Forbes Creek Basin

Photos clockwise: Culvert at ParMac Industrial Park, Forbes Creek sign, Forbes Lake boardwalk.
4.5 Forbes Creek Basin

Overview of Forbes Creek Basin

Forbes Creek drains into the south side of Juanita Bay. The Forbes Creek Basin extends eastward from there, well to the east side of Interstate 405, including Forbes Lake and much of Rose Hill. Extensive wetland and open space areas line both sides of Forbes Creek from its mouth to perhaps about half way to Interstate 405, where first multi-family housing and then industrial land uses crowd the creek. The interstate highway presents a formidable barrier to non-avian wildlife movements, but significant, isolated areas of open space wildlife habitat occur upstream (east) of it as well.

Streams and Fish Use in Forbes Creek Basin

Forbes Creek (Stream #242)

Like Yarrow and Cochran Springs Creeks, Forbes Creek (Stream #242) is characterized by an extensive, quite wild wetlands area at and extending upstream from its mouth.

Cutthroat trout use all of the Forbes Creek stream sections downstream of Interstate 405. Coho salmon juveniles were found during test electrofishing just upstream of 108th Avenue NE, but not in stream sections fished farther upstream. Stickleback, lamprey, and dace were also found in Forbes Creek in the vicinity of 108th Avenue NE. The lower gradient of the stream in its downstream reaches allows these non-salmonid fish to move readily back and forth between the creek and Lake Washington, or to colonize the creek from the lake.

Upstream of 108th Avenue NE to 111th Court NE, there are broad areas of braided channel. This is due in part to the decreasing stream gradient in that area. With less energy to move bedload sediments, the stream deposits those sediments where they tend to fill in existing channels and cause the stream flow to spread out. Upstream of 111th Court NE, a high-flow bypass channel has been constructed in association with a multi-family development, as well as some off-channel ponds.

Upstream of Forbes Creek Drive, a fairly well-forested and natural section of stream exists, though the remnants of an old dam are found there, and the stream channel shows signs of moderate downcutting and bank erosion. This section gives way upstream to an area where the stream is sandwiched between the railroad grade and various industries. It is piped for a few hundred feet under a parking lot with the outfall discharging to a steep rip-rapped slope. This location marks the upstream limit of coho use. They would not be expected to be found farther upstream unless they were planted or transported there by humans.
A hidden gem exists, however, in the wooded ravine section carrying Forbes Creek downstream from Interstate 405 to the long piped section under the parking lot just mentioned. Though the streambed itself is moderately impacted by the somewhat flashy, urban flows that it is forced to carry, the ravine section is vegetated with a fairly mature mixed forest and represents an unexpected, secluded, and little-known island of quality native habitat surrounded by the intensive human land uses of interstate highway, industry, and residential housing.

Upstream of Interstate 405, Forbes Creek branches out into various smaller tributaries, one of which is considered to be the main stem of Forbes Creek and flows out of Forbes Lake. The other most prominent tributary flows through the extensive wetlands upstream of 124th Avenue NE, and another wetland area south of NE 95th Street and between 126th Avenue NE and 128th Avenue NE. Cutthroat trout were found in this latter tributary up to, but not upstream of, 124th Avenue NE. They probably also inhabit the main stem of Forbes Creek up to Forbes Lake.

Stream buffer widths and character are quite diverse along the various Forbes Creek tributaries upstream of Interstate 405. Along Slater Avenue NE, some sections exist where the buffers consist of fairly mature conifer and mixed forests. Elsewhere, as mentioned, the streams flow through extensive wetland areas densely vegetated with shrub-scrub vegetation, primarily willows. Along other sections, the creek channels find their way through residential areas of varying density and along roadside ditches.

The Municipality of Metropolitan Seattle (METRO) has conducted ongoing water quality and sediment quality monitoring at a number of locations within Kirkland, including Forbes Creek. The most recent data are presented in Water Quality of Small Lakes and Streams, Western King County, 1990-1993 Update (METRO Water Resources Section/King County Department of Natural Resources, February 1994). Portions of these data are summarized in the City of Kirkland Surface Water Master Plan (1994). The Forbes Creek Basin Reconnaissance Report (King County, 1987) also includes some water quality data. This information is summarized in the City of Kirkland Surface Water Master Plan (1994). Specific water quality problems and solutions are also presented in the City of Kirkland Surface Water Master Plan (1994).

Wetlands in Forbes Creek Basin

Twenty-two wetlands have been identified in the Forbes Creek Basin area of Kirkland. These are shown on the attached maps as Forbes 1 through 22 with approximate acreages and Cowardin vegetation classifications listed below (Table 5). Specific field data can be found in Appendix B.
Table 3. Wetlands identified in Forbes Creek Basin.

<table>
<thead>
<tr>
<th>Wetland</th>
<th>Approximate size (acres)¹</th>
<th>Cowardin classes²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forbes 1 (Forbes 1)³</td>
<td>82.65</td>
<td>PFO, PSS, PEM, PAB, POW</td>
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<tr>
<td>Forbes 3</td>
<td>0.74</td>
<td>PFO</td>
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<td>0.16</td>
<td>POW</td>
</tr>
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<td>Forbes 5</td>
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<td>PSS, PEM, POW</td>
</tr>
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<td>Forbes 6</td>
<td>0.52</td>
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<td>Forbes 7 (Forbes 13)</td>
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<td>PFO, PSS</td>
</tr>
<tr>
<td>Forbes 8 (Forbes 14)</td>
<td>0.27</td>
<td>PFO, PEM</td>
</tr>
<tr>
<td>Forbes 9 (Forbes 11)</td>
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<td>PFO, PSS, PEM, PAB</td>
</tr>
<tr>
<td>Forbes 10</td>
<td>1.46</td>
<td>PFO, PSS</td>
</tr>
<tr>
<td>Forbes 11 (Forbes 15)</td>
<td>0.60</td>
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<tr>
<td>Forbes 12 (Forbes 12)</td>
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<td>Forbes 15</td>
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<td>Forbes 16</td>
<td>0.14</td>
<td>PSS, POW</td>
</tr>
<tr>
<td>Forbes 17 (Forbes 3)</td>
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</tr>
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<td>Forbes 18 (Forbes 2)</td>
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<td>Forbes 19 (Forbes 5)</td>
<td>8.60</td>
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<td>Forbes 20</td>
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<td>Forbes 21</td>
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<td>PFO</td>
</tr>
<tr>
<td>Forbes 22</td>
<td>0.75</td>
<td>PSS, PFO</td>
</tr>
</tbody>
</table>

1. Sizes shown are approximate only. Wetland delineation and surveying would be required to determine more precise sizes.

