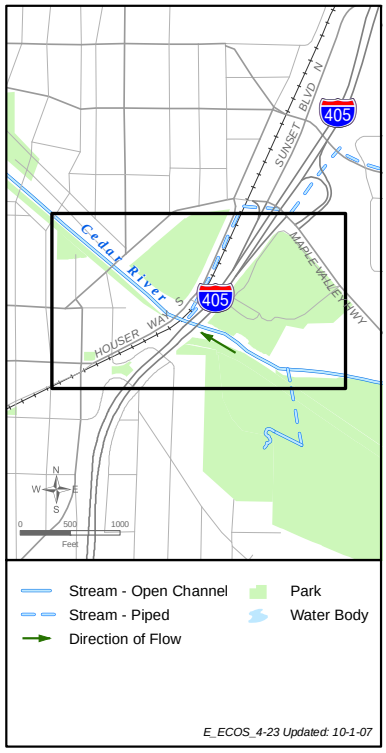
Cedar River

The Cedar River flows under I-405 at approximately RM 1.6. Exhibit 4-24 depicts the Cedar River. The reach of the Cedar River located in the study area is known as the Renton Reach and it was created when the Cedar River was redirected into Lake Washington in 1912. The Renton Reach is entirely artificial, is completely constrained between levees and revetments, and was regularly dredged to prevent flooding (from its completion in 1912 until the mid-1970s). Portions of this reach were again dredged in 1999, for the first time since

What is a riffle?

A shallow area of a stream or river in which water flows rapidly over a rocky or gravelly stream bed.

Exhibit 4-24: Cedar River



Cedar River downstream from I-405

the mid-1970s. This reach is essentially one long riffle with little habitat complexity.[51]

The Renton Reach is affected by urban and industrial uses along the river that contribute to local water quality problems, eliminate the potential for connection with a natural floodplain or the establishment of a riparian corridor, and prohibit the production of significant LWD accumulations in the channel. This reach is the depositional area for many of the river's sediments, and as a result, the substrates tend to have higher levels of fine sediments than upstream substrates.[52]

Riparian vegetation is virtually absent within the Renton Reach of the Cedar River and many areas along the river have been developed up to the edge of the dike system. In those places, virtually no riparian vegetation is present. Where development is set back from the Cedar River, vegetation consists primarily of non-native invasive plant species including Himalayan blackberry, reed canarygrass, and Scot's broom, though some native deciduous and coniferous trees and shrubs are infrequently found along the banks.[53]

The Cedar River is on Ecology's 2004 303(d) List for fecal coliform and temperature.

Anadromous fish use in the Renton Reach of the Cedar River includes spawning, upstream and downstream migration, and some limited rearing by sockeye, Chinook, and coho salmon and steelhead trout. The Cedar River also has known uses by bull trout, which likely use the Renton Reach for upstream and downstream migration.[54]

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[51] *King County Department of Public Works, 1993*

[52] *King County Department of Public Works, 1993*

[53] *Kerwin, 2001*

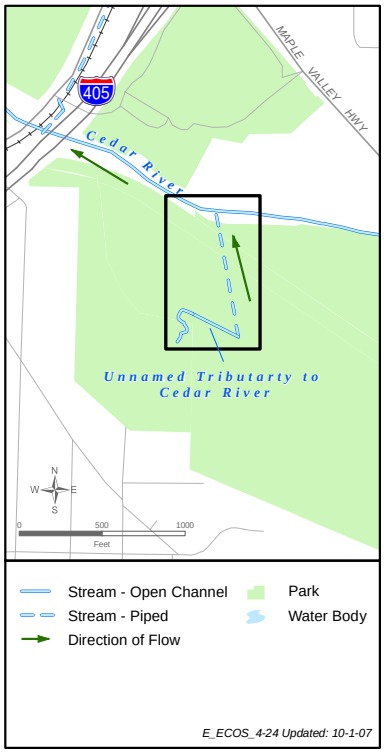
[54] *Kerwin, 2001*

Unnamed Tributary to the Cedar River

The unnamed tributary to the Cedar River originates from the hillside located to the southeast of I-405 immediately south of the Cedar River. The unnamed tributary flows from the hillside, follows the toe of the hill, and enters a wetland with no defined channel. The wetland then drains into a culvert that outfalls to the Cedar River approximately 400 feet from the wetland. Along the toe of the hill, the unnamed tributary has a mixed deciduous and coniferous forested riparian canopy with an understory consisting of a mix of native and non-native plant species. This stream buffer decreases in size as the tributary flows toward the culvert that connects it to the Cedar River. Exhibit 4-25 depicts the unnamed tributary to the Cedar River.

