United States Department of Agriculture
Forest Service
Willamette NF Supervisor's Office
211 East 7th Avenue
Eugene, OR 97401
(PO Box 10607 97440)
FAX #503-465-6717
Contact #503-465-6924

Reply To: 1920/2500

Date: May 2, 1995

Subject: South Santiam Watershed Analysis

To: Rolf Anderson, Sweet Home District Ranger

I have reviewed the South Santiam Watershed Analysis documentation. The results meet my expectations for watershed analysis in FY 95 as agreed to at the Forest Watershed Analysis Workshop in January and meet the core principles of watershed analysis listed in the Regional Forester's 1920 memo, Strategy for Implementing Watershed Analysis in the PNW Region, September 29, 1994. The analysis provides an adequate background and understanding of the conditions and ecological processes in the watershed to proceed with project level planning and analysis for a variety of management activities.

The South Santiam WA is the first comprehensive watershed analysis to be completed on the Forest since the pilot efforts. The entire WA Team is to be congratulated for taking the lessons learned from the pilots and quickly applying that knowledge in the South Santiam analysis. The leadership role of the South Santiam team has helped define and focus the key aspects of the WA process on the Forest and has given me a better understanding and appreciation of the WA process.

The Synopsis document is well written and provides a clear, logical flow of information from issues and key questions, through the characterizations and processes to the resulting conclusions and recommendations. Please send one copy of the complete WA documentation as well as the Synopsis to Neal Forrester for the Forest records.

Thank you for your excellent efforts and results.

Darrel L Kenops

DARREL L. KENOPS
Forest Supervisor

cc:
D.Bates
N.Forrester

SYNOPSIS OF THE SOUTH SANTIAM WATERSHED ANALYSIS

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Introduction

Introduction *"Does fuzzy logic tickle?"*

The National Forest portion of this watershed was analyzed in a watershed assessment in February, 1994 for the 1994 Federal Watershed Restoration / Jobs in the Woods program. This analysis uses that work as a starting point and incorporates information about private lands in the rest of the watershed as well as field information collected on National Forest lands in the fall of 1994. As watershed analysis is an evolving process in 1995, this analysis will have gaps that will need to be filled at a later time. Every effort is made to document those gaps and any assumptions that are used for this analysis. The Federal Agency Guide for Pilot Watershed Analysis (version 1.2) provided guidance for the process.

This synopsis includes the information needed to give an overall understanding of the watershed and allow the reader to make sense of the conclusions and recommendations that are included. It incorporates information from the reports required in the Federal Guide. It is somewhat general in nature but is based on a great amount of detail that is found in these reports. They are listed in the Appendix A of this document and can be obtained from the Sweet Home Ranger District office or the Willamette National Forest Supervisor's Office if more indepth information is desired.

The Place

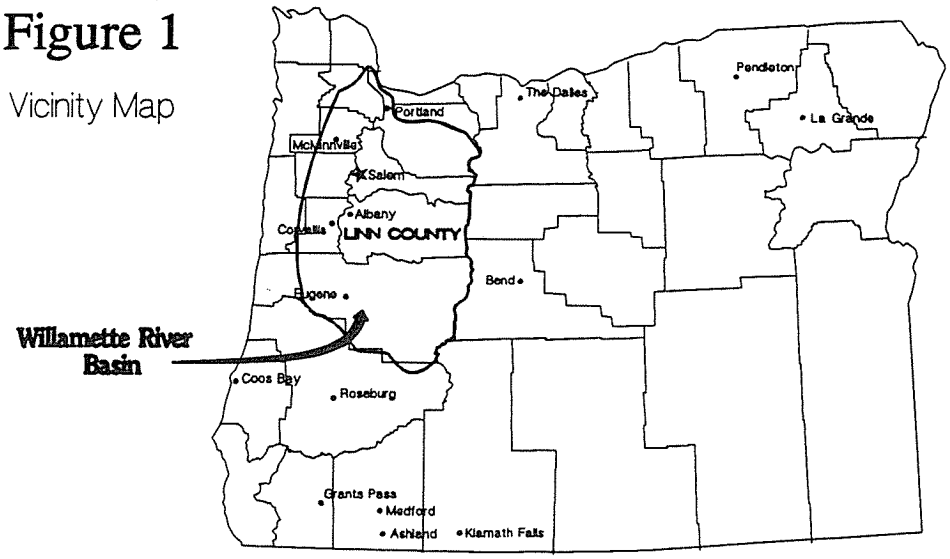
The South Santiam watershed, located in eastern Linn County, Oregon, is the part of the headwaters of the South Santiam River Subbasin in the Willamette Basin, which is part of the Columbia River system (See Figure 1). Approximately 54% of the watershed is on the Willamette National Forest and the majority of the remainder is owned by industrial timber companies. The State of Oregon (Cascadia State Park), Linn County, the Salem District of the Bureau of Land Management and numerous private individuals own small parcels located mainly along the Highway 20 corridor. (See Figure 2)