2. According to Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, 1979).
   
   PFO = palustrine forested wetland  
   PSS = palustrine scrub-shrub wetland  
   PEM = palustrine emergent wetland  
   PAB = palustrine aquatic bed, i.e. algae, moss, floating or submerged plants  
   POW = palustrine open water, unknown bottom

3. The wetland names in parentheses were those used in the 1991 Kirkland Sensitive Areas Mapping Project. The wetland names given in this inventory will replace the old wetland names.

The Forbes Creek Basin covers a large area and has the greatest total wetland acreage and numbers of any of Kirkland’s basins. As shown above, there is a great variety of sizes and types of wetlands in this area. The extensive lower Forbes Valley system was effectively separated from the upper Forbes wetlands near Forbes Lake by the construction of Interstate 405, although limited hydrologic connection is provided by culverts under the freeway.

The lower Forbes Creek system includes the large Forbes 1 wetland, Forbes Creek, associated upland forest areas, several smaller separate wetlands, as well as the
Juanita Bay area of Lake Washington. This area is a prize for Kirkland’s citizens in that it is diverse and extensive, and also is valued as one of the last remaining large blocks of wetland along the shores of Lake Washington. This wetland was rated highest quality for all wetland functions evaluated during the inventory. It provides critical functions, such as water quality maintenance, flood storage, hydrologic support, and a diverse mix of food, cover, and water features for wildlife. It is unusual for such a large block of open space to be present within an urbanized area.

Passive recreational use is made of these lower wetlands in that they are readily viewed from trails and walkways through and around Juanita Bay Park. Beaver activity is extensive, including several dams and accompanying inundated areas, downed trees, and snags. These snags are the remnants of trees killed by the rising water level behind the dams, and serve as important habitat features for various wildlife species, particularly birds. Trees will likely re-grow in these locations at some future time when the present dams are abandoned and drained, and new dams have been built at different locations. Alder, cottonwood, and willow are the most common tree species along lower Forbes Creek. Non-native reed canarygrass and Himalayan blackberries are common in the understory.

The upper Forbes area includes four other relatively large wetlands east of the freeway. These are Forbes 9, 14, 17, and 19 as shown on the maps and are all connected hydrologically by Forbes Creek and tributaries. They are diverse systems which include forested, shrub, and emergent plant communities, as well as open water at Forbes Lake. Structural and plant species diversity contribute to their value, and special habitat features such as snags and cavities also are present in these areas. Each of these four wetlands was rated high quality for the functions evaluated.

There are six wetlands in the Forbes Basin which have been rated mostly in the low to moderate categories for general wetland functions. These are Forbes 2 and 3, fragments of the large Forbes 1 wetland which has been separated by roads; and Forbes 7, 10, 11, and 13, which are parts of the upper Forbes system east of Interstate 405. Forbes 13 was rated higher for cultural/recreational values and wildlife habitat since it is located in North Rose Hill Park. All of these wetlands also are associated with streams and contribute additional wetland features to the value of the riparian corridors.

The remaining 11 wetlands identified in the Forbes Creek Basin are generally small and of relatively low quality. These include Forbes 4, 5, 6, 8, 12, 15, 16, 18, 20, 21, and 22. Several of these are manmade ponds for stormwater and/or aesthetic features within apartment complexes. They are generally about a half acre or less, with the exception of Forbes 4 and 5 which are larger but entirely manmade.
Wildlife Corridors and Open Space Habitats of Forbes Creek Basin

The lower Forbes Valley system forms a large and nearly continuous corridor for wildlife movement. As stated above, this area includes the stream, extensive and diverse wetlands, uplands, and Juanita Bay. It is the longest connected open space area in and around Kirkland. Wildlife are able to move freely and under cover from Lake Washington up to 108th Avenue NE. Beaver activity is prevalent throughout this area, and bald eagles can be seen perching and feeding in the wetlands and near the lakeshore. Also adjacent to the wetland and stream corridor is the wooded slope on the south side of Forbes Creek Drive, a portion of which is part of Juanita Bay Park. This area also connects to the wooded areas of Crestwoods Park and along the railroad tracks both to the south and east toward Interstate 405. Portions of this wildlife corridor extend into both the Kirkland Slope and Moss Bay sections of the Urban Drainage Basins.

The main interruptions to this wildlife corridor are 98th Avenue NE, which cuts through the lower wetlands, and Forbes Creek Drive, which separates the wooded slopes of Juanita Bay Park from the stream and wetland system. The railroad tracks cut through the wooded areas north and east of Crestwoods Park, and the corridor ends abruptly at Interstate 405.

The upper Forbes wetland systems east of Interstate 405 are more isolated blocks of wildlife habitat which are connected hydrologically, but separated by roads and development. However, although their value as wildlife habitat would increase if there were continuous travel corridors, these wetlands still provide significant wildlife refuges at each location. The largest, somewhat continuous section of open space is from the Forbes Lake area northwest along the east side of Interstate 405. This includes the Forbes 9, 10, 13, 14, and 17 wetlands. Slater Avenue NE interrupts this block of habitat and separates the larger wetlands from the stream corridor between Slater and the freeway. Similarly, 124th Avenue NE separates Forbes 14 and 17. As stated above, the freeway is nearly a complete block to wildlife movement between the upper Forbes wetlands and the lower valley.

Primary Functions, Existing Problems and Future Opportunities in the Forbes Creek Basin

The primary ecological functions and features provided in the Forbes Creek Basin are:

- flood/stormwater conveyance
- water quality maintenance for receiving waters
- extensive cutthroat trout habitat in mainstem Forbes Creek downstream of Forbes Lake
- coho salmon in mainstem Forbes Creek downstream of BNRR
- cutthroat trout habitat in some tributaries
- extensive wildlife habitat - wetland, riparian, upland corridor
extensive lakeshore wetland
extensive wetland and open space areas - upper and lower valleys

Existing problems noted during field studies, and opportunities to restore or enhance the functions and features of this basin have been identified and are listed below.

- Improve water quality in the basin through non-point source control and application of best management practices. City staff should meet with WSDOT to begin to address water quality and quantity problems emanating directly from Interstate 405. Work with local schools such as Lake Washington High School, Kirkland Junior High and Alexander Graham Bell Elementary to increase awareness and achieve better water runoff.

- Upgrade stormwater detention in the basin to cope with existing runoff characteristics.

- If at all feasible, daylight the piped section under the business parking lot downstream of Interstate 405. This is an absolute anadromous fish barrier.

- Systematically address fish passage problems for upstream-bound fish along the length of the creek beginning at the downstream end and working upstream, with the goal being to make as much of the basin accessible to migratory coho salmon and cutthroat trout populations as possible. The ultimate goal would be to allow fish to be able to swim upstream from Lake Washington to Forbes Lake and vicinity.

- Protection and preservation of the high quality wetland areas in both the upper and lower valleys should be the primary goal for wetlands in the Forbes Creek Basin.

- Along wetlands where much of the surrounding land has already been developed, it is recommended that vegetated buffers be established wherever possible and as future opportunities arise.

