Exhibit 4-4: I-405, NE 8th Street to SR 520 Improvement Project Wetlands and Streams Sheet 4

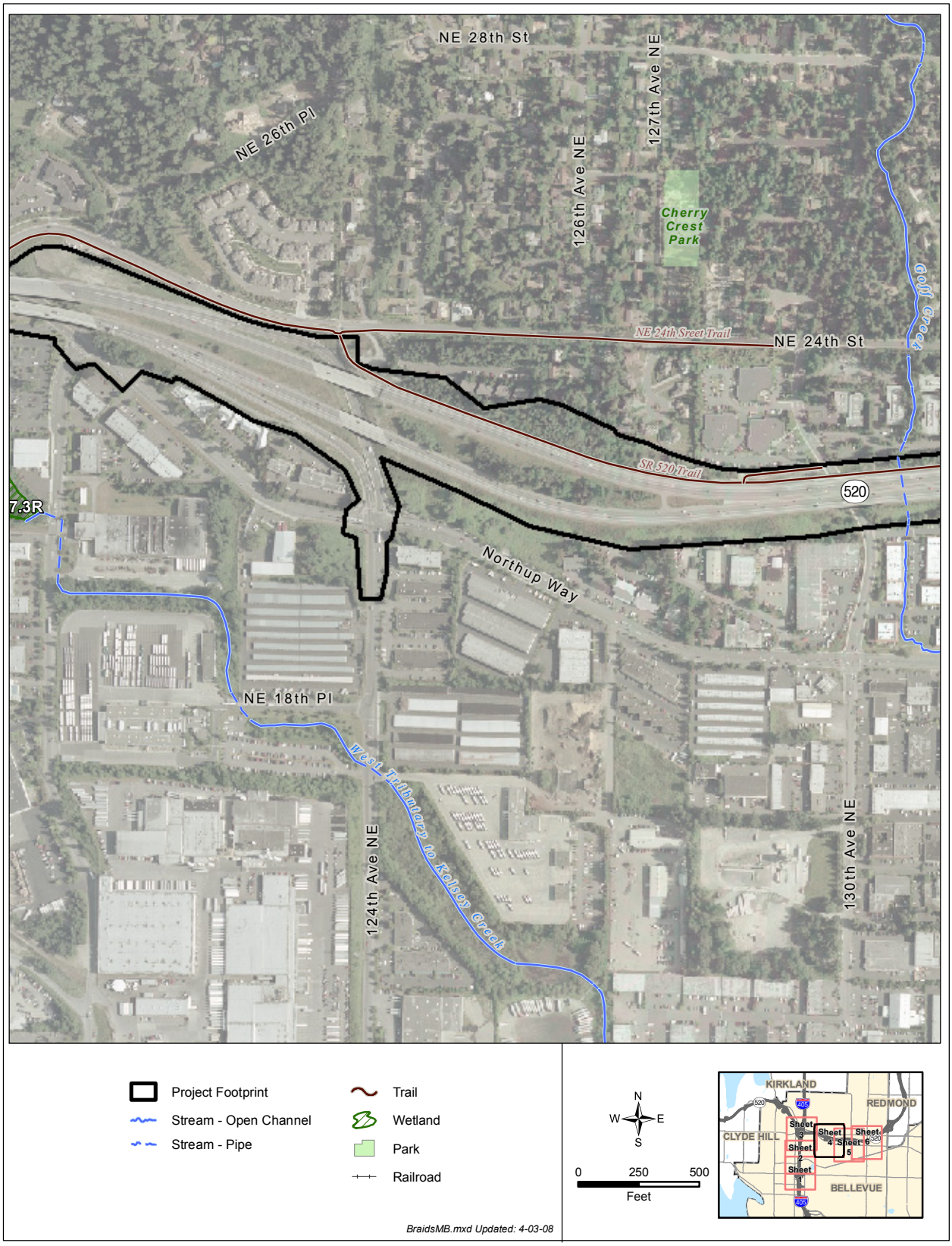
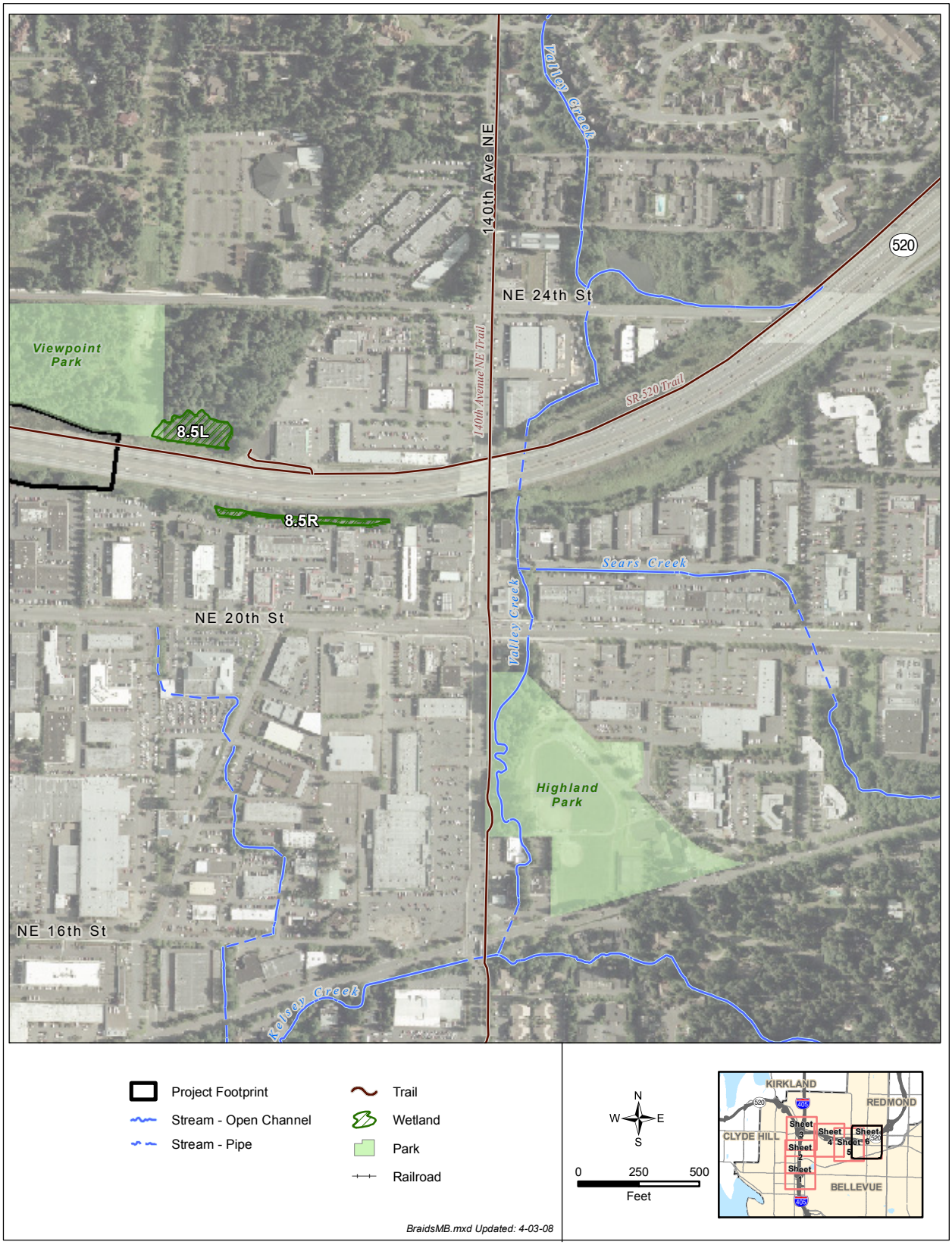


Exhibit 4-4: I-405, NE 8th Street to SR 520 Improvement Project Wetlands and Streams Sheet 5

Exhibit 4-4: I-405, NE 8th Street to SR 520 Improvement Project Wetlands and Streams Sheet 6



Sturtevant Creek Basin

No wetlands occur in the portion of the Sturtevant Creek basin that lies within the study area.

Yarrow Creek Basin

The portion of the Yarrow Creek basin within the study area contains seven wetlands (see Exhibit 4-4 sheet 3), the highest number of wetlands in an individual drainage basin, with a combined total area of 1.91 acres. None of the individual wetlands exceed 0.60 acre. The seven wetlands are located on both sides of SR 520 and within the SR 520 and I-405 interchange. All of the wetlands receive surface water drainage and groundwater. Four of the seven wetlands are emergent wetlands. Of these four, three are slope wetlands fed primarily by groundwater. Two of the wetlands, Wetlands 15.24L and 15.25L, are very small forested wetlands (less than 0.01 acre each) that have direct surface connections to Yarrow Creek. They also receive hydrology from Yarrow Creek during flood flows and from groundwater. The remaining wetland, Wetland 7.18L, is a Category III wetland with multiple wetland habitat classes. This wetland's hydrology stems primarily from groundwater, as indicated by the presence of skunk cabbage.

The majority of the wetlands discharge to catch basins or culverts. A summary of the wetlands located in the Yarrow Creek basin and their characteristics are shown in Exhibit 4-15.

Exhibit 4-5: Summary of Wetlands Located within the Yarrow Creek Basin

Wetland	Size (acres)	Cowardin Classification	Characteristics
6.8L	0.50	Emergent	Emergent wetland dominated by colonial bentgrass (*Agrostis cappillaris*) and red fescue (*Festuca rubra*); located within the southwest corner of the SR 520 and I-405 interchange
6.9L	0.18	Emergent	Slope wetland dominated by colonial bentgrass, reed canarygrass (*Phalaris arundinacea*), and red fescue; located within the southwest corner of the SR 520 and I-405 interchange

Exhibit 4-5: Summary of Wetlands Located within the Yarrow Creek Basin

Wetland	Size (acres)	Cowardin Classification	Characteristics
6.9R	0.23	Emergent	Slope wetland dominated by colonial bentgrass, reed canarygrass, and red fescue; located within the southwest corner of the SR 520 and I-405 interchange
6.95R	0.39	Emergent	Slope wetland with emergent vegetation dominated by reed canarygrass; located within the southwest corner of the SR 520 and I-405 interchange
7.18L	0.59	Forested, scrub-shrub, and emergent	Depressional wetland dominated by skunk cabbage (*Lysichiton americanum*) and red alder (*Alnus rubra*); located northeast of the SR 520 and I-405 interchange, outside of WSDOT right-of-way
15.24L	<0.01	Forested	Riverine wetland with mostly bare ground and a dense overhanging canopy. The dominant understory vegetation is salmonberry (*Rubus spectabilis*); located west of I-405 and north of the SR 520 and I-405 interchange
15.25L	<0.01	Forested	Forested riverine wetland dominated by small-flowered bullrush (*Scirpus macrocarpus*) and field mint (*Mentha arvensis*); located west of I-405 and north of the SR 520 and I-405 interchange

West Tributary to Kelsey Creek Basin

There are two wetlands in the West Tributary to Kelsey Creek basin within the study area that have a combined total area of 4.26 acres. The two wetlands are located east of the SR 520 and I-405 interchange (see Exhibit 4-4 sheet 3).

Wetland 7.3R is hydrologically connected to the headwaters of the West Tributary to Kelsey Creek and is the only Category II wetland in the study area. This wetland is a large, square-shaped riverine wetland bound by roads, parking lots, and structures on three sides and the BNSF Railway tracks on the fourth. The wetland is dominated by red alder, willow (*Salix* spp.), and reed canarygrass, and contains more than 20 different plant species (one of the attributes that increases a wetland's value when applying the Western Washington Wetland Rating System). Wetland 7.2L is a small riverine wetland classified as a forested wetland dominated by red alder and cottonwoods (*Populus* spp.). This wetland, although small in size, is a contributing factor to the headwaters of the West Tributary to Kelsey Creek.

A summary of the wetlands located in the West Tributary to Kelsey Creek basin and their characteristics are shown in Exhibit 4-6.

Exhibit 4-6: Summary of Wetlands Located within the West Tributary to Kelsey Creek Basin

Wetland	Size (acres)	Cowardin Classification	Characteristics
7.2L	0.12	Forested	Riverine wetland dominated by red alder, skunk cabbage, and salmonberry; located on the north side of SR 520 east of the SR 520 and I-405 interchange
7.3R	4.14	Forested, scrub-shrub, and emergent	Large riverine wetland associated with the West Tributary to Kelsey Creek dominated by red alder, willow, and reed canarygrass; located on the south side of SR 520 east of the SR 520 and I-405 interchange, outside WSDOT right-of-way

Goff Creek Basin

Only a small portion of the study area is within the Goff Creek basin (29.12 acres). This portion of the Goff Creek basin contains only a single wetland (see Exhibit 4-4 sheet 3) that comprises an area of 0.04 acres. The wetland is located north of SR 520 and immediately east of where Goff Creek flows

under the highway. A summary of the wetland and its characteristics is shown in Exhibit 4-7.

Exhibit 4-7: Summary of Wetland Located within the Goff Creek Basin

Wetland	Size (acres)	Cowardin Classification	Characteristics
8.1L	0.04	Forested, scrub-shrub, and emergent	Depressional wetland dominated by Himalayan blackberry, Pacific willow (*Salix lasiandra*), and red alder; located north of SR 520 and west of 132nd Ave NE

What is a depressional wetland?

Depressional wetlands occur in topographic depressions. Dominant water sources are precipitation, groundwater discharge, and flow from adjacent uplands. Elevation contours are closed, thus allowing the accumulation of surface water.

Kelsey Creek Basin

No wetlands occur in the portion of the Kelsey Creek basin that lies within the study area.

Valley Creek Basin

There are two wetlands in the Valley Creek basin within or adjacent to the study area (see Exhibit 4-4 sheet 5), with a combined total area of approximately 1.08 acres. The two wetlands are located adjacent to SR 520 or associated SR 520 on- and off-ramps. All of the wetlands receive surface water drainage and groundwater. A summary of the wetlands located in the Valley Creek basin and their characteristics are shown in Exhibit 4-8.

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

Wetland	Size (acres)	Cowardin Classification	Characteristics
8.5L	0.74	Forested and scrub-shrub	Depressional wetland dominated by red alder and Douglas spirea (*Spiraea douglasii*); located on north side of SR 520 between 136th Ave NE and 137th Ave NE
8.5R	0.34	Forested and scrub-shrub	Linear slope wetland dominated by red alder, lady fern (*Athyrium filix-femina*), and Pacific willow; located south of SR 520 between 140th Ave NE and 134th Ave NE, outside WSDOT right-of-way

Aquatic Resources

The I-405, NE 8th Street to SR 520 Improvement Project is located in the Lake Washington/Cedar/Sammamish watershed (Water Resource Inventory Area [WRIA] 8). Specifically, the majority of the project lies in the Kelsey Creek subarea with a small portion of the study area extending into the Lake Washington subarea. The six basins listed above are all located within these two subareas.

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.

The streams in WRIA 8 that are crossed by I-405 and SR 520, or are otherwise in the study area, are Sturtevant Creek, an unnamed tributary to Sturtevant Creek, an unnamed tributary to Yarrow Creek, Yarrow Creek, the West Tributary to Kelsey Creek, Goff Creek, and Valley Creek. The locations of all of the water bodies in the study area are shown in Exhibit 4-4. Habitat conditions in these water bodies within the study area are described in further detail in the remainder of this section. For more information on the water bodies themselves, see the Water Resources Discipline Report for this project.[17]

In general, the streams in the aquatic resources 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 water bodies. Substantial changes have occurred in the vegetation surrounding these water bodies. 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.

Salmonid species found in the study area include Chinook (*Oncorhynchus tshawytscha*) and coho (*O. kisutch*) salmon; and sea-run cutthroat trout (*O. clarki clarki*). Chinook, coho, and searun cutthroat are found in Valley Creek, which is located outside of the project footprint. Coho are found in Yarrow Creek and Sturtevant Creek, also outside of the project footprint. Anadromous salmonid species primarily use the streams in the study area for upstream and downstream

[17] *WSDOT, 2008a.*

What is a salmonid?
A salmonid is a fish of the fish family Salmonidae, for example, salmon, trout, and chars.

migration and rearing. The study area also contains limited spawning habitat for Chinook and coho. Resident cutthroat trout use the study area for all life stages. Chum (*Oncorhynchus keta*), sockeye (*O. nerka*), pink salmon (*O. gorbuscha*) steelhead (*O. mykiss*), and bull trout (*Salvelinus confluentus*) are not known to occur in the study area.

Other fish species likely to be found in the study area include threespine stickleback (*Gasterosteus aculeatus*), longnose dace (*Rhinichthys cataractae*), speckled dace (*R. osculus*), 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*). Longfin smelt (*Spirinchus thaleichthys*) are not known in the study area. Exhibits 4-9 and 4-10 detail the anadromous and resident fish species known to occur in the individual streams in the study area.

Exhibit 4-9: Anadromous Fish Species Known or Presumed to be in Water Bodies in or Near the Study Area

	Fish Species			
	Chinook Salmon	Coho Salmon	Sea-Run Cutthroat	Pacific Lamprey
Sturtevant Creek		✓		
Unnamed Tributary to Sturtevant Creek				
Unnamed Tributary to Yarrow Creek				
Yarrow Creek		✓		
West Tributary to Kelsey Creek				
Goff Creek				
Valley Creek	✓	✓	✓	✓

Exhibit 4-10: Resident Fish Species Known or Presumed to be in Water Bodies in or Near the Study Area

	Fish Species							
	Cutthroat Trout	River Lamprey	Western Brook Lamprey	Sculpin	Longnose Dace	Speckled Dace	Largescale Sucker	Threespine Stickleback
Sturtevant Creek	✓			✓	✓	✓	✓	✓
Unnamed Tributary to Sturtevant Creek								
Unnamed Tributary to Yarrow Creek	✓		✓	✓		✓	✓	✓
Yarrow Creek	✓	✓	✓	✓		✓	✓	✓
West Tributary to Kelsey Creek	✓		✓	✓				✓
Goff Creek	✓		✓	✓			✓	
Valley Creek	✓		✓	✓	✓	✓	✓	✓

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

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

Sturtevant Creek

Sturtevant Creek originates from Lake Bellevue and flows into an open channel between a parking lot for Lake Bellevue businesses and the BNSF Railway right-of-way, as shown in Exhibit 4-4 sheet 1. From there, Sturtevant Creek flows alternatively between open channel and culverted segments until it crosses under I-405 via two side-by-side concrete culverts at SE 4th Street, approximately 0.25 mile south of the study area. The concrete culverts under I-405 and the culverted sections of Sturtevant Creek upstream of I-405 are fish passage barriers, precluding the upstream migration of anadromous fish species. The stream daylights west of I-405, flows southerly into a series of open channel segments broken up by culverted sections, and enters a large wetland complex

Sturtevant Creek west of I-405

What does it mean when a stream daylights?

Daylighting of a stream occurs when the stream flows from a covered or piped channel into an above-ground open channel.

associated with Mercer Slough. The stream then flows under SE 8th Street to its confluence with Mercer Slough.

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

In-stream habitat types of Sturtevant Creek consist predominantly of riffles and glides with eight pools identified along the reach that was surveyed. These pools were primarily a mix of medium and high quality pools, with one pool ranking as low quality. The streambed substrate is mainly composed of fine and coarse gravels, and sediments that range in size from fine silt to boulders. Approximately 10 percent of Sturtevant Creek near I-405 has some form of fish cover including overhanging vegetation within 3 feet of the water surface, filamentous algae, macrophytes, brush and small woody debris, undercut banks, boulders, and constructed culverts. Riparian vegetation along Sturtevant Creek consists of a mix of landscaping trees, shrubs, and grasses; these areas are primarily composed of non-native invasive plant species. Only one piece of LWD was identified in the surveyed reach. The limiting factors analysis for WRIA 8 rated Sturtevant Creek poor for fish passage, riparian habitat, and hydrology.[18]

What does fish cover mean?
Fish cover refers to in-stream habitat that provides refuge, shade, and foraging areas for small and large fish species.

What are macrophytes?
Macrophytes are plants that are large enough to be apparent to the naked eye without the aid of a microscope or dissecting scope.