The watershed is totally within the Western Cascades physiographic province and the range of the Northern Spotted Owl. As such, it has been in the midst of the old growth/spotted owl debate. The town of Sweet Home, which lies just west of the watershed, has received much local and national media attention as a timber dependent community that has been impacted by proposed solutions to this debate. East Linn County governments have been active in rural economic development for much of the 1990's in response to the changes in timber supply from the federal lands. In 1994, Sweet Home Ranger District and Linn District of the Oregon Department of Forestry hosted a Ecosystem Restoration Crew under the Watershed Restoration / Jobs in the Woods program as part of ongoing efforts to improve the employment potential of the area.

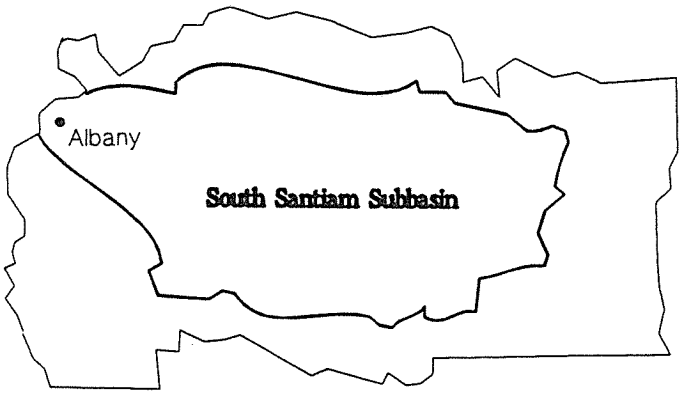
On the National Forest, there are several land allocations within the watershed as established by the Willamette National Forest Land and Resource Management Plan as amended by the Standards and Guidelines for Management of the Spotted Owl (hereafter referred to as the Forest Plan). The Menagerie Wilderness lies north of the South Santiam River. A Late-Successional Reserve runs