- The Forbes 4 and 5 wetlands could be enhanced in terms of wetland functions by allowing the native vegetation along the edges of the ponds to grow naturally without pruning. The buffer area along the ponds could be expanded and planted with a greater variety of native plants. Songbird houses could be installed to provide nesting sites and as an additional aesthetic and passive recreational feature.
• Many of even the smallest wetlands could be enhanced by removing garbage and invasive plants, such as Himalayan blackberry, English ivy, Japanese knotweed, and bittersweet nightshade. Establishing any buffer of native vegetation can provide an improvement for screening, water quality, and wildlife habitat.

• As noted during field studies, plants recently had been installed at the Forbes 12 and 20 wetlands. This is a way to increase wildlife and aesthetic values at small fairly low quality sites, and to maximize the value of even narrow buffer areas. Similar enhancements could be done at other small residential wetlands in this basin.

• Designate the Juanita Bay Park/Forbes Valley corridor as a wildlife preservation area that prioritizes protection of the greenbelt and wildlife refuge. Use interpretive signage to promote public awareness.

• Generate public support of protection through education, incentives, development regulations, private donations, and/or the initiatives of nonprofit foundations.

• Enhance stream buffers to provide some cover for wildlife to travel between wetlands and associated habitats.
Juanita Creek Basin

Photos clockwise: Juanita Creek at 100th Avenue, condominiums at pond on 124th Street, wetlands at 124th.
4.6 Juanita Creek Basin

Overview of Juanita Creek Basin

The Juanita Creek Basin is Kirkland’s largest and most northern drainage basin. Much of the basin area lies north of and beyond the present-day Kirkland city limits, but may one day be brought into the City through annexations. It is with this eventuality in mind that areas of the Juanita Basin still outside the city limits have been included in this report. The streams and stream reaches mostly within the present city limits are addressed here in this report section, and the remainder are addressed in Section 4.7, Potential Annexation Area.

Unlike the other larger stream basins in the City (Yarrow and Forbes), Juanita Creek is different in that an extensive open space habitat area does not exist near the mouth at Lake Washington. Still, due partly to the size and significance of the stream, an important corridor for wildlife movement extends upstream from the mouth and along much of the main stem. Other large, but more isolated, blocks of habitat exist in the central and eastern section of this basin.

Streams and Fish Use in the Juanita Creek Basin (Presently-Incorporated)

Juanita Creek (Stream #230) is the largest of all of Kirkland’s streams. Much of the Juanita Creek basin lies outside of the present Kirkland city limits in the anticipated future annexation area for the city. Streams and stream reaches in the potential annexation area are addressed in Section 4.7, Potential Annexation Area.

The mouth of Juanita Creek is located along the west side of Juanita Beach Park, where a sandy beach has been formed largely due to sediment deposits from the creek. Both cutthroat trout and coho salmon are believed to make use of the entire length of the main stem of Juanita Creek up to Interstate 405. Juvenile coho were captured during test fishing as far upstream as King County’s Edith Moulton Park, beyond the city limits, and adult sea-run cutthroat spawners were seen even farther upstream. In all, over a half dozen of these adult sea (or lake) run cutthroat spawners were seen visually along the length of Juanita Creek during February and March of 1998. They are magnificent fish, typically 16-18 inches in length.

Upstream of Juanita Drive to NE 124th Street, Juanita Creek is confined to a very narrow corridor with often-armored banks as it flows through multi-family housing, a retirement home, and a professional center. A mix of single and multi-family housing occurs along the creek upstream of NE 124th Street to the city limits at NE 132nd Street. The remainder of the Juanita Creek main stem is described in Section 4.7, Potential Annexation Area.
**Tributary # 231**

Tributary # 231 enters Juanita Creek as it plunges approximately three feet from a culvert outfall just upstream of NE 124th Street. From there, it is piped upstream to 98th Avenue NE, where it daylights again. Upstream to the dead end of NE 128th Lane, the stream passes through the yards of a single-family residential area. Upstream of there, the stream flows out of a fairly extensive, bowl-shaped, steeply-sloped, forested area. Eventually, it forks into three separate tributaries in this bowl area, each of which flow off of the intensively developed plateau areas beyond. An old, abandoned “homestead” estate lies low in the bowl area, and many non-native plant specimens, including trees, shrubs, and ground cover can be found near it.

The stream channels through the forested bowl area show signs of scour and erosion, indicating that flashy, urbanized stream flows pass through them. In spite of moderate amounts of woody materials in the stream, no significant pools could be found. Since well-formed pools are the preferred test electrofishing locations, it was difficult to even find likely-looking habitat to fish in. Test electrofishing was conducted at two locations along this stream, upstream of 98th Avenue NE and again upstream of the end of NE 128th Lane. No fish were captured or otherwise detected at either location.

**Totem Lake Tributary, # 235**

The Totem Lake tributary to Juanita Creek can be divided into three distinct sections. The lowermost of the three is the most “stream-like” and extends from a culvert outfall at 102nd Avenue NE and 129th Place downstream to its confluence with the main stem of Juanita Creek, located a short distance upstream of 100th Avenue NE. This section was test-fished on February 19, 1998, just below the culvert outfall. Numerous cutthroat trout, but no juvenile coho, were captured. Among the fish captured was a full-sized sea-run cutthroat trout measured at 17 inches in length. The stream channel has a good gravel substrate with some pools present, though shallow. A limited amount of woody debris is present.

The second channel section, extending upstream from the culvert outfall at 102nd Avenue NE and 129th Place to the east side of Juanita High School, has been severely altered. The stream has been channeled around the south perimeter of the school grounds and playfields in a canal-like, straight ditch with right-angle corners. Sapling alders have grown up along this ditch. Large areas of wetlands were presumably filled to create the school playfields. At the downstream, west side of the school grounds, the stream flow enters a pond with a trash rack and stand pipe for an outlet. From there, flow is piped for several hundred feet downstream to 102nd Avenue NE where it enters the open stream channel.

The third channel section extends upstream of Juanita High School to Totem Lake, interrupted by several roads and Interstate 405. This entire section is characterized
by extensive riparian wetlands. Beaver activity was noted upstream of the high school. No salmonid fish (salmon or trout) were detected by electrofishing along or upstream of Juanita High School, however several sticklebacks were caught and released along the east side of the school.

Tributary # 238

Please see Potential Annexation Area, Section 4.7 for a description of this Juanita Creek tributary.