No anadromous fish are anticipated to use the portion of Sturtevant Creek in the project area, as the I-405 culvert south of the study area acts as a complete upstream fish passage barrier.[19]

Unnamed Tributary to Sturtevant Creek

An unnamed tributary to Sturtevant Creek originates alongside the northbound lane of I-405 at MP 14.01 from a series of storm drains and roadside ditches (Talent ditches) adjacent to the NE 8th Street on-ramp to northbound I-405, as shown in Exhibit 4-4 sheet 1. The storm drains and roadside ditches collect into an underground vault, daylight, and become this unnamed tributary to Sturtevant Creek, as described below.

What is a Talent ditch?
A Talent ditch is a man-made feature constructed to convey stormwater. These features function similarly to wetlands and fall under the jurisdiction of the U.S. Army Corps of Engineers.

The primary water source for the vault is a sequence of ditches that flow south along the east side of I-405. The ditches receive runoff from a parking lot located adjacent to the NE 10th Street bridge, as well as roadside stormwater runoff. The

---

[18] *Kerwin, 2001.*

[19] *WSDOT, 2006c.*

ditches flow through open and culverted segments north of the unnamed tributary to Sturtevant Creek and then into the underground vault. Storm drains located within the median of I-405 also flow into the underground vault, although they only provide a small amount of water.

The unnamed tributary flows alongside the I-405 northbound lane for approximately 350 feet before entering an underground culvert. It again daylights for a short segment near the northbound NE 8th Street on-ramp structure. Along this segment, the east bank is heavily vegetated with willows and alders, but the actual stream and its west bank are entirely shaded by the on-ramp. The stream then enters another culvert and flows south until it confluences with Sturtevant Creek. The exact culvert path from the northbound NE 8th Street on-ramp structure to Sturtevant Creek is unknown.

The unnamed tributary is located in proximity to I-405 to the west and commercial development to the east. The stream is confined by hardened banks and its substrate is composed mostly of imported course angular rock and sand materials typically used for highway construction projects. Rounded river rock native to the study area also occurs sporadically along this reach.

Riparian vegetation and stream buffers are limited in size along both stream banks due to the I-405 roadway and adjacent development. Vegetation is also limited by routine maintenance, including pruning and mowing, to ensure driver safety and visibility. As a result of this routine maintenance, native plant species in the stream buffer are limited to small shrubs, young saplings, and some herbaceous plants. The stream buffer also contains several invasive species including English ivy (*Hedera helix*), Himalayan blackberry, and bittersweet nightshade (*Solanum dulcamara)*.

In-stream habitat in the unnamed tributary to Sturtevant Creek within the study area consists of one long riffle and small pools at the outflow of each culvert. Approximately 5 to 10 percent of the stream reach is covered by overwater vegetation. No woody debris or large boulders were found within the channel.

Unnamed tributary to Yarrow Creek upstream origin

Unnamed Tributary to Yarrow Creek

The unnamed tributary to Yarrow Creek originates from wetlands and stormwater in the study area (see Exhibit 4-4 sheet 3). Beginning on the south side of SR 520, the unnamed tributary to Yarrow Creek alternately flows between open channel and culverted sections.

The stream originates from ground- and stormwater catchment systems within the I-405/SR 520 interchange. On the south side of SR 520, the unnamed tributary exits through a 24-inch corrugated steel culvert and falls approximately 3 feet onto several concrete bag dissipaters, which are placed below the outfall and used to slow and distribute the flow of water. The stream then flows west for approximately 700 feet, narrows in width due to a constricted channel, is directed north underneath SR 520 via a culvert, and again daylights on the north side of SR 520. The stream then ultimately confluences with Yarrow Creek at approximately SR 520 MP 6.3.

Within this reach, the stream is confined to a defined channel, except for an approximately 20-linear-foot section where the stream braids around a debris pile. Riparian vegetation along the unnamed tributary to Yarrow Creek includes a mixed canopy dominated by western hemlock (*Tsuga heterophylla*), red cedar, Douglas fir (*Pseudotsuga menziesii*), and assorted upland shrubs that are primarily native species. The stream meanders beneath a mixed deciduous and coniferous forested riparian canopy with an understory consisting of a mix of native and non-native plant species. The floodplain is wider along this reach with indications of a meandering channel. Riparian vegetation is identified as a mixed canopy dominated by western hemlock, red cedar, Douglas fir, and assorted upland shrubs that are primarily native species. Native vegetation is prevalent along most of the streambank with only minor areas of disturbance. Fish cover of the unnamed tributary to Yarrow Creek consists of overhanging vegetation within 3 feet of the water surface, brush, small woody debris, boulders, constructed structures, and undercut banks.[20]

---

[20] *Kerwin, 2001.*

Yarrow Creek

Yarrow Creek does not flow within the project footprint, but does flow within the study area's northern extent (see Exhibit 4-4 sheet 3). Yarrow Creek originates from Bridle Trails State Park and flows south, via a culvert under I-405, and then through several culverts as it flows west toward 108th Avenue NE. At 108th Avenue NE, Yarrow Creek confluences with an unnamed tributary to Yarrow Creek and flows south under SR 520 through a series of culverts and daylighted channels.

Land use in the Yarrow Creek basin has contributed to the current conditions of the creek. Much of the creek has been piped to accommodate residential, commercial, and industrial development. Yarrow Creek has several fish passage barriers throughout its length.[21] The creek near the study area is used by resident cutthroat trout, shellfish, and aquatic insects. The lower reaches of Yarrow Creek support coho salmon and other anadromous fish. Lack of good spawning habitat has been cited as a limiting factor for salmonids in Yarrow Creek.

In-stream habitat types in this reach consist of a mix of riffle and pool habitats, with only a single pool present. Approximately 10 to 40 percent of Yarrow Creek has some form of fish cover including overhanging vegetation within 3 feet of the water surface, brush, small woody debris, boulders, constructed structures, and undercut banks. The streambed substrate is mainly composed of sand and fine gravel. In total, 55 pieces of LWD were identified in this reach. The limiting factors analysis for WRIA 8 rated Yarrow Creek poor for fish passage, riparian habitat, and hydrology.[22]

West Tributary to Kelsey Creek

The West Tributary to Kelsey Creek does not flow through or into the project footprint, but we evaluated it due to its hydrologic connection with wetlands in the study area (stream location is shown in Exhibits 4-4 sheets 4 and 5) and as a proposed location for discharge of treated stormwater. The creek is identified as 08-0264 in the Washington State WRIA

---

[21] *WSDOT, 2005.*

[22] *Kerwin, 2001.*

system and its basin encompasses a total area of 1,001 acres, all within the City of Bellevue.

Goff Creek downstream culverts south of SR 520

The West Tributary to Kelsey Creek originates from wetland 7.3R, which is located approximately 300 feet south of the study area. As no project activities are anticipated to occur in this area, the West Tributary to Kelsey Creek is not discussed further.

Goff Creek

The majority of the Goff Creek basin is within the City of Bellevue (513 of 679 total acres). Single family residential use is the dominant land use type (62 percent), although a newly constructed commercial complex south of SR 520 has increased impervious surface within the basin.

Goff Creek (see Exhibit 4-4 sheet 4) originates from several tributaries and hillside seeps located approximately 2 miles north of SR 520. Most of these tributaries and seeps are located within Bridal Trails State Park.

What are weirs?
A weir is a small dam commonly used to raise the level of a small river or stream.

Goff Creek enters the study area north of SR 520 and flows at a fairly steep gradient (10 to 15 percent slope) through a commercial office complex. In the area of the office complex, Goff Creek flows through a series of constructed, notched log weirs. The heights of the log weirs range from 0.5 foot to 2 feet and the weirs are set at approximately 30 foot intervals. Approximately 100 feet north of SR 520 and adjacent to a landscaped pond, the stream becomes highly constricted, with the channel width averaging 1 to 2 feet. It then flows into a pool, is directed under a parking lot, daylights for approximately 10 feet, then is diverted into two culverts under SR 520. Immediately upstream of the study area, large conifers dominate Goff Creek's riparian buffer. Within the study area, the riparian buffer is dominated by deciduous trees with English ivy occurring along both banks and encroaching down to the limits of the ordinary high water mark (OHWM).

Goff Creek upstream culvert north of SR 520

South of SR 520, Goff Creek flows in and out of several culverts through a heavily urbanized, commercial area. This portion of Goff Creek has been highly modified and is surrounded by impervious surfacing associated with commercial and industrial uses. The open channel segments of Goff Creek are constricted and pass under a series of

bridges that connect the surrounding businesses to one another. In this area, Goff Creek more resembles a straightened ditch than a natural stream. South of SR 520, the stream channel and adjacent vegetation is composed of maintained ornamental shrubs and trees and mowed grass on both sides of the channel. Goff Creek's floodplain is limited to approximately 10 feet in width throughout the entire reach and is heavily riprapped with large boulders on both banks that create perpendicular embankments nearly 3 feet high.

At the point where it exits the riprapped channel, Goff Creek turns east and flows parallel to NE 20th Street. In this area, it meanders through a mowed grassy area until it eventually confluences with a tributary composed primarily of stormwater runoff. The combined flows from Goff Creek and its tributary then flow through a standpipe that directs the flow south under Northup Way via a culvert.

Goff Creek daylights again immediately south of Northup Way and exits the study area in a heavily confined, linear channel constructed of riprap.

Riparian vegetation along Goff Creek consists of a mix of native and non-native vegetation. Fish habitat in Goff Creek near SR 520 consists primarily of man-made habitat structures, boulders, and overhanging vegetation within 3 feet of the water surface. Additional cover includes minor amounts of macrophytes and small brush and woody debris. The substrate composition within the stream is primarily sand and coarse gravel. No LWD pieces were identified. The limiting factors analysis for WRIA 8 rated Goff Creek poor for fish passage, riparian habitat, and hydrology.[23]

Valley Creek

Valley Creek does not flow through or into the project footprint, but a portion of the Valley Creek basin is within the study area, as depicted in Exhibit 4-9. The stream is located near the eastern terminus of the study area (approximately 1,675 feet to the east of the eastern project limit) and currently receives stormwater runoff from SR 520.

Valley Creek north of SR 520

[23] *Kerwin, 2001.*

Valley Creek originates from several tributaries and hillside seeps located approximately 1.5 miles north of SR 520. It then flows through residential and commercial developments located on the hillside to the north of SR 520. Valley Creek flows under SR 520 through two 48-inch culverts and then daylights at the base of the SR 520 road prism into a confined, open channel that is approximately 5 feet in width.

What is a subcanopy?

The subcanopy is a vegetated layer between the undergrowth and canopy layers. It sits directly below the canopy where temperatures are significantly lower. The subcanopy is relatively continuous and often contains immature trees on their way toward the canopy where there is less competition for water and light.

Valley Creek is a low-gradient stream that flows primarily north to south. Adjacent to SR 520, it flows through a stream buffer ranging from 15 to 30 feet wide on each stream bank. This buffer contains large deciduous trees, including species of willow and a mix of red alders. The subcanopy along this reach is primarily composed of native vegetation.

Valley Creek's floodplain south of SR 520 is highly developed. Several of the businesses immediately adjacent to this reach of Valley Creek are elevated on concrete pilings with associated pads. Standing water was present in this developed area at the time of the stream survey and there was evidence of frequent flooding.

Much of Valley Creek is used as spawning habitat by coho and Chinook, and historically sockeye, including the reach adjacent to SR 520. However, north of SR 520 near the Bellevue Municipal Golf Course, a 1,087-foot-long culvert outfall precludes sockeye from spawning further upstream.[14]

Riparian vegetation along Valley Creek consists of a mix of landscaping trees, shrubs, grasses; these areas are composed of non-native invasive plant species with intermixed native plants. Approximately 75 percent of Valley Creek near SR 520 has some form of fish cover, including overhanging vegetation within 3 feet of the water surface, macrophytes, small woody debris, undercut banks, boulders, and constructed culverts. The streambed substrate is predominantly composed of sand and a silty/sand/muck combination, and sediments range in size from fine silt to boulders. The limiting factors analysis for WRIA 8 rated Valley Creek as good for fish passage and poor for LWD, pools, riparian habitat, and hydrology.[24]

---

[24] *Kerwin, 2001.*

Fish Passage Barriers

The I-405 Team also identified existing culverts within the study area that convey waters of the state and are barriers to fish passage. Based on the results of the investigation, WSDOT determined that two side-by-side culverts associated with Goff Creek are barriers to fish passage. These culverts occur beneath SR 520 and have perch heights greater than 1 foot. The project improvements will not affect Goff Creek or the existing culverts.

Wildlife Habitat

Wildlife habitat, for the purposes of this discipline report, includes the upland habitats in the study area and is primarily quantified by the nature of the upland vegetation found in a given area. It does not include the wetland or aquatic habitats in the study area that are detailed earlier in this report.

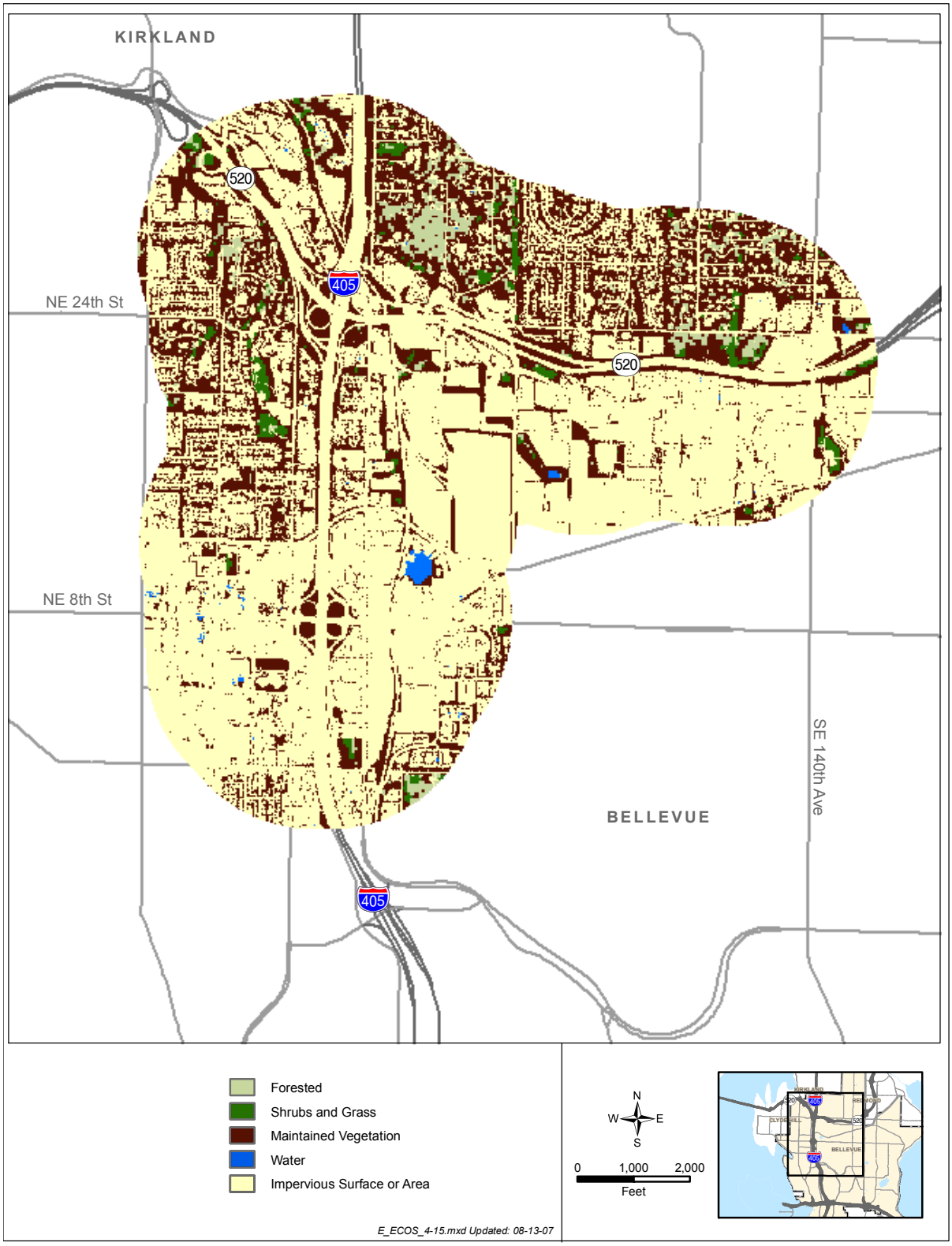
The land use cover types in the study area are shown in Exhibit 4-11. The acreages and percentages of land cover types in the study area and typical percentages of these land cover types in the watersheds are shown in Exhibit 4-12.

Less than 5 percent of the study area is composed of native forest and native shrub/grass cover types. Typically, native wildlife species use native cover habitat types. With such a large portion of the study area (approximately 95 percent) dominated by maintained vegetation and impervious surface cover types, native wildlife species have little native habitat to use.

Upland vegetation refers to the dominant upland vegetation communities present in the study area that are not directly associated with wetlands or streams. Upland land cover in the study area is classified into four land cover types, each serving different ecological functions: three vegetation types and impervious areas. The three vegetation types are forested, shrub/grasses, and maintained vegetation. Water bodies, such as lakes and ponds, were not classified into these cover types nor were they incorporated in area calculations.

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. The forested cover type represents 2.6 percent of the overall land cover in the study area. Typical large tree species found in the forested

Exhibit 4-11: Land Use Cover Types in Study Area



portions of the study area include big leaf maple (*Acer macrophyllum*), red alder, black cottonwood, and Douglas fir. In addition, Western red cedar and western 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 Marsh.*); vine maple (*Acer circinatum Pursh*); Oregon grape (*Berberis aquafolium*); salal (*Gaultheria shallon Pursh*); oceanspray (*Holodiscus discolor*); elderberry (*Sambucus racemosa*); serviceberry (*Amelanchier arborea var.*); stinging nettle (*Urtica dioica*); salmonberry; swordfern *(Polystichum munitum)*; and lady fern.

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. This land use cover type represents approximately 1.5 percent of the overall land cover in the study area. 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. Common species found in shrub/grasses land use cover types are Himalayan blackberry, Oregon grape, oceanspray, kinnikinnick (*Arctostaphyloa uva-ursi*), red fescue, annual blurgrass (*Poa annua*), and Western fescue (*Festuca occidentalis*).

The maintained vegetation land use cover type is composed of areas of roadside vegetation, including roadway medians and shoulders, that are regularly maintained for life, health, and safety purposes, and landscaped areas consisting primarily of plants grown for beauty or ornamental value for residential, commercial, and industrial developments. The maintained vegetation land use cover type represents 27.8 percent of the overall land cover in the study area. Maintained vegetation is typically found in developed or disturbed areas.

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. The impervious surface land use cover type represents 68.1 percent of the overall land cover in the study area. This land use cover type

does contain some small patches of vegetation and open ground that might provide very limited use as habitat. This limited habitat will typically be for non-native rather than native wildlife species.

Exhibit 4-12: Existing Land Cover In the Study Area

Land Cover	Existing Land Cover in Study Area (acres)	Percentage of Land Cover in Study Area (percent)*	Typical Percentage of Land Cover in Study Area Watersheds (percent)**
Forested	64.5	2.6	12.20
Shrubs and Grasses	37.3	1.5	5.10
Maintained Vegetation	699.5	27.8	36.20
Impervious Surface	1,711.8	68.1	46.50
Total	**2,513.2**		

* Within 0.5 mile of the project footprint

** Within 5 miles of the project footprint

What functions do study area ecosystem elements provide?

Wetlands

In general, wetlands in the I-405, NE 8th Street to SR 520 Improvement 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.

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 general topography, water source, and the movement of water.

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.* Using Ecology's system, wetlands were rated based on a point system where points are awarded to three functional value categories: water quality, hydrologic, and wildlife habitat. To determine an accurate assessment of a wetland's functional values, function

scores were calculated based on entire wetland systems, when applicable, not just the delineated portion of wetlands within the study area. As part of Ecology's rating system, the hydrogeomorphic classification of each wetland was determined. Each hydrogeomorphic wetland class has specific rating criteria for water quality and hydrologic functions. Habitat functions rating criteria are the same for each of the hydrogeomorphic wetland classes. A summary of the wetlands observed in the study area is presented below in Exhibit 4-13 and further summarized in the subsequent text.

