CHAPTER TEN
Mid-Puyallup Basin

10.1 BASIN CHARACTERISTICS

The Mid-Puyallup Basin is a subsection of the Puyallup River Watershed that contributes to the Puyallup River between river miles(RM) 4.0 and 26.5. The Basin area covers 57.6 square miles just south of Lake Tapps in the central portion of Pierce County. From north to south, the Basin is roughly 13 miles long, with widths varying from up to 13 miles at the widest point, and 4 miles at it's narrowest.

Multiple jurisdictions exist within portions of the Mid-Puyallup Basin. Part of the City of Fife overlaps the northwestern corner of the Basin. Southeast of Fife, the City of Puyallup is the largest municipality within the Basin. The City of Bonney Lake is to the east with most of the city property within this Basin. The City of Sumner overlaps a small section of the Basin along its northern boundary while the City of Orting is the only city in the southern section of the Basin.

The Mid-Puyallup Basin is mostly rural agricultural land, with suburban development dispersed primarily on upper terraces that surround the valley. Multiple streams comprise the natural drainage system of this Basin and contribute flow to the Puyallup River main stem. Major tributaries include Alderton Creek, Van Ogles Creek, Ball Creek, Fennel Creek, Canyon Falls Creek, and Horsehaven Creek. Climate in the Mid-Puyallup Basin is typical of the maritime Pacific Northwest Region. Temperatures are moderated by proximity to the Pacific Ocean, resulting in mild winters and warm, but not hot, summers. Average annual precipitation (mostly as rain) is about 45 inches with 75% (75%) falling between October and March. Periods of maximum runoff correspond closely with periods of maximum rainfall.

The multiple tributaries that flow from the Mid-Puyallup Basin into the Puyallup River divide the Basin into smaller tributary Basins. Some areas of the Basin drain directly into the Puyallup River and are therefore not associated with any of the tributary Basins. These areas are direct drainage areas. The tributary Basins and direct drainage areas were further divided into subbasins to allow more detailed analyses of hydrology. Drainage in the Basin has been modified over the years with the progression of development, which has controlled much of the upland drainage with manmade systems of conveyance pipelines, ditches, and other stormwater facilities.

Subbasins represent smaller drainage areas, most with a principal drainage pathway that collects and conveys surface water from the subbasins. Two types of subbasins are represented: those with a distinct channel that serves as a principle drainage pathway, and those that drain as unconfined flow directly to the Puyallup River.

10.1.1 Mid-Puyallup Basin

Alderton Creek

The Washington State Department of Fish and Wildlife (WDFW) and the Department of Natural Resources (DNR) hydro layer map the origin of Alderton Creek on the valley floor near the intersection of 102nd Street East and State Route 162 (SR 162) south of Alderton. From here the stream flows north to join the Puyallup River, just west of the corner of 80th Street East and SR 162 at Puyallup RM 12.2; about 1.8 miles from its origin. The stream is listed by these same sources as perennial, draining open fields and farmlands. The creek's drainage area is gradually being converted to residential housing.

Discrepancies were found between how Alderton Creek is cataloged and mapped and its current condition. Alderton Creek is not shown on the 1993 USGS 1:24,000 Sumner quadrangle map. Field reconnaissance conducted as a part of the Basin characterization found that this stream alternates from surface to subsurface flow, piped in places, for virtually all of its length. Little natural surface channel remains. It is concluded that Alderton Creek no longer exists as a continuous open-water channel connecting to the Puyallup River.

Van Ogles Creek

Van Ogles Creek originates on the valley floor south of 92nd Street East. It flows north along the base of the bluff west of Bonney Lake before looping west to Riverside Park where it passes under Riverside Drive and is joined by Tributary 0401 (unnamed). It turns north at this juncture, but swings west again within a moderately confined channel (steep bank on its east and north side) to its confluence with the Puyallup River. This stream and its tributary system upstream of Riverside Drive drain a mixed-use agricultural, residential housing area. Stream length is given as 2.15 miles in a catalog of global streams and salmon utilization, but is 1.9 miles based on summation of DNR/WDFW hydro layer segment lengths. Stream substrate is fine sediment and organic matter where observed in segment 16/8//1. The channel is slough-like at this point, and the water was quite murky on the day of reconnaissance (February 8, 2001).