Figure 1

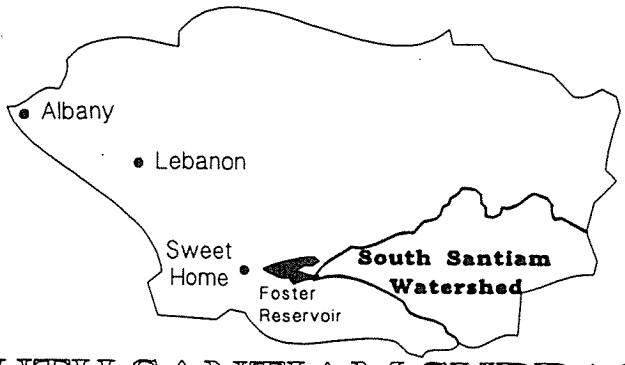
Vicinity Map



OREGON

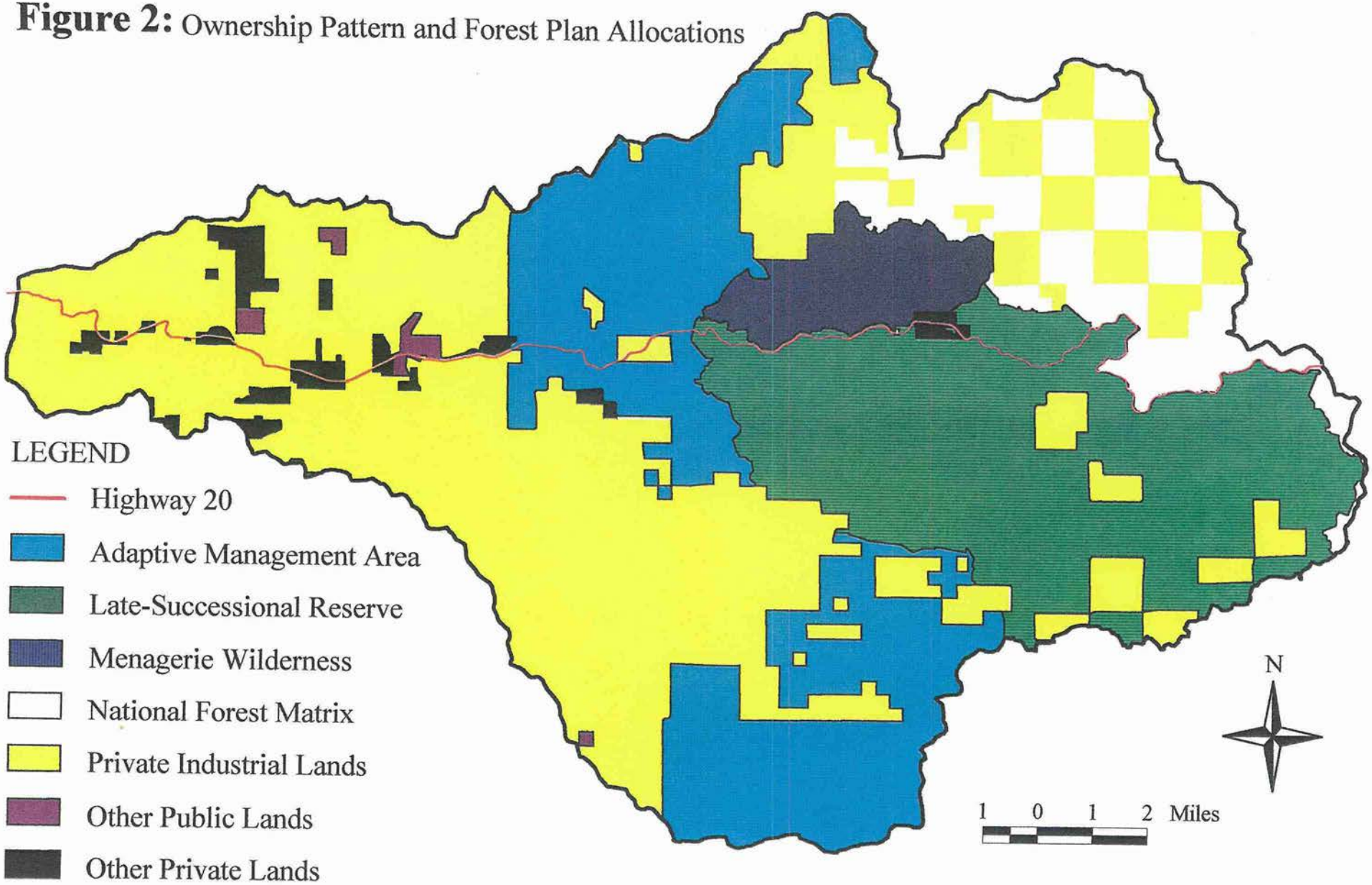


LINN COUNTY



SOUTH SANTIAM SUBBASIN

Figure 2: Ownership Pattern and Forest Plan Allocations



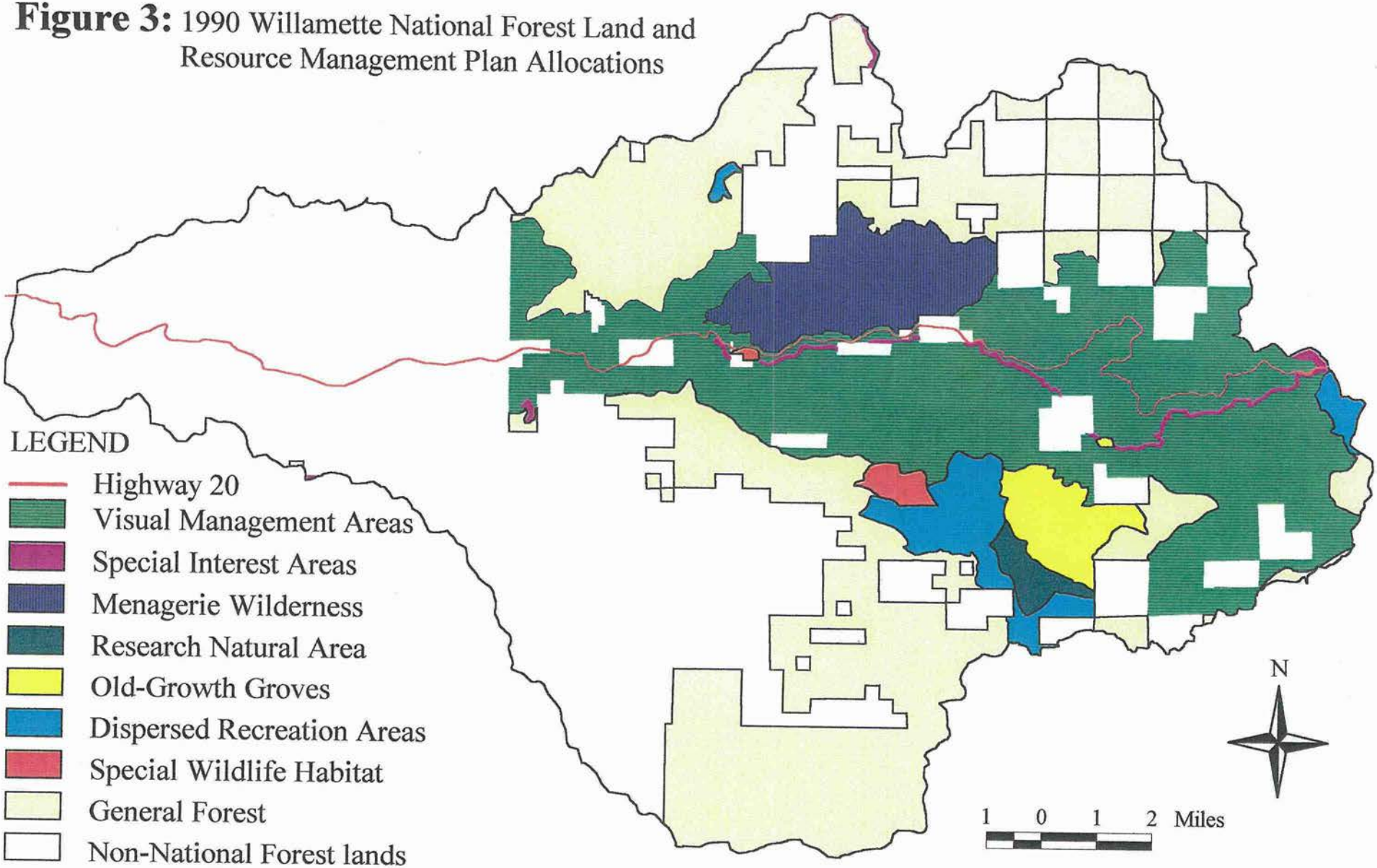
April 1995

south between Moose Mountain and Harter Mountain is in Matrix (See Figure 2). A summary of acres can be found in Table 1. Riparian Reserves also cover large areas of all these allocations. Underlying these broad allocations are several 1990 Willamette National Forest Land and Resource Management Plan (LRMP) allocations, including the Santiam Wagon Road Special Interest Area, the Three Creeks Research Natural Area, Three Creeks Old Growth Grove, the Cougar Rock Special Interest Area, a semi-primitive dispersed recreation area, and special wildlife habitat area as well as scenic allocations along the Highway 20 corridor. (See Figure 3)

Table 1: Acres by Allocation and Ownership

ROD Allocation	Acres	% of Watershed
Congressionally Withdrawn (Wilderness)	4,949	4
Late Successional Reserve	26,783	21
Central Cascades Adaptive Mgmt. Area	26,013	21
Forest Matrix	10,445	8
Total Federal Land	68,190	54
Non-Federal Land	57,550	46
Total Watershed Acres	125,740	100

Figure 3: 1990 Willamette National Forest Land and Resource Management Plan Allocations



Physical Characterization

Major physical features of the watershed include the South Santiam River itself, U.S. Highway 20, the communities of Cascadia and Upper Soda, Iron Mountain Lookout, Tombstone Pass, Gordon Lakes and Gordon Meadows, Cougar Rock communications site, Jumpoff Joe Mountain and numerous other buttes and peaks. The primary tributaries to the South Santiam include Sevenmile Creek, Squaw Creek, Soda Fork, Moose Creek, and Canyon Creek. Foster Reservoir, which is on the western boundary of the watershed, controls the flow of the South Santiam below the watershed. The elevation ranges from about 600 feet at Foster Reservoir in the west to 5,455 feet on top of Iron Mountain in the east.

Geology