Exhibit 4-13: Summary of Wetlands in the Study Area

Wetland	Size (acres)	Cowardin Classification	State Rating (Ecology)/ City of Bellevue Rating	Wetland HGM Class Used for Rating
6.8L	0.50	Emergent	IV	Slope
6.9L	0.18	Emergent	IV	Slope
6.9R	0.23	Emergent	IV	Slope
6.95R	0.39	Emergent	IV	Slope
7.18L	0.59	Forested, scrub-shrub, and emergent	III	Depressional
7.2L	0.12	Forested	III	Riverine
7.3R	4.14	Forested, scrub-shrub, and emergent	II	Riverine
8.1L	0.04	Forested, scrub-shrub, and emergent	III	Depressional
8.5L	0.74	Forested and scrub-shrub	IV	Depressional
8.5R	0.34	Forested and scrub-shrub	IV	Slope
15.24L	<0.01	Forested	IV	Riverine
15.25L	<0.01	Forested	IV	Riverine
Total	**7.29**			

Of the 12 wetlands in the project study area, three (25 percent) were identified as depressional wetlands, four (33 percent) were identified as riverine wetlands, and five (42 percent) were identified as slope wetlands. 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.

Four of the 12 wetlands are dominated by emergent vegetation and three are dominated by forested vegetation. The remaining five wetlands include more than one wetland classification per the Cowardin system.[25] Two wetlands include forested and scrub-shrub habitats and three wetlands include forested, scrub-shrub, and emergent habitats.

In general, the smaller sized wetland systems are emergent wetlands and the larger wetlands, including the wetlands that are outside or extend outside of the WSDOT right-of-way, are forested and scrub-shrub systems. Forested wetlands are generally considered to be of higher value than emergent or scrub-shrub wetlands because of the functional values they provide, such as diverse habitat structure, shade, and water storage and treatment capabilities through vegetation.

Ten of the 12 wetlands (83 percent) within the study area are relatively small (less than 0.6 acres). Of these ten wetlands, eight are less than 0.4 acres and three 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. The two remaining wetlands larger than 0.6 acre are Wetland 8.5L (0.74 acre) in the Valley Creek basin and Wetland 7.3R (4.14 acres) in the West Tributary to Kelsey Creek basin. Both of these wetlands are outside the project footprint and entirely outside WSDOT right-of-way. Larger wetlands typically tend to provide functions known to improve habitat quality. Large wetlands have more capacity for capturing stormwater flows, improving water quality, and providing a variety of habitats for wildlife. Additionally, they 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 function 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.

---

[25] *Cowardin et al., 1979.*

Water Quality Functions

What are wetland water quality functions?
Wetland water quality functions include sediment retention, nutrient removal, and removal of toxic compounds or pollutants.

Opportunities

All of the wetlands in the study area provide low to moderate opportunities to improve water quality. Wetlands with low to moderate scores typically have characteristics such as low organic content in soils, a small proportion of wetland area with minimal ponding, or sparse vegetation that does not restrict flow through the wetland.

Potential

Seven of the 12 wetlands 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 seven wetlands. Five of the 12 wetlands have moderate potential (34 percent to 67 percent of the possible maximum score) to improve water quality. None of the wetlands within the study area have high function scores for the potential to improve water quality (greater than 68 percent of the possible maximum score).

Hydrologic Functions

What are wetland hydrologic functions?
Wetland hydrologic functions include flood storage and reducing erosion.

Opportunities

All of the wetlands within the project footprint provide low to moderate opportunities to reduce flooding and erosion. One wetland within the study area but outside the project footprint provides high opportunities to improve hydrologic functions.

Potential

Eight of the 12 wetlands in the study area have a low potential (less than 34 percent of the possible maximum score) to reduce flooding and erosion, with all eight of these wetlands scoring 25 percent or less of the possible maximum score. The low scores for potential hydrologic functions are due to a lack of natural surface water outlets, ponding features, and characteristics of vegetation to reduce surface flows; a high presence of ditch-like characteristics; and small contribution of the wetlands to the larger watershed. Three of the 12 wetlands have moderate potential (34 percent to 67 percent of the possible maximum score) and one wetland, Wetland 7.3R, has 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 highly constricted outlets or substantial water storage depths during wet periods.

Habitat Functions

Opportunities

All 12 wetlands have a low opportunity (less than 34 percent of the possible maximum score) to provide habitat for many species, and all of the wetlands score 25 percent or less of the possible maximum score. 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.

What are special habitat features?

Special habitat features include LWD, snags, undercut banks, beaver habitat, and amphibian habitat. Wetland areas containing less than 25 percent cover of invasive plant species are also considered to be special habitat features.

Potential

Six of the 12 wetlands 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, interspersion of habitats, and special habitat features. Six of the 12 wetlands have moderate potential (34 percent to 67 percent of the possible maximum score) to provide habitat. None of the wetlands in the study area have a high function score for the potential to provide habitat (greater than 68 percent of the possible maximum score). Wetlands with moderate or high scores typically have characteristics such as several Cowardin vegetation classes, several hydroperiods, high habitat interspersion, or the presence of special habitat features.

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 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 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 for spawning, rearing, migration, foraging, and refugia. Upland species use the streams and riparian areas for resting, nesting, and feeding.

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 water body, and a buffer zone that helps reduce sediment and other contaminant inputs. Riparian vegetation that falls into these water bodies 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. However, only 4 percent of the study area (forested, shrub and grasses) provides relatively native habitats for wildlife species. Therefore, wildlife use in the study area is primarily limited to species tolerant of maintained vegetation and urbanization. A summary of the species observed during IDT site visits, wetland delineations, and stream surveys is in Exhibit 4-14. The table also includes common species not observed, but expected to use the study area.

Exhibit 4-14: Wildlife Use in the Study Area

Species	Observed[1]	Expected[2]	Notes
Birds			
American goldfinch (*Carduelis tristis*)	X		
American robin (*Turdus migratorius*)	X		
Anna's hummingbird (*Calypte anna*)	X		
bald eagle (*Haliaeetus leucocephalus*)	X		Soaring overhead
barn swallow (*Hirundo rustica*)		X	
belted kingfisher (*Megaceryle alcyon*)	X		

Exhibit 4-14: Wildlife Use in the Study Area

Species	Observed[1]	Expected[2]	Notes
Bewick's 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		Winter flocks
cedar waxwing (*Bombycilla cedrorum*)	X		
cliff swallow (*Petrochelidon pyrrhonota*)		X	
Cooper's hawk (*Accipiter cooperii*)	X		Near Wetland 7.3R
dark-eyed junco (*Junco hyemalis*)	X		
downey woodpecker (*Picoides pubescens*)	X		
European starling (*Sturnus vulgaris*)	X		
great blue heron (*Ardea herodias*)	X		Footprints only
herring gull (*Larus argentatus*)	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	

Exhibit 4-14: Wildlife Use in the Study Area

Species	Observed[1]	Expected[2]	Notes
northwest crow (*Corvus caurinus*)	X		
osprey (*Pandion haliaetus*)		X	
peregrine falcon (*Falco peregrinus)*		X	
pileated woodpecker (*Dryocopus pileatus*)	X		
great horned owl (*Bubo virginianus*)		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		
Stelle'rs jay (*Cyanocitta stelleri*)	X		
tree swallow (*Tachycineta bicolor*)	X		
violet-green swallow (*Tachycineta thalassina*)	X		
Wilson's snipe (*Gallinago delicata*)	X		
white-crowned sparrow (*Zonotrichia leucophrys*)	X		
winter wren (*Troglodytes troglodytes*)	X		
yellow-rumped warbler (*Dendroica coronata*)	X		
Mammals			
various bat species (*Myotis spp.*)		X	
beaver (*Castor canadensis*)		X	Foraging evidence

Exhibit 4-14: Wildlife Use in the Study Area

Species	Observed[1]	Expected[2]	Notes
coyote (*Canis latrans*)		X	Scat and tracks observed
deer (*Odocoileus spp.*)	X		
field mouse		X	
gray squirrel (*Sciurus carolinensis*)	X		
douglas squirrel (Tamiasciurus douglasii)	X		
opossum (*Didelphis virginiana*)		X	
mountain beaver (*Aplodontia rufa*)		X	
rabbit	X		
raccoon (*Procyon lotor*)	X		Tracks
vole (*Microtus longicaudus*)		X	
Insects			
dragonfly		X	
gardner spider		X	
mosquito	X		
paper wasp (*Polistes fuscatus pallipes*)	X		
swallow-tailed butterfly (*Papilio spp.*)	X		
water strider (*Gerris remigis*)	X		
western white butterfly (*Pontia occidentalis*)		X	
woodland skipper butterfly (*Ochlodes sylvanoides*)		X	
yellow jacket (*Vespula spp.*)	X		
honey bee (*Apis mellifera*)	X		

Exhibit 4-14: Wildlife Use in the Study Area

Species	Observed[1]	Expected[2]	Notes
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 study area, but not observed during fieldwork performed for the project.

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 snags and small trees adjacent to streams that provide feeding and hunting perches for piscivorous species such as bald eagle, osprey, herons, and belted kingfisher. 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.

The shrub/grasses land use 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 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, 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. 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. Bald eagles were delisted on August 8, 2007, and are no longer protected under the ESA. However, bald eagles will continue to receive protection from state and other federal statutes.

The USFWS website shows that ESA-listed species could occur in King County; however, there are no known occurrences in the study area. Listed fauna species include Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), marbled murrelet (*Brachyramphus marmoratus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), grizzly bear (*Ursus arctos horribilis*), and fisher *(Martes pennanti)*. Listed flora species include golden paintbrush (*Castilleja levisecta*) and marsh sandwort (*Arenaria paludicola*). The USFWS identifies designated critical habitat for marbled murrelet and northern spotted owl in both King and Snohomish counties. However, no designated critical habitat occurs in the study area and both species are not known to occur in the study area.

Valley Creek is the only stream in the study area that contains various life stages of Chinook salmon, listed as threatened under the ESA. Valley Creek is located outside of the project

footprint and will not be affected by project activities. No water bodies in the study area have documented occurrences of any life stages of bull trout or steelhead, which are both listed as threatened under the ESA.

There is potential that other water bodies in the vicinity of the study area support certain Chinook salmon life stages—such as Yarrow Creek, due to its connection to Lake Washington. Chinook salmon use the Valley Creek and Kelsey Creek basins for upstream and downstream migration, and as rearing and spawning habitat. The Chinook salmon found in the water bodies in these basins are a part of the Puget Sound evolutionarily significant unit (ESU) of Chinook salmon, listed as threatened under the ESA.[26]

What is an Evolutionarily Significant Unit?

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

The final Critical Habitat Designations in Washington, Oregon, Idaho, and California for Endangered and Threatened Pacific Salmon and Steelhead[27] were published on September 2, 2005 (50 CFR Part 226), and became effective on January 2, 2006. Critical habitat 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 supporting one or more life stages of the ESU and that contain physical or biological features essential to the conservation of the ESU. No portion of the study area has been designated as critical habitat for Chinook salmon; Lake Washington is the closest designated area. Steelhead and bull trout are not documented in any streams in the study area.

Coho salmon and Pacific and river lamprey (all federal species of concern under the ESA) are known to occur within the study area.

Do any state-listed or state priority aquatic species occur in or around 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

[26] *NMFS, 1999.*

[27] *NMFS, 2005.*

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 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 and coastal cutthroat trout, and river lamprey.[28]

There are several fish stocks listed as *depressed* according to the Salmonid and Steelhead Stock Inventory (SaSSI). A depressed stock is one whose production is below expected levels, based on available habitat and natural variation in survival rates, but above where permanent damage is likely. Lake Washington stocks that are considered depressed are coho and sockeye salmon, and winter steelhead.[29]

What are special status wildlife species?

Special status wildlife species include: those listed as endangered or threatened under the Endangered Species Act (ESA); species that are candidates or are proposed for listing under the ESA; species of federal concern; and species listed by the Washington Department of Fish and Wildlife as endangered, threatened, candidate, sensitive, and other

Do any special status wildlife species occur in the study area?

Based on the WDNR Natural Heritage Program, the WDFW Priority Habitats and Species Program, and USFWS databases, the team has identified two special status species within 1 mile of I-405. The two species are great blue heron (*Ardea heodias*) and osprey (*Pandion haliaeetus*).

Ospreys nest have not been detected within the study area.

No blue heron colonies are located within 1 mile of I-405. One colony exists north of SR 520 near the Yarrow Bay wetland complexes. In 1994, the Swamp Creek colony consisted of 8 nests and in 1996, there were 16 nests with 10 great blue herons. As of 2004, the colony was still active with 9 to 10 nests observed. The great blue heron colony near the Yarrow Bay wetlands occurs in a cottonwood tree, with 6 nests observed during the 1986 and 1987 King County surveys. This colony is still active.[30] [31]

---

[28] *WDFW, 2006.*

[29] *WDFW, 1992.*

[30] *WDFW, 1992.*

[31] *WDFW, 2006.*

Is the project within a recognized tribal fishing area?

The I-405, NE 8th Street to SR 520 Improvement 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 Kelsey Creek and Yarrow Creek basins.

The Muckleshoot Tribe may harvest salmon from the study area pursuant to judicially recognized treaty rights, as interpreted by the Boldt Decision of 1974. The Bold Decision provided the Yakama Tribe "the right to enjoy all these fisheries as they had beforehand," which requires that they take 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 within the state, and to harvest up to 50 percent of the harvestable fish.

SECTION 5 PROJECT EFFECTS

How will project construction affect ecosystem elements?

To build the I-405, NE 8th Street to SR 520 Improvement Project, construction activities will need to occur in and adjacent to wetlands, streams, and their buffers. Direct effects below the OHWM will occur only to the unnamed tributary to Sturtevant Creek; the remaining stream resources in the project footprint were avoided. In addition, construction activities will occur in areas containing wildlife habitat.

The effects from project construction fall into two categories: temporary and permanent effects. Temporary effects are categorized as those effects that will dissipate over time, such as clearing of a work area that will ultimately be replanted and restored to or enhanced above its pre-disturbance state. Permanent effects are those effects that will remain in perpetuity after the project is constructed, such as permanent areas of new roadway or new bridges. However, both temporary and permanent effects can occur to the same resource and resource buffer as a result of construction activities.

The I-405 Team worked with project engineers to identify where the project construction activities would potentially affect the ecosystems resources. Prior to finalizing the project footprint, we modified the design, where feasible, to reduce or avoid effects to wetlands, streams, their associated buffers, and upland habitat. If the element could not be avoided, we determined to what degree project construction will affect ecosystem elements.

Wetlands

Wetlands in the project footprint will experience both temporary and permanent effects as a result of the project.

Permanent Wetland Effects

To construct the I-405, NE 8th Street to SR 520 Improvement Project, only one wetland (Wetland 6.95R) in the study area will be permanently altered and incur permanent buffer effects. A summary of the permanent wetland effects is provided in Exhibit 5-1.

Exhibit 5-1: Summary of Permanent Wetland Effects

Wetland	Wetland Size (acres)	Permanent Wetland Effects (acres)	Percentage of Wetland Incurring Permanent Effects (%)	Wetland Buffer Size (acres)	Permanent Buffer Effects (acres)	Percentage of Wetland Buffer Incurring Permanent Effects (%)
6.8L	0.50	0.00	0	0.35	0.00	0
6.9L	0.18	0.00	0	0.21	0.00	0
6.9R	0.23	0.00	0	0.42	0.00	0
6.95R	**0.39**	**0.30**	**77**	**0.60**	**0.47**	**78**
7.18L	0.59	0.00	0	1.08	0.00	0
7.2L	0.12	0.00	0	0.67	0.00	0
7.3R	4.14	0.00	0	1.98	0.00	0
8.1L	0.04	0.00	0	0.43	0.00	0
8.5L	0.74	0.00	0	0.68	0.00	0
8.5R	0.34	0.00	0	1.16	0.00	0
15.24L	<0.01	0.00	0	0.01	0.00	0
15.25L	<0.01	0.00	0	0.01	0.00	0
Total	**7.29**	**0.30**		**7.60**	**0.47**	

Wetland 6.95R encompasses an area of 0.39 acres and will incur permanent effects to 0.30 acres (77 percent of the total wetland area). Wetland 6.95R is a Category IV, slope wetland dominated by reed canarygrass and surrounded by urban land uses including roads and buildings.

The northeast portion of Wetland 6.95R will be affected by the project. This area is downslope of the remainder of the wetland and also downslope of the source of water in-flow (hydrology). A retaining wall is proposed east of Wetland 6.95R but will not have an effect on existing hydrology. The water source will not be affected by additional project activities and the remaining portion of the wetland is expected to continue functioning after the project is constructed.

Wetland 6.95R is also the only wetland that will incur permanent effects to its regulated buffer. The buffer is a mix of reed canarygrass, planted shrubs, and trees. Buffers dominated by reed canarygrass, or of similar emergent vegetation type, reduce wetland effects by moderating the

effects of stormwater runoff including stabilizing soil to prevent erosion; filtering suspended solids, nutrients, and harmful or toxic substances; and moderating water level fluctuations. Additionally, wetland buffers provide essential habitat for wetland-associated species for use in feeding, roosting, breeding, and rearing of young, and cover for safety, mobility, and thermal protection. However, due to the low habitat rating this wetland received, the buffer likely provides limited habitat to wildlife.[32]

Temporary Wetland Effects

To build the I-405, NE 8th Street to SR 520 Improvement Project, construction activities will need to occur outside of the permanent construction footprint. These construction disturbances will result in a short-term loss of wetland functions. Erosion and sedimentation caused by construction activities potentially increases the amount of sediment settling within a wetland and reduces the quality of habitat available for invertebrate life and habitat for plants. Additionally, loose sediment intrusion reduces the potential water quality and quantity benefits provided by wetlands.

One wetland (Wetland 6.95R) will be temporarily filled and incur temporary buffer effects, and another wetland (Wetland 7.2L) will incur temporary buffer effects. Temporary effects will result from construction activity adjacent to the wetland (e.g., temporary roads and staging areas). The areas of temporary effects will subsequently be restored by removing any temporary fill, and re-vegetated with native plants. Exhibit 5-2 details the temporary wetland effects from the project.

[32] *Castelle et. al., 1992.*

Exhibit 5-2: Summary of Temporary Wetland Effects

Wetland	Wetland Size (acres)	Temporary Wetland Effects (acres)	Percentage of Wetland Incurring Temporary Effects (%)	Wetland Buffer Size (acres)	Temporary Buffer Effects (acres)	Percentage of Wetland Buffer Incurring Temporary Effects (%)
6.8L	0.50	0.00	0	0.35	0.00	0
6.9L	0.18	0.00	0	0.21	0.00	0
6.9R	0.23	0.00	0	0.42	0.00	0
6.95R	**0.39**	**0.05**	**13**	**0.60**	**0.03**	**5**
7.18L	0.59	0.00	0	1.08	0.00	0
7.2L	**0.12**	**0.00**	**0**	**0.67**	**0.04**	**6**
7.3R	4.14	0.00	0	1.98	0.00	0
8.1L	0.04	0.00	0	0.43	0.00	0
8.5L	0.74	0.00	0	0.68	0.00	0
8.5R	0.34	0.00	0	1.16	0.00	0
15.24L	<0.01	0.00	0	0.01	0.00	0
15.25L	<0.01	0.00	0	0.01	0.00	0
Total	**7.29**	**0.05**		**7.60**	**0.07**	

Wetland 6.95R is a Category IV, emergent wetland dominated by reed canarygrass and surrounded by urban land uses including roads and buildings. Wetland 7.2L is a Category III, forested wetland dominated by red alder, skunk cabbage, and salmonberry. Immediately following construction activities, the temporarily disturbed areas of Wetland 6.95R and the buffers of Wetlands 6.95R and 7.2L will be restored and replanted with appropriate native vegetation. WSDOT will develop a project-specific plan before construction begins to identify how vegetation restoration will occur.

Temporary construction disturbance will result in a short-term loss of wetland functions. These temporary effects will begin at the point of initial disturbance and continue until the newly planted trees and plants have become established to pre-disturbance levels. Wetlands where the vegetation is cleared or trimmed will still retain some water quality and quantity function, although at a diminished level until the wetlands are completely re-established. The duration for wetlands to reach

pre-disturbance levels will vary depending on the nature of the wetland disturbed.