No anadromous fish species are expected to occur in the unnamed tributary to the Cedar River due to the lack of a defined channel upstream of where it confluences with the Cedar River.

Exhibit 4-25: Unnamed Tributary to the Cedar River



Fish Passage Barriers

WSDOT has identified 10 existing culverts that convey waters of the state, have been determined to be fish bearing, and where in-water work will occur as a result of the project. Of these 10 culverts, WSDOT has determined that seven of them are existing fish passage barriers.[55] These fish passage barriers occur on Panther Creek, Rolling Hills Creek, an unnamed tributary to Rolling Hills Creek, and Thunder Hills Creek and are described in greater detail under the descriptions of these streams above. The remaining three culverts are presently fish passable. WSDOT will address fish passage at the culverts per the Memorandum of Agreement between WSDOT and WDFW. Exhibit 4-26 details the fish bearing culverts associated with in-water work.

Cedar River tributary just upstream of culvert

[55] *WSDOT, 2007a*

Exhibit 4-26: Fish Bearing Culverts Associated with In-water Work

Stream Conveyed	Culvert Type	Culvert Length (ft)	Upstream Habitat (lf)*	Fish Passable	Barrier Description
Gilliam Creek	108 inch CMP	1,103	600 to 800	Yes	N/A
Gilliam Creek	108 inch CMP	207	1,300 to 2,600	Yes**	N/A
Rolling Hills Creek	48 inch CONC	551	10,200***	No	Temporal barrier based on velocity
Rolling Hills Creek	132 inch CMP	918	6,300***	No	Pipe exceeds velocity criteria at high fish passage design flow
Tributary to Rolling Hills Creek	30 inch CONC	281	200	No	Pipe exceeds velocity and water depth criteria at high fish passage design flow
Thunder Hills Creek	48 inch CONC	466	100	No	Pipe exceeds velocity criteria at high fish passage design flow
Panther Creek	24 inch CMP	155	2,600	No	Pipe exceeds velocity criteria at high fish passage design flow
Panther Creek	30 inch CMP	153	2,600	No	Pipe exceeds velocity criteria at high fish passage design flow
Panther Creek	72 inch Steel	189	7,100	No	Temporal barrier based on velocity
Rolling Hills Creek	3-foot by 4-foot box	265	N/A**** (fish passable)	Yes	N/A

* All habitat gains are approximations based on field reconnaissance and are rounded to the nearest hundred foot increment.

** A large metal flap gate (which controls high flows) and a splash pad are located at the end of this culvert. The flap gate and splash pad on downstream end of the culvert prevent fish from moving up or downstream when it is closed. This culvert is owned by the City of Tukwila (Anchor, 2005).

*** These culverts both carry the main flow of Rolling Hills Creek underneath the I-405/SR 167 interchange. As such, they must be considered together for purposes of fish passage.

**** No upstream habitat length is identified for this culvert as it is presently fish passable and all known upstream habitat is presently available.

CMP = corrugated metal pipe CONC = concrete ft = feet lf = linear feet

Wildlife Habitat

I-405 biologists identified five categories to describe upland vegetation found in the study area. The five categories include wetlands, which provide habitat for a variety of wildlife species in the study area, and four land cover types: forested, shrubs and grasses, maintained vegetation, and impervious surface or area. Wetlands are discussed in detail earlier in this report. As shown in Exhibit 3-1, the study area for upland

vegetation extends 0.5 mile from I-405. Land cover in the study area totals approximately 5,785 acres.

The forested land use cover type is defined as those vegetated areas where tree species with an average height greater than 20 feet are the predominant vegetation. Typical large tree species found in the forested portions of the study area include big leaf maple (*Acer macrophyllum*), red alder, black cottonwood, and Douglas fir (*Pseudotsuga menziesii Franco*). In addition, Western red cedar *(Thuja plicata)* and a variety of hemlocks are occasionally found in the study area. The plants found in the understory of the forested land use cover type include immature tree species; beaked hazelnut (*Corylus cornuta*); vine maple (*Acer circinatum Pursh*); Oregon grape (*Mahonia aquifolium*); salal (*Gaultheria shallon Pursh*); oceanspray (*Holodiscus discolor*); elderberry (*Sambucus var.*); serviceberry (*Amelanchier arborea var.*); stinging nettles (*Urtica dioica*); salmonberry; and sword, lady, and maidenhair ferns (*Polystichum munitum, Athyrium filix-femina,* and *Adiantum pedatum*). A variety of non-native invasive species can also be found in the forested land use cover type including black locust (*Robinia pseudoacacia*); American holly (*Ilex opaca*); English laurel (*Prunus laurocerasus*); field bind weed (*Convolvulus arvensis*); Japanese knotweed (*Polygonum cuspidatum*); Himalayan blackberry; and several grass, tansy, and vetch species. Forested areas total approximately 550 acres in the study area, approximately 9 percent of the total land cover.