The geologic foundation of the South Santiam watershed is older Tertiary basalt lava flows, tuffs and tuffaceous sedimentary rocks. This formation (Little Butte Sequence) dates back to 17 to 32 million years ago. Overlying the Little Butte formation, flows and flow breccias form broad caps on the higher elevation main ridges in the Gordon Lakes/Soapgrass area and throughout the Harter Mountain area. These rocks range in age from 10 to 17 million years old. Resting on these broad upland deposits are even younger ridge-capping flows and flow breccias some of which are similar to flows found in the High Cascade volcanic sequence. This layer is 4 to 10 million years old. (Walker and Duncan 1989)

These rock formations have been extensively modified by erosion created by both mountain glaciation and slope instability. Glacial landforms and glacially derived soils are common to parts of the watershed. During the earliest and most extensive glacial periods that occurred about one million years ago, valley glaciers probably travelled down the South Santiam canyon and some of its tributaries. With the more recent glaciations, smaller glaciers carved cirques on the north and east aspects of the higher peaks. Examples of glacial cirques can be found at the headwaters of Sevenmile and Squaw Creeks as well as on Soapgrass and Tidbits Mountains, Twin Buttes and Two Girls Mountain. In addition to cirques, other glacial features such as hanging valleys and assorted morainal deposits can be found in the watershed but most have been extensively altered by stream erosion and slope instability.

Large scale slump/landflow instability has been a significant factor in slope development and channel morphology since the glacial period ended about 10,000 years ago. The materials of the Little Butte Series can weather to form deep colluvial and residual soils that create conditions where both rotational and translational failures are common. In many areas, actively unstable remnants of these larger landflows can still be found. Most still manipulate and control stream channel morphology to a high degree. Stabilized slump/landflow features such as sag ponds, bench and scarp topography, and disrupted drainages are common in Sheep Creek, Sevenmile Creek, Squaw Creek, and Canyon Creek.