Ball Creek

Ball Creek is another valley floor tributary originating south of Old Military Road at the base of the bluff that forms the Puyallup Valley west wall. This stream flows diagonally northeast across the valley floor, crosses SR 162 and 106th Street East, and continues to its confluence with the Puyallup River. Ball Creek flows through land alternately used for agriculture and housing. Stream length given in a catalog of global streams and salmon utilization is 1.35 miles, but summation of Washington State Department of Fish and Wildlife's "Salmon and Steelhead Habitat Inventory and Assessment Program" segment lengths gives 1.7 miles. The source of Ball Creek appears to be a system of springs and seeps coming down off the west valley wall at a point approximately 0.75 mile south of the mapped channel origin. This is close to the location where the City of Tacoma aqueduct crosses the valley floor and gives an actual stream length closer to 2.4 or 2.5 miles. The channel appears to be perennial and large enough to be fish-bearing from that point northward.

Fennel Creek

Fennel Creek originates on the old Osceola mudflow near the north side of SR 410 east of its intersection with 233rd Street East. The stream generally flows west toward the City of Bonney Lake then turns south and flows through an old Vashon-age melt water drainage channel that also was filled by a lobe of the Osceola mud flow (Crandell 1963) to Victor Falls, RM 2, where the course alters to the west descending through a steep canyon to the Puyallup Valley floor at McCutcheon Road, RM 0.4. There the stream flattens and turns north to flow across the valley floor to its confluence with the Puyallup River. Fennel Creek drains a mixed-use area of agriculture and rural, suburban and urban housing, as well as some light industry. Much new housing development is occurring in the valley and some within the canyon south of the City of Bonney Lake. A large gravel quarry (Maranatha Gravel) is located at the face of bluff that forms the south valley wall of Fennel Creek just upstream from McCutcheon Road, at approximately RM 0.5. The stream also has been known as Kelly Creek. Stream length is given as 7.95 miles and drainage area as 6.58 square miles in a catalog of global streams and salmon utilization. Wintertime base flow near the mouth of Fennel Creek range is on the order of 15 to 20 cubic feet per second (cfs), whereas base flow in the upper reach near the Sumner-Buckley Highway is closer to 10 cfs.

Canyon Falls Creek

Canyon Falls Creek begins in wetlands in a geological depression on the border between Sections 8 and 9 of Township 19N, Range 5E, about 0.5 miles south of Victor Falls on Fennel Creek. AES and Beck (1997) reported a series of wetlands extending downstream around a "fish hook bend" to the west as far as RM 1.8 where the first surface water "daylights," (begins surface flow) . From there, the stream flows just north of west to a commercial fish hatchery at about RM 1.0 where the hatchery water intake (water right for 15 cfs) dries the channel. Return water from the hatchery reenters the stream at RM 0.86. The stream then drops through a steep ravine (gradient 17–18%) to McCutcheon Road, RM 0.55, where the gradient flattens and the stream turns north to join the Puyallup River at Puyallup. The headwaters of Canyon Falls Creek are undeveloped and forested down to the private hatchery. The Cascadia Planned Community development is planned for the uplands south of Canyon Falls Creek (Huckell-Weinman 1998) and a golf course development, named Falling Water, may be built on the uplands north of the creek; i.e., between Canyon Falls and Fennel creeks (Subdivision Development and Design et al. 1996). Land use downstream of McCutcheon Road appears to be agricultural and sparse residential. Stream length is listed as 3.0 miles and the drainage area as 1.71 square miles in a catalog of global streams and salmon utilization; however, the Cascadia Employment Based Planned Community Environmental Impact Statement (Huckell-Weinman 1998) recorded the total drainage area as 3.8 square miles.

Horsehaven Creek

Several different names are associated with this stream and its tributaries. The *Mid-Puyallup Basin Plan* follows the convention given in a catalog of global streams and salmon utilization, which also was used on the WDFW/DNR hydro layer and by the state's "Salmon and Steelhead Habitat Inventory and Assessment Program." The Horsehaven main stem (called Soldiers Home Creek in Thorpe and Stepan 1985) begins at a small 1- to 1.4-acre pond, elevation 440-feet, in Township 18N, Range 5E, Section 6 southwest of the Orting Soldiers Home. It drains west and then north through a steep gully with an impassable cascade and emerges on the valley floor near the Soldiers Home where it is joined by tributaries 0592 and 0593. At this point, the stream becomes a valley tributary, flowing northwest along the base of the bluff for approximately two miles to its confluence with Tributary 0590 (called Lorenz Creek by the Pierce County Conservation District in Year 2000, but considered the main stem of Horsehaven Creek by Thorpe and Stepan 1985). Horsehaven Creek then continues north-northwest to join the Puyallup River at Puyallup RM 20.2.

