Chapter 2 – Overview of the Watersheds

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Overview of Watersheds

Location

The watersheds of Mill Creek, Claggett Creek, Pringle Creek and Glenn-Gibson Creeks all lie in the mid-Willamette Valley (**Map 2-1**). The Glenn-Gibson watershed is located on the west side of the Willamette River in Polk County. The other three watersheds are in Marion County.

The total land area within the four watersheds is approximately 153 square miles. The largest watershed is Mill Creek at approximately 110 square miles. It stretches west from the foothills of the Cascades to the Willamette River. It empties into the Willamette River north of the intersection of D Street and Front Street in Salem. Mill Creek has several tributaries, including Beaver Creek, McKinney Creek and Battle Creek. Water is diverted from Mill Creek into Pringle Creek via the Shelton Ditch and the Mill Race in Salem. The watershed encompasses Salem and several smaller communities, including Turner, Aumsville, Sublimity and Stayton (**Map 2-2**).

Claggett Creek drains approximately 20 square miles. This watershed drains most of East Salem, the city of Keizer, the west portion of Lake Labish and agricultural lands that lie in the north portion of the watershed. The creek flows in a northwesterly direction draining into a slough of the Willamette River northwest of Clear Lake (**Map 2-3**).

The Pringle Creek watershed covers a little over 13 square miles and drains a good portion of south Salem. Specifically, it drains the area north of Kuebler Blvd., west of the Salem airport, and east of the hills identified by the Belcrest Memorial Park and Cemetery. It flows into the Willamette River under the Boise Cascade building in downtown Salem on Commercial Street. It has several tributaries including Clark Creek, West Fork of Pringle Creek, Middle West Fork and East Fork (**Map 2-4**).

The smallest of the watersheds is Glenn-Gibson. It drains approximately 10. 4 square miles of West Salem in Polk County. Glenn Creek flows east and north through the city of Salem and into the West Willamette Slough, northwest of Winslow Way. Gibson Creek is a tributary of Glenn Creek. The confluence of the two creeks is just west of Wallace Road, below the Salemtowne pond. Over 20 small tributaries flow into Glenn and Gibson Creeks (**Map 2-5**).

Population/Land Ownership/Land Use

While the exact population of people in the four watersheds is unknown, the following numbers are estimates using 2000 Census data: Pringle, 34,299; Glenn-Gibson, 19,667; Claggett, 64,888; and Mill, 47,289. The majority of the land is in private ownership with less than 6% of the land held as public property. The predominant land uses in the four watersheds are urban and agricultural (see Hydrology Chapter for land use maps of each watershed).

The Pringle Creek watershed lies almost entirely within the Salem-Keizer urban growth boundary (UGB). Approximately 60% of the watershed is urbanized. Another 27% of the watershed is in agricultural use, primarily in the very southeast portion of the watershed. The watershed contains two large tracts of public land: the Salem airport and the Fairview Training Center site.

About half of the Glenn-Gibson watershed lies within the Salem UGB. Land use is predominantly residential in the east half of the watershed. The upper reaches of the watershed are used for agricultural purposes. Approximately 33% of the watershed is urbanized and 44% is in agricultural use. The Glenn-Gibson watershed is experiencing rapid urban growth in the upper-western reaches inside the UGB.

About two-thirds of the Claggett Creek watershed lies within the Salem-Keizer UGB. Agricultural use is mainly limited to the north portion of the watershed outside of the Salem-Keizer UGB. Approximately 46% of the watershed is urbanized and 45% is in agricultural production. Large areas of public land include the Oregon State Fairgrounds, Chemawa Indian School, and Chemeketa Community College.

The Mill Creek watershed includes part of the city of Salem as well as four smaller communities: Turner, Aumsville, Sublimity and Stayton. Outside of these small communities and the Salem UGB, most of the land is agricultural or rural residential. Only 8% of the watershed is urbanized. About 68% of the watershed is in agricultural production. Oregon Department of Corrections owns several large parcels of land in the watershed.

Climate

The study area has a modified marine climate (U.S. Soil Conservation Service 1972). Winters are cool and wet. Summers are moderately warm and moderately dry. In the Mid-Willamette Valley near Salem, annual average precipitation is about 41 inches, 90 percent of which falls between October and the end of May (Schott and Lorenz 1999). Most of the precipitation received on the valley floor is in the form of rain. The amount of precipitation increases gradually, and the average annual temperature decreases, from the valley eastward to the low foothills of the Cascade

Mountains. About 45 inches of precipitation is received annually along the lower slopes of the foothills (U.S. Soil Conservation Service 1972).

Topography

Elevations in the study area are between 100 feet near the Willamette River to 2400 feet in the foothills of the Cascade Mountains. Hilly areas are located in the Glenn-Gibson watershed of West Salem, in the Pringle Creek watershed and the Battle Creek Basin of the Mill Creek watershed in south Salem, and in the headwaters of the Mill Creek watershed located in the foothills of the Cascade Mountains. There is also an elevated bench marking the edge of the modern floodplain (100 to 500 year recurrence intervals) of the Willamette River in the north end of Keizer. The valley floor is flat with slopes typically 3 percent or less.

