Results

Native Americans

Nez Perce Indian Women

Umatilla Indian Women

The evidence shows that there were Native Americans living on the Columbia Plateau as long as 15,000 years ago. There is no documentation of tribes living in the Thirtymile Creek watershed but evidence in several locations show pictographs and camp sites. The tribes located in that area were originally the Wascos, Tenino, Wyams, Tygh or Ty-ichs, Snakes and Piutes. The book, The First Oregonians, describes the tribes living in this area as Nez Perce, Umatilla, John

Day, Celilo, Tenino and Tygh Valley people (Sue Greer). Camas root and berries were a staple of the Native Americans' diet, and they were plentiful in the Blue Mountains. During the winter they would live close to the Columbia River in small houses made of tule. In March they would catch spawning suckers and then dig various roots in the foothills. In May the Chinook salmon run would start with various runs of steelhead and salmon through the spring until fall. Usually during the heat of the summer the various Indian families would move to higher elevations to avoid the heat. While on these trips they would dig camas, collect berries, and hunt.

Columbia Basin tribes acquired horses in the 1730's (Hug 1861). When the first white visitors came to the Columbia Basin they reported thousands of horses grazing in the vicinity of the various tribes camps. Some feel that this was the first major impact to riparian areas in the west.

Fur Trappers and Explorers

Early journals indicate beavers were plentiful (Gildemiester 1999). In a few decades, with the arrival of the fur trade, beavers were systematically removed from the upper elevations of the Blue Mountain watersheds (ibid). By the 1860s, when the beaver were almost removed entirely, the control beaver had over stream flows, water quality, and sediment was removed as well. Meadows previously "irrigated" by beaver dams became dried (ibis). Nathaniel Wyeth wrote in 1832 that "Streams are being trapped out by mountain men" (qtd. In Gildemiester 1999).

The Oregon Trail

The Oregon trail began in 1841, the largest historical migration of people in the United States (Evans 1990). When passing through the Columbia Basin the train stayed mainly next to the river with a few spurs passing in other areas. While the trail did not pass through what is today the Thirtymile Creek watershed, the people that it brought would shape the area's future.

First Settlers

Gilliam County's western border is formed by the John Day River, named after a member of the Astor-Hunt overland party. Entrepreneur John Jacob Astor sent the party west from St. Louis in 1810 with the goal of setting up a post at the mouth of the Columbia River. Astor wanted to dominate fur trapping in the region. The expedition became divided and widely separated. Experiencing incredible hardships, John Day's group dwindled to two people. Close to the mouth of the river that would later bear his name, Day and Ramsey Crooks were attacked by hostile Indians and robbed of everything—even their clothes. While they were soon rescued, one source claimed that Day later went insane and died in 1814 (Oregon Blue Book).

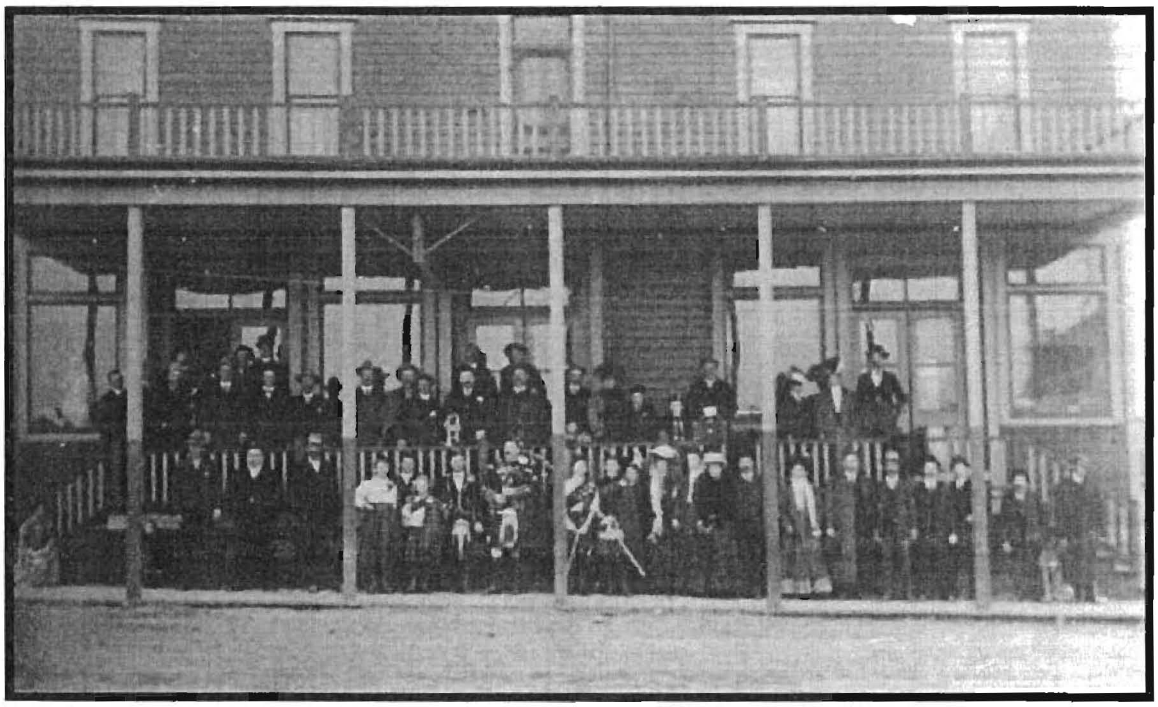
The first permanent settlers came to Gilliam County in 1862 by what was later called "The Reverse Migration" of people who originally settled in the Willamette Valley. Thirtymile Creek has its own unique history. The first settlers in the Thirtymile Creek drainage were at the mouth where Thirtymile Creek and the John Day River join. A family by the name of Armstrong built a house in 1869 and started to raise cows, sheep, and hay. They also ran a ferry to help travelers cross the John Day River. Their home is still standing and is used as a cabin for the Rattray family.

Armstrong Home Built in 1869

Graham's were the second family to move into Thirtymile Creek and then a family by the name of Smith arrived. The Smith's also built a ferry and competed with the original Armstrong's for business. Pembertons settled up Thirtymile Creek and raised sheep and hay. A family by the name of Moore bought most of the mouth of Thirtymile Creek and owned it until 1933 when the current owners, Rattray, purchased it during the depression (Personal Communication with John Rattray).

Interviewees say that Thirtymile Creek had floods in 1948 and 1949 that caused severe damage but nothing compared with the floods of 1964. In 1964 Thirtymile Creek was scoured and land owners along the creek said that Thirtymile Creek flowed perennial until 1964 and now large sections are intermittent. It was also stated by land owners along Thirtymile Creek that before 1957 there were always numerous fish observed spawning along the Creek but from 1957 until 1985 very few steelhead were observed. Some landowners felt that the reduction in fish was due to the large saw mill installed at a location called Kinzua and that steelhead runs increased when the saw mill was closed (Rattray & Hardie).

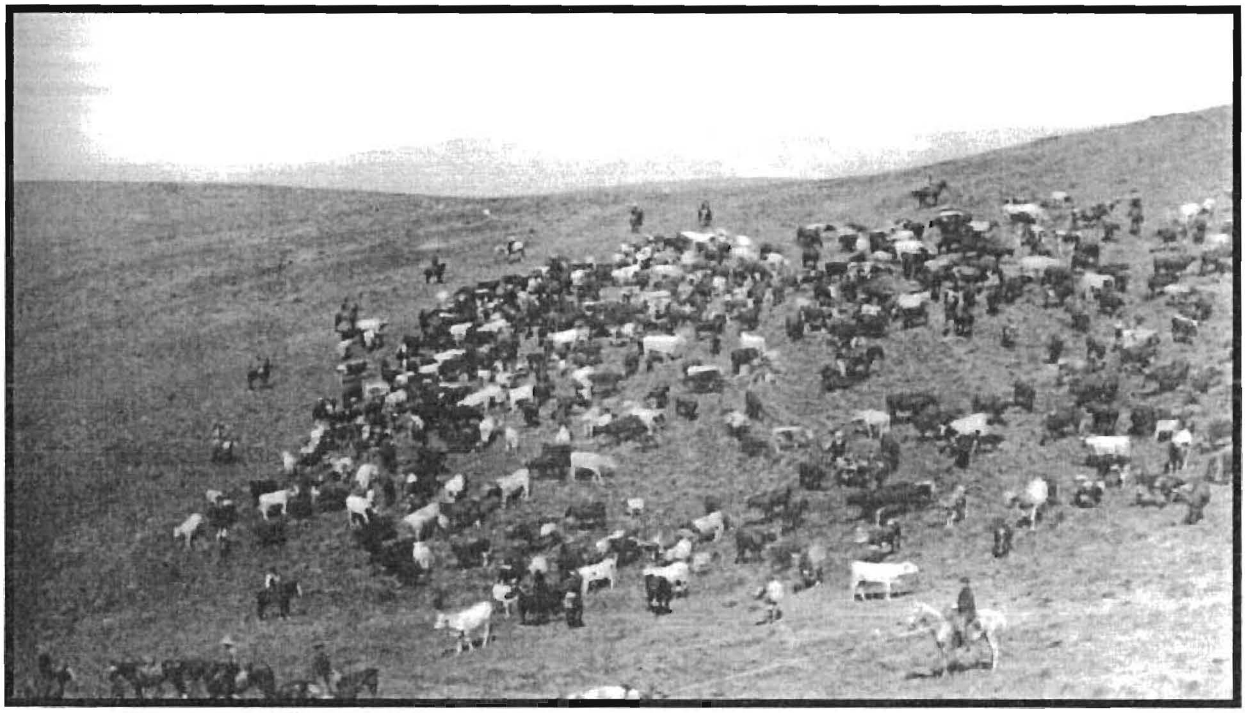
Farther upstream the first member of the Hardie family (Alex) arrived in what is now called Gilliam County from Scotland in 1875 and hearded sheep in the upper reaches of Rock Creek near the town of Lonerock. Bill Hardie tells a family story: "On Christmas day, 1879, Alex's brother, David, walked into Lonerock, fresh from Scotland. It was the first time in nearly five years that Alex had seen another member of his family. David was then 17. His route from Scotland had been by steamer to New York, by train to San Francisco, and then by a series of boats to The Dalles. The last lap, from The Dalles to Lonerock, was by foot. The temperature dipped to minus 24° F. on Rock Creek that December, two days before David reached Lonerock". In 1880 Alex homesteaded a 160 acres on Papersack Creek which is a tributary to Thirtymile Creek. Bill Hardie says that he remembers as a boy seeing his father pitch fork steelhead out of Trailfork Creek at the homestead where he was born and his grandfather David homesteaded in 1883.



Scottish celebration at Oregon Hotel, 1907, note kilts and piper.
(No doubt there were Hardie's present)

There were many families that have their own stories of the hardships that they faced while trying to make a living in the early days along Thirtymile Creek. Names like Dyer, Verse, Maddock, Russell and others that were mentioned with respect and fondness (personal communication with Bill Hardie).

Grazing/Agriculture



Cattle roundup near Mayville, approximately 1900

"A most noticeable change has taken place in Gilliam County, Oregon, during the past ten years. Namely, the conversion of the cowboy into an ordinary farmer. Ten short years ago the resident of this part of Oregon knew little of the meaning of wheat or barley raising, while today, these same two articles are its principle productions. The early settler came to this county with the sole intention of raising cattle and sheep. Today he keeps just enough cows to supply his household with milk and butter.

Another very noticeable feature is the change in the climatic condition. When this country was covered with the tall, waving bunch grass, the annual amount of rain-fall amounted to little or nothing, and the winters were severe to an extreme, the mercury frequently registering 20° or more below zero.

While during the last five years, since over half of the tillable soil has been in cultivation, the annual rainfall has exceeded that of the proceeding five years by more than three times, and only once in the past three years has the mercury reached the zero mark, and then only 4° below for one day.

At the time of the writers first visit to this county twelve years ago, there was not a barbed wire fence to be seen, and every man you saw with the exception of a few business men in the various wetting points, owned a saddle pony and wore Chappederos, Spurs, and fanfare. While today there is one continuous stretch of barbed wire fences extending over the entire length and breadth of the county. And a man wearing Chaps and Spurs is considered a curiosity" (Pauling 1939).

The original settlers raised sheep in the Thirtymile Creek watershed. It is estimated that within the lower Thirtymile Creek watershed there were 6 bands of sheep that lived year long within the canyon. One band of sheep in those days constituted approximately 1,500 animals which made a total of 9,000 animals. Starting in 1920 settlers started plowing the bunch grass and planting wheat. The first yields were approximately 17 to 20 bushels with a year of summer fallow. The yields now are 30-35 bushels with a year of summer fallow. Sheep was the main livestock produced until the 1940's when cattle began to replace sheep (Rattray & Hardie).

Virgin grasslands near Mayville were plowed by eight and nine horse teams

Discussion

There have been many changes to the Thirtymile Creek watershed since the early 1700s when the horse was introduced by Native Americans. Numbers of horses owned by Native American families was a sign of their wealth. Some tribes owned literally thousands of head of horses. Since then fur trappers have come and gone, taking the beaver with them. Settlers have passed through and many stayed or returned. Land has been cleared; farms have been cultivated. Wetlands have been drained. Roads have been built. Noxious weeds have entered the landscape. Fire suppression has been active. Humans have changed the landscape, through extracting resources and putting the land into agricultural production.