Wetland 6.95R and its buffer, dominated by grasses, can be returned to the pre-disturbance level in as little as 1 year. Because of the rapid recovery rate of the emergent community, temporary effects to wetland function would be minimal. Conversely, wetlands dominated by shrubs, including Wetland 7.2L, require a recovery time of 3 to 10 years, and wetlands dominated by deciduous or coniferous trees require 15 to 25 years. After the temporary impacts and replanting, wetland and buffer functions would be reduced because of the lower density and height of the vegetation, but would increase until the vegetation is fully re-established. Often this temporary effect is offset by increased habitat diversity with the plantings.

Erosion and sedimentation caused by construction activities will increase the amount of sediment settling within the disturbed wetlands and reduce the amount and quality of habitat available for invertebrate life and plants. Additionally, loose sediment will reduce the potential water quality and quantity benefits provided by affected wetlands. BMPs will be implemented as required in the WSDOT *Highway Runoff Manual* (HRM)[33] to minimize erosion and sedimentation during construction.

Aquatic Resources

Aquatic resources in the project footprint will experience both temporary and permanent effects as a result of the project. However, only an unnamed tributary to Sturtevant Creek will incur permanent effects below the OHWM.

Permanent Aquatic Resource Effects

As a result of the project, new roadways and roadway structures (e.g., culverts) will be built within or near the unnamed tributary to Sturtevant Creek. The primary effect to this stream is the loss of stream channel habitat. Construction activities will also clear riparian vegetation within the stream buffer; removing the vegetation that provides shade and cover to the stream and for aquatic species. However, since the unnamed tributary to Sturtevant Creek's stream buffer is

[33] *WSDOT, 2006a.*

already degraded, construction activities in the study area are not likely to create substantial effects to it.

Project elements that will permanently affect fisheries and aquatic resources include:

- Encroachment into the OHWM of the unnamed tributary to Sturtevant Creek to allow for widening the on-ramp from NE 8th Avenue to northbound I-405
- Encroachment into the stream buffer of the unnamed tributary to Sturtevant Creek to allow widening the on-ramp from NE 8th Avenue to northbound I-405

Permanent effects to fisheries and aquatic resources will result from the placement of fill material in the stream buffer and from putting a segment of the unnamed tributary to Sturtevant Creek in a pipe, as shown in Exhibit 5-3. Stream habitat affected by project activities is mostly represented by poor habitat conditions, including reduced over-water cover, no LWD contribution, substrate composed mostly of fine silt and sand, and frequent stormwater inputs. A summary of the permanent effects to aquatic resources is in Exhibit 5-4.

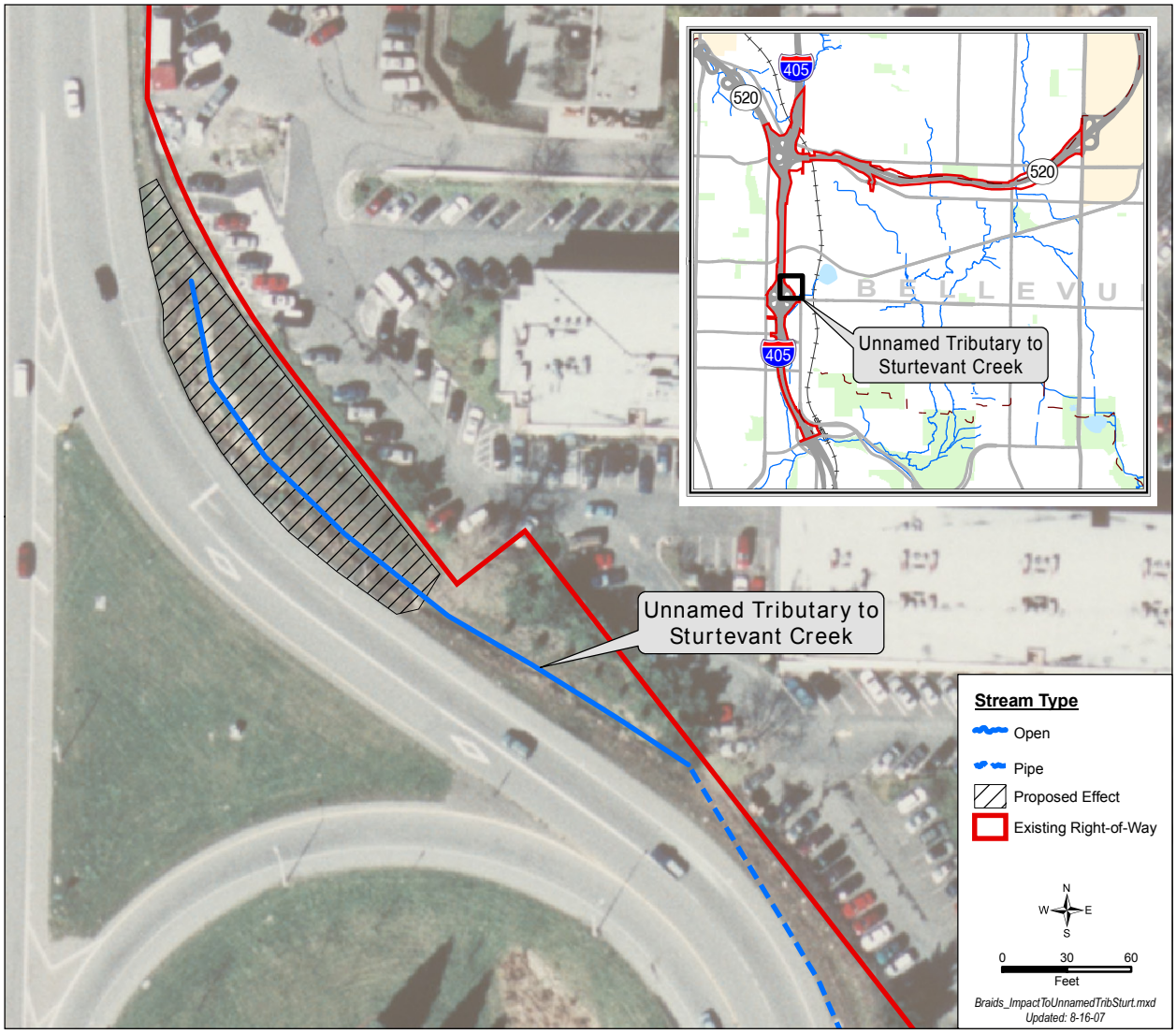
Stormwater Runoff

The I-405, NE 8th Street to SR 520 Improvement Project would add approximately 11.37 acres of new impervious surface within the study area.

Increases in peak stream flows resulting from increased impervious area can negatively affect fish. Peak flows and sustained high flows in streams during storm events can cause harm to, or kill, fish. Harm typically occurs when fish or other aquatic species are unable to get out of high flow areas and are swept downstream or battered against rocks or streambanks. In urbanized streams where little to no refugia habitat exists and where storm events can cause rapid rises in stream levels, peak or sustained high flows can be especially detrimental to fish. Rerouting of stormwater into new or existing stormwater systems can change baseline drainage patterns into or away from creeks, and can also result in lost opportunities for groundwater infiltration.

What is refugia habitat?
Refugia habitat is an area that provides shelter or safety for aquatic or terrestrial species.

Exhibit 5-3: Detailed Drawing of Effects to Aquatic Resources



In addition to effects on fish, increases in peak stream flows can also negatively affect aquatic habitat. High flows can cause streambanks and streambeds to scour and erode, resulting in increased sedimentation, changes in streambed composition, and decreased habitat complexity. Streambank scour can also result in losses of stream buffers as streambanks erode and cause plants to fall into the water.

Exhibit 5-4: Summary of Permanent Stream Effects

	Permanent Effect Below OHWM (square feet)	Permanent Effect on Stream Buffer (square feet)
Sturtevant Creek	0.00	0.00
Unnamed Tributary to Sturtevant Creek	**1,610**	**6,640**
Unnamed Tributary to Yarrow Creek	0.00	0.00
Yarrow Creek	0.00	0.00
West Tributary to Kelsey Creek	0.00	0.00
Goff Creek	0.00	0.00
Valley Creek	0.00	0.00
Total	**1,610**	**6,640**

Negative effects on stream hydrology are expected to be minimized by the following factors:

- WSDOT will provide flow control for runoff from new impervious area to address changes in stormwater discharge to streams. Stormwater flow control facilities will be designed in accordance with the WSDOT HRM.[34]
- The WSDOT HRM[35] mandates that the duration and magnitude of stormwater discharge into streams and rivers during storms will be equal to or less than that experienced under existing conditions within given statistical tolerances for the full range of design, from 50 percent of the 2-year through to the 50-year recurrent storm events. There are also exemptions allowed under specified conditions.

The stormwater facilities that will be constructed as part of the project are intended to mitigate any flow effects that the new pavement will have on peak flows within the study area. Likewise, no negative effects on stream base flows are likely to

[34] *WSDOT, 2006a.*

[35] *WSDOT, 2006a.*

occur from the increase in impervious surface, as the overall amount of impervious surface resulting from the project will only slightly increase. New storm drainage systems will collect runoff from an area greater than all new impervious surfaces created by the project. New stormwater features will treat stormwater runoff before discharging it into study area streams. All stormwater will be treated and discharged within the basin it falls in. Detention, retention, and treatment BMPs will be used for roadways with greater daily traffic, as required by the HRM. Stormwater discharges to the streams of the study area would comply with water quality regulations in accordance with WSDOT's HRM.[36] Therefore, the water quality of stormwater discharge associated with the project is not expected to adversely affect aquatic life in the streams of the study area. Please see the Water Resources Discipline Report for additional information.[37]

Temporary Aquatic Resources Effects

An unnamed tributary to Sturtevant Creek will incur temporary effects to its regulated buffer as a result of construction activities. In addition, temporary effects to aquatic resources (e.g., from lighting, construction noise, erosion, etc.) may affect the unnamed tributary to Sturtevant Creek in various ways, as indicated in the discussion that follows.

Construction activities occurring in or near the unnamed tributary to Sturtevant Creek can disturb fish, other aquatic species, and aquatic habitat. Except where absolutely necessary (as in the case of culvert extensions), construction equipment will not enter streams below the OHWM. In addition, the unnamed tributary to Sturtevant Creek will be dewatered prior to replacing or lengthening the culvert. Dewatering and stream diversions could strand or entrain (draw in) fish and create temporary barriers to fish migration. No fish were observed in the unnamed tributary to Sturtevant Creek during field surveys; however, WSDOT will follow WSDOT's Fish Exclusion Protocols and Standards as appropriate during construction. A summary of the

---

[36] *WSDOT, 2006a.*

[37] *WSDOT, 2008a.*

temporary construction effects to aquatic resources is in Exhibit 5-5.

Exhibit 5-5: Summary of Temporary Stream Effects

	Temporary Effect Below OHWM (square feet)	Temporary Effect on Stream Buffer (square feet)
Sturtevant Creek	0.00	0.00
Unnamed Tributary to Sturtevant Creek	**0.00**	**2,000**
Unnamed Tributary to Yarrow Creek	0.00	0.00
Yarrow Creek	0.00	0.00
West Tributary to Kelsey Creek	0.00	0.00
Goff Creek	0.00	0.00
Valley Creek	0.00	0.00
Total		**2,000**

During stream dewatering, fish stranding and entrainment will be reduced or eliminated by following WSDOT policy, which requires that appropriate protocols for fish exclusion and handling be applied to all projects. Prior to the commencement of in-water work, all fish will be excluded (e.g., with a coffer dam) and removed from the work area with appropriate methods (e.g., electrofishing). Dewatering will occur during the summer months, typically the driest time of the year when fish presence is least likely. In-water construction will be limited to approved work windows, as defined by permit conditions, and in-water work will be completed in the shortest time possible.

Some construction will likely occur during hours of darkness or reduced light. Therefore, artificial lighting will be required for some work areas. Lighting will be directed to illuminate work areas and avoid direct illumination of the water bodies to the greatest extent practicable, to limit effects on fish behavior. These measures should minimize any adverse effects to fish and other aquatic species from lighting during project construction.

At this time, pile driving is not proposed within any streams in the study area.

Project construction activities may extend beyond the footprint of the new roadbed or any other new permanent structures resulting from the project. These areas would include staging areas, temporary access roads, or other related off-site construction activities. The I-405 Team anticipates minimal additional temporary clearing, grubbing, or construction effects to riparian vegetation beyond the permanent effects to stream buffers and riparian vegetation, and any affected areas will be replanted with appropriate native vegetation.

Potential erosion from construction activities could introduce fine sediments into the streams of the study area. Excessive fine sediment entering streams could smother salmon eggs in the gravel (unable to receive enough oxygen to survive), decrease micro- and macroinvertebrate survival (limit available food for fish), and create conditions where visual predators (such as coho salmon) have reduced capacity to capture prey. In addition, certain types of sediments can cause damage to the gills of fish, increasing the risk of anoxia (the absence or reduced supply of oxygen in arterial blood or tissues) and stress that can lead to fish mortality (death).

The potential for erosion and sedimentation will be highest in areas where construction activities will occur directly adjacent to streams. Within the study area, these areas include streams that cross or flow adjacent to I-405 and SR 520. Streams fitting this definition include: Sturtevant Creek, an unnamed tributary to Sturtevant Creek, an unnamed tributary to Yarrow Creek, and Goff Creek. BMPs will be implemented as required in the WSDOT HRM[38] to minimize erosion and sedimentation during construction.

Additional potential short-term effects from the project could include hazardous materials (for example, oil and gasoline), chemical contaminants, nutrients, or other materials entering the water bodies in the study area as a result of accidental spills or leakages. Control of hazardous materials is a standard provision in construction contracts and permits, and WSDOT will address this with BMPs and standard contract provisions. For instance, when practicable, WSDOT will prohibit servicing and refueling of vehicles and large equipment within 200 feet of streams and wetlands (except at

[38] *WSDOT, 2006a.*

commercial service stations), to reduce potential spills of petroleum and hydraulic fluids in sensitive areas. Additionally, WSDOT will create a Spill Prevention, Control, and Countermeasures (SPCC) Plan prior to commencing work.

Wildlife Habitat

Project construction activities will occur adjacent to and within all existing wildlife habitat cover types found in the study area. The permanent effects to wildlife habitat are shown in Exhibit 5-6.

Permanent Wildlife Habitat Effects

The constructed project will result in approximately 11.37 acres of new impervious surfacing in the study area and an associated reduction of other land use cover types and associated habitats. This includes the conversion of 6.98 acres (61 percent) of existing impervious surfaces into roadway impervious surfaces. The permanent loss of approximately

Exhibit 5-6: Potential Land Cover Loss In the Study Area

Land Cover	Baseline Land Cover (acres)*	Permanent Habitat Loss (acres)	Percentage of Overall Land Cover Change (%)
Forested	64.5	0.05	0.08
Shrubs and Grasses	37.3	0.01	0.03
Maintained Vegetation	699.5	4.34	0.62
Total	**801.3**	**4.40**	**0.55**

*Within 0.5 mile of project footprint

4.40 acres of potential habitat will affect wildlife species in the study area. However, the 4.40 acres is comprised of approximately 4.34 acres of maintained vegetation that provides low habitat value. What remains is the reduction of the already sparse forested and shrubs and grasses habitat existing in the study area by approximately 0.06 acre. Wildlife species are likely to migrate to other portions of the study area or outside the study area to find usable and available habitat. Currently, this habitat area is utilized by very few small mammals and bird species due to its constant disturbance and lack of diversity.

The forested land use cover type will be permanently reduced by approximately 0.05 acres from approximately 64.5 acres, which is a 0.08 percent loss due to project construction. Affected forested land cover will be converted to shrub/grass, maintained vegetation, and impervious surface cover types. Where possible, portions of the trees will be avoided and preserved near the margins of the proposed roadway.

The shrub/grasses cover type will be permanently reduced by approximately 0.01 acres from 37.3 acres due to roadway widening. The shrub/grasses cover type will be primarily converted to maintained vegetation and impervious surface land use cover types. The maintained vegetation cover type will be permanently reduced from nearly 700 acres to 695.5 acres from roadway widening and new roadway construction. Most of the maintained vegetation affected will be converted to impervious surface and the shrub/grasses land use cover types. Permanent effects to wildlife habitat will be mitigated for in accordance with applicable laws and regulations.

Temporary Wildlife Habitat Effects

Temporary effects on wildlife species include noise associated with general and localized construction activities. Although resident wildlife are adapted to urban environments and associated noise levels, some wildlife species will be affected during localized construction activities when noise levels noticeably increase. Noise can disturb wildlife by disrupting communication, interfering with mating, and reducing the ability to obtain sufficient food, water, and cover.

Due to the levels of noise typically associated with the I-405 and SR 520 corridors, noise levels from localized construction activities will decrease to ambient levels at approximately 1 mile.[39]

In addition to direct effects to wildlife, construction activities, including clearing vegetation for staging areas and access roads, will affect the land cover types and associated wildlife habitat in the study area. It is anticipated that 0.1 acres of forested, 0.3 acres of shrub/grasses, and 29.8 acres of maintained vegetation will be temporarily disturbed during

[39] *WSDOT, 2007b.*

construction activities, including vegetation clearing, material stockpiling, and staging. WSDOT will develop a project-specific planting plan prior to commencing construction to identify how and where vegetation will be restored.

Construction disturbance will result in a short-term loss of wildlife habitat. Habitat areas will be temporarily reduced until the newly planted trees, shrubs, and forbs become established. Compaction of topsoils and erosion resulting from construction activities could also result in temporary effects during re-vegetation. Soil compaction decreases moisture infiltration and can stunt new root growth of planted species. BMPs will be implemented as required in the WSDOT HRM[40] to minimize compaction, erosion, and sedimentation during construction. Land use cover types where the vegetation is cleared or trimmed will retain some habitat quality and function, although at a diminished level until the cover types are reestablished.

Will project construction affect listed species?

Valley Creek is the only water body in the study area that supports various life stages of Chinook salmon, which is currently listed as threatened under the ESA. As noted earlier, Valley Creek is located outside of the project footprint and will not be affected by project activities. No water bodies in the study area support steelhead or bull trout, which are listed under the ESA. Additionally, state-listed species potentially occurring in the study area will not be affected by project construction.

How will project operation affect ecosystem elements?

No additional negative effects on wetlands, aquatic resources, or wildlife habitat are expected during operation of the I-405, NE 8th Street to SR 520 Improvement Project. Some wetlands and streams within the study area are currently affected by routine vegetation maintenance to meet safety and operation standards as set forth by WSDOT. Wetland and riparian areas located within the right-of-way and presently subject to

---

[40] *WSDOT, 2006a.*

routine maintenance activities would likely continue to be affected by these practices and conditions.

Does the project have other effects that may be delayed or distant from the project area?

Effects that could be delayed or distant from the project include effects that induce growth and associated changes in land use, population density, or growth rate. Delayed or distant effects also include effects on air and water and other natural systems, including ecosystems.

The project is not anticipated to result in additional growth, so no delayed or distant effects from growth are expected. Other potential delayed and distant effects are discussed further in the sections below.

Wetlands

Delayed and distant effects were assessed as they relate to the loss of specific wetland functions. Delayed or distant effects from the project may include a reduction in the habitat area available for wetland-dependent wildlife and changes to wetland hydrology resulting from the built project. However, the loss of high-quality habitat was avoided through consistent interaction between project engineers and project biologists. All of the wetlands and half of the wetland buffer effects occur to relatively low-quality reed canarygrass habitat in the middle of the I-405 and SR 520 interchange.

Wetlands and buffers affected by the project will not be available for use by wildlife as habitat. As a result, increased competition for food and refugia in the remaining wetlands may occur because of the potential influx of displaced wildlife from the affected wetlands. The likelihood and severity of delayed or distant effects caused by increased competition among wetland-dependent wildlife would be highest for wetlands with the largest quantity of potential wildlife habitat. Because the wetlands and buffers affected by the project have a low habitat function, there would be a low likelihood and severity of delayed or distant effects to wetland-dependent wildlife.