The gullies of both the main stem and Tributary 0590 appear inaccessible and forested (based on the revised 1994 USGS Orting quadrangle). However, the headwaters of Tributary 0590 are located in an area designated "Master Planned Community" on the Pierce County land use map and are within the boundary of the Rainier Terrace Planned Community Development (Thorpe and Stepan 1985). The valley floor is a mixed area of homes and agriculture. The Puyallup Tribe once considered building a fish hatchery along upper Horsehaven Creek but abandoned the plan because of the ephemeral nature of its stream flow in late summer months (R. Ladley, personal communication).

Horsehaven main stem stream length is given as 3.3 miles and the Tributary 0590 stream length is given as 1.4 miles in a catalog of global streams and salmon utilization. Tributaries 0591, 0592, and 0593 also are mapped in the catalog, but no stream lengths are given. Winter base flows along the main stem are typically on the order of 3 cfs. Tributary 0590 itself originates at an approximately 10-acre pond, elevation approximately 450-feet, in Township 19N, Range 4E, southwest corner of Section 36, then flows west down a steep ravine with an impassable cascade to the valley floor where it turns north to join the main stem. Over bank flooding of these natural channels occurs primarily along the Puyallup River with less extensive flooding along the tributaries.

10.1.2 Direct Drainages

The 18 subbasins adjacent to the main stem of the Puyallup River are considered to have direct drainage to the main stem through either multiple small channels or subsurface flow. The majority of these direct discharge subbasins drain the flat areas along the bottom of the river valley. Anecdotal accounts from local citizens indicate that drainage tiles were installed in many of these areas in the Basin around 1950 to improve drainage for farming. The land in these subbasins varies greatly from agricultural in the valley bottom to high-density residential sections in the north and south ends of the Basin. Some of the direct drainages in the southern end of the Basin drain elevated plateaus.

10.2 LAND USE IN THE MID-PUYALLUP BASIN

Land use affects surface water hydrology by altering the landscape from its natural condition and changing water drainage, storage, and evaporation characteristics. The effect of various land uses on surface water hydrology is taken into consideration by estimating effective impervious surface within the Basin. In order to conduct a detailed analysis of the current and projected future effective impervious surface within each subbasin, the Basin was divided into more specific land use categories. To assess the hydrologic characteristics of a Basin and to determine the potential for water quality/quantity problems requires an accurate understanding of a Basin's existing and proposed land uses. This section will look at both the existing and future land use of this Basin.

10.2.1 Existing Land Use

Impervious areas in the Mid-Puyallup Basin are more highly concentrated near city centers and on suburban upland plateaus. Most incorporated areas lie in the north portion of the Basin; the only exception is the City of Orting in the south. Suburban developments are found throughout the Basin.

A GIS layer of existing land use (published in 1999) was provided by Pierce County, which became the basis for identifying land types in each subbasin. This layer was based on the County's Assessor-Treasurer's tax parcels, with 15 individual parcel categories. Under these classifications, agricultural land is listed as "Resource Land" and forested areas are listed as "Vacant." The "Other" category has been used for combinations of open water, forests, and agriculture. Land use in each subbasin was first determined from the GIS information and then compared with aerial photographs. Changes were made in some of the subbasins based on the aerial photographs. *Table 10-1* summarizes the existing land use.

TABLE 10-1
EXISTING LAND USE-MID-PUYALLUP BASIN

Existing Land Use	Area (square miles)	Percent of Basin
High Density Residential	5.44	9.40%
Single Family Residential (0.74 to 1.0 acre lots)	12.12	21.00%
Multifamily Residential	.46	.77%
Group Home/Other	.05	.08%
Mobile Home	2.73	4.70%
Commercial/Service	.75	1.70%
Industrial	.55	0.90%
Local roads/Utilities	1.63	2.70%
Education	.63	1.10%
Public Facilities	.17	.30%
Quasi Public Facilities	.12	.20%
Open Space/Recreational	1.80	3.10%
Agricultural	11.55	20.10%
Vacant lands	16.57	28.75%
other	3.03	5.20%
Total	**57.60**	**100%**

10.2.2 Future Land Use

The *Pierce County Comprehensive Plan* was developed and adopted in 1994 in response to the requirements of the Washington State "Growth Management Act"(GMA). The Plan, codified as *Title 19A, Pierce County Code*, indicates a general intent to allow development within the Basin and with residential densities ranging from one unit per 20 acres to six units per acre.