We cannot entirely return the watershed to its original state, as the land is now a livelihood for many people. We do not fully understand or know what its "original" state was. The Native Americans burned large areas at regular intervals to influence food and forage production. Some changes that may have impacted the watershed the most occurred when there was little documentation of their effects, such as removal of the beaver in the mid 1800s. As things currently stand, we can try to restore aspects of the watershed that benefit the habitat of aquatic and terrestrial species that we share the land with, while maintaining a viable economy. The following chapters of this assessment characterize the current conditions of the watershed and identify restoration opportunities.

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Chapter 3: Channel Habitat Types

Introduction

In this chapter, the streams in the Thirtymile Creek watershed have been classified as various channel habitat types (CHTs). Stream classification groups stream reaches into "types", thereby creating a root for understanding how land uses can affect and alter stream channel form. Stream classification also can assist in identifying how different "types" will respond to restoration efforts.

Background

Stream classification is the designation of a stream network, stream, or segment as a generic "type", based upon certain characteristics of the stream. The OWEB system, Channel Habitat Typing, is used to classify stream segments in Oregon into basic channel types. This system is a compilation of previously existing classification systems, including Rosgen and the Tongass National Forest systems. By using a classification system at this scale, patterns can be predicted in channel physical characteristics, but the scale is still broad enough to be identified from topographic maps and limited field work. (WPN 1999)

Methods

USGS topographic maps were used as the base map for channel habitat typing. A map distance meter was used to calculate the length of each reach.

Streams were divided into individual reaches based upon the following guidelines:

- Minimum segment length of 1,000 feet
- Segments were broken out at stream convergence
- Segments covered a minimum of 3 contour lines on USGS topographic 1:24,000 scale maps
- Segments were broken out where distances between contour lines changed significantly
- Segments that were channelized/straightened were broken out

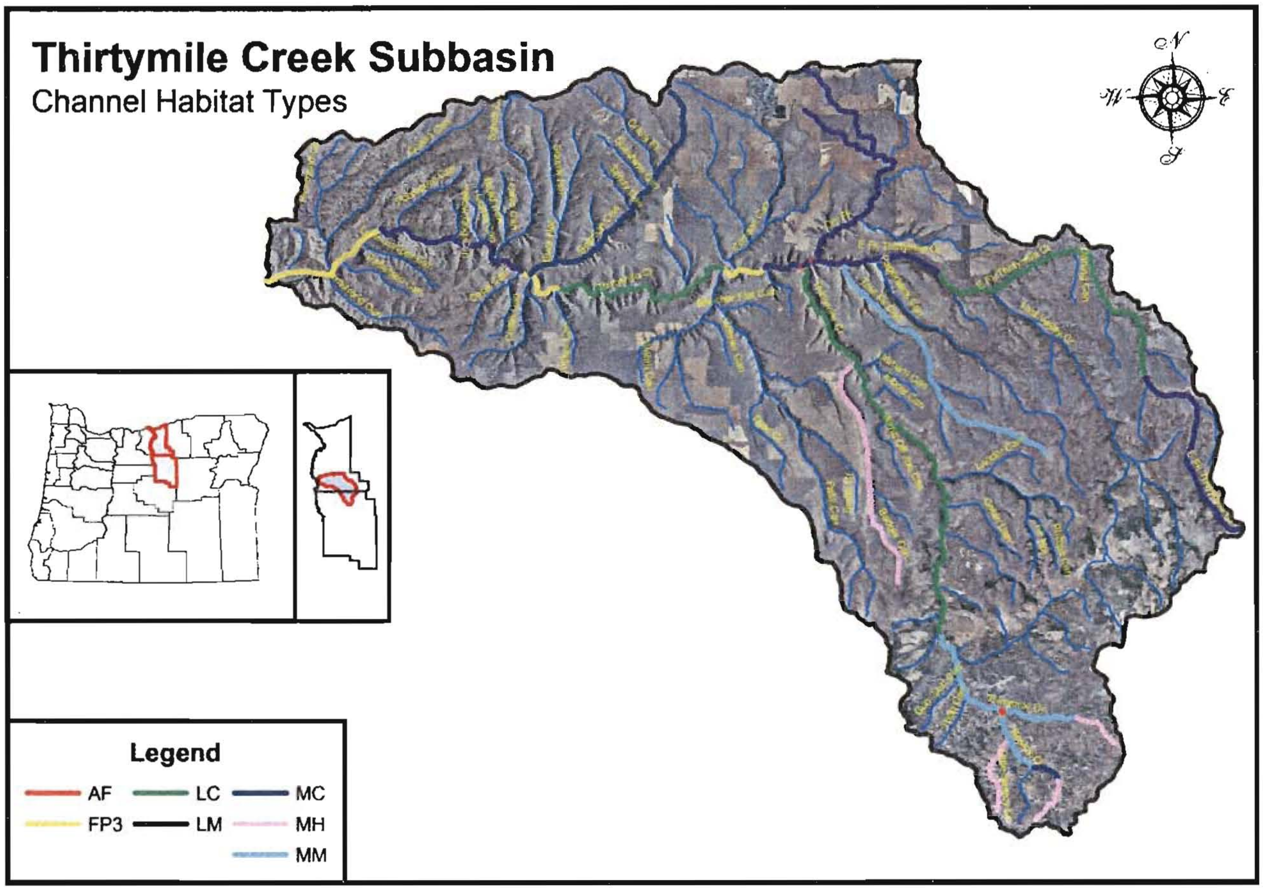
Once streams were divided into reaches, channel gradient and channel confinement were calculated for each reach. According to the OWEB manual, channel gradient is defined as "the slope of the channel bed along a line connecting to the deepest points of the channel". Channel gradient was calculated by dividing the difference in elevation by the horizontal distance of a given length of stream. This was done by measuring the length of the reach, using a distance meter, and the difference in elevation, using USGS topographic maps and a GPS unit. Once channel gradients were calculated they were divided into gradient classes: <1%, 1-2%, 2-4%, 4-8%, 8-16%, and >16%.

The OWEB manual defines channel confinement as "the ratio of bankfull channel width to width of modern flood plain". For Channel Habitat Typing, confinement is broken into three classes: Unconfined, Moderately Confined, and Confined. As channel confinement is difficult to accurately determine from topographic maps alone, in this assessment, confinement was classified based upon both topographic and flood plain maps, which show the **100-year flood plain.** While the 100-year flood plain does not necessarily correspond with the modern flood plain, or the "**flood-prone area"**, using flood maps helped verify the confinement classes assigned to reaches using USGS topographic maps.

Completely channelized reaches as mapped on the 1:100,000 EPA stream layer and the USGS topographic maps were not assigned CHTs. As the length of the stream is shortened when channelized, designating a channel habitat type based upon this method may result in an inaccurate CHT. **It should be noted that there was only one short area briefly above the mouth of 30 Mile Creek that appeared to be channelized.**

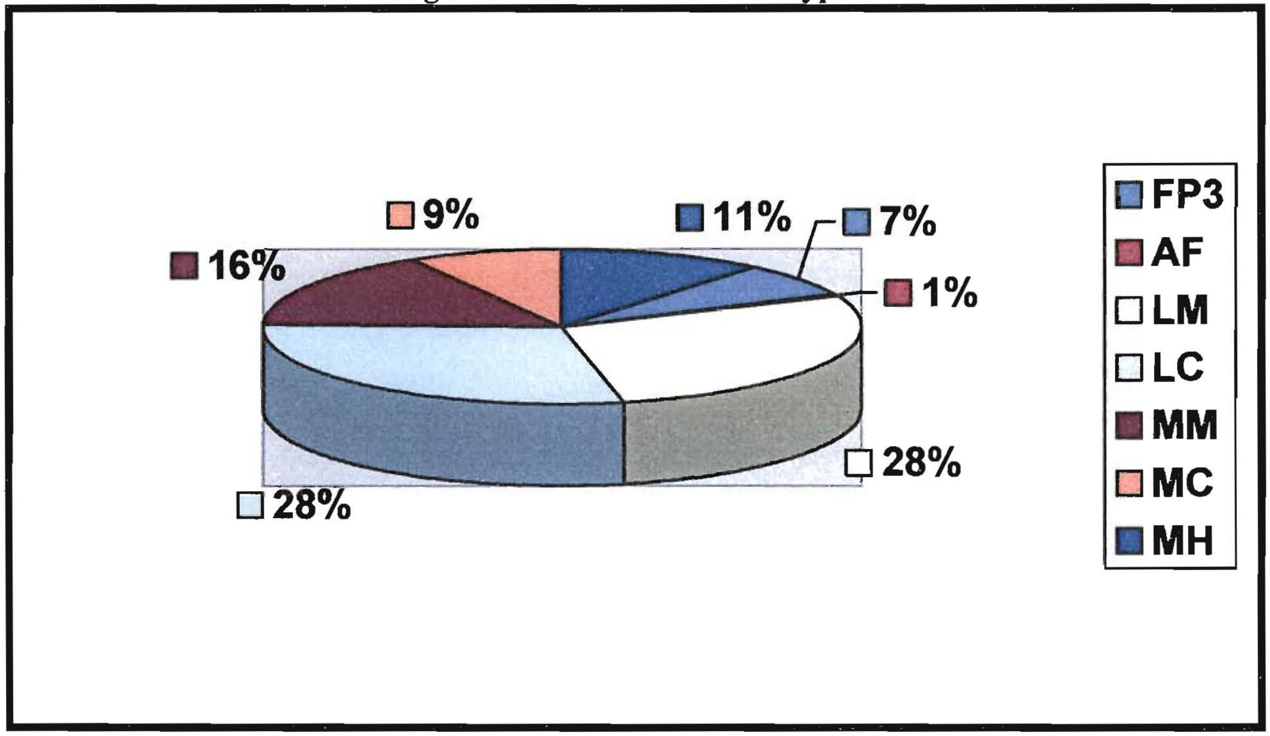
Oregon Youth Conservation Corps (Stream Measurements)

Map 3.1: Channel Habitat Types



Results

Figure 3.1 Channel Habitat Types



Discussion

As stated in the channel habitat type characterizations in **Appendix 3.1**, some channel habitat types are more responsive to stream enhancement efforts than others. However, all respond favorably to riparian vegetation. Managing lands to allow revegetation of riparian areas is the single most important aspect of riparian restoration. Riparian vegetation helps to stabilize stream banks, reduce water temperatures, and provide flood control and other benefits to riparian areas. It can also act as a buffer between aquatic ecosystems and adjacent land uses. For more information on the conditions of riparian areas in Thirtymile Creek, see Chapter 5, **Riparian Areas.**

Channel habitat types are most useful when determining how a section of stream will react to in-stream treatments. The active energy and lateral movement of floodplain channels (FP2 and FP3) limit the success of in-stream treatments except at a very local scale. The steeper channel types (SV, VH, and MV) also are often only responsive locally, as the steepness and confinement of the stream channel limits the effectiveness of treatment. Alluvial fans (AF) do not easily lend themselves to stream enhancement, as the high levels of sediment deposition can limit the success of habitat complexity efforts, such as large wood placement for creation of pools.

The most responsive CHT's to in-stream treatments are moderately confined to unconfined and low to moderate gradient (LM, MM, and MH). These channel habitat types are the best areas to concentrate on increasing stream habitat complexity. They also are among the most responsive to changes in land management activities (floodplain CHTs are the others). As they are not confined by topography, these channel habitat types are more affected by changes in sediment loads (fine and course), peak flows, and large woody debris. For example, removing woody debris can decrease the number of pools and other stream habitat complexities. An increase in sediment load can cause streambed scouring and/or bank erosion. When streams are artificially confined (limited in lateral movement), the channel may react by down-cutting or scouring. This disparity between potential and actual channel habitat type can be identified at the project level. Information on how to restore a stream to its potential channel habitat type is included in **Chapter 10: Fish and Fish Habitat.**

Data Gaps

- **None**

References

Stream Corridor Restoration: Principles, and Practices. The Federal Interagency Stream Restoration Working Group, October 1998.

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Appendix 3.1: Description of Channel Habitat Types

Included below are descriptions of channel habitat types present in the Thirtymile Creek watershed. This information is taken from the OWEB Watershed Assessment Manual. More detail on these and other channel habitat types can be found in Appendix A of Component III of the manual.

Note that the descriptions focus on in-stream process. As all channel types respond favorably to riparian revegetation, this is not emphasized in the descriptions. But it is still an integral, perhaps the most important, part of stream and riparian restoration.

Low Gradient Small Floodplain Channel: FP3

FP3 streams are located in valley bottoms and flat lowlands. They frequently lie adjacent to the toe of foot slopes or hill slopes within the valley bottom of larger channels, where they are typically fed by high-gradient streams. This may be directly downstream of a small alluvial fan and contain wetlands. FP3 channels may dissect the larger floodplain. These channels are often the most likely CHT to support beavers if they are in the basin. Beavers can dramatically alter channel characteristics such as width, depth, form, and most aquatic habitat features.