The Municipality of Metropolitan Seattle (METRO) has conducted ongoing water quality and sediment quality monitoring at a number of locations within Kirkland, including Juanita Creek. The most recent data are presented in Water Quality of Small Lakes and Streams, Western King County, 1990-1993 Update (METRO Water Resources Section/King County Department of Natural Resources, February 1994). Portions of these data are summarized in the City of Kirkland Surface Water Master Plan (1994). Water quality data for Totem Lake are presented in the Totem Lake Management Study (Entrance Engineers, 1989) and in the Juanita Creek Basin Plan (King County Surface Water Management Program, 1977). These are summarized in the City of Kirkland Surface Water Master Plan (1994). Specific water quality problems and solutions are presented in the City of Kirkland Surface Water Master Plan (1994).

Wetlands in Juanita Creek Basin

Thirteen wetlands have been identified in the Juanita Creek Basin area within the city limits of Kirkland. These are shown on the attached maps as Juanita 1 through 13 with approximate acreages and Cowardin vegetation classifications listed below (Table 7). Specific field data can be found in Appendix B.

Table 4. Wetlands identified in the Juanita Creek Basin.

<table>
<thead>
<tr>
<th>Wetland</th>
<th>Approximate size (acres)</th>
<th>Cowardin classes</th>
</tr>
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<tbody>
<tr>
<td>Juanita 1</td>
<td>0.15</td>
<td>PFO, PSS</td>
</tr>
<tr>
<td>Juanita 2</td>
<td>0.28</td>
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</tr>
<tr>
<td>Juanita 3 (Juanita 13)</td>
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<td>POW</td>
</tr>
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<td>Juanita 4 (Juanita 6)</td>
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<tr>
<td>Juanita 8</td>
<td>0.47</td>
<td>PSS, PEM, POW</td>
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<tr>
<td>Juanita 12</td>
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<tr>
<td>Juanita 13 (Juanita 12)</td>
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<td>PSS, PEM, POW</td>
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</table>
1. Sizes shown are approximate only. Wetland delineation and surveying would be required to determine more precise sizes.

2. According to Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, 1979).

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tr>
<td>PFO</td>
<td>palustrine forested wetland</td>
</tr>
<tr>
<td>PSS</td>
<td>palustrine scrub-shrub wetland</td>
</tr>
<tr>
<td>PEM</td>
<td>palustrine emergent wetland</td>
</tr>
<tr>
<td>PAB</td>
<td>palustrine aquatic bed, i.e. algae, moss, floating or submerged plants</td>
</tr>
<tr>
<td>POW</td>
<td>palustrine open water, unknown bottom</td>
</tr>
</tbody>
</table>

3. The wetland names in parentheses were those used in the 1991 Kirkland Sensitive Areas Mapping Project. The wetland names given in this inventory will replace the old wetland names.

There are three wetlands in the Juanita Basin, Juanita 4, 6, and 10, which have been rated highest quality for wetland functions. These wetlands are large and include a variety of plant communities and wetland types which contribute to their overall value.

The Juanita 4 wetland encompasses the large area associated with Juanita Creek behind apartment complexes and commercial areas along NE 124th Street. The wetland has a variety of plant communities including forest, shrub, and emergent types. There are snags scattered throughout the wetland, and it appears that this area is particularly rich in songbird activity. Beaver activity also was noted in this area during field studies. Development extends right to the edge of the wetland along most boundaries with little or no upland buffer area. This riparian wetland is an important feature for water quality maintenance and stormwater storage, as well as an aesthetic open space amenity for neighboring apartment dwellers.

Juanita 6, also known as the “Heronfield Wetland”, is a similar island of wetland that has been surrounded by development, primarily apartment complexes along the south side of NE 124th Street and commercial/industrial development to the east of the wetland. There is little or no buffer area along these sides, but there is a wooded slope along the southwest side of the wetland which provides adjacent upland habitat and some buffering for the wetland. The wetland includes forest, shrub, and emergent plant communities. Many snags and cavities were noted during field studies. Signage along the wetland boundary at the edge of the parking lots provides educational information about the importance of the wetland and its functions.

Juanita 10 includes Totem Lake and the surrounding area. This also includes forest, shrub, and emergent communities, but has the added feature of open water. This arrangement creates many edges and a variety of habitat opportunities for wildlife in this headwater area of Juanita Creek. There is a boardwalk trail through a portion of the wetland that allows visitors to observe a variety of wetland types and wildlife.
activity, particularly waterbirds, songbirds, and woodpeckers. There are numerous snags in this wetland also. This large wetland is bordered with little buffer area on the west, south, and east sides by commercial development, roads, and railroad tracks. Wooded slopes to the northeast provide upland area and wetland buffer features lacking along the other sides.

The rest of the wetlands in the Juanita Basin were rated in the low to moderate range of wetland functions. Juanita 7 is an area east of the Heronfield wetlands which was separated from the large wetland by development several years ago. There is still a hydrologic connection via culverts and ditches, but this area is isolated in terms of wildlife habitat. It appears to be maintained for stormwater detention and has a small trail which may be used by employees at surrounding businesses.

Juanita 3 is an instream pond area along the west side of Juanita High School which has been highly modified and disturbed but appears to be a fairly significant feature for wildlife habitat. Waterfowl, songbirds, and a muskrat were observed here during field studies.

The remaining eight wetlands identified in the Juanita Creek Basin are generally small and of relatively low quality. These include Juanita 1, 2, 5, 8, 9, 11, 12, and 13. Juanita 2, 5, 8, and 13 are manmade ponds used for stormwater and/or aesthetic features within apartment complexes or medical offices. The others are small residential wetlands or emergent depressions used for stormwater and biofiltration, such as Juanita 12 at the Lake Washington Technical College. These wetlands range in size from 0.1 to 1.5 acres.

**Wildlife Corridors and Open Space Habitats of Juanita Creek Basin**

There is a narrow but fairly continuous greenbelt corridor along Juanita Creek. This includes the main stem of the creek up to about 100th Avenue NE as well as several smaller tributaries from the northwest and east, see Map 4. This corridor extends to Juanita Bay and Lake Washington, but is interrupted by several roads including NE Juanita Drive, NE 120th Street, NE 124th Street, and several smaller residential streets. Although there are some small associated wetland areas, this is primarily a riparian corridor which provides habitat for wildlife species which do not require a larger, or more secluded and diverse area.

The large wetlands to the east are more isolated blocks of wildlife habitat which are connected hydrologically, but separated by roads and development. Although the value of these wetlands as habitat would be greater if there were continuous travel corridors, these wetlands still provide significant wildlife refuges at each location.

The Juanita 4 wetland connects west to a fairly narrow riparian area along Juanita Creek, where it borders Juanita High School, and east across 116th Avenue NE to
Interstate 405. The Heronfield wetlands are isolated from other systems by roads and culverts, and residential and commercial development.

There are also two fairly large blocks of upland habitat in this basin which are not associated with streams or wetlands. One is a wooded area west of the freeway and south of NE 118th Street which used to be connected to the Heronfield wetlands. Development surrounds this remaining open space. The other is the forested slopes along the west side of the Lake Washington Technical College. Although isolated from other habitat features, this fairly large block of mixed forest provides food and cover for a variety of wildlife types, particularly birds and small mammals.