The Pierce County zoning ordinance is codified in *Title 18A, Pierce County Code*. Future land use for this Basin has been prescribed through the comprehensive planning process. The agricultural-based river valley is primarily zoned as rural, with lot sizes ranging from five (5) to 20 acres. Zoning for the upland plateau areas indicates a tolerance for higher density development with moderately dense single-family zoning predominating.

Future land use was determined for each Basin using GIS layers that represent Pierce County zoning and land use designations taken from the County's comprehensive plan and GIS layers of each municipality that has land within the Basin. Calculation methods for existing and future land use are similar and assume that zoning areas will become fully built-out in the future.

The initial comparison of existing and future percent impervious area in each subbasin revealed that nine of the 46 subbasins showed lower values of impervious area under future conditions due to lower density land use being shown for some areas. For the purpose of developing the Basin Plan, it is assumed that higher density developments that exist today or already have final approval will be "grandfathered," i.e., built based on the previously higher density levels. As such, it is assumed that existing conditions in at these subbasins will remain the same.

10.3 FLOOD CHARACTERISTICS

Three stream basins were determined to have the greatest potential for future development and flooding due to the size of the basins, the number of pre-existing lots, and the likelihood of growth pressure from future transportation improvements: Ball Creek; Fennel Creek; and Horsehaven Creek. Watercourse flow characteristics of these streams are illustrated in *Table 10-2*.

10.3.1 Known Flood Hazards

Figure 10-1 shows floodplains and wetlands in the Mid-Puyallup Basin. The floodplain boundaries are based upon the most current mapping for Pierce County prepared by the Federal Emergency Management Agency (FEMA). The data is derived from the FEMA *Flood Insurance Rate Maps* (FIRMs).

The "A Zone" represents a 100-year flood hazard area, an area estimated to have a 1% chance of flooding in any given year, or a one-in-100 year chance.

The "X500 Zone" (formerly referred to as "B Zone") represents the 500-year flood hazard area, an area estimated to have a 0.2% chance of flooding in any given year, or an area with a high risk of flooding that has a small drainage Basin (less than one square mile).

10.3.2 Causes of Flooding

Flooding issues ranged from streamside to residential flooding in the upland contributing basins. Flooding concerns also occur along the main stem of the Puyallup River, as a result of Puyallup River flows rather than flows from Mid-Puyallup Basin tributaries. For that reason, Puyallup River main stem flooding response is governed by the *Puyallup River Comprehensive Flood Control Plan* and not by this subbasin.

Field investigations of problem areas were conducted following a review of service requests from Pierce County records and survey information collected from Basin residents. The initial list of complaints was reduced by eliminating non-drainage related issues and some issues recorded as previously resolved by the County. Problems identified as sources of frequent flooding were typically related to inadequately sized conveyance in upland areas, including culverts, ditches, and stormwater ponds. The lack of a formal storm drain system was called out in several surveys. Aggradation in some tributaries also was blamed for recent flooding in some places. In some cases, several reported problems are clustered within a specific neighborhood. Some problems have greater justification for developing capital improvement projects (CIPs) due to their relative significance in meeting the program objectives such as protection against flooding or prevention of resource degradation.

Fixing a particular flooding problem could have the additional benefit of removing a fish passage barrier. Some problem solutions may need nothing more than increased maintenance to remove blockages from culverts and catch Basin covers. A few problems occur on private property and thus may be beyond the scope of this Basin Plan. The most significant problems were found within the tributary Basin areas of Ball Creek, Fennel Creek, and Horsehaven Creek. Ball Creek has several minor flooding problems in the neighborhoods comprising its headwaters and one culvert on the downstream reach that will likely need to be replaced. Fennel Creek has a variety of flooding problems throughout the Basin. The most significant problem is a stormwater pond that is too small and needs an improved overflow path. Horsehaven Creek is similar to Ball Creek in that it has some minor flooding problems in the upper Basin area and on downstream culverts that will likely need to be replaced.