These channels can be associated with a large floodplain complex and may be influenced by flooding of adjacent main-stem streams. Sediment routed from upstream high and moderate gradient channels is temporarily stored in these channels and on the adjacent floodplain.

Channel Responsiveness

Floodplain channels can be among the most responsive in the basin. The limited influence of confining terrain features and fine substrate allows the stream to move both laterally and vertically. Although often considered low-energy systems, these channels can mobilize large amounts of sediment during high flows. This often results in channel migration and new channel formation.

Riparian and In-stream Enhancement Opportunities

Floodplain channels are, by nature, prone to lateral migration, channel shifting, and braiding. While they are often the site of projects aimed at channel containment (diking, filling, etc.), it should be remembered that floodplain channels can exist in a dynamic equilibrium between stream energy and sediment supply. As such, the active nature of the channel should be respected, with restoration efforts carefully planned. The limited power of these streams offers a better chance for success of channel enhancement activities than the larger floodplain channels. While the lateral movement of the channel will limit the success of many efforts, localized activities to provide bank stability or habitat development can be successful.

Alluvial Fan Channel: AF

Alluvial fans are generally tributary streams that are located on the foot-slope land form in a transitional area between valley floodplains and steep mountain slopes. Alluvial fan deposits are formed by a rapid change in transport capacity as the high-energy mountain-slope stream segments spill onto the valley bottom. Channel pattern is highly variable, often dependent on substrate size and the age of the land form. Channels may change course frequently, resulting in a multi-branched stream network. Channels can also be deeply incised within highly erodible alluvial material. Smaller alluvial fan features may be difficult to distinguish from FP3 channels.

Alluvial fans are usually at the lower end of small tributaries. Their dominate substrate is fine gravel to large cobble. Their size varies from small to medium.

Channel Responsiveness

The response of alluvial fans to change in input factors is highly variable. Response is dependent on gradient, substrate size, and channel form. Single-thread channels confirmed by high banks are likely to be less responsive than an actively migrating multiple channel fan. The moderate-gradient and alluvial substrate of many fans result in channels with a moderate to high overall sensitivity.

Riparian and In-stream Enhancement Opportunities

As many alluvial fans are actively moving at a rate greater than most channels, they are generally not well-suited to successful enhancement activities. Although they are considered responsive channels, long term success of enhancement activities is questionable. High sediment loads often limit the success of efforts to improve habitat complexity such as wood placement for pool development.

Low Gradient Moderately Confined Channel: LM

These channels consist of low-gradient reaches that display variable confinement by low terraces or hill slopes. A narrow flood plain approximately two to four times the width of the active channel is common, although it may not run continuously along the channel. Often low terraces accessible by flood flows occupy one or both sides of the channel. The channels tend to be of medium to large sizes, with substrate varying from bedrock to gravel and sand. They tend to be slightly to moderate sinuous, and will occasionally have islands and side-channels.

Channel Responsiveness

The unique combination of an active floodplain and hill slope or terrace controls acts to produce channels that can be among the most responsive in the basin. Multiple roughness elements are common with bedrock, large boulders, or wood generating a variety of aquatic habitat within the stream network.

Riparian and In-stream Enhancement Opportunities

Like floodplain channels, these channels can be among the most responsive of channel types. Unlike floodplain channels, the presence of confining land form features often improves the accuracy of predicting channel response to activities that may affect channel form. Additionally, these controls help limit the destruction of enhancement efforts common to floodplain channels. Because of this, LM channels are often good candidates for enhancement efforts.

In forested basins, habitat diversity can often be enhanced by the addition of roughness elements such as wood or boulders. Pool frequency and depth may increase, and side-channel development may result from these efforts. Channels of this type in non-forested basins are often responsive to bank stabilization efforts such as riparian planting and fencing. Beavers are often present in the smaller streams of this channel type. Fish habitat in some channels may benefit from beaver introduction through side-channel and scour pool development. Introducing beavers, however, may have significant implications for overall channel form and function and should be thoroughly evaluated by land managers as well as biologists as a possible enhancement activity.

Low Gradient Confined Channels: LC

LC channels are incised or contained within adjacent, gentle land forms or incised in volcanic flows or uplifted coastal land forms. Lateral channel migration is controlled by frequent bedrock outcrops, high terraces, or hill slopes along stream banks. They may be bound on one bank by hill slopes and lowlands on the other and may have a narrow floodplain in places, particularly on the inside of meander bends. Stream-bank terraces are often present, but they are generally above the current floodplain. The channels are often stable, with those confined by hill slopes or bedrock less likely to display bank erosion or scour than those confined by alluvial terraces.

High-flow events are well contained by the upper banks. High flows in these well-contained channels tend to move all but the most stable wood accumulations downstream or push to the channel margins. Stream banks can be susceptible to land slides in areas where steep hill slopes of weathered bedrock, glacial till, or volcanic-ash parent materials above the channel. The dominant substrate varies from boulder, cobble, or bedrock with pockets of sand/gravel/cobble.

Channel Responsiveness

The presence of confining terraces or hill slopes and control elements such as bedrock limit the type and magnitude of channel response to changes in input factors. Adjustment of channel features is usually localized and of modest magnitude.

Riparian and In-stream Enhancement Opportunities

These channels are highly responsive and in channel enhancements may not yield intended results. In basins where water temperature problems exist, the confined nature of these channels lends itself to establishment of riparian vegetation. In non-forested lands, these channels may be deeply incised and prone to bank erosion from livestock. As such, these channels may benefit from livestock access control measures.

Moderate Gradient Moderately Confined Channel: MM

This group includes channels with variable controls on channel confinement. Alternating valley terraces and/or adjacent mountain slope, foot slope, and hill slope land forms limit channel migration and floodplain development. Similar to the LM channels, a narrow floodplain is usually present and may alternate from bank to bank. Bedrock steps with cascades may be present. The dominant substrate is gravel to small boulder.

Channel Responsiveness

The unique combination of narrow floodplain and hill slope or terrace acts to produce channels that are often the most responsive in a basin. The combination of higher gradients and the presence of a floodplain set the stage for a dynamic channel system. Multiple roughness elements such as bedrock, large boulders, or wood may be common, resulting in a variety of aquatic habitats within the stream network.

Riparian and In-stream Enhancement Opportunities

Like floodplain channels, these channels are among the most responsive of channel types. Unlike floodplain channels, however, the presence of confining land forms features improves the accuracy of predicting channel response to activities that may affect channel form. Additionally, these controls help limit the destruction of enhancement efforts, a common problem in floodplain channels. The slightly higher gradients give a bit more uncertainty as to the outcome of enhancement efforts as compared to LM channels. MM channels, however, are often good candidates for enhancement efforts.

In forested basins, habitat diversity can often be enhanced by the addition of roughness elements such as wood or boulders. Pool frequency and depth may increase as well as side-channel development as the result of these efforts. Channels of this type in nonforested basins are often responsive to bank stabilization efforts such as riparian planting and fencing.

Beavers are often present in the smaller streams of this channel type. Fish habitat in some channels may benefit from beaver introduction through side-channel and scour pool development. Introduction of beavers, however, may have significant implications for overall channel form and function, and should be thoroughly evaluated by the land managers as well as biologist as a possible enhancement activity.

Moderate Gradient Confined Channel: MC

Moderate Gradient Confined Channels flow through narrow valleys with little river terrace development, or are deeply incised into valley floors. Hill and mountain slopes composing the valley walls may lie directly adjacent to the channel. Bedrock steps, short falls, cascades, and boulder runs may be present; there are usually sediment transport systems. Moderate gradients, well-contained flows, and large-particle substrate indicate high stream energy. Landslides along channel side slopes may be a major sediment contributor in unstable basins. The dominant substrate is course gravel to bedrock.

Channel Responsiveness
The presence of confining terraces or hill slopes and control elements such as bedrock substrates limits the type and magnitude of channel response to changes in input factors. Adjustment of channel features is usually localized and of a modest magnitude.

Riparian and In-stream Enhancement Opportunities
These channels are not highly responsive. In-channel enhancements may not yield intended results. Although channels are subject to relatively high energy, they are often stable. In basins where water temperature problems exist, the stable banks generally found in these channels lend themselves to establishment of riparian vegetation. In non-forested land, these channels may be deeply incised and prone to bank erosion from livestock. As such, these channels may benefit from controlling livestock.

Moderate Gradient Headwater Channel: MH
These moderate-gradient headwater channels are common to plateaus in Columbia River basalts, young volcanic surfaces, or broad drainage divides. They may be sites of headwater beaver ponds. These channels are similar to LC channels, but occur exclusively in headwater regions. They are potentially above the anadromous fish zone.

These gentle to moderate headwater streams generally have low stream flow volumes and, therefore, low stream power. The confined channels provide limited sediment storage in low-gradient reaches. Channels have a small upslope drainage area and limited sediment supply. Sediment sources are limited to upland surface erosion. The dominant substrate varies from sand to cobble or bedrock. Boulders may be present from erosion of surrounding slopes and soils.

Channel Responsiveness
The low stream power and presence of confining terraces or hill slopes and control elements such as bedrock substrates limit the type and magnitude of channel response to changes in input factors. Adjustment of channel features is usually localized and of a moderate magnitude.

Riparian and In-stream Enhancement Opportunities
These channels are moderately responsive. In basins where water temperature problems exist, the stable banks generally found in these channels lend themselves to establishment of riparian vegetation. In nonforested land, these channels may be deeply incised and prone to bank erosion from livestock. As such, these channels may benefit from controlling livestock access.

Chapter 4: Hydrology and Water Use

Introduction

The purpose of this component is to evaluate the major potential impacts of land and water use practices on the hydrology of Thirtymile Creek watershed. Alterations to the natural hydrologic cycle can potentially change peak flows and/or low flows. Depending on the alteration, water quality and aquatic ecosystems can be positively or adversely affected.

Background

To understand how water moves through a watershed, from ridge top to mouth of stream and back, it is important to review the hydrologic cycle. **Figure 4.1** demonstrates the hydrologic cycle.

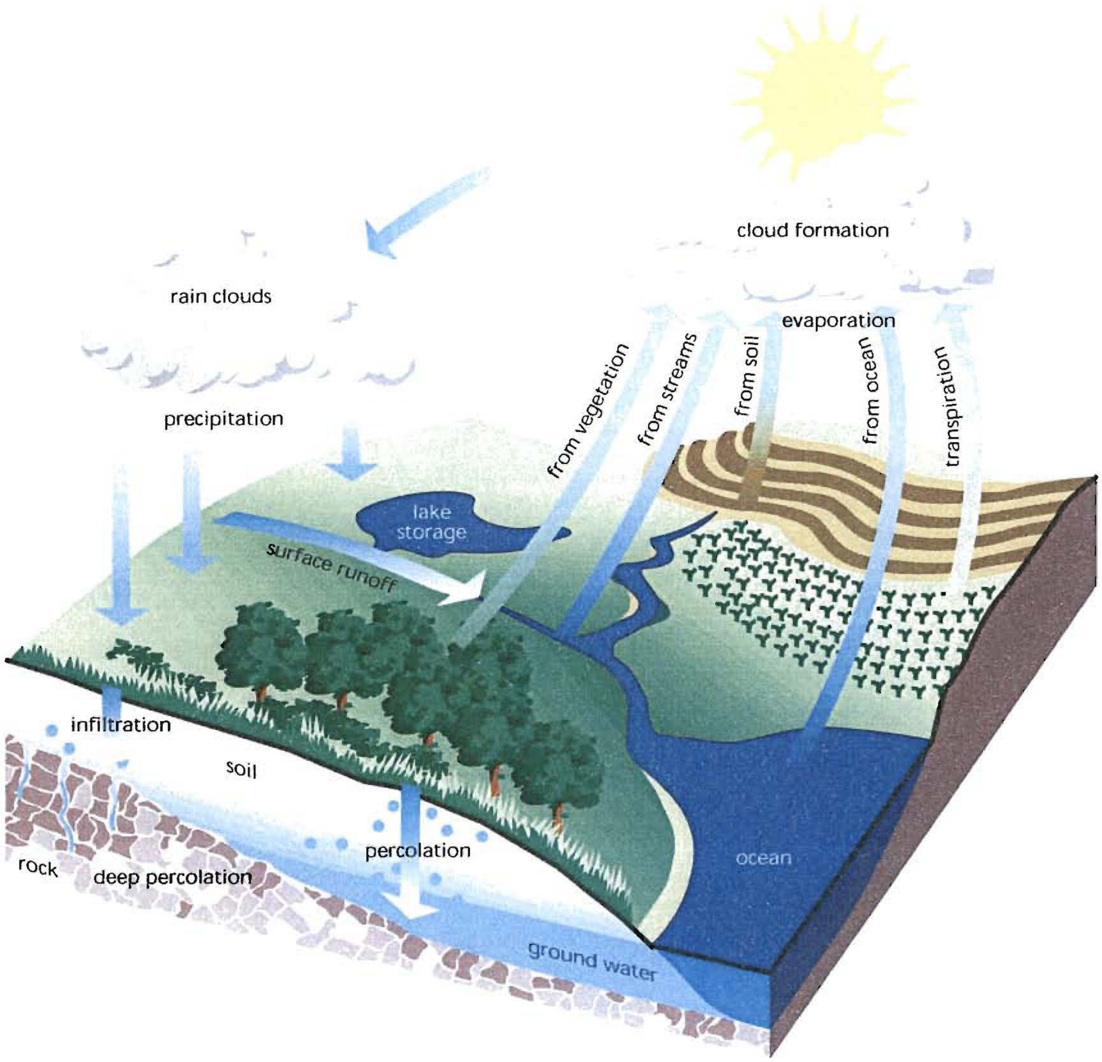


Figure 4.1 Source: <u>Stream Corridor Restoration: Principles, Processes, and Practices</u>

Surface Water
Surface water is fed by runoff from precipitation or groundwater seepage. Groundwater seepage occurs to streams when the ground water elevation is higher than the stream, resulting in a **hydraulic gradient** from the ground to the surface, due to the water table level and flow levels.