This complex geologic history has produced a diverse landscape in the watershed. The landforms include the highly glaciated upland benches and flats with extensive ground moraine as found in the headwaters of Sheep Creek, the steep rocky canyons and crags of Moose

Creek, the large scale stabilized slump/earthflow complexes and associated glacial deposits of Sevenmile and Canyon Creeks, and the flat stable river terraces and outwash plains of the South Santiam River below the confluence of Moose and Canyon Creeks. A more detailed description of the geologic history of the watershed can be found in the Soils and Geology Report.

Mineralization

Associated with plate tectonic movement and subduction zone melting, concentrations of gold, silver, copper, and lead mineralization lay like widely spaced beads on an unclasped necklace that is strung down the western front of the Cascade Range. Historically, each bead has been the center for mineral exploration and mining activity. This necklace extends from at least Mt. Hood to well into the Umpqua National Forest. The line of the necklace crosses the watershed from the upper part of the Moose subwatershed, across the Menagerie and down through the upper end of the Owl subwatershed. The South Santiam watershed appears to lie in the empty area between the beads. To the north is the Quartzville mining district and to the south is the Blue River (Gold Hill) mining district. Little or no base and/or precious metal mineralization has ever been found in the South Santiam.

Hydrology

The South Santiam watershed is typical of many western Cascades watersheds. This watershed has deeply incised stream channels and a high stream density. These streams originate from the glacial terraces found on the northeastern and southeastern boundaries of the watershed. Progressing downslope, these relatively flat stream channels increase in gradient dramatically and become very steep, high energy streams with very incised, steep valley walls. These high energy streams form a river system with a geologically constricted valley bottom. Within the main stem of the larger tributaries and the South Santiam River, small areas of deposition occur as a result of these geologic constrictions (i.e. earthflows and /or exposed bedrock outcrops). Applying a level I Rosgen channel typing methodology, 90 to 95 percent of the smaller streams rate A and Aa+. These channel typings describe the steepness and the high energy nature of the system. A result of this high energy, sediment storage capacity is limited and is tied to the accumulation of large wood in the channels.

A unique feature of the South Santiam watershed is that, due to the fire history, most of the large wood component of the stream system has been removed. Historic records reveal a large stand replacement fire in the 1850's followed by a 100 year storm event in 1861. As result of these two events the channel system was inundated with massive amounts of soil and rocks (sediment) and organic debris. Subsequent fires in 1911 and the 1930's removed the organic component of this debris over a large portion of the watershed. After that, storms were able to mobilize the stored sediments in the river system and flush them downstream. The result is a high energy system that is a very efficient sediment transporter.

In order for the channel to moderate the high energy it works the channel area and removes material on the bottom of the channel. This downcutting of the channel bottom eventually

is restricted when the channel encounters bedrock. Approximately 30% of the channels length surveyed is bedrock with 48% having a boulder, cobble substrate. These areas of boulder cobble and finer particles are very mobile during 10 to 20 year return interval storm events. Due to the mobility of these sediments, benthic organisms are disrupted and nutrient cycling within the stream is very short lived.

Currently the complex history of fire, flood, and management activities have created a very efficient sediment transportation system, one that is highly resistant to increases in peak flows. The upper watershed areas and tributary streams are currently developing a vegetative cover that the area has not experienced naturally since the 1850's. Due to fire suppression and other management activities (putting large wood in streams) these channels are starting to develop the capacity to store sediment again. As these channels accumulate structure and sediment, peak flows become critical in determining the residual time these characteristics can be retained. The residual time in the system will influence the amount and effectiveness of the associated habitats.