Gradual encroachment can cause wetlands to simplify over time, but will not likely occur due to the diminished nature of the wetlands being affected. Nonetheless, as wetlands become

smaller as a result of encroachment, they begin to lose their ability to provide water quality, hydrologic, and habitat functions. In addition, encroachment could result in the disappearance of localized wetland plant communities and related organisms.

New impervious surfacing may also result in a delayed or distant effect on a wetland's hydrology similar to the effects discussed in the section on direct wetland effects.

Aquatic Resources

Delayed or distant effects to aquatic resources may include effects from removal of fish passage barriers or replanting of stream buffers, but neither are proposed activities at the unnamed tributary to Sturtevant Creek. However, stormwater facilities, which include detention ponds and ecology embankments, will collect runoff from all new impervious surfaces created by the project. The water will be treated for enhanced water quality before discharge to streams. Streams in the study area will receive smaller concentrations of metals, such as copper and zinc, from the treated water, which will improve the quality of water entering streams in the study area.

Stream buffers that are temporarily disturbed as a result of the project will be replanted with appropriate native plant species. Most of the existing stream buffers in the study area are degraded—primarily comprised of immature native or non-native invasive vegetation. Establishing native species riparian buffers will increase the quantity and quality of riparian habitat over time, resulting in increased shade, litterfall, and opportunity for LWD recruitment in the study area.

Wildlife Habitat

Delayed or distant effects from the project on wildlife habitat may include a reduction in and fragmentation of the habitat types available for wildlife. Fragmentation of existing habitat may also contribute to reducing overall habitat connectivity and impeding movement of species between divided habitats.

Were potential cumulative effects for ecosystem elements considered?

Cumulative effects for ecosystem elements are evaluated in a separate *Cumulative Effects Analysis Technical Memorandum*.[41] That report discusses cumulative effects of this project in the areas of air quality, surface water and water quality, fisheries and aquatic habitat, and wetlands. Cumulative effects evaluations for other disciplines were determined to be unnecessary for this project.

What effects would occur under the No Build Alternative?

Wetlands

The No Build Alternative would have no permanent, temporary, or indirect effects on wetlands in the I-405, NE 8th Street to SR 520 Improvement Project study area. No wetlands or wetland buffers would be filled or cleared under this alternative, and there would be no change to current moderation of stormwater flows or existing wildlife habitat functions.

Many of the wetlands that occur in the right-of-way are currently affected by the lack of forested upland buffer; mowed vegetation associated with WSDOT maintenance activities; and the lack of modern stormwater control, conveyance, and management facilities. Wetlands in the study area that currently receive untreated runoff would likely continue to be affected by these conditions. Water quality in these wetlands would continue to be affected by sediment transport and erosion. Minor roadway safety improvements would continue to take place.

Aquatic Resources

The No Build Alternative assumes that the project will not be constructed and WSDOT will continue with ongoing maintenance activities in the study area. In this scenario, no physical changes would occur to the streams from construction activities, though some disturbance to stream buffers may occur through routine maintenance activities such as mowing. The amount of untreated stormwater entering

---

[41] *WSDOT, 2008b.*

these water bodies from I-405 and SR 520 would remain unchanged. It is possible that emission-reducing improvements in automobiles or increases in traffic volumes could change the concentrations of pollutants and contaminants entering these streams; however, there is no means to accurately predict that such changes would occur.

The No Build Alternative would not increase impervious surface areas. Therefore, it is assumed that it would result in little change to baseline water quality in, and increased flow into, the streams in the study area. As there are no construction activities associated with this alternative, there would be no effects from construction of in-water structures or removal of riparian vegetation to accommodate construction activities. Existing fish passage barriers throughout the study area would remain. This alternative will not change the existing effects on fish and other aquatic organisms and the habitats in which they live.

Wildlife Habitat

The No Build Alternative would have no permanent, temporary, or indirect effects on wildlife and land use cover types in the I-405, NE 8th Street to SR 520 Improvement Project study area. No cover types would be fragmented, cleared, or converted under this alternative, and there would be no change to current existing wildlife habitat functions.

Most of the wildlife habitat that occurs in the study area is fragmented and non-forested. Vegetated cover types are dominated by invasive plants and early successional species that provide marginal wildlife benefits. Wildlife habitat quality in the right-of-way and existing cover types would continue to be degraded and affected by invasive species under the No Build Alternative. Under the No Build Alternative, normal roadway maintenance will continue including vegetation mowing and clearing to maintain roadway safety.

SECTION 6 MEASURES TO AVOID OR MINIMIZE EFFECTS

What measures will be taken to mitigate effects during construction?

Prior to construction, project biologists worked with project roadway and drainage engineers to identify where construction activities would potentially affect ecosystem elements. Where possible, the project design was altered to minimize or eliminate effects to these elements, such as the relocation or re-design of stormwater ponds originally positioned in close proximity to a sensitive resource. Through this process, roadway alignments were shifted, drainage features and retaining walls were relocated, and other project elements were altered to reduce or eliminate the effects on ecosystem elements from project construction.

Effects resulting from mitigation will be added as the conceptual design is made available.

WSDOT will also take measures during and after construction to reduce effects to ecosystem elements. WSDOT will restore temporarily cleared areas to pre-construction grades and replant those areas with appropriate native vegetation. Additional BMPs that WSDOT will use during construction include:

- Using effective erosion control measures, such as filter-fabric fence, straw mulch, straw bales, and plastic sheeting to prevent silt and soil from entering surface waters (including wetlands).
- Hydroseeding bare soil areas following grading.
- Clearly labeling streams and stream buffers on the construction plans and in the field.
- Demarcating clearing limits with orange barrier fencing wherever clearing is proposed in or near critical areas.
- Locating staging areas and equipment storage areas away from sensitive areas (e.g., streams and wetlands).
- When practicable, WSDOT will prohibit servicing and refueling of vehicles and large equipment within 200 feet of streams and wetlands (except at commercial service stations).

- Preparing and adhering to a SPCC Plan for the project prior to beginning any construction, and maintaining a copy of the plan with any updates at the work site.
- Containing excavated sediment in tanks, or other appropriate containers, to avoid discharge to surface water, and transporting the contained sediments to an approved disposal site.
- Curing concrete before contact with surface water as required by WAC 110-220-070(1)(g) to avoid increased pH that can occur when fresh concrete contacts water.
- Regularly checking items such as fuel hoses, oil drums, and oil and fuel transfer valves and fittings for drips or leaks to prevent spills into surface water.
- Keeping the illuminated area and intensity of nighttime lighting to the minimum that is necessary for the intended purpose. Lights will be directed onto the work areas and away from streams bearing fish, where practicable.

What measures will be taken to mitigate effects of operation?

Wetlands

To compensate for the permanent effects to wetlands resulting from the I-405, NE 8th Street to SR 520 Improvement Project, WSDOT will provide mitigation at a wetland mitigation site located in Kelsey Creek Park, north of the intersection of Richards Road and the Lake Hills Connector in Bellevue, Washington.[42] The mitigation site was established as part of the Bellevue Nickel Improvement Project and only a portion will be used to mitigate for effects to wetlands for the I-405, NE 8th Street to SR 520 Improvement Project. Of the 2.452-acre wetland restoration area, less than 0.5 acre would be proposed as mitigation for this Project.

The Kelsey Creek Park mitigation site is being constructed by excavating an upland area adjacent to Kelsey Creek to an elevation that will match the existing topography of the adjoining wetland. The excavated area is being replanted and enhanced to provide a high functioning wetland. The

[42] *WSDOT, 2006d.*

mitigation site will be transformed from a forested upland area to an emergent wetland complex (adjacent to the existing Kelsey Creek wetland complex). WSDOT is grading the mitigation site to facilitate wetland hydrology, and enhancing wetland habitat by constructing habitat structures and replanting adjacent upland areas with forest-type vegetation.

Aquatic Resources

Stream mitigation for the unnamed tributary to Sturtevant Creek will occur on the mainstem of Sturtevant Creek, approximately 1,000 feet downstream (south) of the culvert under NE 4th Street, as shown in Exhibit 6-1. The site is on WSDOT owned property that is not scheduled for future development and offers the opportunity to mitigate for stream effects by enhancing functions and values on the mainstem of Sturtevant Creek. Mitigation goals include:

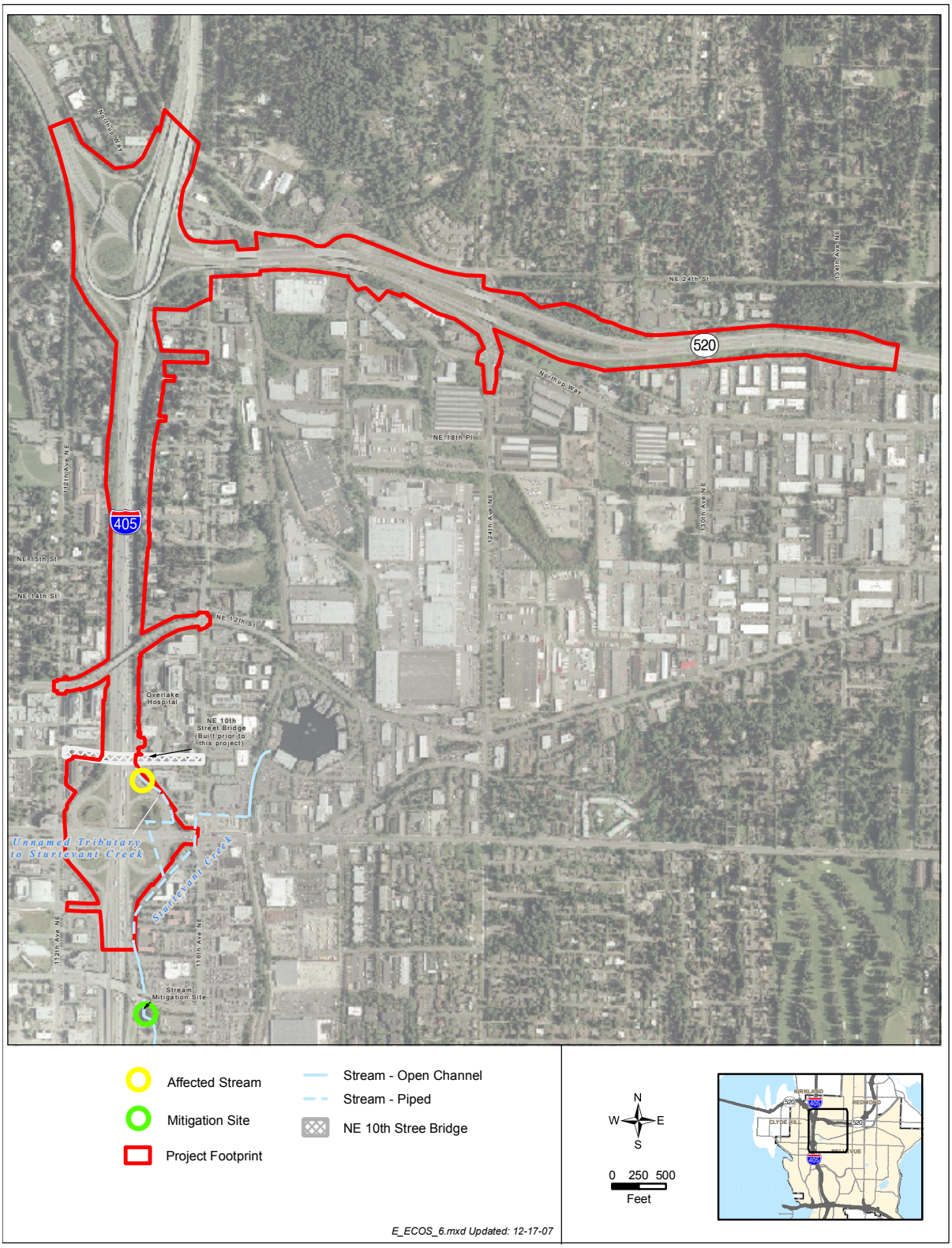
- Increased hydrologic connectivity with two small riparian wetlands
- Increased fish rearing habitat
- Improved riparian buffer conditions
- Increased organic input, slight increase in floodplain storage

The project will meet these goals through installing LWD structures and other in-stream channel enhancements. The stream's buffer will be revegetated with plant species native to the area and invasive vegetation removal and control will be implemented.

Wildlife Habitat

Mitigation measures to offset negative effects will include the revegetating of all temporarily disturbed soils resulting from construction activities. Planted shrubs and tree species will be maintained for a period to ensure the revegetation of target cover types are achieved. Planting will occur in areas that provide connectivity to existing wildlife habitat but still meet safety and maintenance standards set forth by WSDOT. WSDOT will prepare and implement a revegetation plan for the project.

Exhibit 6-1: I 405, NE 8th Street to SR 520 Improvement Project Stream Mitigation Location



SECTION 7 UNAVOIDABLE ADVERSE EFFECTS

Does the project cause any substantial adverse effects that cannot be avoided?

Construction of the I-405, NE 8th Street to SR 520 Improvement Project will result in temporary and permanent effects to ecosystem elements including wetlands, streams, and wildlife habitat in the study area. The existing conditions of wetlands, aquatic resources, and wildlife habitat in the study area are typical of urbanized areas in the Puget Sound area and are generally degraded. Wetlands, streams, and their buffers will incur effects that will compromise their ability to provide water quality, hydrologic, and habitat functions. Wildlife habitat will incur effects that will result in habitat fragmentation and loss of specific habitat types. In addition to these direct effects, the wetland and wildlife habitat ecosystem elements in the study area could also experience effects that are delayed or distant from the study area. These project effects are described in greater detail in Section 5 of this discipline report.

All project effects to ecosystem elements will be mitigated in accordance with the requirements of applicable local, state, and federal laws. Please see Section 6 of this report for more detailed information on wetland, aquatic resource, and wildlife habitat mitigation. As a result of this mitigation, there are no substantial adverse effects from the I-405, NE 8th Street to SR 520 Improvement Project that cannot be avoided.

SECTION 8 REFERENCES

GIS data sources

Exhibit 2-1

WSDOT. 2006-2007. I-405 Staff; project limits.

Exhibit 2-3 – Sheets 1 through 6

WSDOT. 2006-2007. I-405 Staff; project limits, existing right-of-way, proposed right-of-way, relocated noise wall, proposed retaining wall, proposed stormwater features, proposed new pavement.

Exhibit 3-1

Anchor Environmental, L.L.C. (Anchor) 2007. Study Area Boundary.

King County Standard GIS Data Disk, extract June 2006.

Washington State Department of Transportation (WSDOT). 2006 – 2007. I-405 Staff; Project Limits.

WSDOT. Spatial Data Catalog, 1997, Railroads.

Exhibit 4-3

Anchor. 2007. Study Area Boundary.

WSDOT. 2006 – 2007. I-405 Staff; Basins. Updated 2007 by Anchor Environmental, LLC.

WSDOT. 2006 – 2007. I-405 Staff; Project Limits.

Exhibit 4-4 – Sheets 1 through 6

United States Geological Survey (USGS). June 2002. Color Aerial Photography. http://edc.usgs.gov/products/aerial/hiresortho.html

WSDOT. 2006 – 2007. I-405 Staff; NE 10th St. Bridge, Project Limits, Wetlands.

WSDOT. 2006 – 2007. I-405 Staff; Project Limits, Wetlands

Exhibit 4-11

Anchor. 2007. Study Area Boundary.

WSDOT. 2003. Land Use Land Cover with Land Cover Focus: Land Use/Land Cover Map for I-405 Corridor Project. Updated 2006 by Anchor Environmental, LLC.

Base data

All GIS exhibits contain one or more of the following as base layers:

Bellevue. 2006. Lakes, Parks, Streams.

Geographic Data Technology, Inc. (GDT). April 2005. GDT – Dynamap Transportation.

King County Standard GIS Data Disk, extract June 2006.

USGS. June 2002. Color Aerial Photography. http://edc.usgs.gov/products/aerial/hiresortho.html

WSDOT. March 2001. Aerial photography program.

WSDOT. Spatial Data Catalog, 2006, City Limits.

WSDOT. Spatial Data Catalog, 1997, Railroads.

WSDOT. 2006 – 2007. I-405 Staff; Tenth Mile Posts, NE 10th St Bridge, Project Area.

Text references and verbal communications

Castelle, A.J., C. Conolly, M. Emers, E.D. Metz, S. Meyer, M. Witter, S. Mauermann, T. Erickson, S.S. Cooke. 1992. *Wetland Buffers: Use and Effectiveness*. Adolfson Associates, Inc., Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia, Pub. No. 92-10.

City of Bellevue. 2006. Critical Areas Ordinance. Available at: http://www.ci.bellevue.wa.us/critical_areas_update.htm

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. Publ. # FWS/OBS-79/31. U.S. Fish and Wildlife Service.

Kerwin, J. 2001. *Salmon and Steelhead Habitat Limiting Factors Report for the Cedar – Sammamish Basin (Water Resource Inventory Area 8)*. Washington Conservation Commission. Olympia, WA.

King County. 1990. King County Sensitive Areas Map Folio.

National Marine Fisheries Service (NMFS). 2005. *Final Critical Habitat Designations in Washington, Oregon, Idaho and California for Endangered and Threatened Pacific Salmon and Steelhead*.

NMFS. 1999. Endangered and threatened species: threatened status for three Chinook salmon ESUs in Washington and Oregon, and Endangered status for one Chinook salmon ESU

in Washington. Final Rule. Federal Register 63(56): 14308-14328. (National Marine Fisheries Service). March 24, 1999.

Natural Resources Conservation Service (NRCS) and United States Department of Agriculture (USDA). 1995. *Hydric Soils of the State of Washington*. Washington, D.C.

United States Department of Interior. 1988. National Wetlands Inventory, Mercer Island and Kirkland Quadrangle.

Washington State Department of Ecology (Ecology). 2006. Washington State Wetland Rating Form – Western Washington, version 2. Olympia, WA.

Ecology. 2005. S*tormwater Management Manual for Western Washington*. Available at: http://www.ecy.wa.gov/programs/wq/stormwater/manual.html.

Ecology. 2004. *Washington State Wetlands Rating System – Western Washington, Revised*. Publication ##04-06-025. Olympia, WA.

Ecology. 1997. *Washington State Wetlands Identification and Delineation Manual*. Publication No. 96-94. Olympia, WA. Washington State Department of Ecology.

Washington Department of Fish and Wildlife (WDFW). Priority Habitat Species Program. 2006. Available at: http://wdfw.wa.gov/hab/phspage.htm.

WDFW. 2004. SalmonScape. Available at: http://wdfw.wa.gov/mapping/salmonscape/ (accessed October 2, 2007).

WDFW. 1992. *Salmonid and Steelhead Stock Inventory*. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Washington State Department of Natural Resources (WDNR). 2005. Natural Heritage Program. Available at: http://www.dnr.wa.gov/nhp/refdesk/plan/index.html.

Washington State Department of Transportation (WSDOT). 2008a. *I-405, NE 8th Street to SR 520 Improvement Project Water Resources Discipline Report*. Prepared by I-405 Project Team. March 2008.

WSDOT. 2008b. *I-405, NE 8th Street to SR 520 Improvement Project Cumulative Effects Analysis Technical Memorandum*. Prepared by I-405 Project Team. February 2008.

WSDOT. 2007a. *2007-2026 Highway System Plan, High Benefit Low Cost*. Olympia, Washington. Available at: http://www.wsdot.wa.gov/planning/HSP.htm.

WSDOT. 2007b. Biological Assessment for I-405, NE 8th Street to SR 520 Improvement Project. 2007.

WSDOT. 2006a. *Highway Runoff Manual*. Publication M31-16. Olympia, Washington.

WSDOT. 2006b. *Hydraulics Manual*. Publication M23-03. Olympia, Washington.

WSDOT. 2006c. *I-405 Bellevue Nickel Improvement Project I-90 to Southeast 8th Street Fish and Aquatic Resources Discipline Report*. January 2006.

WSDOT. 2006d. *Kelsey Creek Wetland Mitigation Plan*. Prepared for the I-405, SE 8th to I-90 (South Bellevue), I-405, 112th Ave SE to I-90, and I-405, NE 8th Street to SR 520 Improvement Projects. Prepared for the I-405 Project Team. Prepared by Adolfson Associates, Inc. Seattle, Washington. May 2006.