Groundwater
Groundwater is water held underground by soils and rock. As water infiltrates, it migrates vertically to the groundwater table. The amount of water held in the groundwater is dependent upon precipitation, hydraulic gradient, and void space in the soils or rock. During times of low flows, groundwater may supply water to stream channels. During high flows, groundwater can be recharged from nearby streams and channels.

Storage
Water storage can occur through manmade or natural conditions. Types of natural storage include snow pack, ponds, wetlands, and in the soil profiles. Man made storage includes reservoirs and ponds.

Peak Flows
Peak flows are the highest flow of water in a stream in a given year, and are not necessarily floods. Spring snowmelt or the occasional rain-on-snow event result in peak flows in the Thirtymile Creek watershed. However, precipitation is not the only factor influencing peak flows. Human changes in the landscape can cause areas to drain more rapidly than naturally, resulting in a higher, earlier peak flow. Human created storage can also cause areas to retain water further in the season, thereby decreasing the intensity and extending the duration of peak flow.

Low Flows
Low flows are the period of lowest flows of water in a stream in a given year. In the Thirtymile Creek watershed, low flows generally occur between July and September. Low flows affect water quality, as there is less water in a stream to dilute pollutants. Less water also heats more rapidly, contributing to increases in water temperature. Usually, the months when flows occur are the months that irrigated crops require the most water. While salmonids rely on high flows to enter and leave the system, they require water for "hatching" and rearing year-round.

Land Uses' Potential Effects on Hydrology
Forestry practices can result in the removal of vegetative cover, compaction of soils, road building, and culvert installation. Removing vegetation cover can lead to a short-term decrease in **evapotranspiration** and increased seasonal run-off (WPN 1999). Forestry practices can also have neutral to positive effects on the hydrology of the area.

Grazing alters plant community composition and can affect soil characteristics. Both can adversely affect infiltration rates, thus decreasing storage and increasing runoff. Surface runoff is the most common type of runoff on grazed lands (WPN 1999).

Agriculture can also dramatically affect stream flows. Farming can alter runoff rates on soils, depending upon the soil type and the agricultural practice. Agriculture has a greater effect on naturally highly permeable soils, as it can reduce the infiltration rates of the soil. In soils that are naturally of low permeability, this effect is much smaller (WPN 1999). Certain agricultural practices can increase infiltration rates, such as increasing organic matter in the soil and surface "litter" to reduce overland flows.

Leveling and field draining have resulted in the elimination of many wetlands and depressions that previously diffused flood peaks by providing detention storage (WPN 1999). These practices also have reduced infiltration opportunities, as surface and subsurface flows move faster into the channel network when not temporarily stored in wetlands, depressions, and the soil profile.

Water removed from streams for irrigation can result in lower stream flows. Irrigation ditches increase the velocity of surface and subsurface flows, thereby reducing infiltration opportunities. Removal of groundwater for irrigation and other consumptive uses can alter water table levels and affect stream flows, both positively and negatively (WPN 1999).

Rural residential development can result in larger impervious surfaces, reduced infiltration, and increased surface runoff. Ditches, gutters, and roads divert and route precipitation to streams faster than infiltration into the soil (WPN 1999).

Water Use

Water Rights

In Oregon, all water is publicly owned. To remove surface water, a water right is necessary. Some methods of removing groundwater also require a water right. Water rights are managed by the Oregon Water Resources Department (OWRD). Water rights information, including maps of points of diversion and places of use, can be accessed on the ORWD website. For more information on water rights, contact the Gilliam County Watermaster, 541-384-4207.

Water Availability

Oregon Water Resources Department allocates current water rights based on water availability in their Water Availability Basins (WABs). A water availability basin is an area of land that drains to the mouth of a stream, designated by OWRD for planning purposes. In the Thirtymile Creek watershed there is one WAB. **Map 4.3** shows the Water Availability Basin for Thirtymile Creek watershed.

For Water Availability Basins without historical stream flow data, a computer model is used to estimate water availability. As there have been no stream gages in the Thirtymile Creek watershed, this is the method for measuring water availability in the watershed. The model uses drainage area, elevation, precipitation, and other characteristics to calculate natural stream flow.

OWRD defines water availability as the amount of water physically and legally available for future **appropriation**. It is calculated as "natural stream flow minus consumptive uses minus in-stream water rights". Consumptive use is "any water use that causes a net reduction in stream flow". It is calculated with the assumption that the non-consumed water is returned to the stream from which it is diverted. In-stream water rights are "water rights held in trust by OWRD for the benefit of the people of Oregon to maintain water in-stream for public use".

When calculating water availability for water appropriation, OWRD determines natural stream flow at two **exceedance** levels: 50% and 80%. Stream flow data from the base period (1958-1987) is used to calculate exceedance levels. At the 50% exceedance, half the time the natural flows are above this value and half the time flows are below this value. Surface and ground water rights are allocated based on the 80% exceedance level (OWRD). In-stream and storage rights are allocated using the 50% exceedance level (WPN 1999).

Water availability for the consideration of issuance of new water rights is calculated by the following formula:

Water availability = natural stream flow (at the 50% or 80% level) – consumptive use of diverted water – in-stream rights

Methods

Data was gathered from a variety of sources. Anna Smith a hydrologist from the Bureau of Land Management, helped the author develop the estimated hydrograph for 30 Mile Creek. Geological information was gathered from maps and communication with Oregon Department of Geology geologists. Water rights and water availability information was accessed on-line at www.wrd.state.or.us.

Results

Climate

Average annual precipitation varies within the watershed. The driest month is July and the wettest month is November. (NOAA annual precipitation map). **Map 4.1** shows levels of annual precipitation in the 30 Mile Creek Watershed. **Table 4.1** shows precipitation, area and elevation by sub-watershed.

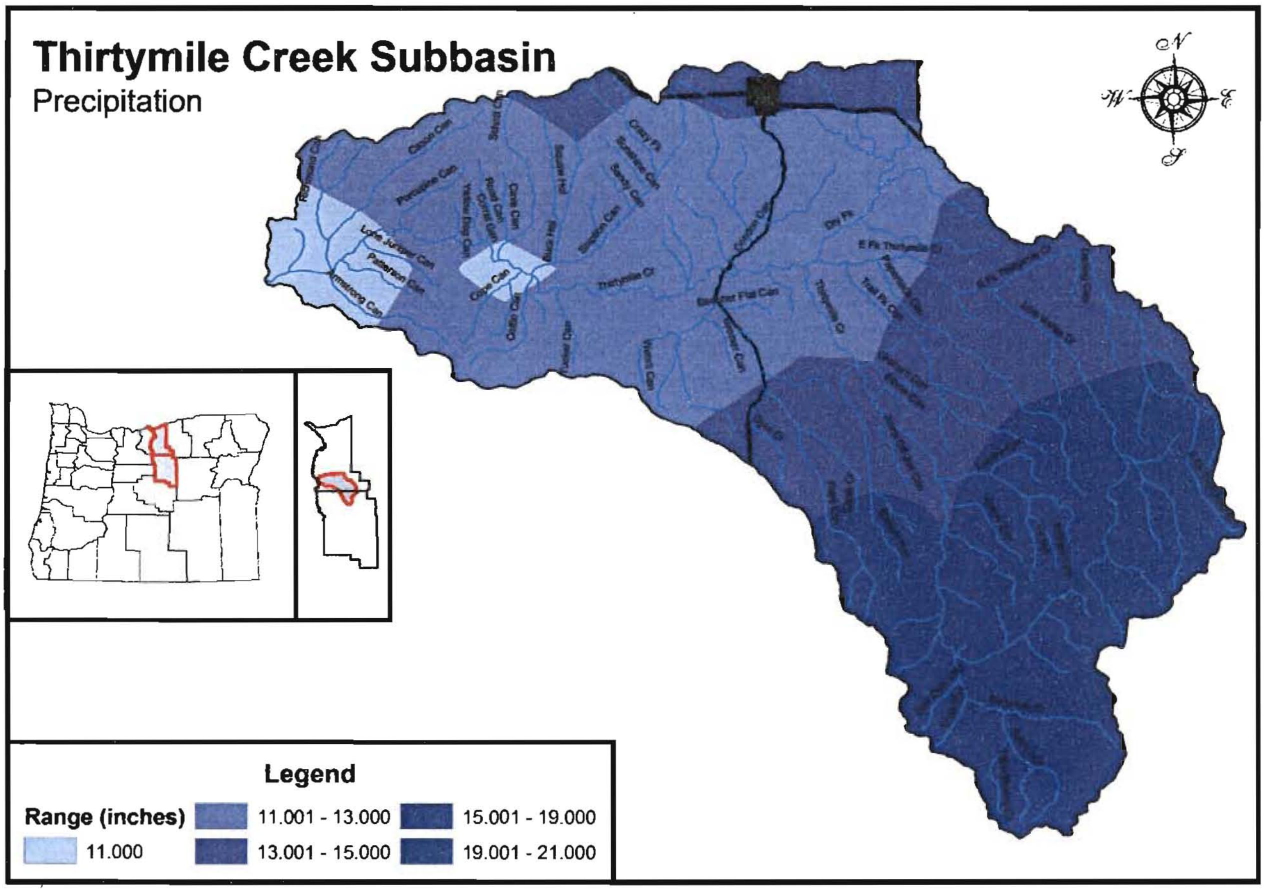
Only the Upper Thirtymile Creek Watershed includes the transient snow zone (3,000-5,000 feet). This is the area where rain-on-snow events usually occur. A rain-on-snow event is a peak flow generating process that occurs during a quick warming in the late winter, where rain falls on snow and causes large scale runoff. In years when rain-on-snow events occur, they are the primary peak flow generating event. But rain-on-snow events do not occur every year. Most years, the peak-flow generating process is spring snowmelt, which usually occurs between November and March. Intense summer storms with hail and fast heavy precipitation can also occur but not as often. Flood events usually occur in December and January, when warm temperatures and high precipitation results in high flows.

Table 4:1 Area, Elevation, and Annual Precipitation by Sub-watershed

Sub-watershed	Area (mi^2)	Minimum Elevation (ft)	Maximum Elevation (ft)	Mean Annual Precipitation (in)
Lower Thirtymile Creek	**72.9**	**971**	**2,950**	**12 in**
Upper Thirtymile Creek	**199**	**2,000**	**5,117**	**18 in**

sources: USGS topographic maps and NOAA annual precipitation map.

Map 4.1: Precipitation Map of the Thirtymile Creek Watershed



Geology
Map 4.2 shows the geology of the Thirtymile Creek watershed. Fault lines are included in the map. It can be speculated that the fault line along portions of Thirtymile Creek is the reason the creek is seasonally dry (personal conversation with, Mark Ferns, DOGAMI). The fault may act as a sink for the water, causing it to enter the fault and leave both the groundwater and surface water systems.

Springs and seeps are common in the Thirtymile Creek watershed. Many are the result of water stored in between basalt layers coming to the surface as the basalt erodes. As the sides of these ridges erode, they do so in a stair step, with the permeable rock exposed horizontally. It is at these levels that the springs come to the surface.

Stream Density
Table 4.2 shows stream density (341 stream miles/area) by sub-watershed in Thirtymile Creek watershed. These densities were calculated from the EPA 1:100,000 stream layer, which does not include all the small streams in the upper and lower watershed. Stream density can indicate the potential infiltration and runoff of an area.

Stream Flow
One way to summarize and display hydrologic information is through the development of a hydrograph. A hydrograph is the plot of stream flow over time. Stream flow is measured by stream gages placed in streams at specific locations. Where there is no stream gage, it is possible to create a representative hydrograph for the stream in question. Within the same basin, another stream of similar topography and drainage area that has a stream gage may be used instead.