The Totem Lake area (Juanita 10) is isolated from the other large Juanita wetlands by Interstate-405. However, this area is fairly extensive and includes Totem Lake and associated wetlands which connect with wooded slopes to the northeast and east beyond the Kirkland city limits.

**Primary Functions, Existing Problems and Future Opportunities in the Juanita Creek Basin**

The primary ecological functions and features provided in the Juanita Creek Basin are:

- flood/stormwater conveyance
- water quality maintenance for receiving waters
- extensive cutthroat trout, coho salmon habitat in various tributaries and mainstem Juanita Creek downstream of Interstate 405
- wildlife habitat - riparian corridor and wetlands
- extensive wetland and open space islands - upper valleys

Existing problems noted during field studies, and opportunities to restore or enhance the functions and features of this basin have been identified and are listed below.

**Mainstem**

- Review King County Basin Reconnaissance studies; investigate success of King County restoration projects which have been completed.
- Improve water quality through an educational program, perhaps in partnership with Lake Washington Technical College, Juanita High School, and Juanita Elementary School.
- Require stringent detention for future development and provide funds for detention infrastructure for existing development.
• Consider softening intensively armored banks and constricted corridor in multi-family, retirement home, and professional office section near the mouth of the creek downstream of NE 124th Street.

Tributary #231 Basin

• Look for opportunities to daylight sections of this stream that now flow in pipes.
• Investigate ways to control the flashy urban flows that feed this tributary from the surrounding plateau areas.
• Provide streambank stabilization at select, limited locations.

Totem Lake Tributary #235 Basin

• The degraded stream and instream pond (Juanita 3 wetland) west of Juanita High School could be cleaned up and enhanced as a school project. The "sump" pond and the piped stream section below it could be eliminated and replaced with a fish-passable, open channel section with in-stream and stream buffer habitat, as well as associated wetland features. In the short term, the existing wetland area could be enhanced with weed removal and installation of native plants. Purple loosestrife should be removed from this area.
• The canal-like ditch that now circumvents the school grounds needs to be re-worked such that it provides improved in-stream and stream buffer habitat conditions.

Other

• The primary goal for wetlands in the Juanita Creek Basin is to protect and preserve the high quality wetland areas from further impacts.
• In areas where much of the surrounding land has already been developed, it is recommended that vegetated buffers be established wherever possible and as future opportunities arise.
• The Juanita 1 wetland has been partially cleared and there is opportunity to restore and enhance this small residential wetland.
• Juanita 2 wetland could be enhanced by allowing a buffer area of native vegetation to develop without mowing or pruning. Plantings could be planned to preserve the views of the neighboring residents while providing some additional food and cover for wildlife, particularly waterfowl and songbirds.
• Juanita 5 and 12 wetlands are stormwater areas which could be enhanced by planting a variety of native plants on the sideslopes.

• Juanita 13 wetland also could be enhanced by allowing a buffer area of native vegetation to develop without mowing or pruning. Plantings could be planned to preserve the views from adjacent areas while providing some additional food and cover for wildlife, particularly waterfowl and songbirds. Songbird houses could be installed to provide nesting sites and an additional aesthetic and passive recreational feature.

• Many of even the smallest wetlands could be enhanced by removing garbage and invasive plants, such as Himalayan blackberry, English ivy, Japanese knotweed, and bittersweet nightshade. Establishing any buffer of native vegetation can provide an improvement for screening, water quality, and wildlife habitat.

• Stream buffers should be enhanced wherever possible to provide some cover for wildlife to travel between wetlands and associated habitats.
Annexation Area

Trail and creek at O.O. Denny Park.
4.7 Potential Annexation Area

Overview of Potential Annexation Area

In addition to portions of the Juanita Creek Basin, areas generally south of NE 145th Street and west of the Juanita Creek Basin, extending to Lake Washington, are in the future annexation area of Kirkland. Four smaller sub-basins, all draining directly into Lake Washington, were identified in this area. These are: Champagne Creek, Denny Creek, Stream #0227 (along Holmes Point Drive), and Stream #0226 (in Saint Edward Park). Though not without the pressures on wildlife habitat from urbanization, this particular area still has several large blocks of relatively undisturbed open space habitat. These areas include Denny Park, Big Finn Hill Park, and Saint Edward State Park. Some additional open space areas also remain, presumably in some cases due to the presence of steep slopes.

Streams and Fish Use in Potential Annexation Area

Juanita Creek Basin

The portions of Juanita Creek and its tributaries addressed in this report section are outside the present-day (1998) Kirkland city limits, lying generally north of NE 132nd Street. Streams were generally reviewed northward from NE 132nd Street up to NE 145th Street as being within the anticipated future annexation area. A fairly minor portion of the basin lies north of that line. Streams and stream reaches presently within the city limits are addressed in Section 4.6, Juanita Creek Basin. As mentioned in Section 4.6, both cutthroat trout and coho salmon are believed to use the entire length of Juanita Creek from its mouth up to Interstate 405. No fish of any kind, however, were detected by test electrofishing upstream of the freeway.

Upstream of NE 132nd Street, Juanita Creek flows past a psychiatric hospital and a rehabilitation clinic. Beyond there, single family housing predominates, but the Helen Keller School and Edith Moulton Park are also present upstream of 108th Avenue NE. Effective buffer widths along the main stem of Juanita Creek vary considerably, from 10 feet or less to about 50 feet in developed areas. The only place with a noticeably wider buffer is at Edith Moulton Park. Cottonwood, alder, big leaf maple, fir, and cedar trees can be found sporadically along the length of the creek, as well as various native and non-native understory species. Of note, Himalayan blackberry is especially pervasive along the stream channels throughout the basin, with reed canary grass, nightshade and Scot’s broom also occurring densely at some locations.

One technical note, the stream labeled as #241 from the Washington Department of Fisheries’ catalog is considered here to be the main stem of Juanita Creek in the upper basin rather than #230 upstream of the confluence of those two streams. Stream #230 is piped for some distance upstream of that point, is smaller, and does not function as the present-day “main stem” of the stream in any meaningful way.
Upstream of Interstate 405, stream #241 flows through a wooded area at High Woodlands Park. King County has constructed an in-stream detention facility upstream of the inlet of the culvert under the freeway. No fish use of this stream section was detected by test electrofishing. Though the ravine is well-vegetated with a fairly mature and diverse mixed forest, the stream channel appears to be subjected to some rather flashy and intense urban runoff. Sediment deposition is evident in the county’s detention pond, and the stream channel is somewhat incised upstream.