TABLE 10-2
MID-PUYALLUP BASIN WATERCOURSE FLOW CHARACTERISTICS

Watercourse/Reach Identifier	Drainage Area (Acres)	Modeled Peak Flows (existing conditions) 2-Year	10-Year	25-Year	50-Year	100-Year
Ball Creek-BC-1	48.9	10.0	12.8	15.5	18.3	22.0
Ball Creek-BC-2	1155.3	9.4	12.4	15.1	17.9	21.4
Fennel Creek-0-0.68 mile	8320.0	N/A	473.0	N/A	642.0	720.0
Fennel Creek-.68-2.02 mile	8192.0	N/A	484.0	N/A	647.0	719.0
Fennel Creek-.2.02-3.78 mile	7808.0	N/A	476.0	N/A	630.0	698.0
Fennel Creek-.3.78-5.41 mile	5120.0	N/A	340.0	N/A	459.0	512.0
Fennel Creek-.5.41-HW mile	3264.0	N/a	247.0	N/A	322.0	353.0
Horsehaven Creek-HH-1	508.3	18.4	25.6	34.3	38.9	43.8
Horsehaven Creek-HH-2	188.2	97.9	141.3	163.1	179.4	195.8
Horsehaven Creek-HH-3	706.7	62.1	89.3	103.3	113.8	124.6
Horsehaven Creek-HH-6	1825.6	40.0	56.3	64.7	71.2	77.8
Horsehaven Creek-HH-4	453.4	44.0	65.7	78.2	88.3	99.0
Horsehaven Creek-HH-5b	302.3	48.1	70.6	83.0	92.7	102.9
Horsehaven Creek-HH-5a	1005	35.5	53.4	63.6	71.7	80.2
Horsehaven Creek-HH-5c	238.7	5.8	8.2	9.5	10.5	11.5
Horsehaven Creek-HH-7	1213.2	32.1	46.1	53.3	58.8	64.4