Table 4.2: Stream Density

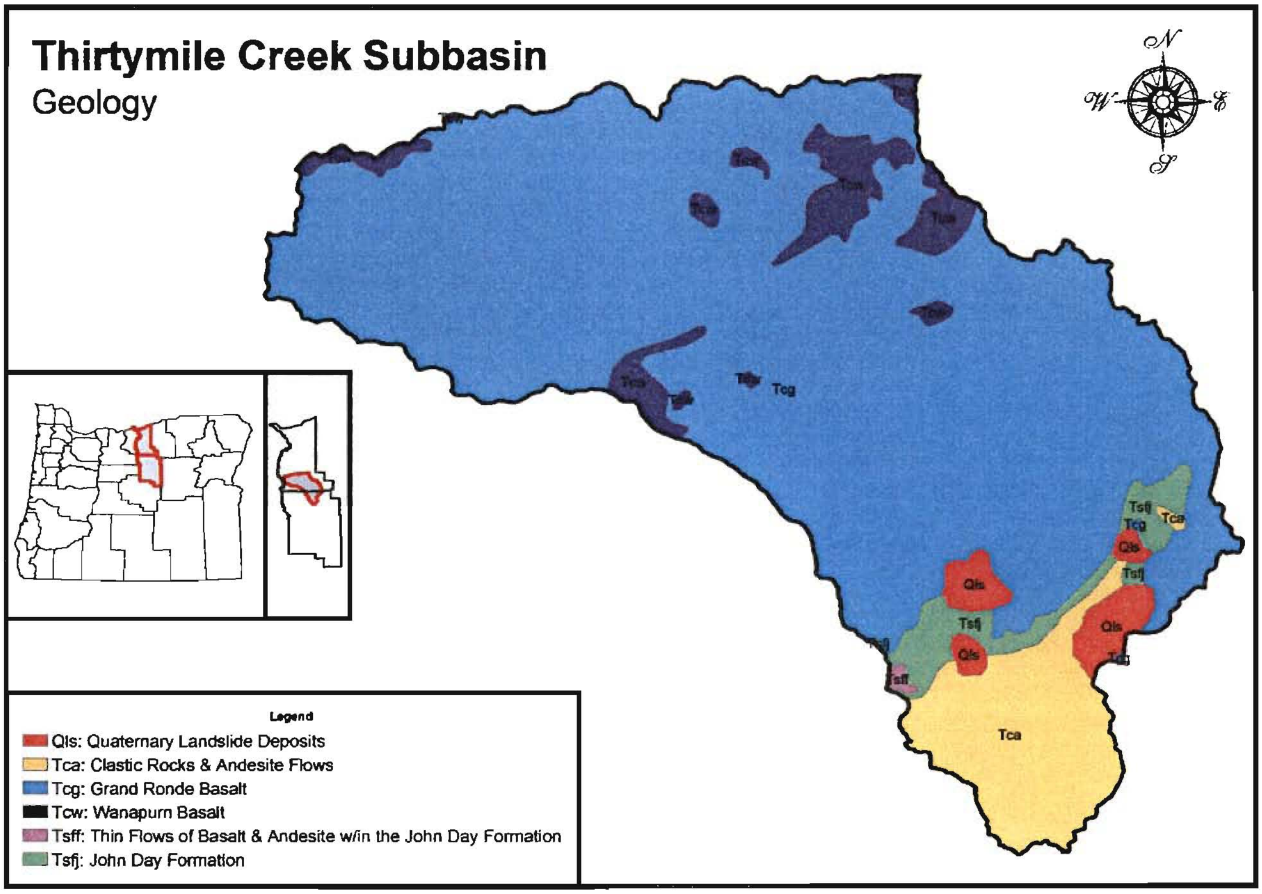
Sub-watershed	Stream Density (mi/mi²)	Total Stream Miles
Thirtymile Creek	**1.3**	**341 Miles**

Source: EPA 1:100,000 Stream Layer

As Thirtymile Creek has never had a stream gauge, this method was used to generate its hydrograph. Nearby Pine Creek in Wheeler County (drainage area = 64.96mi²). This stream has a stream gauge and is a smaller drainage area and stream size. The average unit discharges (average discharge divided by the drainage area) were averaged, as to minimize watershed-specific differences in drainage area and flow. The average cfs/year was multiplied by a percentage for each month, to generate the hydrograph over a year's time. The percentages per month were obtained from the statistical summaries calculated for the stream gauge on the John Day River below Thirtymile Creek.

Figure 4.2 shows the generated hydrograph for Thirtymile Creek. Monthly percentages used to calculate monthly discharge are listed in the table. This is an estimated average hydrograph, which will only show the general characteristic of flow in the Thirtymile Creek watershed. Peak flows are generated in early spring/late spring. Low flows generally occur during late summer to early fall.

Map 4.2: Geology of the Thirtymile Creek Watershed



Map 4.3: Fault Lines Within Thirtymile Creek Watershed

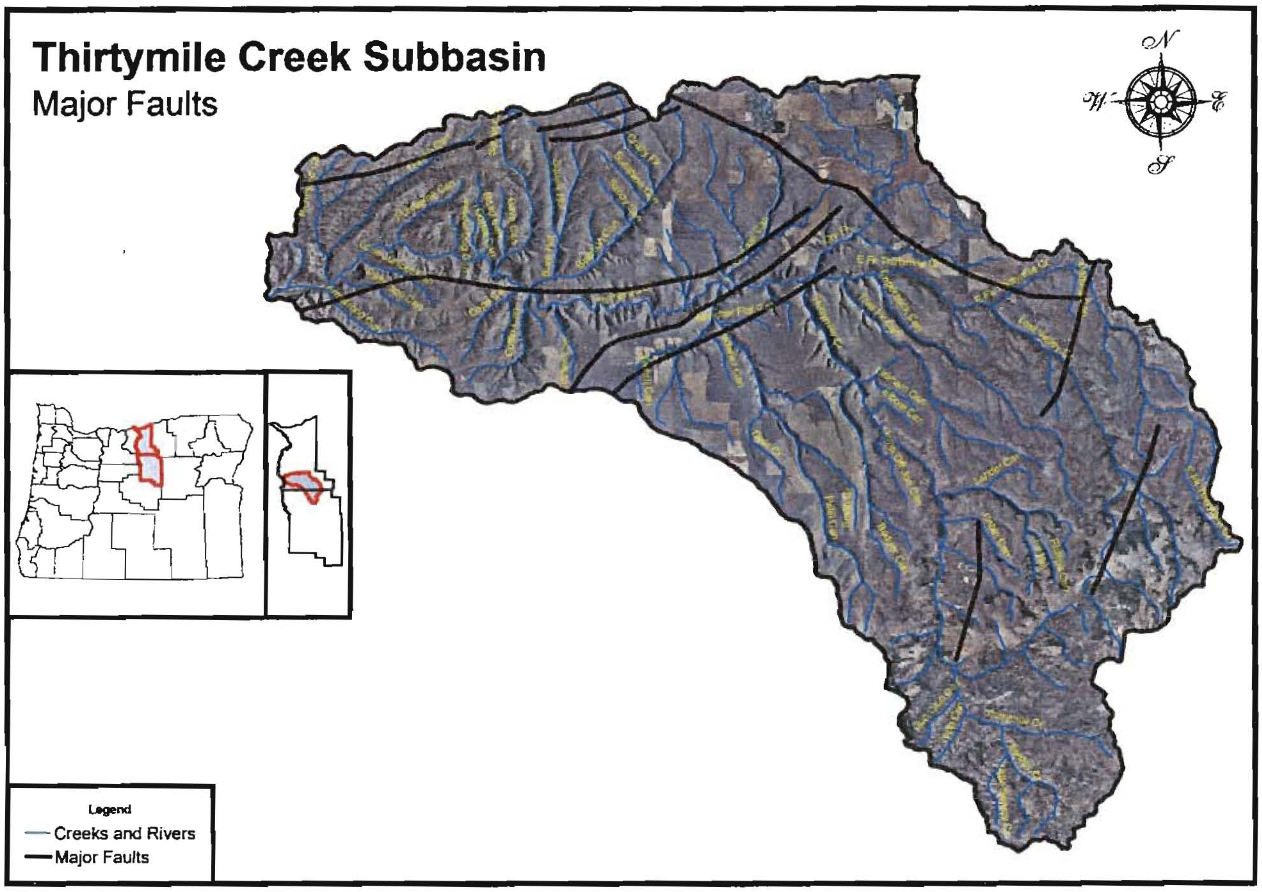
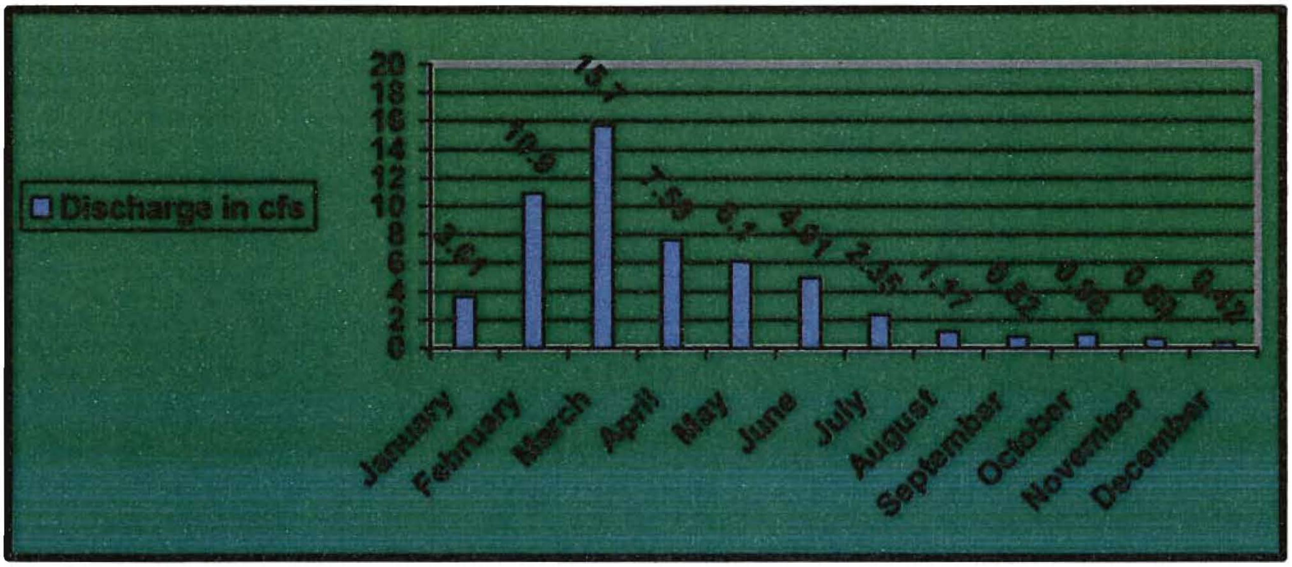


Figure 4.2: Estimated Average Monthly Discharge of Thirtymile Creek



Analysis of Hydrologic Impacts of Land Uses

Peak flows and low flows can be affected by land uses, as mentioned in the introduction of this component. This section includes basic analysis that measure the potential of various land uses to affect peak and low flows in the watershed.

Forestry

Historically, lower elevation forests in the watershed were open and park-like, with a species composition of large ponderosa pines. This was caused because fire was a natural part of the eco-system and ponderosa pine was relatively fire resistant. The **crown closure** (the amount of canopy cover in a given area) was historically less than 30% in these stands. In higher elevation forests, the species composition was a variety of conifers, and the forests were denser, with a crown closure greater than 30%.

As species composition in the once ponderosa pine forest has diversified to include other conifers, the crown closure has increased. Though the total acreage is small, stands that have always been dense, mixed conifer forests, for the most part, have crown closures greater than 30%. Potential of crown closure to affect peak flows was analyzed using the Washington State Department of Natural Resources Interim Rain-on-Snow Rules. This process determines potential as low or at risk by looking at the percent of forestry land use area above rain-on-snow area with less than 30% crown closure. About 90% of the forestry land use area is in the 3,000-5,000 feet rain-on-snow zone. In order for the rain-on-snow forested lands to affect peak flows, there would have to be 65% of those lands with less than 30% crown closure. From close observations while in the field, numerous field measurements, and aerial photo review it is estimated that 50% of those lands in the rain-on-snow zone have less than 30% crown closure, Therefore, the potential is **LOW** for the forested lands to be contributing to changes in peak flows in the Thirtymile Creek watershed at this time.

Percent Equivalent Clearcut Acre (ECA) is a measurement used to estimate the effect of timber harvesting on the hydrology of a watershed. Equivalent clearcut acres were calculated for the Umatilla National Forest Analysis. The Thirtymile Creek watershed's ECA was 3.2%. As the level of concern for Equivalent Clearcut Acres is 15%, this watershed is well under the level where timber harvest would detrimentally affect the hydrology of the area.

Agriculture and Range Lands
Range lands is the major land use in the Thirtymile Creek watershed, accounting for 50% of the total acres. Agriculture is second with 29% and the most abundant crop is a wheat/summer fallow rotation.

The Natural Resources Conservation Service has calculated runoff curves for various agricultural and range practices, along with background curves of runoff for lands in natural condition. Soil types are assigned a hydrologic soil group, depending upon infiltration rates. Hydrologic soil group (HSG) A has the highest infiltration rate and (HSG) D has the lowest infiltration rate.