The shrub/grasses land use cover type consists of vegetated areas predominated by woody plants less than 20 feet tall, grasses and grass-like plants, or both. Plant species typically found in this land use cover type are similar to those understory and invasive plants found in the forested land use cover type, with the exception of those species that have a strong preference for shaded environments. The shrubs and grasses land cover totals approximately 251 acres in the study area, approximately 4 percent of the total land cover.

The maintained vegetation land use cover type is composed of areas of roadside vegetation, including roadway medians and shoulders, that are regularly maintained for safety purposes, and landscaped areas consisting primarily of plants grown for beauty or ornamental value for residential, commercial, and industrial developments. Maintained vegetation is typically

found in developed or disturbed areas. Maintained vegetation land cover totals approximately 1,550 acres in the study area, approximately 27 percent of the total land cover.

The impervious surface land use cover type includes areas such as pavement, roofs, and compacted or hardened surfaces that do not allow the passage of rainfall or runoff into the ground. Impervious surfaces such as roads, buildings, and parking lots have little to no habitat value. This cover type does contain some small patches of vegetation and open ground that might provide very limited use as habitat. These vegetated patches and open ground areas are typically occupied by non-native rather than native wildlife species. Impervious surface or area totals approximately 3,435 acres in the study area, or 60 percent of the total land cover in the study area.

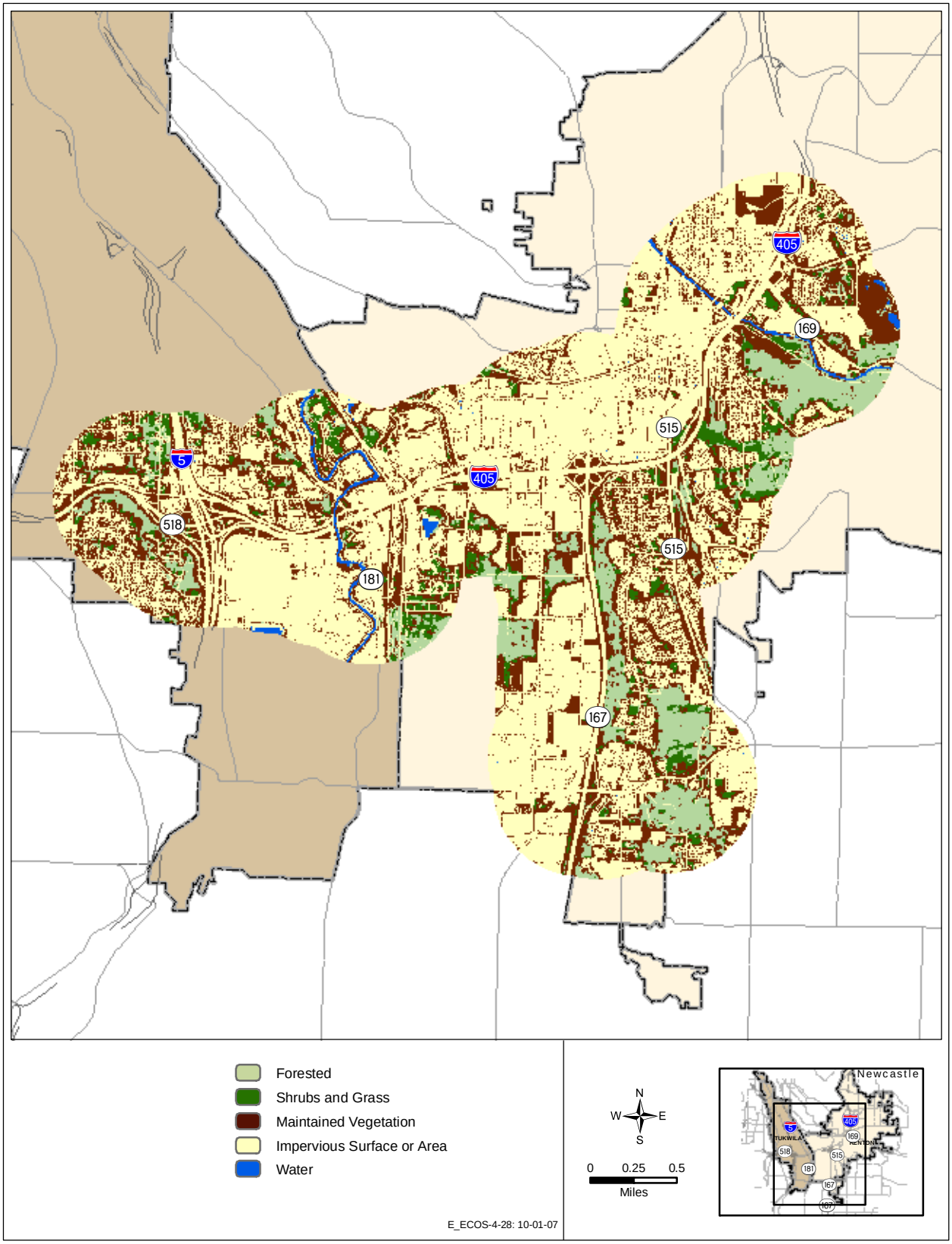
The associated acreages and percentages of land cover types in the study area, and typical percentages of these land cover types in the watersheds in the study area, are listed in Exhibit 4-27. The land use cover types in the study area are shown in Exhibit 4-28. Refer to Exhibits 4-1, 4-3, 4-4, and 4-5 for the total area and distribution of wetlands in the study area.