WSDOT. 2005. *I-405, SR 520 to SR 522 - Kirkland Nickel Project Fish and Aquatic Resources Discipline Report*. February 2005.

APPENDIX A I-405 STREAM SURVEY METHODOLOGY

600 – 108th Avenue NE, Suite 405
Bellevue, WA 98004
Main 425-456-8500
Fax 425-456-8600

To: I-405 Team
MAP Team

From: Derek Koellmann

Date: March 21, 2005

Re: Recommended Stream Survey Protocols

Overview

The I-405 Bellevue and Renton Improvement Project study areas cross or are located within the proximity of a variety of streams and rivers. As such, various elements of the projects have the potential to affect these waterbodies. To help determine the nature and extent of these effects, the habitat in these waterbodies must be assessed to quantitatively and qualitatively document in-stream and riparian conditions. This document describes the methodology that will be used to collect information on the physical characteristics of the streams and rivers in the study areas.

The specific habitat variables to be assessed in this study include:

a. Existing stream geomorphology
b. In-stream habitat type
c. Riparian vegetation
d. Substrate composition
e. Abundance of large woody debris
f. Quality of pools

The information collected will be used in conjunction with existing fisheries information (i.e., from existing reports and data, interviews, etc.) for the study areas to assess the quality and quantity of fish spawning, migration, and rearing habitat and provide information on the current and potential fish and other aquatic species use of the streams and rivers.

This methodology has been developed to document existing habitat in the study area in a manner that can be repeated so that future habitat conditions can be assessed post project construction.

Mercer Slough is located within the Bellevue study area, but does not fall under the definition of a stream or river per this section, nor would the protocols recommended herein be appropriate to assess the habitat values in Mercer Slough. A separate method for documenting habitat values in Mercer Slough is proposed at the end of this memo.

600 – 108th Avenue NE, Suite 405
Bellevue, WA 98004
Main 425-456-8500
Fax 425-456-8600

Stream Survey Approach

Stream surveys will be performed on all streams and rivers that are crossed by I-405 and SR 167 or are located within the immediate proximity of the project area. The surveys will be conducted from approximately 300 feet upstream and 1,320 feet downstream (1/4 mile) of the proposed project footprint.

Up to eleven transects will be laid out perpendicular to stream flow at regularly spaced intervals along the streams to be surveyed. The minimum distance between transects will be 50 feet and the maximum distance will be 300 feet. The distance between transects will be based upon the bankfull width of the stream to be surveyed. For some streams that run parallel to I-405 or SR 167, such as Gilliam and Panther Creeks, two sets of transects may be established to ensure that habitat values throughout the stream reach are appropriately documented. Slightly different protocols will be used in wadeable versus non-wadeable streams and rivers.

At and in-between each transect qualitative and quantitative descriptions of in-stream and riparian habitat will be collected. A summary of the protocols to be used and habitat variables to be assessed is described further below. A field training day is scheduled prior to initiating the full field effort. It is anticipated that some minor adjustments to the protocols may be needed based on this training. Protocol adjustments would be considered where applicable to improve the characterization of target parameters and/or to improve sampling efficiency.

Summary of Habitat Variables and Associated Protocols

The following protocols will be used to quantify the various habitat variables.

Existing Stream Geomorphology

Existing stream geomorphology information will be collected using protocols detailed in the US Environmental Protection Agency's (EPA) document *Quantifying Physical Habitat in Wadeable Streams* by Kaufmann et al. (1999) (Quantifying Physical Habitat).

Quantifying Physical Habitat details the concepts, rationale, and analytical procedures for characterizing physical habitat in wadeable streams based on raw data generated from methods similar or equal to those of Kaufmann and Robison (1998) that are used by the U.S. Environmental Protection Agency (USEPA) in its Environmental Monitoring and Assessment Program (EMAP). Guidance is provided for calculating measures or indices of stream size and gradient, sinuosity, substrate size, habitat complexity and cover, riparian vegetation cover and structure, and anthropogenic disturbances. Two-person crews typically complete EMAP habitat measurements in 1.5 to 3.5 hours of field time per sampling reach. While this time commitment

600 – 108th Avenue NE, Suite 405
Bellevue, WA 98004
Main 425-456-8500
Fax 425-456-8600

is greater than that required for more qualitative methods, these more quantitative methods are more repeatable (i.e., more precise).

Variables to be surveyed using Quantifying Physical Habitat

1) Wetted width
2) Bankfull width
3) Bankfull height
4) Stream depth
5) Reach Length
6) Sinuosity of Reach
7) Slope of Reach
8) Bank angles

Existing Stream Geomorphology Metrics

1) Mean and standard deviation (SD) of wetted width, bankfull width, bankfull height, stream depth, reach slope, and bank angles
2) Reach Sinuosity

In-Stream Habitat Type

In-Stream Habitat Type will be quantified using the *Timber Fish and Wildlife* (TFW) *Monitoring Program Method Manual for the Habitat Unit Survey* by Pleus et al (1999). (Habitat Unit Survey) and the EPA's *Rapid Bioassessment Protocols for Use in Streams and Rivers* by Plafkin et al. (1989) (Bioassessment Protocols).

The Habitat Unit Survey provides methods for identifying habitat units, measuring their surface area, and collecting information on residual pool depth and pool-forming factors. Other information produced includes pool:riffle ratio, length of side channels, and the frequency distribution of residual pool depths and pool-forming factors.

The Bioassessment Protocols were originally developed in the 1980's to provide cost-effective, efficient biological survey techniques. The assessment is done using a visually-based approach to characterizing the physical habitat structure of the stream site. The concepts underlying the Bioassessment Protocols are:

- Cost-effective, scientifically valid procedures for biological surveys,
- Provisions for multiple site investigations in a field season,

600 – 108th Avenue NE, Suite 405
Bellevue, WA 98004
Main 425-456-8500
Fax 425-456-8600

- Quick turn-around of results for management decisions, and
- Scientific reports easily translated to management and the public.

Variables to be surveyed using the Habitat Unit Survey

1) Stream Discharge
2) Core Habitat Units (e.g. pool & riffle sequences)
3) Surface Area Measurements of Core Habitat Units
4) Residual Pool Depths
5) Pool Forming Factors (e.g. LWD, boulder, etc)

Variables to be surveyed using Bioassessment Protocols

1) Epifaunal substrate/available cover
2) Channel Alteration (including armoring)

In-Stream Habitat Type Metrics

1) Stream discharge (cfs)
2) % of Core Habitat Units
3) Habitat Units per Kilometer and Bankfull Width
4) Pools per Kilometer
5) Factors contributing to pool formation (PFF)
   a) % of units
   b) % of primary PFF
   c) % of pool surface area
6) Mean and SD residual pool depth
7) Mean and SD % epifaunal substrate/available cover
8) % Altered channel
9) % Streambank armoring

Riparian Vegetation

Riparian vegetation will be quantified using a combination of protocols from Quantifying Physical Habitat and Bioassessment Protocols.

600 – 108th Avenue NE, Suite 405
Bellevue, WA 98004
Main 425-456-8500
Fax 425-456-8600

Variables to be surveyed using Quantifying Physical Habitat

1) Canopy Cover
2) Riparian Vegetative Structure

Variables to be surveyed using Bioassessment Protocols

1) Bank Stability
2) Bank Vegetative Protection
3) Riparian Vegetative Zone Width

Riparian Vegetation Metrics

1) Mean and SD of canopy densiometer values
2) % ground cover, mid layer vegetation cover, and canopy level cover, % total ground, mid layer vegetation, and canopy level cover, and % invasives
3) Mean and SD % Bank Stability
4) Mean and SD % Bank Vegetative Protection
5) Mean and SD % Riparian Vegetative Zone Width

Substrate Composition

Substrate composition information will be collected using protocols detailed in *Quantifying Physical Habitat* and *Methods for Evaluating Riparian Habitats with Applications to Management* by Platts et al. (1987) (Evaluating Riparian Habitats). For smaller stream segments where there is not adequate stream length to apply this method, a Wolman pebble count will be conducted to determine substrate composition. (Wolman 1954).

Evaluating Riparian Habitats is a comprehensive compilation of methods for resource specialists to use in managing, evaluating, and monitoring riparian conditions adjacent to streams, lakes, ponds, and reservoirs.

Variables to be surveyed using Quantifying Physical Habitat

1) Substrate Size
2) Substrate Composition

600 – 108th Avenue NE, Suite 405
Bellevue, WA 98004
Main 425-456-8500
Fax 425-456-8600

Variables to be surveyed using Evaluating Riparian Habitats

1) Substrate Embeddedness (%)

NOTE: In non-wadeable systems, such as the Green River, substrate sizes will be estimated either visually (where possible) or by using the drag method as prescribed by Lazorchak et al. (2000) in the *Field Operations and Methods for Measuring the Ecological Condition of Non-Wadeable Rivers and Streams*.

Substrate Composition Metrics

1) Mean and SD of substrate size class
2) 75th percentile of substrate size class
3) Substrate median size class
4) 25th percentile of substrate size class
5) % breakdown of substrate size classes
6) Mean and SD % embeddedness

Abundance of Large Woody Debris

Abundance of Large Woody Debris (LWD) will be quantified using the Level 1 survey method from the TFW Monitoring Program (LWD Method) method manual for the large woody debris survey by Schuett-Hames et al.(1999).

The LWD Method provides methods for documenting the number, volume and characteristics of large woody debris pieces in stream channels. The Level 1 survey involves a rapid tally of pieces by size category and produces information on total and key LWD pieces per channel width.

Variables to be surveyed using the LWD Method

1) Number of LWD Pieces
2) Identification of Key LWD Pieces
3) Distribution of LWD in stream corridor
4) LWD jam composition

Large Woody Debris Metrics

1) % LWD pieces by size class and channel zone

600 – 108th Avenue NE, Suite 405
Bellevue, WA 98004
Main 425-456-8500
Fax 425-456-8600

2) % key LWD pieces
3) LWD pieces per channel width
4) LWD pieces per kilometer
5) LWD jam composition by % size class

Quality of Pools

Quality of Pools will be measured using methods described in *Monitoring Protocols to Evaluate Water Quality Effects of Grazing Management on Western Rangeland Streams* by Bauer and Burton (1993) (Water Quality Effects).

Water Quality Effects describes a monitoring system to assess grazing impacts on water quality in streams o the western United States. The monitoring methods were selected for application by natural resource professionals with backgrounds in soils, range, hydrology, fisheries biology, and water quality. Though designed to be used in an agricultural environment, many of the protocols in this document (such as assessment of pool quality) can be applied over a broad geographic range.

<u>Variables to be surveyed using the Water Quality Effects</u>

1) Pool depth (in conjunction with the Habitat Unit Survey)
2) Substrate
3) Overhead Cover
4) Submerged Cover
5) Bank Cover

NOTE: The individual variables surveyed will be assimilated into a pool quality index that will detail habitat values for individual pools.

<u>Quality of Pool Metrics</u>

1) Mean and SD pool quality index

Ordinary High Water Mark (OHWM)

OHWM measurements will be conducted in accordance with the protocols contained in *A Guide for Field Identification of Bankfull Stage in the Western United States* by the USDA, Forest Service, Stream Systems Technology Center Rocky Mountain Research Station.

600 – 108th Avenue NE, Suite 405
Bellevue, WA 98004
Main 425-456-8500
Fax 425-456-8600

The OHWM for each stream will be marked for 60 lineal feet along the stream from the proposed toe of slope of impact line. In instances where the OHWM is located more than 60 lineal feet from the proposed toe of slope of impact line OHWM will not be marked and it will be documented in a technical memorandum that the distance to the OHWM exceeds 60 lineal feet.

Establishing Reference Points

A handheld GPS unit will be used to establish reference points at the upstream and downstream end of each surveyed stream reach to allow for future surveys to be conducted within the same reach.

Photographic Documentation

Photographs will be taken at the upstream end, downstream end, and mid-point of each survey reach. In addition, significant features (e.g. LWD jams, culvert outlets, etc) will also be photographed.

Mercer Slough

Mercer Slough is a unique feature within the Bellevue study area. Several streams in the study area outlet into the slough, however the slough itself is a lacustrine (lake influenced), rather than a riverine, system. The slough is used by a variety of aquatic species and acts as a migration corridor and rearing area for salmonids in various life stages.

To assess the habitat values of Mercer Slough, habitat survey crews will determine the extent of inundated vegetated areas and deeper channel areas (those with no vegetation breaking the surface of the slough). A Differential Global Position System (DGPS) will be used to collect data along the outer margin of the wetted perimeter and deeper channel areas of Mercer Slough within the study area. This approach will provide information on the extent of the two main habitat types in Mercer Slough. A discussion of how these habitats could be affected by the project and/or used by fish could be prepared as part of the Bellevue Nickel Improvement Project Fisheries and Aquatic Resources Discipline Report. Existing information will be used to determine fish use in Mercer Slough.

600 – 108th Avenue NE, Suite 405
Bellevue, WA 98004
Main 425-456-8500
Fax 425-456-8600

References

A guide for field identification of bankfull stage in the western United States [videorecording] / producers, USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Stream Systems Technology Center ; producer/director, Chris Frye.

Bauer, S. B., and Burton, T. A. 1993. *Monitoring protocols to evaluate water quality effects of grazing management on western rangeland streams*. United States Environmental Protection Agency, Water Division, Surface Water Branch, Region 10, Seattle, Washington. pp. 145-148.

Kaufmann, P.R, P. Levine, E.G. Robison, C. Seeliger, and D.V. Peck. 1999.*Quantifying Physical Habitat in Wadeable Streams.* EPA/620/R-99/003. U.S.Environmental Protection Agency, Washington, D.C.

Lazorchak, J.M., Hill, B.H., Averill, D.K., D.V. Peck, and D.J. Klemm (editors). 2000. *Environmental Monitoring and Assessment Program -Surface Waters: Field Operations and Methods for Measuring the Ecological Condition of Non-Wadeable Rivers and Streams* U.S. Environmental Protection Agency, Cincinnati OH.

Plafkin, J.L., M.T. Barbour, K.D. Porter, S.K. Gross, and R.M. Hughes. 1989. *Rapid bioassessment protocols for use in streams and rivers: Benthic macroinvertebrates and fish.* U.S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington, D.C. EPA 440-4-89-001.

Platts, W. S., C. Armour, G. D. Booth, M. Bryant, J. L. Bufford, P. Cuplin, S. Jensen, G. W. Lienkaemper, G. W. Minshall, S. B. Monsen, R. L. Nelson, J. R. Sedell, and J. S. Tuhy. 1987. *Methods for evaluating riparian habitats with applications to management*. USDA Forest Service General Technical Report INT-221. Intermountain Research Station, Ogden, UT. 187 pp.

Pleus, A.E., D. Schuett-Hames, and L. Bullchild. 1999. *TFW Monitoring Program method manual for the habitat unit survey*. Prepared for the Washington State Dept. of Natural Resources under the Timber, Fish, and Wildlife Agreement. TFW-AM9-99-003. DNR #105. June.

J. G. Scholz and D. B. Booth, 2001, Monitoring small urban streams: Strategies and protocols for humid-region lowland systems: Environmental Monitoring and Assessment, 71(2), p. 143-164

Schuett-Hames, D., A.E. Pleus, J. Ward, M. Fox, and J. Light. 1999. *TFW Monitoring Program method manual for the large woody debris survey*. Prepared for the Washington State Dept. of Natural Resources under the Timber, Fish, and Wildlife Agreement. TFW-AM9-99-004. DNR #106. June.

600 – 108th Avenue NE, Suite 405
Bellevue, WA 98004
Main 425-456-8500
Fax 425-456-8600

Wolman, M.G. 1954. *A method of sampling coarse river bed material*. American Geophysical Union **35**:951-956.

APPENDIX B STREAM SURVEY SUMMARIES

Valley Creek
Habitat Survey Summary Sheet

Large Woody Debris Metrics		**In-Stream Habitat Type Metrics**	
Channel Zone 1 - Number of LWD	35	Stream Discharge	0.9 cfs
Channel Zone 1 - % of total LWD	38%	HUs Per Mile	67.45
Channel Zone 2 - Number of LWD	38	Pools per Mile	24.09
Channel Zone 2 - % of total LWD	41%	Mean Residual Pool Depth (inches)	23.31
Channel Zone 3 - Number of LWD	19	SD of Residual Pool Depth	9.78
Channel Zone 3 - % of total LWD	21%	Mean Channel Alteration	Suboptimal
Total number of LWD	92	Mean Left Bank Stability	Marginal
Number of Key LWD Pieces	0	Mean Right Bank Stability	Marginal
% Key LWD Pieces	0%	Mean Bank Stability	Marginal
LWD Pieces per Mile	443.22	Mean Left Bank Vegetative Protection	Marginal
		Mean Right Bank Vegetative Protection	Marginal
Existing Stream Geomorphology Metrics		Mean Vegetative Protection Overall	Marginal
Mean Wetted Width (feet)	8.32	Mean Left Bank Riparian Zone Width	Marginal
Mean Bankfull Width (feet)	11.96	Mean Right Bank Riparian Zone Width	Marginal
Mean Bankfull Height (feet)	1.23	Mean Riparian Zone Width	Marginal
Mean Stream Depth (inches)	8.00		
Mean Reach Slope	1.10%	**Substrate Composition Metrics**	
Mean Left Bank Angle	52.73°	Dominant Substrate Class Size	Sand
Mean Right Bank Angle	48.64°	% Bedrock (smooth)	0%
SD of Wetted Width (feet)	2.98	% Boulder (250 to 4000 MM)	2%
SD of Bankfull Width (feet)	4.07	% Cobble (64 to 255 MM)	0%
SD of Bankfull Height (feet)	0.33	% Coarse Gravel (16 to 64 MM)	9%
SD of Stream Depth (inches)	6.16	% Fine Gravel (2 to 16 MM)	9%
SD of Left Bank Angle	26.68°	% Sand (.06 to 2 MM)	49%
SD of Right Bank Angle	24.40°	% Silt/Sand/Muck	31%
Total Stream Length Surveyed (feet)	1096	% Hardpan	0%
		% Wood	0%
Quality of Pool Metrics		% Other	0%
Mean Pool Quality Index	4.8	Mean % Embeddedness	85%
SD of Pool Quality Index	1.10	SD of % Embeddedness	32%
Total Number of Pools	5		
		Riparian Vegetation Metrics	
Canopy Cover Measurements		% Canopy Vegetation Cover	Heavy (40-75%)
% Canopy Cover	64%	% Mid Layer Vegetation Cover	Very Heavy (>75%)

Goff Creek
Habitat Survey Summary Sheet

Large Woody Debris Metrics		**In-Stream Habitat Type Metrics**	
Channel Zone 1 - Number of LWD	0	Stream Discharge	.24 cfs
Channel Zone 1 - % of total LWD	0%	HUs Per Mile	83.66
Channel Zone 2 - Number of LWD	0	Pools per Mile	37.18
Channel Zone 2 - % of total LWD	0%	Mean Residual Pool Depth (inches)	14.42
Channel Zone 3 - Number of LWD	0	SD of Residual Pool Depth	6.21
Channel Zone 3 - % of total LWD	0%	Mean Channel Alteration	Poor
Total number of LWD	0	Mean Left Bank Stability	Optimal
Number of Key LWD Pieces	0	Mean Right Bank Stability	Optimal
% Key LWD Pieces	0%	Mean Bank Stability	Optimal
LWD Pieces per Mile	0.00	Mean Left Bank Vegetative Protection	Marginal
		Mean Right Bank Vegetative Protection	Marginal
Existing Stream Geomorphology Metrics		Mean Vegetative Protection Overall	Marginal
Mean Wetted Width (feet)	4.01	Mean Left Bank Riparian Zone Width	Marginal
Mean Bankfull Width (feet)	8.80	Mean Right Bank Riparian Zone Width	Marginal
Mean Bankfull Height (feet)	2.52	Mean Riparian Zone Width	Marginal
Mean Stream Depth (inches)	5.29		
Mean Reach Slope	3.39%	**Substrate Composition Metrics**	
Mean Left Bank Angle	46.67°	Dominant Substrate Class Size	Sand
Mean Right Bank Angle	50.00°	% Bedrock (smooth)	0%
SD of Wetted Width (feet)	1.63	% Boulder (250 to 4000 MM)	0%
SD of Bankfull Width (feet)	8.62	% Cobble (64 to 255 MM)	0%
SD of Bankfull Height (feet)	1.34	% Coarse Gravel (16 to 64 MM)	33%
SD of Stream Depth (inches)	4.91	% Fine Gravel (2 to 16 MM)	9%
SD of Left Bank Angle	14.14°	% Sand (.06 to 2 MM)	47%
SD of Right Bank Angle	10.90°	% Silt/Sand/Muck	5%
Total Stream Length Surveyed (feet)	1704	% Hardpan	0%
		% Wood	0%
Quality of Pool Metrics		% Other	7%
Mean Pool Quality Index	4	Mean % Embeddedness	70%
SD of Pool Quality Index	1.13	SD of % Embeddedness	40%
Total Number of Pools	12		
		Riparian Vegetation Metrics	
Canopy Cover Measurements		% Canopy Vegetation Cover	Heavy (40-75%)
% Canopy Cover	51%	% Mid Layer Vegetation Cover	Moderate (10-40%)