**Simonds Tributary # 236**

Juanita Creek tributary #236, the Simonds tributary, appears to support salmonid fish use over more of its length than any of the other Juanita Creek tributaries. Both juvenile coho salmon and cutthroat trout were captured by electrofishing at Juanita-Woodinville Way NE, and cutthroat trout were captured upstream of a definitive barrier to upstream fish migration at 100th Avenue NE. The only other Juanita Creek tributary found to have significant salmonid fish use was the lower section (only) of the Totem Lake tributary #235, as described in Section 4.6.

From its mouth at the Juanita Creek main stem to NE 137th Place, tributary #236 flows through an area with about 50-foot-wide buffers forested with alder, cedar, fir, and cottonwood trees. Understory vegetation includes Himalayan blackberry, salmonberry, sword fern, and reed canary grass. In-stream habitat is comparatively good, with a gravel substrate, a moderate amount of woody material in the stream, and some very well formed pools. The section upstream of NE 137th Place to Juanita-Woodinville Way NE is similar, however a fairly severe bank failure is present on the west side, just upstream of NE 137th Place. In addition, a sanitary sewer line has been placed parallel to and under the creek. In-stream habitat is not quite as diverse, possibly due to the disturbance of the previous stream channel at the time the sewer line was installed.

Between Juanita-Woodinville Way NE and 100th Avenue NE, the stream is closely confined as it winds through the yards and between the houses of fairly dense single-family residential developments. Effective stream buffers range from zero, with mowed grass right to the water’s edge, up to twenty feet or so in width where some alder, poplar and various landscaping trees are present. Very little woody material is found in the stream to help form pools and diversify habitat.

The plunge at the culvert outfall below 100th Avenue NE is a definitive barrier to upstream fish movements. King County has developed an in-stream detention facility immediately upstream of the road. Continuing upstream, along Simonds Road NE, tributary #236 has a braided channel through a depositional zone. Except for the road and a very few houses, the areas along the stream channel are the sideslopes of a generally well-wooded ravine. The upper watershed appears to be somewhat less densely developed than neighboring watershed areas. Cutthroat trout were found by test fishing to inhabit the stream sections that flow parallel to
Simonds Road NE.

(Note: This stream does not have an official name. We have given it the unofficial name Simonds Tributary as a geographical locator.)

**Tributary # 238**

Juanita Creek tributary #238 flows through a well-wooded ravine to the east and upstream of 108th Avenue NE, presently in unincorporated King County. The stream flows through areas of multi-family housing and health care facilities within the Kirkland city limits upstream (east) of Interstate 405 to the second crossing of NE 132nd Street. The culvert under 120th Avenue NE has a plunge at the outfall that would be a barrier to upstream fish movements. A large in-stream pond occurs just south (downstream) of NE 132nd Street. Back into King County, the stream flows through a park just north (upstream) of NE 132nd Street, with cut grass right down to the water's edge. Upstream (east) of 124th Avenue NE, the stream forks, each fork flowing through wooded ravine areas. The channels there are braided, downcut, and/or eroded in various locations, showing the apparent signs of volatile, highly urbanized flows. Test electrofishing was conducted just north (downstream) of the first (downstream) NE 132nd Street crossing and also on the east side of Interstate 405 just east and upstream of Totem Lake Boulevard. No fish were captured at either location.

**Tributary # 230**

At the confluence between streams #230 and #241, stream #230 plunges from a pipe within Windsor Vista Park. It is confined in a pipe from there for several blocks upstream, to the west, where it finally emerges and flows in an open roadside channel along Juanita-Woodinville Way NE. The open channel section downstream of NE 145th Street was test-fished. No fish use was detected. Some young trees, primarily alder and cottonwood, have grown up along the ditched roadside channel. However the stream corridor is quite narrow, and the stream is sandwiched between backyard fences and Juanita-Woodinville Way NE. The understory is dominated by Himalayan blackberry.

**Champagne Creek (unnumbered)**

Champagne Creek is an independent drainage that enters Lake Washington at Champagne Point north of Juanita Bay. It passes closely between several houses through their landscaped yards near its mouth. Upstream of these houses, it flows out of a fairly deep and steep-sided ravine. At the mouth of the ravine, or just upstream of the houses, is a broad area of floodplain deposition, extensive enough to have killed several trees. The ravine is well-forested with a variety of fairly mature trees and various understory species. The stream channel shows signs of active sediment transport - moderate erosion and significant deposition. A few
small, but well formed pools with cover are formed around several old growth logs and stumps. Two cutthroat trout, about 5 and 7 inches long, were captured from one of these pools.

(Note: This stream does not have an official name. We have given it the unofficial name Champagne Creek as a geographical locator.)

**Denny Creek # 228**

The mouth of Denny Creek lies downstream of Holmes Point Drive NE in Denny Park. The effective buffer width in the park downstream of Holmes Point Drive NE is 25 to 40 feet, with lawn and various park amenities beyond. Trees lining this section of stream include cottonwood, cedar, fir, and big leaf maple. Some sections of the channel are moderately eroded. Upstream of Holmes Point Drive NE, a parking lot borders the north side of the creek for a hundred feet or so, beyond which the stream flows out of a very well forested ravine. The forest is unusually mature for this area, and some of the conifer trees appear to be borderline old growth. The forest continues uninterrupted, though with some variation, through to Juanita Drive NE. The stream channel through the ravine shows moderate signs of erosion. Three-to-four-foot-high vertical streambanks are common. A good variety and moderate amount of large woody material is present, helping to create some well-formed pools. Fish captured by test electrofishing near and just upstream of Holmes Point Drive NE include cutthroat trout, juvenile coho salmon, and sculpins.

Upstream of Juanita Drive NE, the stream passes first through an area forested with alder, next past single-family homes, and then it forks into two smaller tributaries in the vicinity of a school and the Big Finn Hill Park ballfields at NE 138th Street. The transition to this disturbed urban setting from the comparatively pristine setting in the ravine downstream of Juanita Drive NE is striking. The flows from these urbanized areas obviously impact the stream channel within the ravine.

Though the King County Sensitive Areas Map Folio 1990 indicates salmonid fish use of Denny Creek extending upstream of Juanita Drive NE, extensive test electrofishing in the creek on both sides of that road failed to reveal the presence of any fish.

**Tributary # 227**

Stream #227 flows down a ravine along Holmes Point Drive NE (68th Avenue NE) and enters Lake Washington downstream of 62nd Avenue NE. Near its mouth, this stream flows closely between residences that lie near each other along the shore. The creek flows along straightened, rock-lined channels with grass and formal landscaping right up to the edge through this area. Just downstream of 62nd Avenue NE, there is an old concrete dam in the stream, perhaps 12 feet high.
Sediments have completely filled in behind the dam such that there is no pool or ponded area. The 8-foot-high plunge at the dam’s piped spillway is definitely a barrier to upstream fish migration.