Exhibit 4-27: Baseline Land Cover In the Study Area

Land Cover	Baseline Land Cover in Study Area (acres)	Percentage of Land Cover in Study Area (percent)	Typical Percentage of Land Cover in Green River, Springbrook, and Cedar River Watersheds*
Forested	550	9%	19%
Shrubs and Grasses	251	4%	6%
Maintained Vegetation	1,550	27%	6%
Impervious Surface	3,434	60%	46%
Total	5,785		

* Within 5 miles of the project footprint

Exhibit 4-28: Land Use Cover Types in Study Area



What is a wetland hydrogeomorphic classification?

The hydrogeomorphic classification of a wetland is based on the three fundamental factors that influence how wetlands function, including geomorphology, water source, and hydrodynamics.

What is a riverine wetland?

Riverine wetlands occur in valleys associated with stream or river channels. They lie in the active floodplain of a river and have important hydrologic links to the water dynamics of the river or stream. The distinguishing characteristic of riverine wetlands in Washington is that they are frequently flooded by overbank flow from the stream or river.

What is a slope wetland?

Slope wetlands normally are found where there is a discharge of groundwater to the land surface. Slope wetlands are usually incapable of depressional storage because they lack the necessary closed contours. Principal water sources are usually groundwater return flow and flow from surrounding uplands, as well as precipitation.

What functions do study area ecosystem elements provide?

Wetlands

In general, wetlands in the Tukwila to Renton Project study area provide many functions including fish and wildlife habitat, water quality improvements, floodwater storage, and groundwater recharge. However, most of the study area wetlands have been disturbed by human influence to some extent. Consequently, these wetlands are compromised in their ability to provide these functions.

The functional values of wetlands in the study area were rated according to the most current version of the Ecology *Washington State Wetlands Rating System – Western Washington: Revised*.[56] Based on the rating scores, the overall functions of each of the three wetland rating categories of water quality, hydrologic, and wildlife habitat are rated as low (less than 34 percent of the possible maximum score), moderate (34 percent to 67 percent of the possible maximum score), or high (greater than 68 percent of the possible maximum score). Overall, the majority of wetlands in the study area have low water quality, hydrologic, and wildlife habitat function scores. Few of the wetlands have high water quality or wildlife habitat function scores and none of the wetlands have high hydrologic function scores. Of the 22 wetlands in the study area, 17 were identified as depressional wetlands, three were identified as riverine wetlands, one was identified as a depressional and riverine wetland, and one was identified as a slope wetland. Ecology's wetland rating field data forms are presented in Appendix C. Additional information on the wetlands in the study area can be found in Appendix D and a table summarizing wetland functions can be found in Appendix E.

Habitat function of the study area wetlands is further defined by their Cowardin classification (forested, scrub-shrub, emergent, and aquatic bed). Three wetlands were classified as forested systems, six wetlands were classified as scrub-shrub systems, six wetlands were classified as emergent wetlands, one wetland was classified as a scrub-shrub and aquatic bed system, four wetlands were classified as scrub-shrub and

[56] *Ecology, 2004*

emergent systems, and two of the wetlands include forested, scrub-shrub, and emergent systems. Wetlands with mixed classifications are generally of higher value than wetlands with a single classification. Forested wetlands are generally considered to be of higher value than emergent or scrub-shrub wetlands because of the functional values they provide.

In general, the smaller sized wetland systems are emergent wetlands and the larger wetlands, including the wetlands that extend outside the WSDOT right-of-way, are forested and scrub-shrub systems.