Sturtevant Creek
Habitat Survey Summary Sheet

Large Woody Debris Metrics		**In-Stream Habitat Type Metrics**	
Channel Zone 1 - Number of LWD	0	Stream Discharge	1.073 cfs
Channel Zone 1 - % of total LWD	0	HUs Per Mile	75.98
Channel Zone 2 - Number of LWD	0	Pools per Mile	30.36
Channel Zone 2 - % of total LWD	0	Mean Residual Pool Depth (inches)	12.94
Channel Zone 3 - Number of LWD	1	SD of Residual Pool Depth	1.75
Channel Zone 3 - % of total LWD	100%	Mean Channel Alteration	Marginal
Total number of LWD	1	Mean Left Bank Stability	Marginal
Number of Key LWD Pieces	0	Mean Right Bank Stability	Marginal
% Key LWD Pieces	0	Mean Bank Stability	Marginal
LWD Pieces per Mile	3.79	Mean Left Bank Vegetative Protection	Poor
		Mean Right Bank Vegetative Protection	Poor
Existing Stream Geomorphology Metrics		Mean Vegetative Protection Overall	Poor
Mean Wetted Width (feet)	7.22	Mean Left Bank Riparian Zone Width	Poor
Mean Bankfull Width (feet)	25.3	Mean Right Bank Riparian Zone Width	Poor
Mean Bankfull Height (feet)	2.43	Mean Riparian Zone Width	Poor
Mean Stream Depth (inches)	5.98		
Mean Reach Slope	1%	**Substrate Composition Metrics**	
Mean Left Bank Angle	75°	Dominant Substrate Class Size	Fine Gravel
Mean Right Bank Angle	81°	% Boulder (250 to 4000 MM)	4%
SD of Wetted Width (feet)	1.79	% Cobble (64 to 255 MM)	8%
SD of Bankfull Width (feet)	5.29	% Coarse Gravel (16 to 64 MM)	20%
SD of Bankfull Height (feet)	0.42	% Fine Gravel (2 to 16 MM)	46%
SD of Stream Depth (inches)	4.61	% Sand (.06 to 2 MM)	14%
SD of Left Bank Angle	47°	% Silt/Sand/Muck	4%
SD of Right Bank Angle	43°	% Hardpan	0%
Total Stream Length Surveyed (feet)	1391	% Wood	4%
		Mean % Embeddedness	40%
Quality of Pool Metrics		SD of % Embeddedness	35%
Mean Pool Quality Index	5.88		
SD of Pool Quality Index	1.55	**Riparian Vegetation Metrics**	
Total Number of Pools	8	% Canopy Vegetation Cover	Moderate (10-40%)
		% Mid Layer Vegetation Cover	Sparse (<10%)
Canopy Cover Measurements			
% Canopy Cover	84%		

Unnamed Tributary to Yarrow Creek
Habitat Survey Summary Sheet

Large Woody Debris Metrics		**In-Stream Habitat Type Metrics**	
Channel Zone 1 - Number of LWD	10	Stream Discharge	
Channel Zone 1 - % of total LWD	56%	HUs Per Mile	100.86
Channel Zone 2 - Number of LWD	6	Pools per Mile	50.43
Channel Zone 2 - % of total LWD	33%	Mean Residual Pool Depth (inches)	7.24
Channel Zone 3 - Number of LWD	2	SD of Residual Pool Depth	2.02
Channel Zone 3 - % of total LWD	11%	Mean Channel Alteration	13.67
Total number of LWD	18	Mean Left Bank Stability	Marginal
Number of Key LWD Pieces	0	Mean Right Bank Stability	Marginal
% Key LWD Pieces	0%	Mean Bank Stability	Marginal
LWD Pieces per Mile	181.54	Mean Left Bank Vegetative Protection	Suboptimal
		Mean Right Bank Vegetative Protection	Suboptimal
Existing Stream Geomorphology Metrics		Mean Vegetative Protection Overall	Suboptimal
Mean Wetted Width (feet)	3.53	Mean Left Bank Riparian Zone Width	Marginal
Mean Bankfull Width (feet)	10.42	Mean Right Bank Riparian Zone Width	Marginal
Mean Bankfull Height (feet)	1	Mean Riparian Zone Width	Marginal
Mean Stream Depth (inches)	0.72		
Mean Reach Slope	5.35%	**Substrate Composition Metrics**	
Mean Left Bank Angle	45.00°	Dominant Substrate Class Size	Cobble
Mean Right Bank Angle	47.50°	% Bedrock (smooth)	0%
SD of Wetted Width (feet)	1.68	% Boulder (250 to 4000 MM)	0%
SD of Bankfull Width (feet)	7.99	% Cobble (64 to 255 MM)	25%
SD of Bankfull Height (feet)	0.27	% Coarse Gravel (16 to 64 MM)	55%
SD of Stream Depth (inches)	0.6	% Fine Gravel (2 to 16 MM)	0%
SD of Left Bank Angle	23.80°	% Sand (.06 to 2 MM)	15%
SD of Right Bank Angle	20.20°	% Silt/Clay/Muck	5%
Total Stream Length Surveyed (feet)	524	% Hardpan	0%
		% Wood	0%
Quality of Pool Metrics		% Other	0%
Mean Pool Quality Index	2.2	Mean % Embeddedness	41%
SD of Pool Quality Index	1.79	SD of % Embeddedness	36%
Total Number of Pools	5		
		Riparian Vegetation Metrics	
Canopy Cover Measurements		% Canopy Vegetation Cover	Heavy (40-75%)
% Canopy Cover	57%	% Mid Layer Vegetation Cover	Heavy (40-75%)

Lower Yarrow Creek
Habitat Survey Summary Sheet

Large Woody Debris Metrics		**In-Stream Habitat Type Metrics**	
Channel Zone 1 - Number of LWD	0	Stream Discharge	
Channel Zone 1 - % of total LWD	0%	HUs Per Mile	8.13
Channel Zone 2 - Number of LWD	4	Pools per Mile	0.00
Channel Zone 2 - % of total LWD	100%	Mean Residual Pool Depth (inches)	0
Channel Zone 3 - Number of LWD	0	SD of Residual Pool Depth	0
Channel Zone 3 - % of total LWD	0%	Mean Channel Alteration	Marginal
Total number of LWD	4	Mean Left Bank Stability	Suboptimal
Number of Key LWD Pieces	0	Mean Right Bank Stability	Suboptimal
% Key LWD Pieces	0%	Mean Bank Stability	Suboptimal
LWD Pieces per Mile	16.26	Mean Left Bank Vegetative Protection	Poor
		Mean Right Bank Vegetative Protection	Poor
Existing Stream Geomorphology Metrics		Mean Vegetative Protection Overall	Poor
Mean Wetted Width (feet)	6.11	Mean Left Bank Riparian Zone Width	Marginal
Mean Bankfull Width (feet)	8.57	Mean Right Bank Riparian Zone Width	Marginal
Mean Bankfull Height (feet)	2.73	Mean Riparian Zone Width	Marginal
Mean Stream Depth (inches)	9.7		
Mean Reach Slope	0.71%	**Substrate Composition Metrics**	
Mean Left Bank Angle	54.38°	Dominant Substrate Class Size	Sand
Mean Right Bank Angle	57.50°	% Bedrock (smooth)	0%
SD of Wetted Width (feet)	1.19	% Boulder (250 to 4000 MM)	3%
SD of Bankfull Width (feet)	1.51	% Cobble (64 to 255 MM)	3%
SD of Bankfull Height (feet)	0.8	% Coarse Gravel (16 to 64 MM)	13%
SD of Stream Depth (inches)	5.79	% Fine Gravel (2 to 16 MM)	10%
SD of Left Bank Angle	16.78°	% Sand (.06 to 2 MM)	68%
SD of Right Bank Angle	15.58°	% Silt/Clay/Muck	5%
Total Stream Length Surveyed (feet)	1299	% Hardpan	0%
		% Wood	0%
Quality of Pool Metrics		% Other	0%
Mean Pool Quality Index		Mean % Embeddedness	86%
SD of Pool Quality Index		SD of % Embeddedness	28%
Total Number of Pools	0		
		Riparian Vegetation Metrics	
Canopy Cover Measurements		% Canopy Vegetation Cover	Sparse
% Canopy Cover	25%	% Mid Layer Vegetation Cover	Moderate (10-40%)

Yarrow Creek
Habitat Survey Summary Sheet

Large Woody Debris Metrics		**In-Stream Habitat Type Metrics**	
Channel Zone 1 - Number of LWD	13	Stream Discharge	0.703 cfs
Channel Zone 1 - % of total LWD	24%	HUs Per Mile	68.75
Channel Zone 2 - Number of LWD	25	Pools per Mile	6.87
Channel Zone 2 - % of total LWD	45%	Mean Residual Pool Depth (inches)	9.84
Channel Zone 3 - Number of LWD	17	SD of Residual Pool Depth	0
Channel Zone 3 - % of total LWD	31%	Mean Channel Alteration	Marginal
Total number of LWD	55	Mean Left Bank Stability	Marginal
Number of Key LWD Pieces	0	Mean Right Bank Stability	Marginal
% Key LWD Pieces	0%	Mean Bank Stability	Marginal
LWD Pieces per Mile	378.11	Mean Left Bank Vegetative Protection	Marginal
		Mean Right Bank Vegetative Protection	Marginal
Existing Stream Geomorphology Metrics		Mean Vegetative Protection Overall	Marginal
Mean Wetted Width (feet)	6.43	Mean Left Bank Riparian Zone Width	Marginal
Mean Bankfull Width (feet)	9.16	Mean Right Bank Riparian Zone Width	Marginal
Mean Bankfull Height (feet)	2.11	Mean Riparian Zone Width	Marginal
Mean Stream Depth (inches)	2.58		
Mean Reach Slope	5.79%	**Substrate Composition Metrics**	
Mean Left Bank Angle	26.64°	Dominant Substrate Class Size	Fine Gravel
Mean Right Bank Angle	26.18°	% Bedrock (smooth)	0%
SD of Wetted Width (feet)	2.03	% Boulder (250 to 4000 MM)	0%
SD of Bankfull Width (feet)	3.53	% Cobble (64 to 255 MM)	5%
SD of Bankfull Height (feet)	2.24	% Coarse Gravel (16 to 64 MM)	27%
SD of Stream Depth (inches)	1.57	% Fine Gravel (2 to 16 MM)	31%
SD of Left Bank Angle	19.75°	% Sand (.06 to 2 MM)	24%
SD of Right Bank Angle	22.32°	% Silt/Clay/Muck	9%
Total Stream Length Surveyed (feet)	768	% Hardpan	0%
		% Wood	4%
Quality of Pool Metrics		% Other	0%
Mean Pool Quality Index	1	Mean % Embeddedness	56%
SD of Pool Quality Index	0	SD of % Embeddedness	38%
Total Number of Pools	1		
		Riparian Vegetation Metrics	
Canopy Cover Measurements		% Canopy Vegetation Cover	Heavy (40-75%)
% Canopy Cover	65%	% Mid Layer Vegetation Cover	Heavy (40-75%)

APPENDIX C ECOLOGY'S WETLAND RATING FORMS

The following describes the abbreviation used to describe the mottle abundance, mottle size, and mottle contrast when examining soils. The abbreviations were used on the routine wetland delineation forms which were completed in the field.:

Mottle Abundance:
f - Few (<20%)
c- Common (2%-20%
m - Many (> 20%)

Mottle Size:
f - Fine (0-5mm)
m - Medium (5-15mm)
c - Coarse (>15mm)

Mottle Contrast:
f - Faint
d - Distinct
p - Prominent

Wetland name or number 6.8L

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 - Updated July 2006 to increase accuracy and reproducibility among users

Name of wetland (if known): 6.8L Date of site visit: 11/15/2006

Rated by CKD / JRP Trained by Ecology? Yes__ No X Date of training____

SEC: 19 TWNSHP: 25N RNGE: 5E Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure ~~D5~~ JRP **Estimated size** 0.5 acres

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III___ IV X

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score <30

Score for Water Quality Functions	2
Score for Hydrologic Functions	0
Score for Habitat Functions	5
TOTAL score for Functions	7

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ **Does not Apply** X

Final Category (choose the "highest" category from above) IV

Summary of basic information about the wetland unit

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine		Depressional	
Natural Heritage Wetland		Riverine	
Bog		Lake-fringe	
Mature Forest		Slope	X
Old Growth Forest		Flats	
Coastal Lagoon		Freshwater Tidal	
Interdunal			
None of the above	X	Check if unit has multiple HGM classes present	

Wetland name or number 6.8L

Does the wetland unit being rated meet any of the criteria below?

If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands That May Need Additional Protection (in addition to the protection recommended for its category)	**YES**	**NO**
SP1. *Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered* ***animal or plant*** *species (T E species)?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.		X
SP2. *Has the wetland unit been documented as habitat for any State listed Threatened or Endangered* ***animal*** *species?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category I Natural Heritage Wetlands (see p. 19 of data form).		X
SP3. *Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?*		X
SP4. *Does the wetland unit have a local significance in addition to its functions?* For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.		X

To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.

The hydrogeomorphic classification groups wetlands into those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Wetland name or number 6.8L

Classification of Wetland Units in Western Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides (i.e. except during floods)?
NO – go to 2 **YES** – the wetland class is **Tidal Fringe**

If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)? **YES – Freshwater Tidal Fringe** **NO – Saltwater Tidal Fringe (Estuarine)**

If your wetland can be classified as a Freshwater Tidal Fringe use the forms for ***Riverine*** *wetlands. If it is Saltwater Tidal Fringe it is rated as an* ***Estuarine*** *wetland.* Wetlands that were called estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term "Estuarine" wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p.).

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.
NO – go to 3 **YES** – The wetland class is **Flats**

If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland unit **meet both** of the following criteria?
____The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) at least 20 acres (8 ha) in size;
____At least 30% of the open water area is deeper than 6.6 ft (2 m)?
NO – go to 4 **YES** – The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the entire wetland unit **meet all** of the following criteria?
X The wetland is on a slope (*slope can be very gradual*),
X The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
X The water leaves the wetland **without being impounded**?
NOTE: *Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually 3ft diameter and less than 1 foot deep).*
NO - go to 5 **YES** – The wetland class is **Slope**

Wetland name or number 6-8L

5. Does the entire wetland unit **meet all** of the following criteria?

____ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river

____ The overbank flooding occurs at least once every two years.

NOTE: The riverine unit can contain depressions that are filled with water when the river is not flooding.

NO - go to 6 **YES** – The wetland class is **Riverine**

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding. The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM clases. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit: classify the wetland using the class that represents more than 90% of the total area.

HGM Classes within the wetland unit being rated	*HGM Class to Use in Rating*
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine along stream within boundary	Depressional
Depressional + Lake-fringe	Depressional
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE under wetlands with special characteristics

If you are unable still to determine which of the above criteria apply to your wetland, or if you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

Wetland name or number 6-8L

		Points (only 1 score per box)
S	**Slope Wetlands** WATER QUALITY FUNCTIONS - Indicators that the wetland unit functions to improve water quality	
S	**S 1. Does the wetland unit have the potential to improve water quality?**	*(see p.64)*
S	S 1.1 Characteristics of average slope of unit: Slope is 1% or less *(a 1% slope has a 1 foot vertical drop in elevation for every 100 ft horizontal distance)* Slope is 1% - 2% points 3 Slope is 2% - 5% points 2 Slope is greater than 5% points 1 points 0	1
S	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions)* YES 3 points NO 0 points	0
S	S 1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants: *Choose the points appropriate for the description that best fits the vegetation in the wetland. Dense vegetation means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 inches.* Dense, uncut, herbaceous vegetation >90% of the wetland area points 6 Dense, uncut, herbaceous vegetation > 1/2 of area points 3 Dense, woody, vegetation > 1/2 of area points 2 Dense, uncut, herbaceous vegetation > 1/4 of area points 1 Does not meet any of the criteria above for vegetation points 0 Aerial photo or map with vegetation polygons	Figure ___ 0
S	**Total for S 1** *Add the points in the boxes above*	1
S	**S 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150ft — Untreated stormwater discharges to wetland — Tilled fields, logging, or orchards within 150 feet of wetland — Residential, urban areas, or golf courses are within 150 ft upslope of wetland — Other **YES** multiplier is **2** **NO** multiplier is **1**	*(see p.67)* multiplier 2
S	**TOTAL - Water Quality Functions** Multiply the score from S1 by S2 *Add score to table on p. 1*	2

Comments

Wetland name or number 6.8L

		Points (only 1 score per box)
S	**Slope Wetlands** HYDROLOGIC FUNCTIONS - Indicators that the wetland unit functions to reduce flooding and stream erosion	*(see p.68)*
S	**S 3. Does the wetland unit have the potential to reduce flooding and stream erosion?**	
S	S 3.1 Characteristics of vegetation that reduce the velocity of surface flows during storms. *Choose the points appropriate for the description that best fit conditions in the wetland. (stems of plants should be thick enough (usually > 1/8in), or dense enough, to remain erect during surface flows)* Dense, uncut, **rigid** vegetation covers > 90% of the area of the wetland. points 6 Dense, uncut, **rigid** vegetation > 1/2 area of wetland points 3 Dense, uncut, **rigid** vegetation > 1/4 area points 1 More than 1/4 of area is grazed, mowed, tilled or vegetation is not rigid points 0	0
S	S 3.2 Characteristics of slope wetland that holds back small amounts of flood flows: The slope wetland has small surface depressions that can retain water over at least 10% of its area. YES points 2 NO points 0	0
	Add the points in the boxes above	0
S	**S 4. Does the wetland have the opportunity to reduce flooding and erosion?**	*(see p. 70)*
S	Is the wetland in a landscape position where the reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows? *Note which of the following conditions apply.* — Wetland has surface runoff that drains to a river or stream that has flooding problems — Other ..... *(Answer NO if the major source of water is controlled by a reservoir (e.g. wetland is a seep that is on the downstream side of a dam)* **YES** multiplier is **2** **NO** multiplier is **1**	multiplier 2
S	**TOTAL - Hydrologic Functions** Multiply the score from S 3 by S 4 ***Add score to table on p. 1***	0