Potential change in runoff was calculated for each agricultural and range practice in the Thirtymile Creek watershed by comparing each practice's runoff curve with background curves. The background curves used were grassland in good hydrologic condition and woods in good hydrologic condition (for areas where forests were converted into farmland). **Appendix 4.1** details the results. The majority of crop and range land management practices had low or moderate potentials to cause a change in runoff that would affect peak flows in the watershed. Thus, the overall potential of agriculture and range land uses affecting peak flows in the Thirtymile Creek watershed was **LOW TO MODERATE.** This is only a measurement of cultivation practices and their effects on the hydrology. It does not account for how irrigation ditches, tiling, land leveling, loss of wetlands, conversion of land from forest to crop land, and other changes in the watershed that have improved conditions for agriculture have affected the hydrology of the watershed. **To understand these practices' effects on the watershed's hydrology would require a more in-depth analysis.**

Roads
Road density in the Thirtymile Creek watershed was calculated by multiplying public road mileage by an average width of .0066 for county and private roads and an average width of .0047 miles for forest service roads. **Table 4.3** shows the total miles of roads and road density in the Thirtymile Creek watershed, by sub-watershed.

Table 4.3: Road Mileage in the Thirtymile Creek Watershed

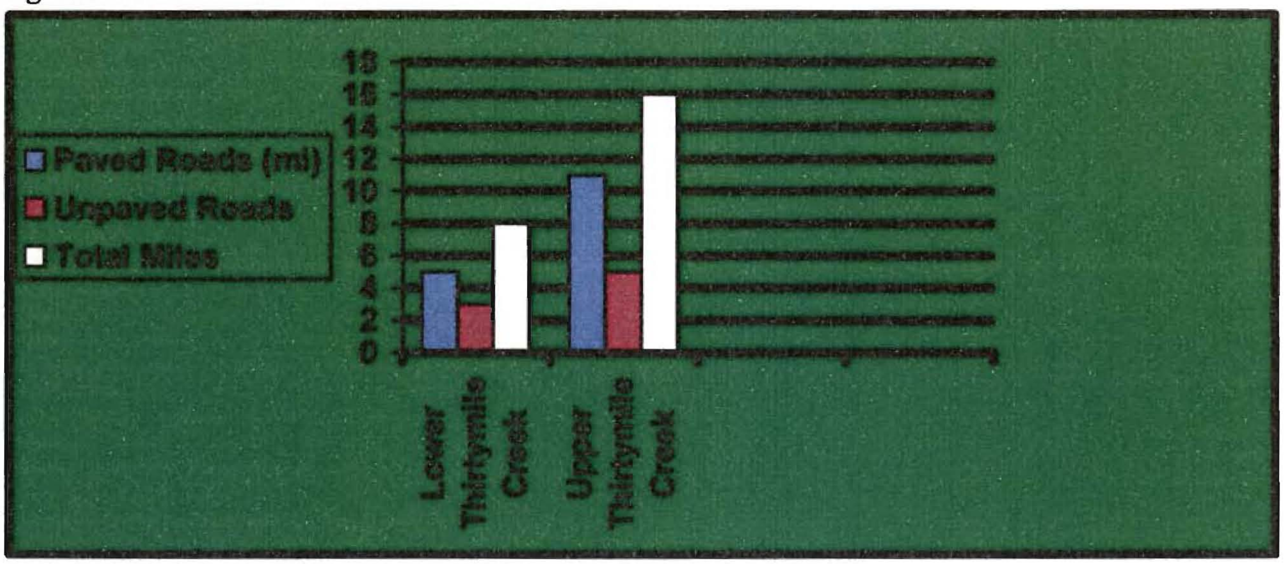
Sub-watershed	Total Road Miles	Road % of Total Area	Total Road Area (mi^2)
Lower Thirtymile Creek	8 Miles	<1%	.05(mi^2)
Upper Thirtymile Creek	16 Miles	<1%	.11(mi^2)
Total	24 Miles	<1%	.16(mi^2)

Source: ODOT road shapefile data

Road densities greater than 4% of total land area are considered to have the potential to affect runoff and peak flows (WPN 1999). As the Thirtymile Creek watershed and each of its sub-watersheds fall far below road densities of 4%, the potential that roads are influencing peak flows and runoff is **LOW.**

As infiltration rates and runoff patterns are affected by road surfaces, paved, and unpaved road mileage was calculated. **Figure 4.3** shows paved and unpaved road mileage. Unpaved roads include both native surface and rock, which differ in infiltration rates and as a sediment source.

Figure 4.3: Road Surfaces In Watershed



Rural Residential

Impervious surface was calculated using the estimated acreage of Rural Residential (514 acres, 0.29% of watershed). Average lot size of the rural residential area was estimated at 1 acre, with a corresponding average impervious area of 20%. Percent of impervious surface in the Thirtymile Creek watershed was determined to be <1%, with a corresponding **LOW** potential for affecting peak flows. Low potential is any watershed with an impervious surface of less than 5 percent (OWEB 1999).

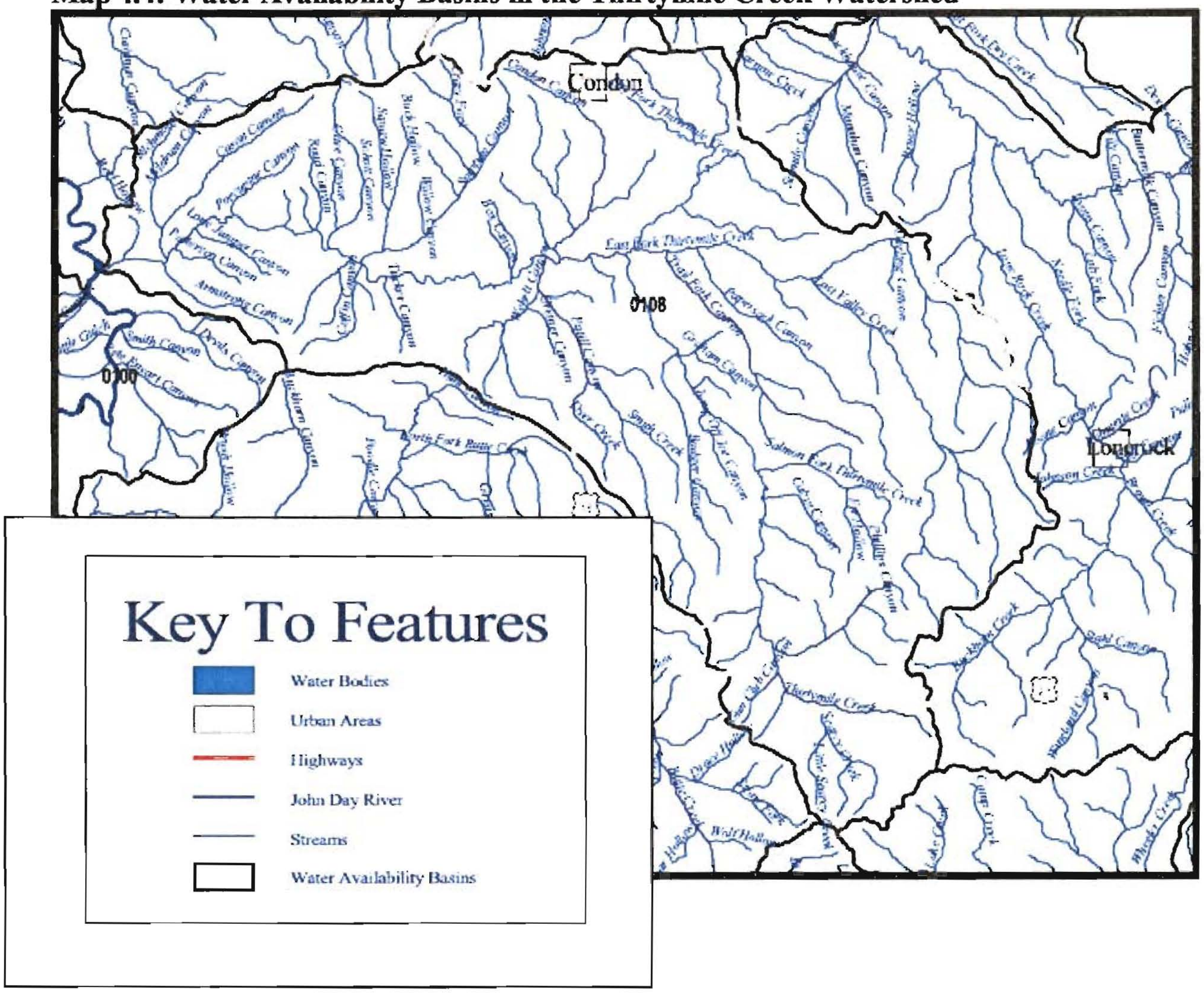
Water Use

Types of consumptive uses in the Thirtymile Creek watershed were obtained from the WARS database for each Water Availability Basin. **Table 4.4** shows these uses in each WAB. In each WAB, irrigation is the primary consumptive use. **Map 4.4** shows the Water Availability Basins in the Thirtymile Creek watershed.

Table 4.4: Consumptive Uses by Water Availability Basin in the Thirtymile Creek Watershed

Water Availability Basin	Irrigation	Domestic	Storage
Thirtymile Creek	99%	1%	0%

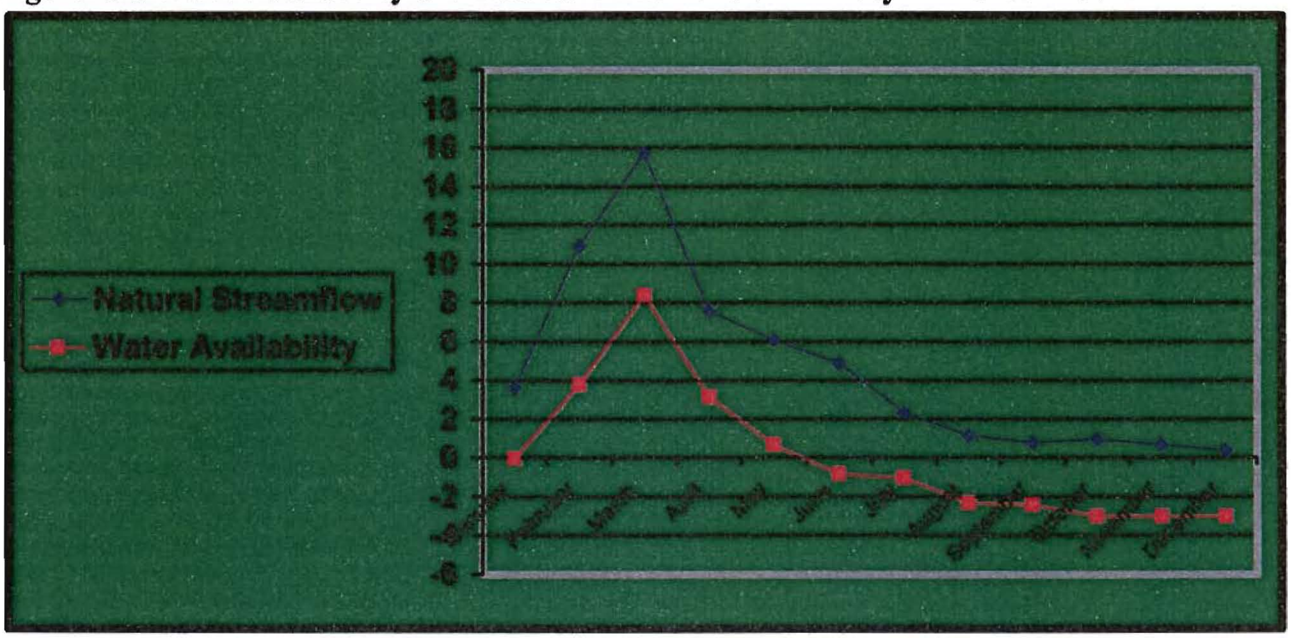
Map 4.4: Water Availability Basins in the Thirtymile Creek Watershed



Water Availability

Water availability information at the 50% and 80% exceedance levels was obtained from the Water Availability Database System (WARS) at the OWRD website (www.wrd.state.or.us). **Figure 4.4** graph water availability and natural stream flow for each WAB at the 80% exceedance level. Note that both in-stream water rights and consumptive uses are the difference in cfs between water availability and natural stream flow. **Where water availability goes negative, water rights are over allocated.**

Figure 4.4: Water Availability and Natural Stream Flow in Thirtymile Creek Basin



Discussion

Climate, soils, and geology are major determinants of the natural hydrology of a watershed. Since the majority of precipitation in the Thirtymile Creek watershed occurs as snow, snow melts are the cause of peak flows. The period of low flows occurs during summer months when there is little precipitation. There are also a number of springs in the watershed located at different elevations throughout the system. Some of these springs provide varying amounts of water throughout the year. Others are seasonal springs, releasing water during the late winter and early spring months. Because of the steep, narrow banks and high infiltration rates water is rapidly absorbed into the soils. During the hot and dry months this causes the creek to dry up on the surface in some locations. It is what also causes flooding when the soil profile is full and there is heavy spring run off.

