CHAPTER 2. HISTORICAL AND REFERENCE CONDITIONS

2.1 Watershed History

The historical use of natural resources in the North Santiam watershed has been described in two recent reports prepared for the North Santiam Watershed Council. The first was a comprehensive draft history of the watershed, prepared by Ben Swartely through the University of Oregon Resource Assistance for Rural Environments Program. The second was a report that provided an edited version of that earlier work (North Santiam Watershed Council 2001). This chapter summarizes the portions of those reports that are most relevant to the purposes of this watershed assessment.

The principal indigenous people of the North Santiam watershed were the Kalapuya, who were divided by location and linguistic factors into ten divisions, one of which was the Santiam. Use of the land by the Kalapuya and other indigenous people, including the Mollala, correlated with changing resource availability through the seasons. Larger, semi-permanent winter villages were situated in the valley bottom, along the lower reaches of the North Santiam River. From late March until October, the populations of the larger villages dispersed into smaller hunting and gathering groups, camping near the location of the desired resource. Up-valley dispersal into the mountains followed seasonal warming as the availability of wild food plants increased (Gilsen 1998). The majority of the subsistence activities were focused on the Willamette Valley, adjacent foothills, and the lower reaches of major tributaries.

The Kalapuya made only infrequent use of the North Santiam watershed above the lower reach, but they had contact with the Mollala tribe, who inhabited the western slopes of the Cascades year-round.

The Kalapuya were dependent upon the rivers, Willamette Valley marshes, dry prairies, lakes, riparian corridors, and wetlands. The Kalapuya economy was based largely on wild plants. Important plants gathered by these people included camas lily, tarweed, acorns, hazelnuts, and berries. Wild game, insects, and anadromous fish were of secondary importance.

Annual burning was used to control the growth of brush and trees in the Willamette Valley, making it easier to hunt and improving growing and harvesting conditions for edible plants. This burning practice maintained an oak savannah environment that favored the species on which the Kalapuya depended. The lower reach of the North Santiam River was affected in much the same way as the rest of the Willamette Valley, but the Kalapuya's influence lessened upstream. Above the middle reach, only dry season hunting and foraging was carried out. Available information suggests that the uppermost limit of burning was probably in the vicinity of Mill City.

Regular contact between the Native American culture and European settlers began about 1831. Many diseases were introduced, the most devastating of which was malaria. Within a decade, the Kalapuya population had been devastated. The remaining Santiam Kalapuya were removed to the Grand Ronde reservation in 1857.

The first large wave of settlers in the Willamette Valley arrived in 1843 at Oregon City. These immigrants spread across the valley to set up homesteads and farms. By 1846, the first permanent settlements were built as far south as the Santiam River. Ferries for crossing the large rivers played an important role in settlement, including Hale's Ferry at Jefferson (Bowen 1978). The major activity was agriculture, including animal husbandry. The lower reach of the North Santiam watershed had an 1850s population of 10 households. There were three mills in the Santiam area, and these, along with a growing demand for agricultural land, contributed to rapid deforestation.

Some of the earliest population and commerce centers in the watershed included Jefferson, Sublimity, and Stayton. The history of Stayton was closely linked to the North Santiam River, and the river has been dramatically affected by modifications to the channel and flow of the river at Stayton. The river comes within three miles of Mill Creek at Stayton and then turns to the southwest and away from the major population center of Salem. It was soon recognized that flow from the North Santiam could be diverted into Mill Creek, which flowed to Salem, and the logical place for this diversion was Stayton.

In the mid-1850s, plans were developed for construction of a woolen mill at a Mill Creek site in Salem, the site having been chosen in part because of the potential to augment streamflow by diverting water from the North Santiam River. Territorial approval was granted in 1856. The Salem ditch followed the contour of a high terrace through the upper portion of modern Stayton. It was soon followed by construction of the Stayton Power Canal along a lower terrace, which would return water to the river a little more than a mile downstream. It was used to power local industries, such as wool carding, furniture factories, saw mill, and flour mill.

There were two major challenges associated with operation of these two early water diversions: huge seasonal and episodic variations in flow, and the difficulty of keeping enough water diverted into the ditches to keep operations running. The river was braided and tended to shift laterally in position. In 1873, the north channel was extended to re-intercept the river and a dam was constructed to direct additional water into the two ditches.

The period from 1880 to 1950 was marked by a transition from pioneer homesteads to an industrial economy. It was during this period that the middle and upper reaches of the watershed became permanently inhabited. Because of steep slopes and fast-flowing water in the North Santiam Canyon, only small narrow pockets could be settled, and these became the present-day towns.