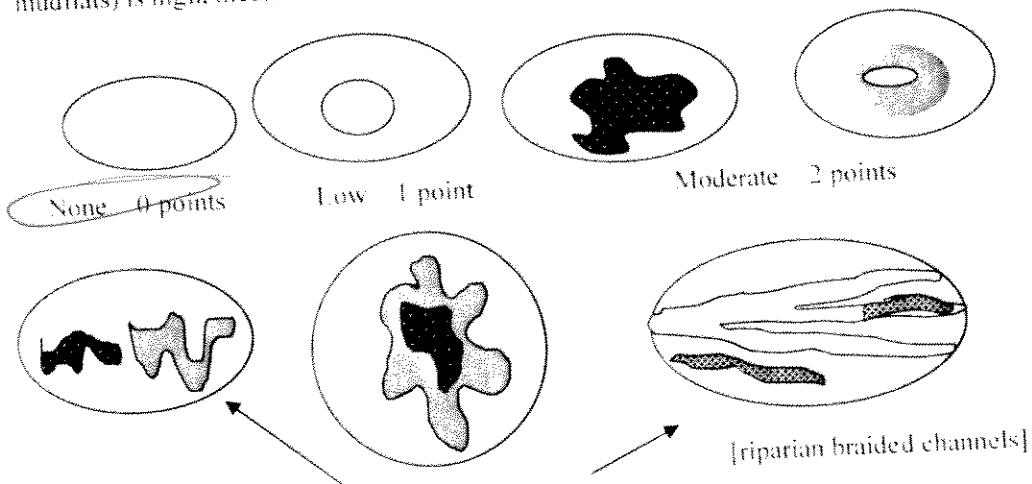
Comments

Wetland name or number 6.BL

These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS - Indicators that unit functions to provide important habitat	**Points** (only 1 score per box)
H 1. Does the wetland unit have the potential to provide habitat for many species?	
H 1.1 Vegetation structure ***(see p. 72)*** *Check the types of vegetation classes present (as defined by Cowardin)- Size threshold for each class is ¼ acre or more than 10% of the area if unit is smaller than 2.5 acres.* Aquatic bed X Emergent plants Scrub shrub (areas where shrubs have >30% cover) Forested (areas where trees have >30% cover) *If the unit has a forested class check if:* The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss ground-cover) that each cover 20% within the forested polygon *Add the number of vegetation structures that qualify. If you have:* 4 structures or more points 4 3 structures points 2 2 structures points 1 (1 structure) points 0 Map of Cowardin vegetation classes	Figure ___ 0
H 1.2. Hydroperiods ***(see p. 73)*** *Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (see text for descriptions of hydroperiods)* Permanently flooded or inundated Seasonally flooded or inundated X Occasionally flooded or inundated X Saturated only Permanently flowing stream or river in, or adjacent to, the wetland Seasonally flowing stream in, or adjacent to, the wetland ***Lake-fringe wetland*** **= 2 points** ***Freshwater tidal wetland*** **= 2 points** 4 or more types present points 3 3 types present points 2 (2 types present) point 1 1 type present points 0 Map of hydroperiods	Figure ___ 1
H 1.3. Richness of Plant Species ***(see p. 75)*** Count the number of plant species in the wetland that cover at least 10 ft². *(different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle* If you counted: 19 species points 2 5 - 19 species points 1 5 species points 0 *List species below if you want to:*	0

Total for page 1

Wetland name or number 6.8L

	Figure ___
H 1.4. Interspersion of habitats *(see p. 76)* Decide from the diagrams below whether interspersion between Cowardin vegetation classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.  NOTE: If you have four or more classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes	0
H 1.5. Special Habitat Features: *(see p. 77)* *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* Large, downed, woody debris within the wetland (4in. diameter and 6 ft long). Standing snags (diameter at the bottom 4 inches) in the wetland Undercut banks are present for at least 6.6 ft (2m) and or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m) Stable steep banks of fine material that might be used by beaver or muskrat for denning (30degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey brown)* At least 1 acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* Invasive plants cover less than 25% of the wetland area in each stratum of plants *NOTE: The 20% stated in early printings of the manual on page 78 is an error.*	6
H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	1

Comments

Wetland name or number 6.8L

H 2. Does the wetland unit have the opportunity to provide habitat for many species?	
H 2.1 Buffers *(see p. 80)* *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."* — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No structures are within the undisturbed part of buffer. (relatively undisturbed also means no-grazing, no landscaping, no daily human use) **Points = 5** — 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference. . **Points = 3** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3** **If buffer does not meet any of the criteria above** — No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland >95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — Heavy grazing in buffer. **Points = 1** — Vegetated buffers are 2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland **Points = 0.** X Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	Figure ___ 1
H 2.2 Corridors and Connections *(see p. 81)* H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? *(dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor).* YES **4 points** *(go to H 2.3)* NO go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR** a **Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? YES **2 points** *(go to H 2.3)* NO H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (> 40 acres) OR within 1 mi of a lake greater than 20 acres? YES **1 point** NO **0 points**	0

Total for page 1

Wetland name or number 6.8L

H 2.3 Near or adjacent to other priority habitats listed by WDFW *(see p. 82)*
Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.*
These are DFW definitions. Check with your local DFW biologist if there are any questions.

Riparian: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.8 ha (2 acres).

____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft.

____**Old-growth forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age.

____**Mature forests:** Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest.

____**Prairies:** Relatively undisturbed areas (as indicated by dominance of native plants) where grasses and/or forbs form the natural climax plant community.

____**Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

Caves: A naturally occurring cavity, recess, void, or system of interconnected passages

Oregon white Oak: Woodlands Stands of pure oak or oak conifer associations where canopy coverage of the oak component of the stand is 25%.

Urban Natural Open Space: A priority species resides within or is adjacent to the open space and uses it for breeding and/or regular feeding; and/or the open space functions as a corridor connecting other *priority habitats*, especially those that would otherwise be isolated; and/or the open space is an isolated remnant of natural habitat larger than 4 ha (10 acres) and is surrounded by urban development.

Estuary/Estuary-like: Deepwater tidal habitats and adjacent tidal wetlands, usually semi-enclosed by land but with open, partly obstructed or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines there is appreciable dilution of sea water. Estuarine habitat extends upstream and landward to where ocean-derived salts measure less than 0.5ppt. during the period of average annual low flow. Includes both estuaries and lagoons.

Marine/Estuarine Shorelines: Shorelines include the intertidal and subtidal zones of beaches, and may also include the backshore and adjacent components of the terrestrial landscape (e.g., cliffs, snags, mature trees, dunes, meadows) that are important to shoreline associated fish and wildlife and that contribute to shoreline function (e.g., sand/rock/log recruitment, nutrient contribution, erosion control).

If wetland has **3 or more** priority habitats = **4 points**
If wetland has **2** priority habitats = **3 points**
If wetland has **1** priority habitat = **1 point** No habitats = 0 points

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4.

0

Wetland name or number 6.8L

H 2.4 Wetland Landscape *(choose the **one** description of the landscape around the wetland that best fits)* ***(see p. 84)*** There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points 3 The wetland is Lake-fringe on a lake **with** disturbance and there are 3 other lake-fringe wetland within ½ mile points 3 There is at least 1 wetland within ½ mile. points 2 There are no wetlands within ½ mile. points 0	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1, H2.2, H2.3, H2.4*	4
TOTAL for H 1 from page 14	1
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	5

Wetland name or number 6.8L

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland meets the attributes described below and circle the appropriate answers and Category.

Wetland Type *Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.*	**Category**
SC 1.0 Estuarine wetlands ***(see p. 86)*** Does the wetland unit meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt. YES = Go to SC 1.1 NO X	
SC 1.1 Is the wetland unit within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? YES = Category I NO go to SC 1.2	**Cat. I**
SC 1.2 Is the wetland unit at least 1 acre in size and meets at least two of the following three conditions? YES = Category I NO = Category II — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. If the non-native *Spartina* spp. are the only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II). The area of Spartina would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category I. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre. — At least ¼ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least 2 of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.	**Cat. I** **Cat. II** **Dual rating I/II**

Wetland name or number

SC 2.0 Natural Heritage Wetlands *(see p. 87)* Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species. SC 2.1 Is the wetland unit being rated in a Section/Township/Range that contains a Natural Heritage wetland? *(this question is used to screen out most sites before you need to contact WNHP/DNR)* S/T/R information from Appendix D or accessed from WNHP/DNR web site YES ____ – contact WNHP/DNR (see p. 79) and go to SC 2.2 NO X SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as or as a site with state threatened or endangered plant species? YES = Category I NO X not a Heritage Wetland	**Cat. I**
SC 3.0 Bogs *(see p. 87)* Does the wetland unit (**or any part of the unit**) meet both the criteria for soils and vegetation in bogs? *Use the key below to identify if the wetland is a bog.* ***If you answer yes you will still need to rate the wetland based on its functions.*** 1. Does the unit have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils)? Yes - go to Q. 3 No - go to Q. 2 2. Does the unit have organic soils, either peats or mucks that are less than 16 inches deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on a lake or pond? Yes - go to Q. 3 No - Is not a bog for purpose of rating 3. Does the unit have more than 70% cover of mosses at ground level, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)? Yes - Is a bog for purpose of rating No - go to Q. 4 NOTE: If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog. 4. Is the unit forested (> 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover (> *30% coverage of the total shrub/herbaceous cover)?* 2. YES Category I No X Is not a bog for purpose of rating	**Cat. I**

Wetland name or number 6.8L

SC 4.0 Forested Wetlands ***(see p. 90)*** Does the wetland unit have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife's forests as priority habitats? *If you answer yes you will still need to rate the wetland based on its functions.* — **Old-growth forests**: (west of Cascade crest) Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm) or more. NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and "OR" so old-growth forests do not necessarily have to have trees of this diameter. — **Mature forests**: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old OR have average diameters (dbh) exceeding 21 inches (53cm); crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. YES Category I NO X not a forested wetland with special characteristics	**Cat. I**
SC 5.0 Wetlands in Coastal Lagoons ***(see p. 91)*** Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? — The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks — The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* YES = Go to SC 5.1 NO X not a wetland in a coastal lagoon SC 5.1 Does the wetland meets all of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of invasive plant species (see list of invasive species on p. 74). — At least ¼ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland is larger than 1/10 acre (4350 square feet) YES Category I NO Category II	**Cat. I** **Cat. II**

Wetland name or number _____

SC 6.0 Interdunal Wetlands *(see p. 93)* Is the wetland unit west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? YES - go to SC 6.1 NO X not an interdunal wetland for rating ***If you answer yes you will still need to rate the wetland based on its functions.*** In practical terms that means the following geographic areas: • Long Beach Peninsula- lands west of SR 103 • Grayland-Westport- lands west of SR 105 • Ocean Shores-Copalis- lands west of SR 115 and SR 109 SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is once acre or larger? YES = Category II NO → go to SC 6.2 SC 6.2 Is the unit between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre? YES = Category III	**Cat. II** **Cat. III**
Category of wetland based on Special Characteristics *Choose the "highest" rating if wetland falls into several categories, and record on p. 1.* If you answered NO for all types enter "Not Applicable" on p.1	

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

6.8 L

Project/Site: 405 BRMDS	Date: 11/15/2006
Applicant/Owner: WSDOT	County: KING
Investigator: Douglas, Pursley	State: WA

Do Normal Circumstances exist on the site?	(Yes)	No	Community ID: –
Is the site significantly disturbed (Atypical Situation)?	Yes	(No)	Transect ID: –
Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes	(No)	Plot ID: SP 1 Wet

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Agrosa capill.	H 30%	FAC	9.		
2. Festuca rubra	H 50%	FAC+	10.		
3. Lolium perenne	H 20%	FACU	11.		
4. Phalaris	H 20%	FACW	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

"Percent of Dominant Species that are OBL, FACW or FAC" (excluding FAC-). 83 %

Remarks: More than 50% of dom. species OBL FACW or FAC"

HYDROLOGY

____ Recorded Data (Describe in Remarks):	Wetland Hydrology Indicators:
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	X Inundated
____ Other	X Saturated in Upper 12 Inches
____ No Recorded Data Available	____ Water Marks
	____ Drift Lines
Field Observations:	____ Sediment Deposits
Depth of Surface Water: 0 (in.)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: 9 (in.)	Secondary Indicators (2 or more required):
Depth to Saturated Soil: 0 (in.)	____ Oxidized Root Channels in Upper 12 Inches
	____ Water-Stained Leaves
	____ Local Soil Survey Data
	____ FAC-Neutral Test
	____ Other (Explain in Remarks)

Remarks:

Saturated + standing water

SOILS

Map Unit Name (Series and Phase): AGC Alderwood Gravelly Sandy Loam

Drainage Class

Field Observations Confirm Mapped Type? Yes No

Taxonomy (Subgroup)

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-6	O/A	10YR 5/1	Ø		Clay Loam
6-10	B	10 YR 5/1	10 YR 6/4	M, C, F	Sandy loam w/gravel
10-18		10 YR 5/1	10 YR 4/4	M, C, F	Clay loam w/gravel

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- X Aquic Moisture Regime
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes No (Circle)

Wetland Hydrology Present? Yes No

Hydric Soils Present? Yes No

Is this Sampling Point Within a Wetland? Yes No (Circle)

Remarks

3 of 3 parameters

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

6.8L

Project/Site:	405 BRADS	Date:	11/15/2006
Applicant/Owner:	WSDOT	County:	King
Investigator:	Douglas / Pursley	State:	WA

Do Normal Circumstances exist on the site?	(Yes)	No	Community ID: –
Is the site significantly disturbed (Atypical Situation)?	Yes	(No)	Transect ID: –
Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes	(No)	Plot ID: SP 2 Wet

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Agrostis cap	H 20%	Fac	9.		
2. Fest. rub	H 40	fac+	10.		
3. Holcus lanat	H 10	Fac	11.		
4. Rub. Arm	S 5	FacUp	12.		
5. Lolium perenne	H 30	FacUp	13.		
6.			14.		
7.			15.		
8.			16.		

"Percent of Dominant Species that are OBL, FACW or FAC" (excluding FAC-). 66%

Remarks: < 50% obl, FacW, fac"

HYDROLOGY

____ Recorded Data (Describe in Remarks):	Wetland Hydrology Indicators:
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	X Inundated
____ Other	X Saturated in Upper 12 Inches
____ No Recorded Data Available	____ Water Marks
	____ Drift Lines
Field Observations:	____ Sediment Deposits
Depth of Surface Water: Ø (in.)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: 7 (in.)	Secondary Indicators (2 or more required):
Depth to Saturated Soil: 0 (in.)	____ Oxidized Root Channels in Upper 12 Inches
	____ Water-Stained Leaves
	____ Local Soil Survey Data
	____ FAC-Neutral Test
	____ Other (Explain in Remarks)

Remarks: freestanding above compact clay layer

SOILS

Map Unit Name (Series and Phase): AGC Alderwood Gravelly sandy soil

Drainage Class: _____

Field Observations Confirm Mapped Type? Yes (No)

Taxonomy (Subgroup): _____

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-3	OA	10YR 5/1			Clay loam
3-7	A	10YR 5/1	10YR 5/4	c, c, d	Clay
7-18	AB	10YR 5/1	10YR 5/6	c, c, d	Clay - very compact

Hydric Soil Indicators:

- ____ Histosol
- ____ Histic Epipedon
- ____ Sulfidic Odor
- X Aquic Moisture Regime
- X Gleyed or Low-Chroma Colors
- ____ Concretions
- ____ High Organic Content in Surface Layer in Sandy Soils
- ____ Organic Streaking in Sandy Soils
- ____ Listed on Local Hydric Soils List
- ____ Other (Explain in Remarks)

Remarks

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)

Wetland Hydrology Present? (Yes) No

Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks: Lacking Vegetation / hydric.

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

6.8 L

Project/Site:	405 BRADS	Date:	11/15/2006
Applicant/Owner:	WSDOT	County:	King
Investigator:	Douglas Turskey	State:	WA

Do Normal Circumstances exist on the site?	Yes (circled)	No	Community ID: —
Is the site significantly disturbed (Atypical Situation)?	Yes	No (circled)	Transect ID: —
Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes	No (circled)	Plot ID: SP 3 WET

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Agros cap	H 40%	Fac	9.		
2. Festuca rub	H 30	Fac+	10.		
3. lolium perenne	H 30	FACUP	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

"Percent of Dominant Species that are OBL, FACW or FAC" (excluding FAC-). 70%

Remarks: 50% or greater FAC species

HYDROLOGY

Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other
- ___ No Recorded Data Available

Field Observations:

Depth of Surface Water: Ø (in.)

Depth to Free Water in Pit: 10 (in.)

Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- X Inundated
- X Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name (Series and Phase): AgC (Alderwood gravelly sandy loam)

Drainage Class: —

Field Observations Confirm Mapped Type? Yes (No)

Taxonomy (Subgroup):

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-6	OA	10YR 5/1	—	—	Sandy loam
4-6	A	10YR 5/1	10YR 5/6	C, C, D	Sandy loam
6-18	AB	10YR 5/1	10YR 5/6	C, C, D	Clay

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)

Wetland Hydrology Present? (Yes) No

Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

6.8 L

Project/Site:	405 Braids	Date:	11/15/2006
Applicant/Owner:	WSDOT	County:	KING
Investigator:	Pursley / Douglas	State:	WA

Do Normal Circumstances exist on the site?	Yes	No	Community ID: –
Is the site significantly disturbed (Atypical Situation)?	Yes	No	Transect ID: –
Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes	No	Plot ID: 4 - UP

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Agros capill	H 20	Fac	9.		
2. Festuca rub	H 20	Fact	10.		
3. Plantag lancea	H 40	Fac	11.		
4. Rubus arme	S 20	FacU	12.		
5. Taraxac offic.	H 30	FacU	13.		
6.			14.		
7.			15.		
8.			16.		

"Percent of Dominant Species that are OBL, FACW or FAC" (excluding FAC-). 61%

Remarks: yes < 50% obl, facw, or fac

HYDROLOGY

____ Recorded Data (Describe in Remarks):
____ Stream, Lake, or Tide Gauge
____ Aerial Photographs
____ Other
____ No Recorded Data Available

Field Observations:

Depth of Surface Water: Ø (in.)

Depth to Free Water in Pit: 18 (in.)

Depth to Saturated Soil: Ø (in.)

Wetland Hydrology Indicators:

Primary Indicators:
____ Inundated
____ Saturated in Upper 12 Inches
____ Water Marks
____ Drift Lines
____ Sediment Deposits
____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
____ Oxidized Root Channels in Upper 12 Inches
____ Water-Stained Leaves
____ Local Soil Survey Data
____ FAC-Neutral Test
____ Other (Explain in Remarks)

Remarks: No sat of freestanding water until 18 in

SOILS

Map Unit Name (Series and Phase): AGC Alderwood Gravelly sandy loam

Drainage Class: _____

Field Observations

Confirm Mapped Type? (Yes) No

Taxonomy (Subgroup): _____

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-18	A-B	10YR 4/4			Sand w/ gravel fil prism

Hydric Soil Indicators:

- ____ Histosol
- ____ Histic Epipedon
- ____ Sulfidic Odor
- ____ Aquic Moisture Regime
- Gleyed or Low-Chroma Colors
- ____ Concretions
- ____ High Organic Content in Surface Layer in Sandy Soils
- ____ Organic Streaking in Sandy Soils
- ____ Listed on Local Hydric Soils List
- Other (Explain in Remarks)

Remarks

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)

Wetland Hydrology Present? Yes (No)

Hydric Soils Present? Yes (No)

Is this Sampling Point Within a Wetland? (Circle) Yes (No)

Remarks

Does not meet hydrology or soils parameters

Approved by HQUSACE 3/92

Wetland name or number 6.9L

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 - Updated July 2006 to increase accuracy and reproducibility among users

Name of wetland (if known): 6.9L Date of site visit: 11/13/2006

Rated by CKD / JRP Trained by Ecology? Yes__ No X Date of training —

SEC: 19 TWNSHP: 25N RNGE: 2E Is S/T/R in Appendix D? Yes__ No X

Map of wetland unit: Figure — **Estimated size** 0.18 acres

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III___ IV X

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for Water Quality Functions	2
Score for Hydrologic Functions	0
Score for Habitat Functions	5
TOTAL score for Functions	7

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ Does not Apply X

Final Category (choose the "highest" category from above) **IV**

Summary of basic information about the wetland unit

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine		Depressional	
Natural Heritage Wetland		Riverine	
Bog		Lake-fringe	
Mature Forest		Slope	X
Old Growth Forest		Flats	
Coastal Lagoon		Freshwater Tidal	
Interdunal			
None of the above	X	Check if unit has multiple HGM classes present	

Wetland name or number 6.9L

Does the wetland unit being rated meet any of the criteria below?

If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands That May Need Additional Protection (in addition to the protection recommended for its category)	YES	NO
SP1. *Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered* ***animal or plant*** *species (T/E species)?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.		X
SP2. *Has the wetland unit been documented as habitat for any State listed Threatened or Endangered* ***animal*** *species?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category I Natural Heritage Wetlands (see p. 19 of data form).		X
SP3. *Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?*		X
SP4. *Does the wetland unit have a local significance in addition to its functions?* For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.		X

To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.

The hydrogeomorphic classification groups wetlands into those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.