Farther upstream, the creek flows out of a deep ravine bordered by Holmes Point Drive NE on the south side and sloped forested areas on the north. Big leaf maple, alder, and cedar trees are the most common. The substrate in the stream is very sandy, and sandy deposition along the stream margins is an indication that sideslope instability along the ravine is contributing sediment loading. Large woody materials are fairly abundant in the stream channel, but few pools are formed, perhaps due to the apparent high level of sediment loading. Test electrofishing along the stream in the ravine failed to reveal the presence of any fish.

**Tributary # 226**

Tributary # 226, and most of its drainage basin, lies entirely within Saint Edward State Park. Most of this basin is well-forested with big leaf maple and alder trees, with fewer fir, cedar, and hemlock trees also present. Common understory plants include salmonberry, sword fern, red elderberry, and osoberry. Even so, some ravine sideslope failure was noted. The stream channel contains abundant woody material. A few small, somewhat circular pools are formed, separated by relatively longer riffles. No test electrofishing was conducted in this stream, however significant fish use is questionable due to its small size. An existing one and one-half foot plunge over placed rock at the mouth of the creek into Lake Washington would not be easily passable by upstream-bound fish, though it may not constitute an absolute migration barrier.

The Municipality of Metropolitan Seattle (METRO) has conducted ongoing water quality and sediment quality monitoring at a number of locations in and around Kirkland, including Juanita Creek. The most recent data are presented in *Water Quality of Small Lakes and Streams, Western King County, 1990-1993 Update* (METRO Water Resources Section/King County Department of Natural Resources February 1994). Portions of these data are summarized in the *City of Kirkland Surface Water Master Plan* (1994).

**Wetlands in the Potential Annexation Area**

Twelve wetlands have been identified in the potential annexation area north of Kirkland. These are shown on the attached maps as Juanita 14 through 21 and Lake Washington 1 through 4 with approximate acreages and Cowardin vegetation classifications listed below. Specific field data can be found in Appendix B.
Table 5: Wetlands identified in the potential annexation area.

<table>
<thead>
<tr>
<th>Wetland</th>
<th>Approximate size (acres)²</th>
<th>Cowardin classes²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juanita 14</td>
<td>0.5</td>
<td>PFO, PSS</td>
</tr>
<tr>
<td>Juanita 15</td>
<td>0.7</td>
<td>PFO, PSS, PEM</td>
</tr>
<tr>
<td>Juanita 16</td>
<td>4.6</td>
<td>PFO, PSS, PEM, POW</td>
</tr>
<tr>
<td>Juanita 17</td>
<td>1.0</td>
<td>PEM, POW</td>
</tr>
<tr>
<td>Juanita 18 (Juanita 20³)</td>
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<td>PFO</td>
</tr>
<tr>
<td>Juanita 19</td>
<td>0.6</td>
<td>PFO</td>
</tr>
<tr>
<td>Juanita 20</td>
<td>3.8</td>
<td>PFO</td>
</tr>
<tr>
<td>Juanita 21 (Juanita 1)</td>
<td>1.6</td>
<td>PFO, PSS, PEM</td>
</tr>
<tr>
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<td>PFO</td>
</tr>
<tr>
<td>Lk. Washington 2 (E. Lk. Wa 2)</td>
<td>12.9</td>
<td>PFO, PSS</td>
</tr>
<tr>
<td>Lk. Washington 3 (E. Lk. Wa 3)</td>
<td>1.3</td>
<td>PFO, PSS, POW</td>
</tr>
<tr>
<td>Lk. Washington 4 (E. Lk. Wa 32)</td>
<td>8.3</td>
<td>PFO</td>
</tr>
</tbody>
</table>

1. Sizes shown are approximate only. Wetland delineation and surveying would be required to determine more precise sizes.

2. According to Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, 1979).

   - PFO = palustrine forested wetland
   - PSS = palustrine scrub-shrub wetland
   - PEM = palustrine emergent wetland
   - POW = palustrine open water, unknown bottom

3. The wetland names in parentheses were those used in the 1991 Kirkland Sensitive Areas Mapping Project. The wetland names given in this inventory will replace the old wetland names.

There also may be wetland areas that have not been identified in the Saint Edward, Big Finn Hill, and Denny parks areas. In particular, there are likely to be riparian wetlands as well as some seepage areas along sideslopes adjacent to the streams in these parks. Mapping of these wetlands would require additional study and specific wetland delineation which is beyond the scope of this study.

The two largest wetlands identified in the potential annexation area are both within parks. Juanita 18 is within Edith Moulton Park and is a forested wetland associated with Juanita Creek. This wetland was rated mostly in moderate categories with slightly higher values for water quality maintenance, cultural/recreational features, and wildlife habitat which reflect its location adjacent to the creek and in public ownership. Lake Washington 2 is a forested and shrub community in the eastern part of Big Finn Hill Park north of Finn Hill Junior High School. This area also was rated in the moderate to moderate/high categories for the wetland functions evaluated.

Lake Washington 4 is a wetland and upland complex in the Inglewood area west of 78th Avenue NE. This area is a mix of forest and shrub types with linear wetland sections braided throughout. There are trails and rutted tire tracks from motorbikes...
adjacent to birch stands and excavated channels. This size shown above is probably an artificially high estimation since the wetland and upland areas appear to be intertwined.

Juanita 16 and 20 are both riparian wetlands which were rated in the low to moderate categories for wetland functions. Although both are fairly narrow wetland fringes, they contribute important features to the stream corridor, especially in terms of wildlife habitat, water quality, and stream flow support. Juanita 16 also includes a small instream pond.

The rest of the wetlands identified in the potential annexation area are quite a bit smaller, ranging from just under one-half acre to 1.6 acres, with low or low to moderate wetland values. These include Juanita 14, 15, 17, 19, and 21, and Lake Washington 1 and 3. All of these are located in fairly densely developed areas, surrounded by houses or apartment buildings, with the exception of Lake Washington 1 which is along the edge of Big Finn Hill Park east of 72nd Avenue NE.

Wildlife Corridors and Open Space Habitats in the Potential Annexation Area

Much of the potential annexation area is fairly well built out with residential and related development. The most significant exception is created by Saint Edward State Park which connects to Big Finn Hill Park and Denny Park, and includes several creeks as well as the Lake Washington 1 and 2 wetlands. This large block of forested area extends to Lake Washington and provides cover for wildlife to move between a number of different habitats. NE Juanita Drive is the main interruption through this fairly continuous habitat area, as it effectively separates the eastern extension of Big Finn Hill Park from the rest.

South of Denny Park is the Champagne Point area which includes a relatively large wooded area, separated from the lake with fairly dense shoreline development. This area is associated with the Champagne Creek corridor. Another fairly continuous block of open space is just west of the existing Kirkland city limit between NE Juanita Drive and NE 131st Way along streams 0231, 0232, and 0233.