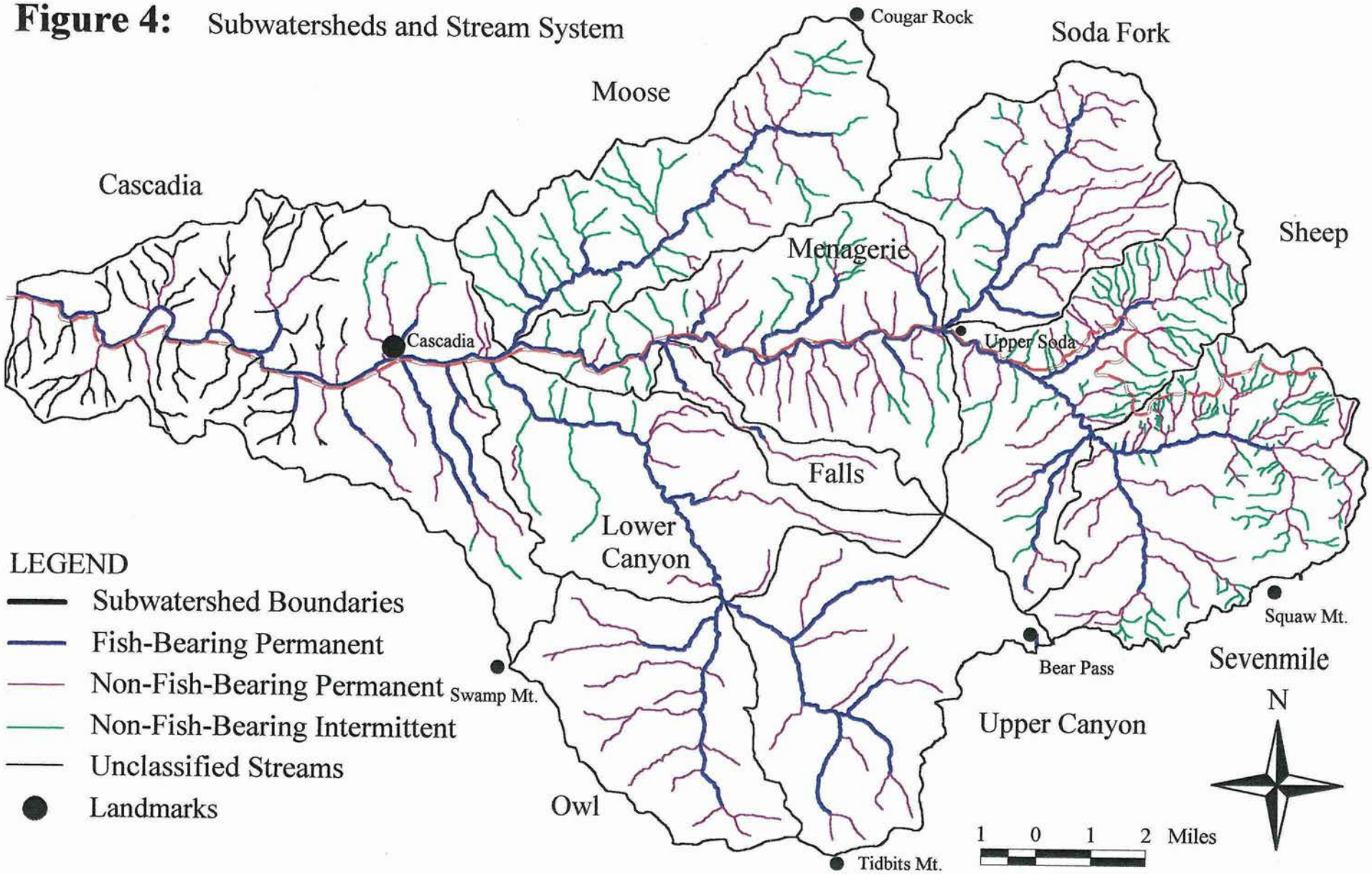
The beneficial uses found within this watershed are domestic, fisheries, recreation, hydroelectric, agricultural, and industrial. Domestic use is associated with the small landowners, located primarily along Highway 20. The fisheries beneficial use covers anadromous and resident fisheries as well as non-game aquatic species. Recreation uses include the campgrounds, Cascadia State Park, and Highway 20 and the Old Santiam Wagon Road where they are within the South Santiam River Riparian Reserve. Hydroelectric use is associated with the Falls Creek Hydroelectric project. Agricultural uses are associated with the small farms and homesteads around Cascadia. Triple T Studs sawmill, located near the confluence of Moose Creek, is the only industrial user. Prioritization of instream flows for western Cascades watersheds by the State of Oregon has not been done and is beyond the scope of this analysis. Potential minimum instream flow requirements will vary over the watershed due to topography, vegetation, and the beneficial uses being supported.

The South Santiam watershed has been spatially aggregated into four geographical areas consisting of the 10 subwatersheds that make up the watershed. These areas and subwatersheds will be referenced throughout the document. Subwatershed size and locations can be found in Table 2 and Figure 4, respectively. Also shown on Figure 4 are the streams in the watershed. Not all intermittent streams have been mapped but stream densities throughout the watershed are expected to be similar to those found in the east half of Sevenmile subwatershed.

