Appendix F

Human Disturbance History

Middle Twisp River (RM 7.8 – 18.12)

Contents

1 Early Disturbance

The first documented inhabitants of the region were members of three major bands of the Sinkaietk people (or Northern Okanagans): the Tokoratums, the Kartars, and the Knkonelps. The Sinkaietk spent winters in permanent camps and spent the summers out hunting deer and bears and fishing for salmon. Disturbance in the region was small-scale and related to using the floodplain and river systems as a basis for a subsistence economy. Conflicting reports regarding the origins of the word Twisp exist, but the leading theory is that it is derived from a combination of the native-American words "T-wapsp" which means "yellow jacket" and "Twistsp" which means "sound of the buzzing wasp."

With the exception of some early explorers, fur trappers, and miners, Euro-American settlement began in the Twisp in the late 1890s. Early settlement included construction of homesites, small-scale farming, and local logging. The Town of Twisp was established in 1897, first called "Glovers-Ville" on a plat drawn up by Henry C. Glover. In 1904, Twisp was one of the largest towns in Okanogan County and was filled with farmers, ranchers, and loggers. By this point, the town already included a number of amenities such as a post office, several general stores, a hotel, a state fish hatchery, and two restaurants (Figure 1).

Figure 1. Downtown Twisp in 1909 (West 2011).

2 Mining

The first major impact to the area was in the form of mining. The Methow Valley mining rush began in the Twisp River Valley in 1886, when a large gold ledge was discovered on War Creek (Smith 2013). Miners soon flocked to the area, using the town of Twisp as a supply point before heading up the Twisp River Valley to the Slate Creek Mining district (Smith 2013). By 1897, there were three mines registered in the Twisp mining district. The exact extent of disturbance and mining in the Twisp River Valley is unknown. GLO maps from 1902 and 1913 depict active mines. In the last eight months of 1939 alone, Twisp's Alder mine shipped "230 carloads of ore and four carloads of concrete" sourced from the Twisp area (Figure 2). The rugged conditions of the valley made mining difficult and dangerous, and in the end the region did not prove highly profitable (Smith 2013).

Upland mining and its associated practices have likely impacted the Twisp River in a number of ways, including potential changes to the hydrologic and sediment regime. These may have included removal of instream gravels, diversion of water, and deposition of mining waste in the channel or floodplain.

Figure 2. The Alder Mine outside of Twisp (Methow Valley Conservancy 2013).

3 Agriculture and Grazing

Small-scale agriculture, including clearing, farming, and agricultural diversion dates back to the mid-1800s. Available information for the majority of these uses is described at the wider Methow Basin scale. The first documented cattle grazing in the Methow region dates back to 1889, with sheep grazing becoming commonplace during the 1920s and 1930s (Figure 3). As demand for wool escalated during World War I, over 75,000 sheep grazed the headwaters of the Twisp (McLean 2011). Grazing rates slowed

significantly in the 1940s and 50s. Most contemporary grazing is limited to the lower elevations, with about 2,800 cattle grazing the Methow valley annually.

Although a significant economic and cultural resource for the Methow valley, riparian grazing historically resulted in some localized soil compaction, bank erosion, and loss of riparian understory seedlings and shrubs. Perhaps the most significant historical impacts of agriculture on the Twisp River were water diversions. Many of these were unscreened and resulted in direct fish mortalities, while the combination of others withdrew instream flows during low flow periods critical to salmonid habitat.

Figure 3. Sheep grazing in the upper Methow (Methow Valley Conservancy 2012).

4 Timber Harvest

Timber harvest began in the region in the mid-1800s. Cabins, boat ramps, and early roads are visible on survey maps from GLO maps by 1902, indicating that by this point small-scale timber harvest was ongoing in the area. Land was usually cleared for farming and grazing (USBR 2008). In 1910, a traveler to the area noted seeing "billions of board feet of Timber" (West 2011). By 1940, the pace and scope of the region's timber harvest accelerated with the expansion of the railroad, improved technology, and the construction of sawmills in the area and continued until the 1970s. In the 1970s, a dramatic shift in USFS policy came in the form of the USFS Twisp/Winthrop/Conconully (TWC) Forest Environmental Impact Statement. This document brought timber harvest to a complete standstill (MVCC 2000). Eventually this plan was repealed allowing timber sales to return to some of the forest. Today, approximately 90% of the

land in the Twisp River drainage is USFS land, about half of which is located within the Chelan-Sawtooth wilderness area and is administratively withdrawn from most active management activities including thinning and prescribed burns (USBR 2008). On non-wilderness lands, large-scale timber harvest and associated road building primarily occurs in the form of salvage operations following wildfires.