Another wooded area is found along Simonds Road west of 100th Avenue NE. This follows the Juanita Creek corridor, includes riparian wetlands, and connects north into open space in the Bothell city limits. Edith Moulton Park provides another forested block of habitat which connects north and south along fairly narrow stream corridors with associated streamside wetlands and the larger wetland within the park. It is separated by Interstate 405 from Kingsgate Park and a tributary of Juanita Creek on the east side of the freeway.

The easternmost part of the potential annexation area also includes a large wooded open space area west of the Burlington Northern Railroad tracks. This extends
beyond the potential new city limits.

**Primary Functions, Existing Problems and Future Opportunities in the Potential Annexation Area**

The primary ecological functions and features provided in the potential annexation area are:

- flood/stormwater conveyance
- water quality maintenance for receiving waters
- extensive cutthroat trout, coho salmon habitat in main stem Juanita Creek downstream of Interstate 405
- cutthroat trout, coho salmon habitat in some tributaries (Juanita and Lake Washington basins)
- wildlife habitat - riparian corridor, upland parkland, wetlands

Existing problems noted during field studies, and opportunities to restore or enhance the functions and features of this basin have been identified and are listed below.

- Review King County Basin Reconnaissance studies; investigate success of King County restoration projects which have been completed.

- Improve water quality through an educational program, perhaps in partnership with local schools, such as Inglewood High School, Juanita High School, Finn Hill Junior High, and Robert Frost Elementary School.

**Juanita Tributary #236 Simonds Basin**

- Stabilize the west (right) streambank upstream of NE 137th Place.

- Investigate the possibility of making the culvert under 100th Avenue NE fish-passable, including the county’s in-stream detention pond immediately upstream.

**Juanita Tributary #238 Basin**

- Investigate ways to control the flashy urban flows that feed this tributary from the surrounding hillslope areas towards Kingsgate.

- There are numerous opportunities to improve buffer quality through the planting of native vegetation upstream of Interstate 405 between Totem Lake Boulevard and upstream of NE 132nd Street. This includes areas in parks, around in-stream ponds, between multi-family housing units, and between and along professional buildings.
**Champagne Creek Basin**

- Improve the width and condition of the stream buffers between the residences at the mouth.
- Investigate ways to control the flashy urban runoff that is feeding the stream and appears to be responsible for its erosion and sedimentation problems.

**Denny Creek Basin**

- Widen the effective buffer at the park parking lot just upstream of Holmes Point Drive NE. There appears to be room to have a wider buffer and still provide parking.
- Improve urban runoff conditions upstream of Juanita Drive NE. Both an increased level of detention and water quality improvements may be needed. Much of this area is under public control as schools and King County’s Big Finn Hill Park, both of which include large parking areas and various sports playfields.
- The Lake Washington 2 wetland which is north of Finn Hill Junior High School, could be cleaned up along its edges and enhanced with weed removal and installation of native plants as a school project.

**Tributary #227 Basin**

- Investigate ways to improve urban runoff conditions from the surrounding developed plateau areas.
- Investigate the presence of ravine sideslope failures in the ravine along the creek and Holmes Point Drive. Remediate as determined.
- Improve the width and condition of the stream buffers and channel between the residences at the mouth.

**Other**

- The primary goal for wetlands in the potential annexation area is to protect and preserve the remaining wetland areas from further impacts.
- Dumping and disturbance has occurred along the residential edges of the Juanita 18 wetland at Edith Moulton Park. These activities should be controlled, and the areas cleaned up and restored where necessary.
• The primary goal for riparian wetlands and associated corridors such as Juanita 16 and 20 is to remove garbage, and prevent further degradation to these sensitive areas.

• The Lake Washington 3 wetland also would benefit from the removal of garbage and yard waste.

• The Lake Washington 4 wetland is a highly disturbed area which could be enhanced by blocking motorbike recreation and revegetation of disturbed areas. Wetland channels could be improved with buffer vegetation.

• As noted during field studies, vegetation has been planted at the Juanita 21 wetland which is associated with a stormwater pond. This will increase habitat values and screening of the adjacent wetland areas. Purple loosestrife, a very invasive non-native plant, was noted here and should be removed to maintain diversity in the wetland community.

• Small residential wetlands could be enhanced by allowing a buffer area of native vegetation to develop without mowing or pruning. Plantings could be planned to preserve the views of the neighboring residents while providing some additional food and cover for wildlife, particularly waterfowl and songbirds.

• Many of even the smallest wetlands could be enhanced by removing garbage and invasive plants, such as Himalayan blackberry, English ivy, Japanese knotweed, and bittersweet nightshade. Establishing any buffer of native vegetation can provide an improvement for screening, water quality, and wildlife habitat.

• Stream buffers should be enhanced wherever possible to provide some cover for wildlife to travel between wetlands and associated habitats.
Section 5. Executive Summary

Kirkland has some of the most important stream and wetland features along Lake Washington. It is also home to countless other smaller, yet significant resources. All of these natural features can benefit from clearer regulation, better protection and selected restoration and enhancement efforts as suggested by this study.

Kirkland’s largest and most important streams are Juanita and Forbes Creek. Both serve as critical wildlife corridors and are the primary habitat for cutthroat trout and coho salmon within the city. The size of their drainage basins makes them especially important for receipt of stormwaters and discharge into Lake Washington. Yarrow Creek also has a large basin area within the city and is significant because it provides salmonid fish habitat and productive associated wetlands. Smaller critical drainages include Carillon Creek, Cochran Springs Creek and Everest Creek.

Two of Kirkland’s largest and most important wetlands are the lakeshore wetlands at the mouth of Yarrow and Cochran Springs Creek and the mouth of Forbes Creek. Other important wetlands are found in the upper Forbes basin, and in the Juanita Creek Basin, including Heronfields, the large wetland north of NE 124th, and wetlands associated with Totem Lake. Significant and diverse plant and animal communities in all of these larger wetlands contribute to their value as does their ability to store and filter stormwater runoff. Smaller wetlands, such as those near Bridle Trails State Park and in Everest Park, also contribute valuable wildlife habitat and water quality and quantity controls.

Protection of streams and wetlands within the City of Kirkland will require careful stewardship. Some areas are already plagued by problems such as excessive sedimentation, invasive plants and trash dumping. These problems may become more threatening as Kirkland continues to urbanize. Solutions include native landscape plantings, streambank protection efforts, citizen cleanups and even city acquisition of more stream and wetland areas.
REFERENCES


King County. 1977. Juanita Creek Basin Plan: A Multiple Purpose Surface Water Management Program.
King County Environmental Division. 1990. *King County Wetland Inventory.* King County Environmental Division, King County, WA.

----. 1991. *Kirkland Sensitive Areas Mapping Project.* King County Environmental Division, King County, WA.


METRO Water Resources Section/King County Department of Natural Resources. February 1994. *Water Quality of Small Lakes and Streams, Western King County, 1990-1993 Update.*