Table 2: Acres by Subwatershed

Area	Subwatershed	Acres
Upper South Santiam	Sevenmile	14,035
(53,286 acres = 42%)	Sheep	12,023
	Soda Fork	10,451
	Menagerie	14,066
	Falls	2,711
Canyon	Upper Canyon	13,066
(35,095 acres = 28%)	Owl	9,779
	Lower Canyon	12,250
Moose (11%)	Moose	13,564
Cascadia (19%)	Cascadia	23,795
South Santiam Watershed		125,740

Figure 4: Subwatersheds and Stream System



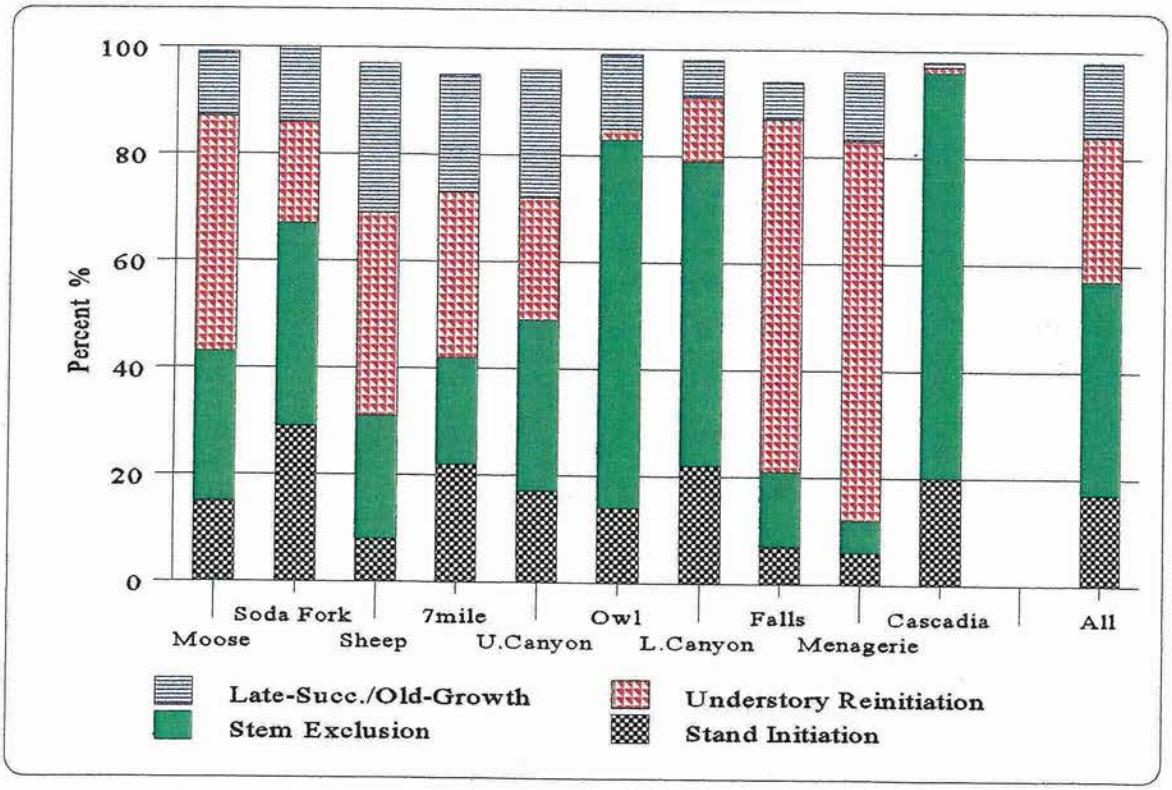
Biological Characterization

Vegetation

The watershed lies within the western hemlock and Pacific silver fir vegetation zones (70% and 30% respectively). Dominant tree species include Douglas-fir, western hemlock, western redcedar, Pacific silver fir, noble fir, red alder, and bigleaf maple. Common understory species include vine maple, rhododendron, sword fern, salal, huckleberries, beargrass, and numerous grasses and forbs.

About 41% of the watershed is covered with the older seral stages (understory reinitiation (27%) and late-successional/old growth (14%)) dominated by conifer tree species with a high degree of canopy closure. The other 57% is in the early seral stages as a result of clearcut patch harvesting that has been scattered throughout the watershed over the last fifty years. Figure 5 illustrates the percentage of each seral stage in the watershed as a whole and in each subwatershed. The amount less than 100% for each bar is accounted for by non-forested lands. See Figure 6 for a description of these seral stages and Figure 7 for a map of the current pattern of seral stages.

Figure 5: Current Distribution of Seral Stages



Riparian vegetation conditions vary due to land ownership patterns and National Forest land management allocations. For example, nearly the entire riparian area adjacent to Keith Creek (Menagerie subwatershed) is composed of understory reinitiation stands indicative of the fire history of the area. On the other hand, Soda Fork Creek (Soda Fork subwatershed) shows a patchwork of understory reinitiation and stand initiation seral stages on National Forest lands, with stand initiation and stem exclusion seral stages being predominate on private lands. See Figure 8 for graphs depicting the distribution of seral stages found in riparian reserves within each subwatershed and each area.