Land uses have affected the hydrology of Thirtymile Creek through changing soil infiltration rates, the relationship between ground and surface waters, and diminishing already natural low flows. Given that there were many historical wetlands in the bottomlands of Thirtymile Creek (see Chapter 6: Wetlands), the subsequent major flooding events has dramatically changed the length of time soils are saturated, thereby reducing groundwater recharging in the spring. Most of this was caused by the removal of woody vegetation along the creeks riparian area.

Of the land use effects on hydrology assessed in this chapter, all, except agriculture, had low potentials to affect peak flows in the watershed. Change in crown closure over time has probably not affected peak flows, as there is currently denser crown closure than historically and the amount of ECSs is small. Rural residential lands in the watershed have a relatively small impervious layer, thus not affecting overall hydrology. Agriculture and range lands had a low to moderate potential to affect peak flows. Agriculture and range lands were assessed only by the difference in runoff rates due to crop and range management practices, but did not evaluate the impact of irrigation, or grazing intensities. These are much more difficult to quantify, especially given the lack of data, but are probably the land use activities that have most greatly impacted the watershed's hydrology.

Water is primarily used for irrigation, with some allocated for domestic uses. As shown by OWRD's Water Availability modeling, water is over-allocated from May on, meaning that there are more water rights than there is flow in the stream system. As these months include months of low flow (July-September), water uses in the Thirtymile Creek watershed are affecting low flows and water quality. It should be noted that even though there are more water rights than water in Thirtymile Creek many of those rights don't appear to be used on a consistent basis.

Data Gaps

- Flow data
- Historical hydrological information
- Miles of private roads

References

United States. US Geological Survey. Statistical Summaries of Streamflow Data in Oregon: Volume 1-Monthly and Annual Streamflow, and Flow-Duration Values, Open-File Report 90-118, Prepared in cooperation with the Oregon Water Resources Department

Stream Corridor Restoration: Principles, Processes, and Practices. The Federal interagency Stream Restoration Working Group, 1998.

Watershed Professionals Network. Oregon Watershed Assessment Manual. Salem, Oregon: prepared for the Governor's Watershed Enhancement Board, June 1999.

Appendix 4.1: Analysis of Agricultural and Range Lands for Potential Change in Peak Flow

Cover Type/Conservation Practice/Hydrologic Condition/HSG	Runoff Curve	Back ground	Back ground Runoff Curve #	Rainfall Lower Range (in)	Rainfall Upper Range (in)	Runoff Depth Lower Range	Runoff Depth Upper Range	Runoff Depth Back ground Lower Range	Runoff Depth Back ground Upper Range	Change in Runoff, Range	Potential to Affect Peak Flow
Previously Forested, Now Cultivated/Range Land											
Small Grain/Straight Row/Poor/B	76	Woods Good B	55	1.4	1.8	0.13	0.29	0.0	0.0	.13-.29	Low
Small Grain/Straight Row/Good/B	75	Woods Good B	55	1.4	1.8	0.13	0.29	0.0	0.0	.13-.29	Low
Small Grain/Straight Row/Poor/C	84	Woods Good C	70	1.4	1.8	0.39	0.65	0.06	0.17	.33-.48	Moderate
Small Grain/Straight Row/Good/C	83	Woods Good C	70	1.4	1.8	0.39	0.65	0.06	0.17	.33-.48	Moderate
Pasture, Grassland, or Range/Poor/B	79	Woods Good B	55	1.4	1.8	0.24	0.44	0.0	0.0	.24-.44	Moderate
Pasture, Grassland, or Range/Fair/B	69	Woods Good B	55	1.4	1.8	0.06	0.17	0.0	0.0	.06-.17	Low
Pasture, Grassland, or Range/Good/B	61	Woods Good B	55	1.4	1.8	0.0	0.03	0.0	0.0	0-.03	Low
Pasture, Grassland, or Range/Poor/C	86	Woods Good C	70	1.4	1.8	0.39	0.65	0.06	0.17	.33-.48	Moderate
Pasture, Grassland, or Range/Fair/C	79	Woods Good C	70	1.4	1.8	0.24	0.44	0.06	0.17	.18-.27	Low
Pasture, Grassland, or Range/Good/C	74	Woods Good C	70	1.4	1.8	0.13	0.29	0.06	0.17	.07-.12	Low
Previously, Grassland, Now Cultivated/Range Land											
Small Grain/Straight Row/Poor/B	76	Herb/Good/B	62	1.4	1.8	0.13	0.29	0.0	0.03	.13-.26	Low
Small Grain/Straight Row/Good/B	75	Herb/Good/B	62	1.4	1.8	0.13	0.29	0.0	0.03	.13-.26	Low
Small Grain/Straight Row/Poor/C	84	Herb/Good/C	74	1.4	1.8	0.39	0.65	0.13	0.29	.26-.36	Moderate
Small Grain/Straight Row/Good/C	83	Herb/Good/C	74	1.4	1.8	0.39	0.65	0.13	0.29	.26-.36	Moderate
Pasture/Grassland, or Range/Poor/B	79	Herb/Good/B	62	1.4	1.8	0.24	0.44	0.0	0.03	.24-.41	Moderate
Pasture/Grassland, or Range/Fair/B	69	Herb/Good/B	62	1.4	1.8	0.06	0.17	0.0	0.03	.06-.14	Low
Pasture/Grassland, or Range/Good/B	61	Herb/Good/B	62	1.4	1.8	0.0	0.03	0.0	0.03	0.0	Low
Pasture/Grassland, or Range/Poor/C	86	Herb/Good/C	74	1.4	1.8	0.39	0.65	0.13	0.29	.26-.36	Moderate
Pasture/Grassland, or Range/Fair/C	79	Herb/Good/C	74	1.4	1.8	0.24	0.44	0.13	0.29	.09-.15	Low
Pasture/Grassland, or Range/Good/C	74	Herb/Good/C	74	1.4	1.8	0.13	0.29	0.13	0.29	0.0	Low

rainfall was estimated from NOAA 2yr 24 hr precipitation map, runoff curves used were calculated by the NRCS and obtained from the OWEB Watershed Assessment manual, background curve used was herbaceous-mixture of grass, weeds, and low-growing brush, with brush the minor element in good hydrologic condition

Chapter 5: Riparian

Introduction

This chapter describes current conditions of riparian areas in the Thirtymile Creek watershed as compared with potential riparian ecosystems for the purpose of identifying restoration.

Background

Riparian vegetation, i.e. the plant communities along streams and rivers, plays many important roles in aquatic ecosystems. It shades streams, keeping water temperatures from warming. It furnishes cover for fish populations, dissipates stream velocity, stabilizes stream banks, helps filter pollutants and sediments, and provides food and habitat for many aquatic and terrestrial animals. During peak flows, riparian vegetation may slow and dissipate floodwater energies, thereby preventing streambank and bed erosion (WPN 1999). Riparian vegetation can provide a buffer between aquatic ecosystems and adjacent land uses.

By measuring riparian vegetation cover, the amount of shade and potential recruitment for large woody debris (LWD) can be estimated. Large woody debris, which includes dead trees, root wads, and large limbs, is important to stream structure and fish habitat. When dead trees or limbs enter the stream system, water flow patterns are changed and pools are created. These pools capture gravel and sediment and provide sheltered habitats for fish and other aquatic species.

Methods

Aerial photographs taken in May of 1996, orthophoto's and on the ground data were the primary source used to measure riparian cover. Stream banks were divided into numerous Riparian Condition Units (RCU), where the amount of riparian vegetation and adjacent land uses were relatively constant throughout each individual unit. For each RCU, the following parameters and descriptions of the unit and stream were also noted: RCU number, bank (right or left); length of RCU; stream name; sub-watershed; ecoregion; channel habitat types; stream size; width of vegetation directly along stream banks; discontinuities due to land use; riparian recruitment situation; level of shade; and vegetation. Some field checking was made to ensure correct identification of vegetation. This data should only be used as a general overview of riparian conditions in the watershed.

Materials used in the riparian assessment were:

- 1996 Orthophotoquads
- Computerized measuring tool
- USGS Topographic maps
- ODFW Fish and Habitat survey

Shade was measured in terms of low, medium, and high, as determined by the OWEB assessment manual. Low shade is where the stream surface is visible and banks are entirely visible or visible at times (<40%). Medium shade is where the stream surface is visible, but the banks are not visible (40-70%). High shade is where the stream surface is not visible, is slightly visible, or is visible in patches (>70%).

Riparian vegetation was measured in terms of abundance (sparce/dense), size (small, medium, large **diameter at breast height [dbh]),** and dominant species (herbaceous/grasses, brush, hardwood, conifer, mixed species, (conifer/hardwood). Results of vegetation were simplified, thus excluding size of dominant vegetation. Habitat surveys were lacking or very brief that were conducted at redd sites while mapping anadromous fish habitat.

Results

Riparian conditions were measured on the main stream of Thirtymile Creek and 6 tributary streams (Sniption, Badger, Searcy, Little Searcy, East Fork Thirtymile, and Trail Fork) in the Thirtymile Creek watershed. A total of 200 units were assessed for a total of 81.6 miles. Thirtymile Creek (40.1 miles), Sniption Creek (7.4 miles), Badger Canyon (1.8 miles), Little Searcy Creek (2.3 miles), Searcy Creek (3.4 miles), Trail Fork Canyon (8.3 miles), and East Fork Thirtymile Creek (18.6 miles) were surveyed from the mouth to the headwaters.

Table 5.1: Shading along Creeks in Thirtymile Creek Watershed

Shade Catigory	Thirtymile Creek	Sniption Creek	Badger Canyon	Searcy Creek	Little Searcy Creek	East Fork Thirtymile Creek	Trail Fork Canyon
High (>70%)	10.5%	0%	0%	22%	21%	0%	0%
Medium (40-70%)	16%	1%	0%	69%	56%	8%	7%
Low (<40%)	73.5%	99%	100%	9%	23%	92%	93%
Total	100%	100%	100%	100%	100%	100%	100%

Table 5.2: Vegetation Types on Thirtymile Creek and Tributaries

Vegetation	Thirtymile Creek	Sniption Creek	Badger Canyon	Searcy Creek	Little Searcy Creek	East Fork Thirtymile Creek	Trail Fork Canyon
Herbaceous/ Grasses	43.5%	99%	100%	18%	8%	80%	78%
Sparse Brush	30%	1%	0%	4%	15%	12%	15%
Sparse Hardwood	1%	0%	0%	0%	0%	0%	2%
Sparse Mixed Trees	13%	0%	0%	22%	41%	3%	5%
Sparse Conifer	2%	0%	0%	47%	15%	5%	0%
Dense Brush	2%	0%	0%	0%	4%	0%	0%
Dense Hardwood	4%	0%	0%	0%	0%	0%	0%
Dense Mixed Trees	4%	0%	0%	1%	7%	0%	0%
Dense Conifer	.5%	0%	0%	8%	10%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

Appendix 5.1 shows potential streamside vegetation by **ecoregion** in the watershed. Of the streams surveyed they all fall within three ecoregions, Umatilla Plateau (10C), Deschutes/John Day Canyons (10K), and John Day/Clarno Highlands (11b).

Streamside vegetation width (how far from the stream riparian vegetation extends) is naturally dependent upon ecoregion and the confinement of the stream (See Appendix 5.1). Land uses can also limit riparian vegetation widths. Agriculture, the main limiting land use in the watershed limits riparian width in many reaches to less than what would occur naturally. In many reaches, native riparian vegetation was almost entirely replaced with agriculture or altered by pasture use.

Discussion

Shade from riparian vegetation is important for maintaining cool water temperatures. As Thirtymile Creek has little shade for almost the entire length on the lower end of the stream, its high summer temperatures (see Chapter 7: Water Quality) are likely due, in part, to lack of shade. Seventy percent of the streams in Thirtymile Creek have little or no shade. If you take out Searcy and Little Searcy Creeks (which are forest streams) 91.5% of the riparian areas in the Thirtymile Creek drainage have little or no shade.

Amounts of large woody debris in the Thirtymile Creek watershed were found to be low in number or nonexistent. This attribute was not studied in this evaluation but it should be noted that because of the lack of shade or the vegetation that produces shade it can be assumed that woody vegetation is also severely lacking. As large woody debris plays an integral role in pool creation, this lack of in-stream wood and a lowered potential for future recruitment can have far reaching effects on stream structure and fish habitat.

Lack of riparian vegetation or vegetation without large and deep root systems also can contribute to bank instability. Bank instability is quantified as bank erosion, which can contribute to sediment problems. It also widens streams, which can make the vegetation present less effective for maintaining cool water temperatures.

Data Gaps:

- Woody debris amounts/values/needs within watershed
- Erosion measurements comparing existing status with proper functioning

References

Ecosystem Appendix, Oregon Watershed Assessment Manual, Salem, Oregon; prepared for the Oregon Watershed Enhancement Board, 2001.

Watershed Professionals Network. Oregon Watershed Assessment Manual, Salem, Oregon; prepared for the Governor's Watershed Enhancement Board, 1999.