Geology and Soils

The Willamette Valley is an inland valley that was at one time part of a broad continental shelf. Uplifting and tilting of both the Coast Range and Western Cascades left a valley in what had previously been a shelf extending from the Cascades to the west (Orr et al. 1992). Tilt of the valley floor is south to north rather than inward toward the center. Hills within the valley such as the Eola Hills in West Salem, the Ankeny Hills in south Salem and the Waldo Hills north of Turner are blocks of volcanic rocks (Columbia River Basalts) uplifted along faults (Schott and Lorenz 1999).

From about 15,500 to 13,000 years ago there was a series of glacial floods that came down the Columbia River and backed up into the Willamette Valley. These floods covered parts of the valley with up to 350 feet of water. Ice jams at the mouth of the Willamette River slowed retreat of floodwaters. Soil formations in the valley are the results of silts and clays settling out of the massive flood events (Schott and Lorenz 1999).

Geologists suspect the Willamette River has meandered across the valley in several locations. At one time the river may have followed an easterly course, flowing northward through a gap between the South Salem and Waldo Hills in the present day location of Mill Creek. Lake Labish in the northern portion of the study area likely represents an old channel of the Willamette River following a course that is now the Pudding River. Alluvial deposits from the Cascades coming down Abiqua and Butte Creeks deposited material on the eastern side of the valley, pushing the river to the west. Deposits may have dammed the river, creating Lake Labish. The thick layers of peat in the ancient lake suggest the area was once a swamp or bog (Schott and Lorenz 1999).

Deposits of gravel interspersed with layers of silt, clay and sand are located below the flat terrain that stretches from Stayton east to Turner and south to the North Santiam River. These deposits can be up to 100 meters thick (Crenna and Yeats 1994)

and were episodically flushed into the area by the ancestral Willamette and North Santiam Rivers. The North Santiam River transported glacial outwash from the Cascade Mountains, laying down fan-like deposits in the Turner and Salem areas. These layers of silt and clay are discontinuous lenses, which impede surface infiltration and create perched water bodies and high seasonal water tables. The gravel resources in this alluvium have been, and are currently, extensively mined in the Turner and south Salem areas along Mill Creek (MWVCOG 2000).

Wetlands in the Salem-Keizer area are a reflection of the relatively level topography. Most are found in mineral soils, on fine clay deposits which settled in swales and depressions. They are slow-draining, holding water for a significant portion of the growing season (Schott and Lorenz 1999).

Vegetation

Before European settlement, the mid-Willamette Valley was composed of a variety of native plant communities (**Maps 2-6** and **2-7**). An excerpt from Marion County's *Natural Heritage Park Selection and Acquisition Plan* (Marion County Public Works Department 2000) summarizes the nature of the land prior to European settlement:

> Drawing from information found in early land surveying records and settler accounts, we can recreate a picture of the landscapes that greeted this area's first pioneers. The pre-settlement landscape that they saw was not untouched by humans. Native Americans had managed the valley by using deliberately set fires as a way to maintain game habitats, desirable plants, and open areas. Some of the early landscapes such as the scenic oak savannas and native grass prairies that covered much of the Willamette Valley were a direct result of this fire ecology (Boyd 1999). Along the rivers spread forests of cottonwood, alder, ash, and the other hardwoods, sometimes for miles back from the banks. Extensive wetlands formed along the winding rivers and also made up shrub swamps, wet prairies, and marshes (Oregon Biodiversity Project 1998; Hulse 1998).

Urban development, changes in hydrology (e.g., channelizing streams and swales for stormwater management), logging, agriculture, and fire control have altered historic plant communities in the Salem-Keizer area (Schott and Lorenz 1999) (**Table 2-1** and **Map 2-8** and **Map 2-9**). With increasing settlement of the area came deliberate fire suppression, intensive agricultural and forestry practices, and an influx of new plants. In comparison with pre-settlement conditions, areas that once held ecosystems such as the oak savannas, wide riverside forests, expansive wetlands, and open prairies, now features growing urban centers, highly productive agricultural and forested areas, and rural homes (Hulse 1998).

Table 2-1. The six primary ecosystems in Marion County and the percentage lost since the 1851-1865 Federal General Land Office Survey

Pre-settlement Ecosystem Type	% Original	% Lost
Closed Forest: riparian-wetland	10.5 - 14%	71.8 - 57.6%
Shrubland	0 – 2%	100%
Prairie	26.1%	99.4%
Savanna	50.6%	87.9%
Woodland & Closed Forest: upland	10.8%	86.7%

Source: Kagan et al. (2000)

Table 2-2 shows the historic vegetation communities of the four watersheds. Prairies and savannas dominated the landscape in Pringle, Glenn-Gibson and Mill Creek watersheds (**Maps 2-6** and **2-7**). The Claggett Creek watershed had the most diverse landscape of plant communities. In addition to prairies and savannas, the Claggett Creek watershed also contained upland and riparian forest communities. Shrublands once dominated Lake Labish.