The continued expansion of the Willamette Valley population and development of the railroad system fueled increasing demand for timber and agricultural production. The most readily available land was found in the riparian areas along the rivers, and these were soon stripped of vegetation. Rail lines connected Lyons and Mill City to Albany, and the main railroad crossed the Santiam River at Jefferson. But Stayton was only accessible from Salem by road. A spur of the Southern Pacific eventually connected West Stayton about 1900, but Stayton itself was not connected by rail until 1964.

Other water diversions were constructed during this period. The Sidney Ditch was dug in the 1880s and runs about 12.5 miles from the North Santiam to the Willamette River. Its original use was to power a gristmill, but it was soon used for irrigation. It is now managed by the Sidney Irrigation Association and often carries between 1,000 and 1,500 cfs, of which only a small amount is used (North Santiam Watershed Council 2001).

Increase in water demand led to construction and improvements in dams. Periodic large floods destroyed the dams and modified the river channel. In 1909, the main channel of the river switched from the Marion to the Linn County side and left the channel dry from which the Salem and Stayton ditches derived their intake water (North Santiam Watershed Council 2001). Increased agricultural development led to expansion of irrigation capacity and vegetable and fruit canning facilities.

The fourth major water diversion at Stayton was constructed in 1937 at Geren Island, to provide drinking water for Salem. At that time, the cannery in Stayton was seasonally receiving 100 tons of beans per day, harvested by more than 7,000 workers.

The first towns along the middle reach of the North Santiam River were constructed in the early 1900s. At Mill City, the river takes a hairpin turn, allowing flow to be diverted into a manmade channel, to power the saws of a lumber mill. The Santiam Lumbering Company at Mill City was first used to saw timbers for the Oregon Pacific railroad, which crossed the North Santiam River at Mill City and continued to Idanha. The mill upgraded from the water-powered and horse-powered activities to steam-powered machines, and this caused an increase in logging activities and an increase in the population of Mill City. By 1914, the mill was bought out by the Hammond industrial empire, and operated as Hammond Mill. Timber harvesting activities continued up and down the length of the North Santiam Canyon.

The California Gold Rush of 1849 and the discovery of gold near Jacksonville, OR in 1851 attracted miners to streams throughout the Oregon Cascade Mountains. The North Santiam Mining District was probably prospected prior to the discovery of gold in 1896 but the earlier records were lost (Callaghan and Buddington 1938, Minor and Pecor 1977). During the period 1915 to 1930, the North Santiam District was a significant producer of copper (14,000 lbs), zinc (13,000 lbs), and lead (3,000 lbs; Minor and Pecor 1977).

The factor that exerted the largest influence on the North Santiam watershed was related to development of flood control and hydroelectric power capacity. The Army Corps of Engineers began the Willamette Valley Project, along with various flood control acts and the Works Progress Administration (WPA). This plan was based on the natural resource planning strategy to assure maximum economic and cultural growth. It included elements of flood control (through bank revetments and reservoirs), navigation, hydroelectric power generation and increased irrigation.

With the construction of the dams at Detroit and Big Cliff, the watershed began to take on many aspects of its current form. Water flows are regulated and flood events are controlled. Much of the watershed has been heavily influenced by logging activities, agricultural development, and water diversions.

2.2 Reference Conditions

In the past, fire contributed to forest structural diversity, with multiple age classes, snags, and downed wood. The forest included multi-layered canopies, abundant nesting sites in snags, travel corridors, foraging sites, germination sites, and nutrient and water storage. Due to fire suppression, timber harvest, and planting activities, the diversity and complexity of the historical forest has been replaced by simplicity and instability. Diverse forests have largely been converted to monocultures of Douglas fir. Age class distributions have changed from an average of 2.3 age classes per site to one (Teensma 1987).

Prior to fire suppression and European settlement, the western portion of the North Santiam River watershed had more land in oak savannahs, and the foothills and higher elevations were more dominated by late-successional coniferous forest. There was more habitat available for many species that are considered rare today, especially those that tended to be associated with oak savannah, low-elevation wetlands, and late-successional coniferous forest.

Historical disturbance regimes were associated with fire, windstorms, floods, insects, disease, and humans. Fire was the primary disturbance force. Today, humans are the primary agents of disturbance, and the resulting disturbance has been more widespread. Large blocks of older forest have been replaced by a less extensive and more highly fragmented mature forest and large blocks of early-successional forest. Connectivity of habitats has decreased, resulting in lesser wildlife dispersal capabilities.

Geology

Major geologic and slope forming processes are similar today to what they were in the past. Although glaciation is no longer a dominant process, slopes continue to form and to be reshaped from stream downcutting, and eroded material is deposited in depositional areas. The rate of historical stream downcutting may, however, have been higher in some locations and lower in others, as compared with current rates.