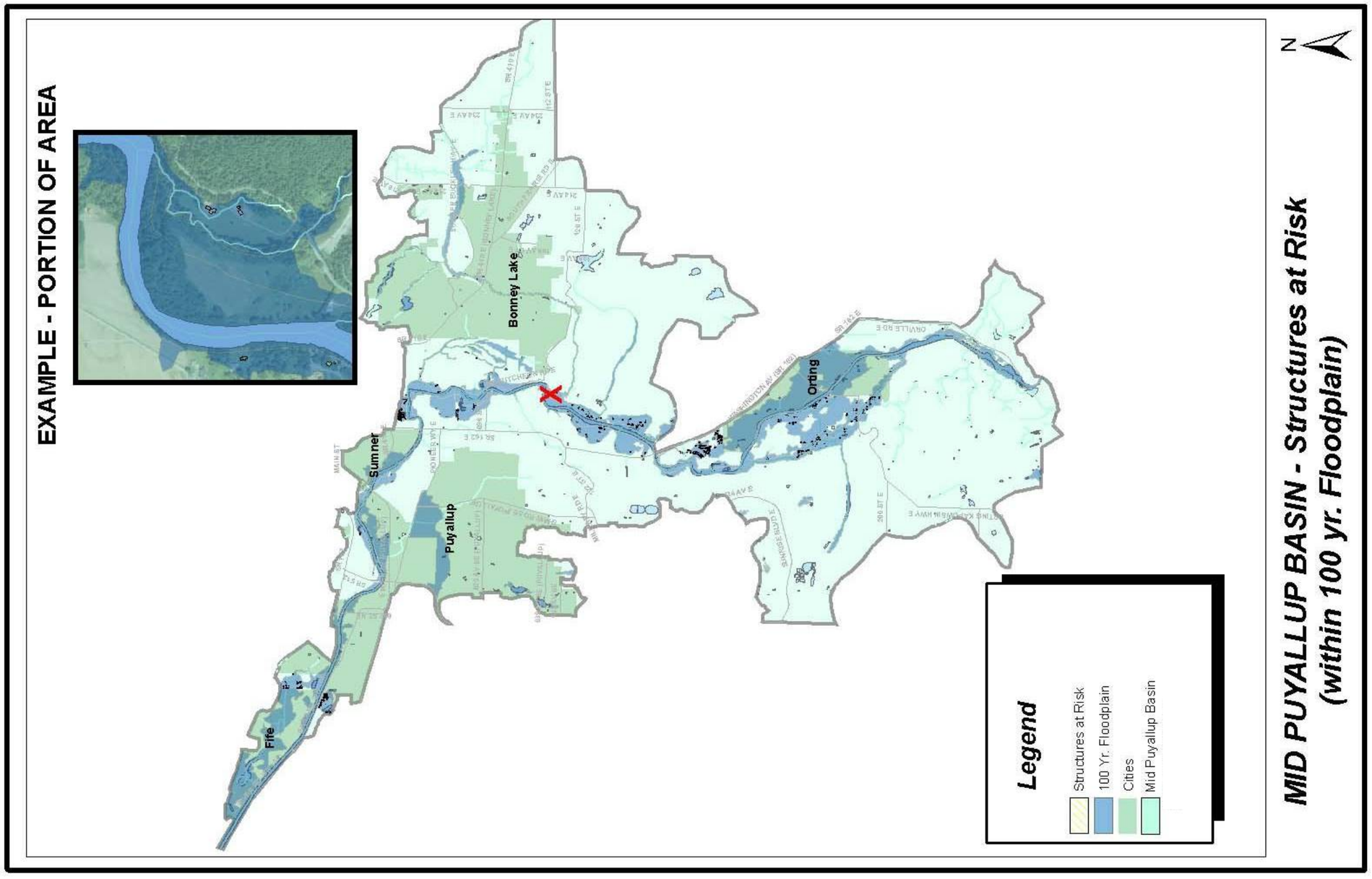

Figure 10-1
Floodplain extent and location
Mid-Puyallup Basin

10.4 FLOOD HAZARD IMPACTS

Flooding in the Mid-Puyallup Basin can have numerous impacts on the way of life within this Basin, and Pierce County in general. Under this section, we will assess the vulnerability of the Basins, improved property, critical facilities, and assess the impact a flooding on the Basin's population and economy.

10.4.1 Public Safety and Health

There have been historical occurrences of flooding within the Mid-Puyallup Basin. However, in comparison to flood events and total damages within other Basins within the County, these losses and associated damages are a small percentage of the overall damages within the County. Since the early 1960's, there have been no reports fatalities immediately caused by flooding within this Basin. Since the land uses within this Basin are predominantly residential or vacant lands, the potential impact flooding can have on public health and safety within this Basin would focus on potential damage to private property and life safety issues dealing with the use of potentially impacted infrastructure. These potential impacts could be reduced via informing the public of the potential for flood damages within the Basin, and refining or establishing procedures for early warning within the Basin.

There is real-time flood warning capability within the Mid-Puyallup Basin. USGS real-time gauges are located at:

- The Puyallup River at Puyallup
- The Puyallup River near Alderton
- The Puyallup River near Orting
- The Puyallup River near Electron

The approximate lead time for flood warning provided within this Basin is 24 to 48 hours based on flood threat recognition system capability within the Basin. Flood prediction is not an exact science. Although gauge readings and historical data are excellent forecasting tools, rivers can continually change. There are also local factors that can contribute to flooding such as stream and creek discharge into a river, snowmelt and damming caused by fallen trees and other debris. Therefore, during flood situations floodplain residents should not rely solely on gauge readings and historical flood levels, but should keep an eye on the river and stay tuned to local media reports.

10.4.2 Critical Facilities

Critical facilities identified in the Basin are the McMillin Reservoir, the City of Sumner sewage treatment plant, and the City of Puyallup sewage treatment plant. The McMillin Reservoir is owned and operated by Tacoma Water and can store up to 210 million gallons of drinking water for residents within their service area. The reservoir is located at 12603 136th Street East just south of the City of Puyallup. The City of Sumner sewage treatment plant is located at 12801 Houston Road East in the City of Sumner. The City of Puyallup sewage treatment plant is located at 1602 18th Street NW in the City of Puyallup and began operation in 1999. The Pierce County Sheriff's station in Bonney Lake provides emergency services and is located at 21201 Highway 410 East. No hospitals are located within the Basin. These critical facilities are documented in the Pierce County Hazard Mitigation Plan (2004).

Using the parameters to define "Critical Facilities" discussed in Chapter 1 of this risk assessment, Pierce County Water Programs, coordinating with Pierce County Emergency Management has identified the critical facilities listed in *Table 10-3* that could be impacted by flooding within the Mid-Puyallup Basin. The basis for this determination is: physical location within a mapped or known floodplain, known history of flooding, and the lack of flood protection to the facility. These are facilities that are considered

to be vulnerable and in need of an action(s) to mitigate the impacts of flooding. It should be noted that this list does not include critical "infrastructure".