Table 2-2. Acres of Historic Vegetation Types per Watershed Prior to European Settlement[1]

	Pringle	Glenn-Gibson	Claggett	Mill
Closed forest; Riparian & Wetland	59	96	1140	413
Closed forest; Upland	0	0.00	4230	3298
Emergent Wetland	0	0	23	0
Prairie	185	1262	6185	31449
Savanna	8281	6739	3574	31729
Shrubland	0	0	726	882
Water	0.3	31	169	0
Woodland	0	0	409	1732

[1]Data Source: Kagan et al. (2000)

An analysis of aerial photographs from 1993 by ODFW has provided some information on the current vegetation communities in the Willamette Valley (ODFW 2001). Urban and agricultural vegetation communities currently dominate the four watersheds (**Table 2-2** and **Maps 2-8** and **2-9**). Non-native species such as English Ivy and Himalayan blackberry are frequent in the "managed" vegetation community found in urban areas. Urban areas are also dominated by cultivars and non-native vegetation planted for landscaping purposes. Native understory vegetation has been replaced by mowed lawns in many areas. Agricultural areas are managed for the production of

food and goods. Native vegetation is typically limited to strips along waterways and in areas where poor soils limit agricultural production. The heavy use of pesticides in both urban and agricultural settings is indicative of how humans manage these vegetative communities (see Water Quality Chapter).

Table 2-3. Acres of Current Vegetation Types by Watershed[1]

	Pringle	Glenn-Gibson	Claggett	Mill
Urban	5097	2657	7631	5644
Agricultural	1545	2954	6666	38954
Unmanaged Pasture[2]	780	599	776	8489
Riparian/Wetlands	444	481	1017	5245
Oak/Fir/Madrone	479	1245	115	5702
Upland Forest	180	194	252	3817
Unclassified Forest	0	0	0	1670

[1]Data Source: ODFW (2001)

[2]Unmanaged pasture is considered an agricultural use. It is shown as a separate category to highlight the fact that these areas have a high potential for inclusion into habitat protection programs according to ODFW. The display on Maps 8 and 9 shows that many of the areas coded in this category are simply fallow or unmanaged lands, not necessarily abandoned pasture.

Agriculture

The type of crops grown in areas dominated by agriculture depends on the topography and soils. Perennial grass production for grass seed and hay is the major agricultural use in the Pringle Creek watershed. Orchards are common in the hilly landscape of the Glenn-Gibson watershed. Agricultural uses vary in the Claggett Creek watershed. Perennial grasses and row crops (e.g. onions in Lake Labish) are common in the watershed. Vineyards and hops are commonly grown in the agricultural fields north of Keizer on the fertile land of the Willamette River floodplain. Agricultural uses in the Mill Creek watershed are varied and many. Approximately 61% of land in agricultural production is used to grow perennial grasses in the Mill Creek watershed. The second most common agricultural use is unmanaged pasture at 18%. Over 8,000 acres of land is categorized as unmanaged pasture. ODFW believes that land in this category has a high potential for inclusion into habitat protection programs. Other agricultural uses in the Mill Creek watershed include row crops, annual grass production and Christmas tree farms.

References

Boyd R. (ed.). 1999. *Indians, fire, and land in the Pacific Northwest.* Oregon State University Press. Corvallis, OR.

Crenna, P., and R. Yeats. 1994. "Late Cenozoic Tectonics and Paleogeography of the Salem Metropolitan Area, Central Willamette Valley, Oregon." *Oregon Geology* Vol. 56, No. 6.

Hulse, D. (ed.). 1998. *Willamette River Basin: A Planning Atlas.* Institute for a Sustainable Environment. Eugene, OR.

Kagan, Jimmy, J. Christy, M. Murray and J. Titus. 2000. *Classification of Native Vegetation of Oregon.* Oregon Natural Heritage Program—Oregon State University Institute for Natural Resources. Corvallis, OR.

Mid-Willamette Valley Council of Governments (MWVCOG). 2000. *City of Turner Local Wetlands and Riparian Inventory.* Salem, OR.

Marion County Public Works Department. 2000. *Natural Heritage Park Selection and Acquisition Plan. Version 2B-12/06/00.* **http://www.open.org/~mpubwork/parks/nhp/nhpkplan.htm**

Oregon Biodiversity Project. 1998. *Oregon's Living Landscape: Strategies and Opportunities to Conserve Biodiversity.* Defenders of Wildlife. Portland, OR.

Oregon Department of Fish and Wildlife. 2001. **http://rainbow.dfw.state.or.us/pub/gis/k24/meta/wv-veg.html**

Orr, E. L., W. N. Orr and E. M. Baldwin. 1992. *Geology of Oregon, 4th Rev. Ed.* Kendall/Hunt Publishing. Dubuque, IA.

Schott, M. and J. Lorenz. 1999. *Salem-Keizer Area Local Wetland Inventory Marion and Polk Counties, Oregon.* Mid-Willamette Valley Council of Governments. Salem, OR.

U.S. Soil Conservation Service. 1972. *Soil Survey of Marion County Area, Oregon.* U.S. Government Printing Office. Washington, D.C. Copy at Marion Soil and Water Conservation District. Salem, OR.