Slope stability was historically higher in some portions of the watershed and has been decreased by vegetation removal through timber harvest, road building, and stream clean-out activities. Elsewhere in the watershed, slope instability was historically higher and has been reduced by fire suppression throughout the last century. This is probably mainly on south and west facing steep slopes, that commonly experienced frequent intense fires which historically consumed most vegetation and destabilized hillslopes on a periodic basis.

Sediment Delivery

Historical sediment loading, transport, and deposition were largely the result of peak flows and erosion. After fires burned an area and removed most of the vegetation, erosion contributed large volumes of sediment to stream channels, especially in the drier south-facing and west-facing subwatersheds. The sediment-loaded channels were later flushed out during peak flows, transporting sediment down the water course. The amount of large woody debris contributed to the system varied with fire intensity. Intense fires tended to consume potential LWD. More moderate fires killed, but did not consume, large trees, thereby contributing LWD. The rate of sediment delivery to stream systems was historically higher than today in areas where fire suppression has dramatically reduced the frequency of large-scale fire events. In contrast, the rate of sediment delivery was likely lower historically in recently-logged areas. Sediment movement within the stream system was historically much slower than today because of the historical presence of greater quantities of large woody debris, which retarded sediment movement within the stream channel.

Hydrology

The basic stream patterns and channel gradients are largely controlled by geology, and have not changed much in recent times. However, fire exclusion has reduced the amount of sediment and LWD introduced to the stream channels. Both sediment and large woody materials are necessary for proper hydrological functioning and stream-floodplain interaction.

Historical peak flows were probably similar to peak flows today in that they occurred primarily in association with rain-on-snow events in the transient snow zone. However, peak flows in the study area were more frequent and were often of greater magnitude prior to installation of the dams. Stream flows historically occupied the flood plains during peak flows on a regular basis. The movement of water into the floodplains during peak flows helped to absorb stream energy and reduce downstream bank erosion. Peak flows were also higher subsequent to clear-cutting or large-scale fires that historically burned vast areas of the watershed, stripping them of their vegetation. This vegetation removal reduced evapotranspiration and increased storm runoff for many years after the fire.

The dams have also had an impact on low flows because water is released from the dams during the dry months to augment natural flows. Thus, historical low flows were lower than they are today, especially above Stayton, where much of the water withdrawal occurs.

Stream Channels

Streams historically exhibited diverse channels with multiple side channels, storage areas with pools, and intergravel flows behind accumulations of LWD. There was abundant sediment, that pulsed through the stream system over relatively long periods of time. The abundant sediment and LWD created complex systems of stream channels and floodplains.

There was abundant pool habitat and extensive backwater areas. Stream channel complexity contributed to greater diversity of habitats for aquatic and riparian biota.

Water Quality

Historic water quality is difficult to determine because of the lack of data. It is likely, however, that water temperatures were lower than today because of greater stream and forest soil shading throughout the watershed afforded by the prevalence of old-growth forest in the upper reaches of the watershed. Historically, stream temperatures increased subsequent to large-scale fire disturbance. Sediment was more efficiently trapped by LWD and moved more slowly through the watershed. For the North Santiam River watershed as a whole, turbidity levels were probably lower historically than they are today. This is not necessarily the case for the study area below the dams, however. Pulses of high sediment transport and high turbidity have always occurred in association with peak flows. Much of that sedimentary material is now removed from the system by the reservoirs.

Anecdotal evidence suggests that historic water temperatures tended to be lower. For example, the temperature of Lower Blowout Creek in mid-July of 1938 was 53°F (with air temperature of 84°F). More recent temperatures have been in the high sixties, reaching as high as 70°F (Willamette National Forest 2000).

Fish species present historically were probably similar to what they are today, although dam installation and habitat alterations have favored some species and contributed to the decline of others. For example, warmer temperatures in some reaches may favor dace at the expense of cutthroat or rainbow trout. The dams also blocked access by anadromous fish to the upper watershed.

The Santiam subbasin historically provided the majority of the winter steelhead production and about one-third of the spring chinook salmon production in the Willamette Basin (ODFW 1995). Up to two-thirds of the Santiam steelhead production occurred in the upper portions of the North and South Santiam Rivers, and the remaining production occurred in the lower tributaries. With construction of the dams, fish access to the upper reaches of the North, Middle, and South Santiam Rivers was blocked. Wild anadromous fish production is now restricted to the lower mainstems and lower-elevation tributary streams. Hatchery production of spring chinook was increased as mitigation for the dams on the North Santiam, and was derived primarily from native Willamette stock.