Fifteen of the 22 wetlands (68 percent) within the study area are relatively small (less than 0.6 acres). Of these 15 wetlands, 14 are less than 0.4 acres and nine are less than 0.1 acre. These small wetlands tend to be located in small topographic depressions with hydrologic connections to hillside seeps or roadside drainage ditches with associated catch basins or culverts. Of the remaining seven wetlands in the study area, three (14 percent) are between 1 acre and 1.3 acres, and four (18 percent) are larger than 4 acres. The seven wetlands in the study area that are larger than 1 acre are Wetlands 0.3R and 0.9R in the Green River Basin, and Wetlands 2.9L, 24.7R, 25.0L, 25.5L, and 25.8L in the Springbrook Creek Basin.

Large wetlands have more capacity for capturing stormwater flows, improving water quality, and providing a variety of habitats for wildlife, and are more likely to provide more beneficial functions than smaller wetlands. Water quality, hydrologic, and habitat functional values for wetlands in the study area are described below. For each category, the wetland's opportunity to provide that function is described first and the wetland's potential to provide that function is described thereafter. Ecology's wetland function field data forms are presented in Appendix C.

Water Quality Functions

All of the wetlands in the study area provide opportunities to improve water quality, to varying degrees, primarily because their location in an urban environment allows the opportunity for water quality improvement.

Ten of the 22 wetlands (45 percent) in the study area have a low potential (less than 34 percent of the possible maximum score) to improve water quality due to their association with

roadside drainage ditches with culverts or catch basins that provide unconstricted or slightly constricted surface outlets. Minimal or no seasonal ponding occurs within these 10 wetlands. Ten of the wetlands (45 percent) have moderate potential scores (34 to 67 percent of the possible maximum score) to improve water quality. The remaining two wetlands (9 percent), Wetlands 24.7R and 25.0L, have a high potential to improve water quality (greater than 68 percent of the possible maximum score). Wetlands with moderate or high scores typically have characteristics such as organic soils, a high proportion of wetland area with seasonal ponding, or dense vegetation to restrict flow through the wetland.

What are wetland hydrologic functions?

Wetland hydrologic functions include flood storage and erosion reduction.

Hydrologic Functions

All of the wetlands in the study area provide opportunities to reduce flooding and erosion to varying degrees.

Fourteen of the 22 wetlands (64 percent) in the study area have a low potential (less than 34 percent of the possible maximum score) to reduce flooding and erosion. The low scores for potential hydrologic functions are due to a lack of natural surface water outlets, ponding features, and the types of vegetation to reduce surface flows; a high presence of ditch-like characteristics; and small contribution of the wetlands to the larger watershed. Six of the wetlands (27 percent) have moderate potential scores (34 percent to 67 percent of the possible maximum score). The remaining two wetlands (9 percent), Wetlands 0.9R and 2.81R, have high function scores for the potential to improve hydrologic functions (greater than 68 percent of the possible maximum score). Wetlands with moderate or high scores typically have characteristics such as a highly constricted outlets or significant water storage depths during wet periods.

Habitat Functions

Ten of the 22 wetlands (45 percent) have a low potential (less than 34 percent of the possible maximum score) to provide habitat for many species. The low score for habitat opportunity is due to the characteristics of the wetland buffers and the overall lack of quality habitat conditions near or adjacent to the wetlands, including their proximity to roads and highway medians. In addition to the wetlands being located near roads, the sides of the wetlands opposite the roadway are often located near residential or commercial

development. Eleven (50 percent) of the wetlands had a moderate score (34 to 67 percent of the possible maximum score) and one wetland (5 percent), Wetland 24.7R, had a high score (greater than 68 percent of the possible maximum score).

Wetlands with moderate or high scores typically have characteristics such as a several Cowardin vegetation classes, several hydroperiods, high habitat interspersion, or the presence of special habitat features. Twenty-one of the 22 wetlands (95 percent) have a low potential (less than 34 percent of the possible maximum score) to provide habitat for many species. The low score for habitat functions is due to the general lack of vegetative structure, hydroperiods, plant richness, habitat diversity, and special habitat features. The remaining wetland (5 percent) has a moderate potential score (34 to 67 percent of the possible maximum score). The wetland with the moderate score has a relatively undisturbed buffer.

What are special habitat features?

Special habitat features include large woody debris, snags, undercut banks, beaver habitat, amphibian habitat, and less than 25 percent cover of invasive plant species.

Several of the wetlands in the study area also have the potential to act as juvenile salmonid rearing habitat due to their association with a waterbody that is known or assumed to contain juvenile salmonids. The wetlands that could provide juvenile salmonid rearing habitat are Wetlands 0.15R and 0.3R due to their association with Gilliam Creek, and Wetlands 24.7R and 25.0L due to their association with Panther Creek. Wetlands 0.15R and 0.3R are located above the ordinary high water mark (OHWM) of Gilliam Creek and only provide refugia habitat for fish during high flow events. Wetlands 24.7R and 25.0L have permanent connections to Panther Creek and provide year-round refugia habitat for fish.