Upland timber harvest and its associated practices have likely impacted the Twisp River in a number of ways. In addition to removal of sources of large wood, these include potential changes to the hydrologic and sediment regime. Although mass-wasting events and alluvial fan contributions are a natural process in the Twisp, research indicates that forests with a history of timber harvest exhibit increased amounts of landslides and debris flows (Benda and Cundy 1990, Swanson and Lienkaemper 1978, Sidle et al. 1985). This is related to the destabilizing effect of tree removal and the hydrologic/erosion effects of the forest road network.

Timber harvest along the valley floor has also directly altered channel processes since the late 1800s. Harvest and removal of riparian trees was documented as early as 1902 (GLO) and continued through much of the 20th century. This removal of riparian vegetation led to the associated loss of the important channel functions this vegetation serves, including streambank stability, flood moderation, regulation of inundation processes, shade, moderation of stream temperature fluctuations, and providing future sources of large wood material to the channel. Although riparian clearing is no longer occurring in most of the study reach, the effects of this historical practice will continue to affect wood-loading for the foreseeable future.

5 Fire Suppression

The fire regime within the Twisp River Watershed is a major driver in forest ecology, which influences riparian stand conditions and ultimately, instream flow patterns and large wood conditions. Prior to Euro-American settlement, the Twisp River fire regime would have been primarily low intensity on a relatively frequent recurrence interval (e.g. every five years) (USFS 1995). Fire suppression began in 1911 and has continued through today. This has led to an altered fire regime and an increased risk of moderate to high intensity burns within the watershed (PWI 2004, USFS 1995).

Fire suppression within the basin has also led to shifts in vegetative composition from more open stands of fire-tolerant species (primarily ponderosa pine) to higher density stands of less fire-tolerant species (primarily Douglas fir). Since the 1920s, there has been a 73% reduction of ponderosa pine in the watershed, as well as a buildup of fuels along the forest floor (USFS 1995). The historically more open stands had larger trees than the higher density stands seen today, which has served to decrease the size of riparian trees that are now available to be recruited by the river.

6 Habitat Alterations

Habitat alterations within the Twisp River Watershed began in the late 1800s. Most of the historical information that is available applies to the lower Twisp River, below the study area, and may have only limited applicability to the Middle Twisp. Irrigation diversions were present on maps as early as 1902. These diversions were not screened until the 1930s or later, and combined with dams on the mainstem Methow and Columbia Rivers, led to a rapid decline in salmonid populations. By 1935, there were 16 documented irrigation diversions on the Twisp River. The majority of these were unscreened until the 1930s. One diversion, located at approximately RM 0.5, diverted the entirety of the Twisp River's flow during the late summer months. An early report noted that the numerous dams and diversions

throughout the basin led to such unfavorable habitat conditions, that "only a few early run spring chinook and even less steelhead trout" remain (Bryant and Parkhurst 1950).

One of the most significant human impacts to stream channels has been direct wood removal. Wood has been removed from stream channels for various reasons. Following both the floods of 1948 and 1972, the Army Corps of Engineers utilized bulldozers to remove large wood and channelized Little Bridge Creek, a tributary of the Twisp (RM 9.78), as well as some segments of the mainstem Twisp River (KWA 2004, PWI 2003). These activities removed natural large wood accumulations and channel substrate, as well as straightened portions of the channel. This work was done for flood protection. Wood has also been removed in more recent years to address recreational safety issues and to protect against potential property damage.

7 Development Trends Since 1950

In addition to the historical trends in development that have taken place in the region, there was an increase in human disturbances throughout the study area since the 1950s resulting in significant impacts to the sediment transport and hydraulic regimes. The study area is currently 31.3% public property and 68.7% private property within the low geomorphic surface, with the National Forest accounting for a majority of the public property. Much of the private property has undergone vegetation clearing, floodplain grading, and residential development, which continues today and accounts for 18.8% of the surface area on the low geomorphic surface. The valley bottom within the study area has a road density of 3.4 mi/mi^2.

Flood mitigation practices of the mid- to late-1970s led to removal of native substrate and habitat elements such as log jams. Those practices also included the construction of levees to prevent flooding on private property, which reduces floodplain connectivity and lateral channel migration. Riprap was also used intermittently throughout the study area as a method of bank stabilization for residential properties as well as roadway embankments and bridge abutments. This armoring limits natural lateral channel migration and sediment sourcing from streambanks.

Table 1. Human alterations and development in the study area. The low geomorphic surface includes the contemporary floodplain and alluvial terraces.

Metric	Value in the Low Geomorphic Surface
Road Density	3.4 mi/mi^2
Public Land	31.3%
Private Land	68.7%
Portion of Channel with Levees and Bank Armoring	27.5%
Developed and Cleared Land	18.8%

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