Since the Pierce County Water Programs Division *Basin Planning Program* has such a strong capital facilities component, it has been assumed that critical infrastructure with vulnerability to flooding within each basin will be adequately addressed through the basin planning problem assessment and action prioritization process. A detailed assessment of these facilities is not provided in this risk assessment for security purposes.

Pierce County Emergency Management has performed this assessment as part of the County-wide "Hazard Mitigation Plan" prepared pursuant to the "Disaster Mitigation Act." The County will direct the "non-structural approach" by this plan. The focus of the Basin Planning Program as it pertains to critical facilities will be to attempt to provide flood protection to potentially vulnerable critical facilities through the structural approached identified as actions. Both programs consider it a high priority to provide protection to critical facilities, and are committed to working together to achieve this objective.

TABLE 10-3
MID-PUYALLUP BASIN CRITICAL FACILITIES IN THE 100-YEAR FLOODPLAIN

Government Function	Medical	Hazardous Materials	Schools	Other	**Total**
0	2	0	5	2	**9**

10.4.3 Structures impacted

Table 10-4 shows an estimate of the number of structures on parcels in the floodplain. These estimates were generated using Planimetric data available for this Basin.

To identify the potential dollar/loss exposure for the Basing, assessed values for improvements to each of the parcels shown to have structures within the 100-year floodplain were accumulated by subbasin. This value is representative of the exposure. To truly gauge vulnerability, the depth of flooding would need to be identified to apply FEMA's depth/damage functions to this exposure. This detail of information was not available at the time of the preparation of this assessment. However, total exposure values can be a good gauge of potential flood impact for planning purposes and for identifying potential project benefits when prioritizing mitigation actions.

TABLE 10-4
STRUCTURES WITHIN THE 100-YEAR FLOODPLAIN MID-PUYALLUP BASIN

Structure Type				
Commercial	Dwelling	Other	**Total**	Market Improvement Value
29	612	79	**720**	$81,231,400

10.4.4 Repetitive Loss Areas

As required by section 503.c, of the *2006 CRS Coordinators Manual*, Pierce County has created a list of properties considered to be in a repetitive loss area, as defined under section 503.b. Pierce County considers 100% of its regulated floodplain to be subject to repetitive flood risk exposure. This premise is the basis for its comprehensive floodplain management program. None of the identified repetitive loss areas lie within the Mid-Puyallup Basin.

10.4.5 Insurance Analysis

Flood insurance statistics can help identify vulnerability by regionally isolating areas where claim activity is high and a high rate of flood insurance is in force. *Table 10-5* summarizes vital insurance statistics that can be used to help identify vulnerability within the Mid-Puyallup Basin. The locations of these policies are identified in *Figure 1-2*.

TABLE 10-5
FLOOD INSURANCE STATISTICS FOR THE MID-PUYALLUP BASIN

Number of flood insurance policies in force within the Basin (as of May 1, 2007)	358
Number of Policies within a mapped floodplain (FIRM)	178
Number of Policies outside of a mapped floodplain	180
Number of Claims filed within the Basin	40
Number of claims filed for losses outside the 100-year floodplain	8
Estimated number of insurable, primary Structures in mapped floodplains	641
Estimated % of at risk structures with flood insurance coverage	27.8%
% of current flood insurance coverage outside of a mapped floodplain	50%

Based on a review of this data, the following observations can be made:

- Based on the approximate number of primary, insurable structures in the floodplain and the insurance coverage in force within the floodplain, insurance coverage is approaching the national average within this Basin. According to a study being conducted for the NFIP by the Rand Corporation, nationwide about 49% of single-family homes in special flood hazard areas (SFHAs) are covered by flood insurance.
- With 50% of the current policies in force located outside of a mapped floodplain, there appears to be some flooding issues within this Basin not addressed via the existing mapping. These could be drainage related flood issues that the Basin Planning program seeks out, that typically are not captured through standardized floodplain mapping techniques.
- The claims activity within this Basin has been occurring primarily within the mapped/regulated floodplain. This suggests that flooding that is occurring within the Basin that is causing property damage is typical riverine flooding associated with the 100-year floodplain.