Aquatic Resources

Rivers, streams, and their associated buffers provide a variety of functions. These functions include the transport and storage of water, sediment, nutrients, and other materials; habitat for plants, animals, and humans; groundwater recharge; floodwater storage; and filtering of contaminants. The rivers and streams in the study area perform these functions to varying degrees.

Within the study area, the riparian and in-stream habitat conditions are largely degraded; however, the streams, rivers, and associated riparian habitat in the study area still provide habitat for a variety of fish and wildlife species. Anadromous

and resident fish species use the streams and rivers for spawning, rearing, migration, foraging, and refugia. Upland species use the stream, river, and riparian areas for refugia, foraging, hunting, nesting, denning, perching, and migrating.

In addition to providing wildlife habitat, riparian areas also provide shade to help reduce stream temperatures, litterfall that supplies food and other nutrients to the waterbody, and a buffer zone that helps reduce sediment and other contaminant inputs. Riparian vegetation that falls into these waterbodies can also provide cover for fish or provide basking areas for amphibians and reptiles.

Wildlife Habitat

The different land use cover types found in the study area provide functional habitats for a variety of species. Exhibit 4-29 summarizes the species observed during I-405 Team site visits, wetland delineations, and stream surveys and common species not observed but expected to use the study area.

The forested land use cover types in the study area have a relatively high degree of use by wildlife for cover, foraging, nesting, and denning areas, as well as migration corridors. However, forested land use cover types are typically small and surrounded by more urbanized areas, limiting use by larger mammals. Most of the forested habitat in the study area has been affected to some degree by human influence and some of the typical habitat features found in forested areas, such as fallen trees and snags, are lacking in these areas as compared to natural conditions. Primary and secondary cavity nesting bird species have opportunities to nest in areas where dead or dying trees and limbs exist. Portions of the study area contain large trees adjacent to rivers or streams that provide feeding and hunting perches for piscivorous species such as eagles, osprey, herons, and fishers. In general, these forested areas provide habitat for birds, mammals, reptiles, amphibians, and a variety of insect species.

What are piscivorous species?
Piscivorous species are fish-eating species of animals.

Exhibit 4-29: Wildlife Use in the Study Area

Species	Observed[1]	Expected[2]	Notes
Birds			
American goldfinch (*Carduelis tristis*)	X		
American robin (*Turdus migratorius*)	X		
Barn swallows (*Hirundo rustica*)	X		
Belted king fisher (*Megaceryle alcyon*)	X		
Bewicks wren (*Thryomanes bewickii*)	X		
Black-capped chickadee (*Poecile atricapillus*)	X		
Brewer's blackbird (*Euphagus cyanocephalus*)		X	
Brown creeper (*Certhia americana*)	X		
Bushtit (*Psaltriparus minimus*)	X		
Cedar waxwing (*Bombycilla cedrorum*)		X	
Cliff swallows (*Petrochelidon pyrrhonota*)	X		
Coopers hawk (*Accipiter cooperii*)	X		
Dark eyed junco (*Junco hyemalis*)		X	
Downey woodpecker (*Picoides pubescens*)	X		
European starling (*Sturnus vulgaris*)	X		
Great blue heron (*Ardea herodias*)	X		
House finch (*Carpodacus mexicanus*)		X	
Mallard (*Anas platyrhynchos*)		X	
Mourning dove (*Zenaida macroura*)		X	
Northern flicker (*Colaptes auratus*)	X		
Northern rough-winged swallow (*Stelgidopteryx serripennis*)	X		
Northwest crow (*Corvus caurinus*)	X		
Osprey (*Pandion haliaetus*)	X		Male, female, and juvenile seen at one location
Pileated woodpecker (*Dryocopus pileatus*)	X		
Red-breasted merganser (*Mergus serrator*)		X	
Red-tailed hawk (*Buteo jamaicensis*)	X		
Red-winged blackbird (*Agelaius phoeniceus*)		X	
Rock dove (*Columba livia*)	X		
Rufus hummingbird (*Selasphorus rufus*)		X	
Song sparrow (*Melospiza melodia*)	X		
Stellars jay (*Cyanocitta stelleri*)	X		
Tree swallow (*Tachycineta bicolor*)	X		

1 - Species in the observed column were observed during IDT site visits, wetland delineations, and stream surveys performed for the project
2 - Species in the expected column are common species typical to the project area, but not observed during fieldwork performed for the project

Exhibit 4-29: Wildlife Use in the Study Area (continued)