Appendix 5.1: Potential Streamside Vegetation

Table 1: Umatilla Plateau (10c) Ecoregion

CHT Group	RA1 Zone	RA1 Description	RA2 Width	RA2 Description	Other Considerations
Constrained	0-25'	**Type:** Shrubs such as Douglas spirea, red osier dogwood, willows, water birch, and mountain alder. **Size:** N/A **Density**: N/A	**N/A**	**Type: N/A Size: N/A Density: N/A**	
Semi-constrained	0-50'	**Type**: Shrubs such as Douglas spirea, red osier dogwood, willows, water birch, and mountain alder. **Size**: N/A **Density:** N/A	**N/A**	**Type: N/A Size: N/A Density: N/A**	
Un-constrained	0-75'	**Type**: Shrubs such as Douglas spirea, red osier dogwood, willows, water birch, and mountain alder. **Size**: N/A **Density:** N/A	**N/A**	**Type: N/A Size: N/A Density: N/A**	

Current Streamside Conifer Regeneration: Naturally not present.

Upland Vegetation: Agricultural crops (primarily wheat). Native vegetation includes bluebunch wheatgrass, Idaho fescue, rose, hawthorn, and snowberry.

Historic Crown Closure: Less than 30%.

Land Uses: Wheat farming, grazing.

Other:

Source: Ecoregion Appendix for the Oregon Watershed Assessment Manual

Table 2: Deschutes/John Day Canyons (10k) Ecoregion

CHT Group	RA1 Zone	RA1 Description	RA2 Width	RA2 Description	Other Considerations
Constrained	0-25'	**Type:** Hardwoods (white alder, willow) and shrubs such as willow and red osier dogwood. Infrequent ponderosa pine. **Size:** Medium **Density**: Sparse	**N/A**	**Type: N/A** **Size: N/A** **Density: N/A**	
Semi-constrained	0-50'	**Type**: Hardwoods (white alder, willow) and shrubs such as willow and red osier dogwood. Infrequent ponderosa pine.. **Size**: Medium **Density:** Sparse	**N/A**	**Type: N/A** **Size: N/A** **Density: N/A**	
Un-constrained	0-75'	**Type:** Hardwoods (white alder, willow) and shrubs such as willow and red osier dogwood. Infrequent ponderosa pine. **Size**: Medium **Density:** Sparse	**N/A**	**Type: N/A** **Size: N/A** **Density: N/A**	

Current Streamside Conifer Regeneration: Few occur naturally.

Upland Vegetation: Agricultural crops (primarily wheat). Native vegetation includes juniper, bluebunch wheatgrass, Idaho fescue, rose, hawthorn, and snowberry.

Historic Crown Closure: Less than 30% historic crown closure.

Land Uses: Wheat farming, grazing, recreation.

Other:

Source: Ecoregion Appendix for the Oregon Watershed Assessment Manual

Table 3: John Day/Clarno Highlands (11b)

CHT Group	RA1 Zone	RA1 Description	RA2 Width	RA2 Description	Other Considerations
Constrained	0-25'	**Type:** Hardwoods (alder & cottonwood) and shrubs (willows, Sitka alder, mountain alder) **Size:** Small **Density**: Dense	25-100'	**Type:** Conifers (infrequent true fir and ponderosa pine) **Size: Medium** **Density: Sparse**	Fire suppression in recent decades has caused an increase in true fir dominance. See Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type:** Hardwoods (alder & cottonwood) and shrubs (willows, Sitka alder, mountain alder and common snowberry) **Size:** Small **Density**: Dense	50-100'	**Type:** Conifers (infrequent true fir and ponderosa pine) **Size: Medium** **Density: Sparse**	Fire suppression in recent decades has caused an increase in true fir dominance. See Kovalchik (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type:** Hardwoods (alder, willow, aspen & cottonwood) and shrubs (willows, Sitka alder, mountain alder and common snowberry, shrubby cinquefoil) **Size:** Small **Density**: Dense	75-100'	**Type:** Conifers (infrequent true fir and ponderosa pine) **Size: Medium** **Density: Sparse**	Fire suppression in recent decades has caused an increase in true fir dominance. Under certain circumstances, there are few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as beaked sedge or aquatic sedge at higher elevations. See Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Some true fir, ponderosa pine.

Upland Vegetation: Native vegetation includes grasses, ponderosa pine, true fir.

Historic Crown Closure: Historically and currently, the forests in this ecoregion were highly variable. Historic canopy closure was <30% in the areas dominated by ponderosa pine savannas. Some park-like ponderosa pine stands had canopy closures of 40%-60%. Some pole sized stands that originated after fire had densities of greater than 70%. Other forest types in this region also had canopy closures of greater than 30%.

Land Uses: Grazing, timber harvest .

Other:

Source: Ecoregion Appendix for the Oregon Watershed Assessment Manual

Chapter 6: Wetlands

Introduction
This chapter identifies wetlands in the watershed and examines their role in the hydrology of the area. Restoration opportunities are also discussed.

Background
Wetlands are areas with saturated, or **hydric,** soils dominated by water tolerant plants (The Oregon Wetlands Conservation Guide). The term "wetlands" generally include swamps, marshes, bogs, and similar areas. The Army Corps of Engineers defines wetlands as "those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated conditions" (qtd. In WPN 1999). Wetlands are often located in riparian areas, but they also can occur in upslope areas with no obvious connection to stream channels.

Wetlands in Oregon are protected and regulated by the Division of State Lands, under the state Removal-Fill Law, the Army Corps of Engineers, under the federal Clean Water Act, and for some agricultural wetlands, the Natural Resources Conservation Service, under a provision in the Federal Food Securities Act (Morlan 1990).

Wetlands provide many important functions to the landscape, including water quality improvements, flood control, groundwater charging, and habitat for fish and wildlife. By trapping sediments and contaminants and slowing the flow of runoff, wetlands help maintain good water quality. By storing, intercepting, and delaying runoff, wetlands can reduce downstream flooding. Wetlands are also strongly associated with groundwater. Some wetlands can recharge aquifers, which can help extend streamflows during the drier months. In eastern Oregon, the duration of streamflow has been extended by restoring wet meadows in headwaters (WPN 1999). Many plants, fish, and wildlife have co-evolved with wetlands and are dependant upon them for habitat and food sources.

As wetlands can contribute to critical hydrological and biological functions in a watershed, it is important to determine the locations and extent of wetlands in a watershed.

Methods
For the Thirtymile Creek watershed assessment, digital National Wetland Inventory (NWI) maps were not available through www.nwi.fws.gov, so hard copies were ordered through the Oregon Department of State Lands. Acreages and wetland types were determined using these maps. No other wetland inventories have been completed within the watershed.

The National Wetland Inventory was conducted by the U.S. Fish and Wildlife Service in 1974, NWI maps are based on aerial photography for an initial wetlands inventory of the large areas (Morland 1990) and are not created for regulatory purposes. As the scale of these surveys is rough, representation of individual wetlands may be inaccurate. Oregon has adopted the NWI maps as a basis for a State Wetlands Inventory and Wetlands Management Program.

Results

Historical Wetlands in the Watershed

Historically, a large majority of the wetlands were located along the stream channel or in side canyons where water collected from smaller watershed areas. It is unknown the extent of historical wetlands in the watershed, as many potential wetland sites have been drained and/or farmed.

Appendix 6.2 describes potential wetland plant communities in the Thirtymile Creek watershed as described by the Natural Resources Conservation Service.

Current Wetlands in the Watershed

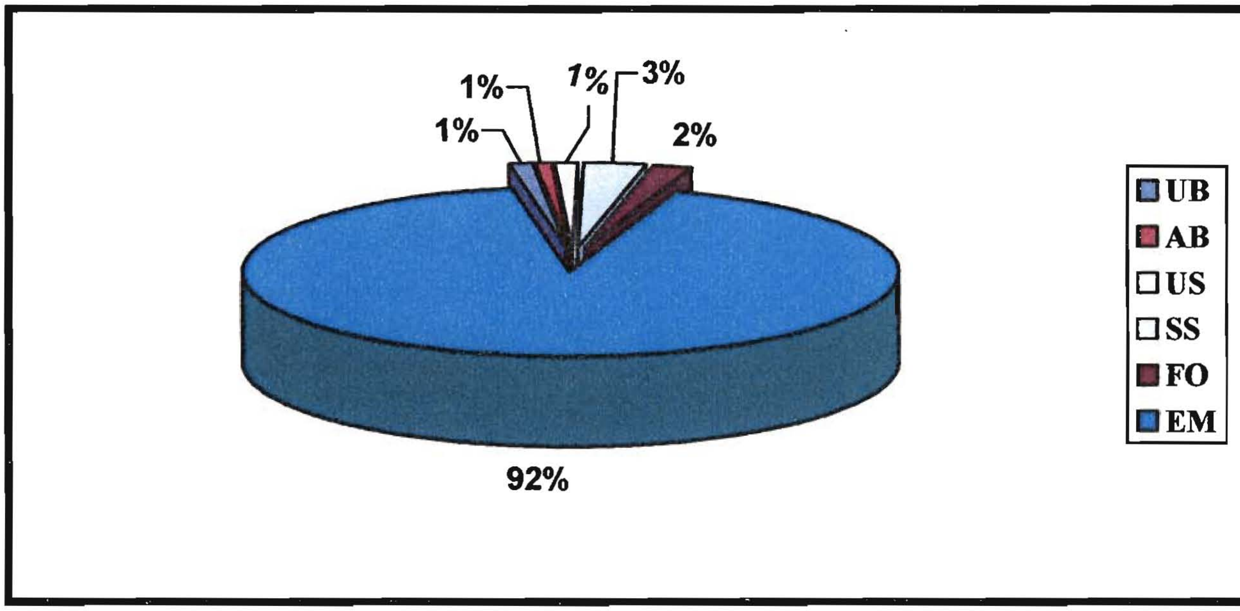
The National Wetland Inventory is the only watershed inventory available for the Thirtymile Creek watershed. Of the 172,943 acres in the Thirtymile Creek watershed, 52 acres were identified as wetlands.

The National Wetlands Inventory divides wetlands into five systems: marine, estuarine, riverine, lacustrine, and palustrine. Thirtymile Creek watershed's wetlands are all riverine or palustrine in nature. Riverine is the designation for the stream and palustrine wetlands are defined as including "all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand" (qtd. In Morlan 1990). Once a wetland has been classified by system, it is then classified by subsystem and class. Palustrine wetlands are not divided into subsystems, only classes. Classes in the palustrine system are shown in **Table 6.1.**

Table 6.1: Classes of Palustrine Wetlands

Class	Symbol
Rock Bottom	RB
Unconsolidated Bottom	UB
Aquatic bed	AB
Unconsolidated Shore	US
Moss-Lichen	ML
Emergent Wetland	EM
Scrub/Shrub Wetland	SS
Forested Wetland	FO
Open Water/Unknown Bottom	OW

Figure 6.2: Thirtymile Creek Wetlands by Class



Location of NWI Wetlands in the Watershed

Wetlands are typically found in depressions and the lower part of the landscape (Just the Facts #4). In the Thirtymile Creek watershed, the majority of the wetlands are distributed alongside streams with smaller, isolated wetlands scattered throughout the intermittent drainages that drain into Thirtymile Creek. A map was not included in this assessment as the level of detail requires a larger map size. Hard copies of the NWI maps can be obtained at the Gilliam-East John Day Watershed Council Office.

Lower Thirtymile Creek Sub-watershed 22 Acres of Wetland
Upper Thirtymile Creek Sub-watershed 30 Acres of Wetland

Hydric Soils

While hydric soils have not been mapped in the Thirtymile Creek Watershed, there are soil types that can include hydric soils. The entire soil type is not a potential hydric soil, rather, just areas with a certain landform (such as a depression). **Table 6.2** lists the potential hydric soil types according the the Gilliam County Hydric Soil List. The column "local landform" list the areas where the soil type could be hydric. To confirm hydric soils in an area, soil testing would need to be conducted.

Table 6.2: Potential Hydric Soils in the Thirtymile Creek Watershed

Soil Type	Name	Inclusion	Local Landform	Criteria Met
29D	Quincy-Rock Outcrop Complex 1-20%	Wet Spots	Depression	Saturation
35	Riverwash	Marsh and Wet Spots	Flood Plain	Saturation, Flooding

Discussion
Historically, wetlands were more widespread in the Thirtymile Creek watershed than they are today. Over time wetlands have been farmed over, disconnected from nearby streams, drained, and leveled. Removal of beavers may have also been responsible for diminishing wetlands, as beaver dams were removed, nearby floodplains were no longer flooded.

Currently, the NWI shows less than one percent of the watershed as being wetlands. As this inventory was done on a large scale with no field checking, the actual amount of wetlands currently present in the watershed is higher. If you are interested in inventorying wetlands on your property, contact the local Natural Resources Conservation Service office.

There are funding opportunities for wetland restoration. While not possible on a large scale, due to the agricultural nature of the watershed, selected restoration of wetlands can improve the hydrology and water quality of the area. **As wetlands play a role in groundwater charging, increasing wetlands can improve late season low flows.**

Data Gaps
- Hydric soil mapping
- Compilation of soil survey characteristics that indicate areas of historical wetlands
- Wetland plant community information

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Watershed Professionals Network. Oregon Watershed Assessment Manual. Salem, Oregon: prepared for the Governor's Watershed Enhancement Board, 1999.