Species	Observed[1]	Expected[2]	Notes
Violet green swallows (*Tachycineta thalassina*)	X		
Western scrub jay (*Aphelocoma californica*)	X		Adults feeding three juveniles
White crowned sparrow (*Zonotrichia leucophrys*)		X	
Winter wren (*Troglodytes troglodytes*)		X	
Yellow-rumped warbler (*Dendroica coronata*)	X		
Mammals			
Various bat species (*Myotis spp.*)		X	
Coyote (*Canis latrans*)		X	Scat and tracks observed
Deer (*Odocoileus spp.*)	X		
Field mice		X	
Feral Cats (*Felis cattus*)		X	
Feral Dogs (*canis lupus familiaris*)		X	
Gray squirrel (*Sciurus carolinensis*)	X		
Douglas squirrel (*Tamiasciurus douglasii*)	X		
Opossum (*Didelphis virginiana*)		X	
Mountain beaver (*Aplodontia rufa*)		X	Burrow observed
Rabbit	X		
Raccoon (*Procyon lotor*)	X		Sleeping in crotch of maple tree
Vole (*Microtus longicaudus*)		X	
Insects			
Dragonfly	X		
Gardner spider	X		
Mosquitos	X		
Paper wasps (*Polistes fuscatus pallipes*)	X		
Swallow-tailed butterfly (*Papilio spp.*)	X		
Water striders (*Gerris remigis*)	X		
Western white butterfly (*Pontia occidentalis*)	X		
Woodland skipper butterfly (*Ochlodes sylvanoides*)	X		
Yellow jackets (*Vespula spp.*)	X		
Honey bees (*Apis mellifera*)	X		
Reptiles/Amphibians			
Garter snake (*Thamnophis spp.*)	X		
Pacific chorus frog (*Pseudacris regilla*)		X	

1 - Species in the observed column were observed during IDT site visits, wetland delineations, and stream surveys performed for the project
2 - Species in the expected column are common species typical to the project area, but not observed during fieldwork performed for the project

The shrub/grasses cover type provides habitat for a variety of smaller birds and mammals, reptiles, amphibians, and a variety of insect species. Shrubs and grasses provide food sources for insects, songbirds, upland game birds, and many mammals. Shrubs can also provide shelter from predators or extreme weather, or to nest and raise young. Predator species, such as raptors and coyotes, use shrub and grassy areas to hunt.

The maintained vegetation land use cover type does not typically provide habitat for a large diversity of species due to the regular disturbance regime associated with these areas. These areas are often frequented by small birds and mammals that are adapted to human presence. Use of these areas by small birds and mammals can attract predators to these areas.

Non-native plant species are common to both the shrub/grasses and maintained vegetation land use cover types. The presence of these non-native plant species typically increases and favors use by non-native wildlife species. In addition, the entirety of the study area is used by non-native domesticated and feral wildlife such as cats, dogs, and other common pet species.

The impervious surface land use cover type provides little to no wildlife habitat value.

Do any federally listed species or federal species of concern occur in the study area?

No federally listed upland species are known to inhabit the study area. The USFWS website shows that ESA-listed species, including Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), marbled murrelet (*Brachyramphus marmoratus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), golden paintbrush (*Castilleja levisecta*), marsh sandwort (*Arenaria paludicola*), grizzly bear (*Ursus arctos horribilis*), or fisher *(Martes pennanti)*, could occur in King County; however, there are no known occurrences of and no suitable habitat exists for these species in the study area.

Several of the rivers and streams in the study area contain various life stages of Chinook salmon, steelhead, and bull trout, which are currently listed as threatened under the ESA. Waterbodies in the study area known to be used by Chinook salmon include the Green and Cedar Rivers and Springbrook

Creek, though it is likely that some smaller waterbodies in the study area also support certain Chinook salmon life stages, such as Gilliam Creek, due to its connection to the Green River and the lower reaches of Panther Creek due to its association with Springbrook Creek. Chinook salmon primarily use the portions of these waterbodies that are in the study area for upstream and downstream migration and rearing; however, substrate conditions in the Cedar River in the study area could provide some limited spawning habitat. The Chinook salmon found in these waterbodies are a part of the Puget Sound evolutionarily significant unit (ESU) of Chinook salmon, listed as threatened under the ESA.[57]

What is an Evolutionarily Significant Unit?

An evolutionarily significant unit (ESU) of a fish species is the term used by NMFS for the population protected by a listing under the ESA.

Critical habitat for Chinook salmon is designated for areas containing the physical and biological habitat features, or primary constituent elements (PCEs), essential for conserving the species or that require special management considerations. PCEs include sites that are essential to support one or more life stages of the ESU and that contain physical or biological features essential to the conservation of the ESU. The portions of the Green and Cedar Rivers and Springbrook Creek that are located in the study area are designated as critical habitat for Chinook salmon.

Historically, bull trout were reported to use the lower Green River in "vast" numbers.[58] However, bull trout are observed infrequently in this system today. In recent times, bull trout have been reported on the lower Green River as far upstream as the mouth of Newaukum Creek at approximately RM 41.[59] In addition, the Lake Washington system (including the Cedar River), the lower Green River, and the marine areas of Puget Sound have been identified as containing important foraging, migration, and overwintering habitat necessary for bull trout recovery.[60]

It is not known whether the bull trout observed in the lower Green River basin are foraging individuals from other core areas or if natural reproduction may still persist somewhere within the basin. Based on observed behavior from other

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[57] *NMFS, 1999*

[58] *Suckley and Cooper, 1860*

[59] *USFWS, 2004*

[60] *USFWS, 2004*

systems within the management unit and on the size of individuals typically reported, there is a strong likelihood that bull trout in the lower Green River are anadromous migrants from other core areas. Reports of historic bull trout use of the lower Green River tributaries are rare and there have been no recent observations.[61]

The study area also contains areas designated as critical habitat for bull trout. For an area to be included as critical habitat, it must provide one or more of the following functions for bull trout: spawning, rearing, foraging, or over-wintering habitat to support essential existing bull trout local populations; movement corridors necessary for maintaining essential migratory life history forms; or suitable habitat that is considered essential for recovering existing local populations that have declined or that need to be re-established to achieve recovery. The portions of the Green River located in the study area are designated as critical habitat for bull trout because they provide movement corridors necessary for maintaining essential migratory life history forms.

Waterbodies in the study area known or anticipated to be used by steelhead include the Green and Cedar Rivers and Gilliam, Springbrook, and Panther Creeks, though it is likely that some smaller waterbodies in the study area also support certain steelhead trout life stages. The steelhead trout found in these waterbodies are a part of the Puget Sound distinct population segment (DPS) of steelhead trout. NMFS has concluded that critical habitat cannot be determined at this time for the Puget Sound steelhead DPS.[62]

Coho salmon and Pacific and river lamprey (federal species of concern under the ESA) can be found in the waterbodies in the vicinity of the study area.

Washington State priority fish and aquatic species include all state endangered, threatened, sensitive, or candidate species, and species of recreational, commercial, or tribal importance that are considered vulnerable. All fish species with state candidate status that occur in the study area also hold a federal designation and have been discussed earlier in this section. No other state sensitive, threatened, or endangered

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[61] *USFWS, 2004*

[62] *NMFS, 2006*

fish species occur within the study area. Other fish species that are designated as priority species that may occur within the study area include chum and sockeye salmon, coastal cutthroat trout, and river lamprey.[63]

Is the project within a recognized tribal fishing area?

The Tukwila to Renton Project is located within the tribal treaty rights for usual and accustomed fishing areas of the Muckleshoot Tribe. The Muckleshoot Tribe's usual and accustomed fishing areas in the study area include the Green, Cedar, and Black Rivers, and the tributaries to these rivers.

What are Treaty Tribes?

Any tribe recognized by the United States government, with usual and accustomed fishing grounds, whose fishing rights were reserved under a treaty and have been affirmed by a federal court.

Before the Lake Washington ship canal was constructed in 1916, Lake Washington extended farther south and had its outlet through the Black and Duwamish Rivers. The Cedar River did not empty into the lake, but rather into the Black River. At the junction of the Cedar and Black Rivers were several winter villages and an important tribal fishery. The Black River joined the White River to form the Duwamish River and there was another important tribal settlement and fishery at this junction. Farther upstream, the White River and the Green River met and on the land between the forks was the most important and largest up-river settlement and fishery.[64]

The Muckleshoot harvest salmon from the study area pursuant to judicially recognized treaty rights, as interpreted by the Boldt Decision of 1974. The Boldt Decision provided the Yakama Tribe "the right to enjoy all of these fisheries as they had beforehand," which requires that they take the fish "by consent of the tribes in that region" and that consent still applies today. Over the years, judicial decisions have affirmed that treaty tribes have a right to harvest fish free of state interference, subject to conservation principals, to co-manage the fishery resource with the state, and to harvest up to 50 percent of the harvestable fish.[65]

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[63] *WDFW, 2004*

[64] *For details on these judicial decisions, refer to* United States v. Washington, *384 F. Supp. 312 (WD Wn.1974), aff'd 520 F.2d 676 (9th Cir. 1975).*

[65] *For details on these judicial decisions, refer to* United States v. Washington, *384 F. Supp. 312 (WD Wn.1974), aff'd 520 F.2d 676 (9th Cir. 1975).*