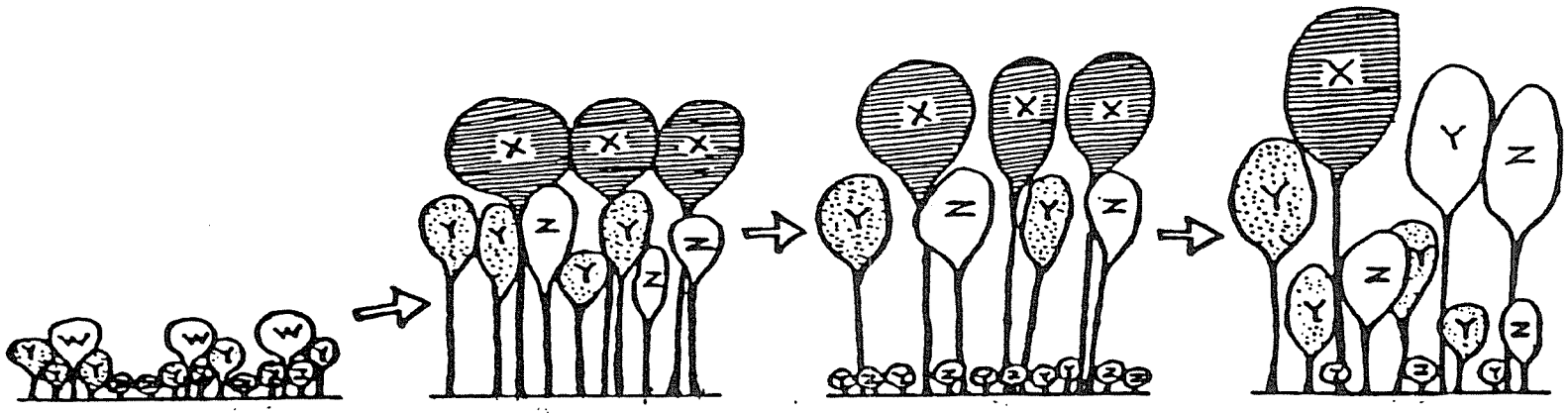
Past forest fires played a key role in shaping the size and distribution of vegetation in the watershed as is characteristic of most Western Cascade forests. Stand replacement fires affecting this watershed occurred around 1200 and 1550, and in 1856 and 1911. The stands created by these last 2 fires now occupy about 27% of the watershed, most of it in one contiguous block. See Figure 9 for a map of the pattern of seral stages that existed in 1914.

Reforestation history: The majority of the 56,000+ acres that have been harvested in the watershed have been artificially reforested by tree planting or aerial seeding. The remaining small percentage seeded in from natural seedfall. Parts of the Sevenmile Burn were planted between 1915 and 1917 and this planting project was part of the first significant recorded artificial reforestation in Oregon.

Regeneration techniques used in the watershed parallel those used in the western Cascades over similar time periods. Prior to the mid 1950's much of the reforestation was accomplished by natural seed-fall from seed trees left for this purpose or from trees in adjacent stands. From the mid 1950's to late 1960's, a mixture of tree planting and aerial seeding were the predominate reforestation methods. Because tree planting established and grew trees faster and used less seed, it became the predominate reforestation method over aerial seeding from the late 1960's to the present.

Seed used for reforestation in the watershed has been evolving toward increased genetic improvement for wood quality and growth while preserving genetic diversity. Since the late 1960's most of the reforestation seed used in the watershed has been from local parent trees selected for their good growth and form characteristics. From the mid 1970's increasing levels of genetically improved seed, from seed orchards and progeny testing, have been used for reforestation. Timber Service Company's Mason Seed Orchard is located in the west end of the watershed near Sweet Home and is one of the oldest Douglas-fir seed orchards in the Pacific Northwest. This seed orchard was started in 1960 and since 1974 all their reforestation seed has come from this orchard. The Forest Service has 3 evaluation plantations within the watershed which are part of the Willamette National Forest genetic tree improvement program.

Figure 6: Seral Stage Descriptions



Seral Stage	Stand Initiation	Stem Exclusion	Understory Reinitiation	Late Succ.\Old Growth
Seral Code	SI	SE	UR	OG
Typical Age Range	0-30	15-70	50-200	150+
Current Average*	10	35	75	
Typical DBH Range	0-6"	4"-10"	8"-36"	24"+
Current Average	1"	7"	20"	30"+
Elk Habitat	Forage	Hiding Cover	Thermal Cover	Optimal Thermal
Riparian Structure	Small	Small	Medium	Large
Owl Habitat	Non-habitat	Non-habitat	Dispersal	Nesting, Rearing, Foraging
Snag Habitat	Some snags	Almost no snags	Some snags	Full complement

Adapted from Oliver and Larson (1990) for South Santiam Watershed Analysis

*Tree ages are typically younger than the age of the disturbance that created the stand.

Figure 7: Current Seral Stage Pattern

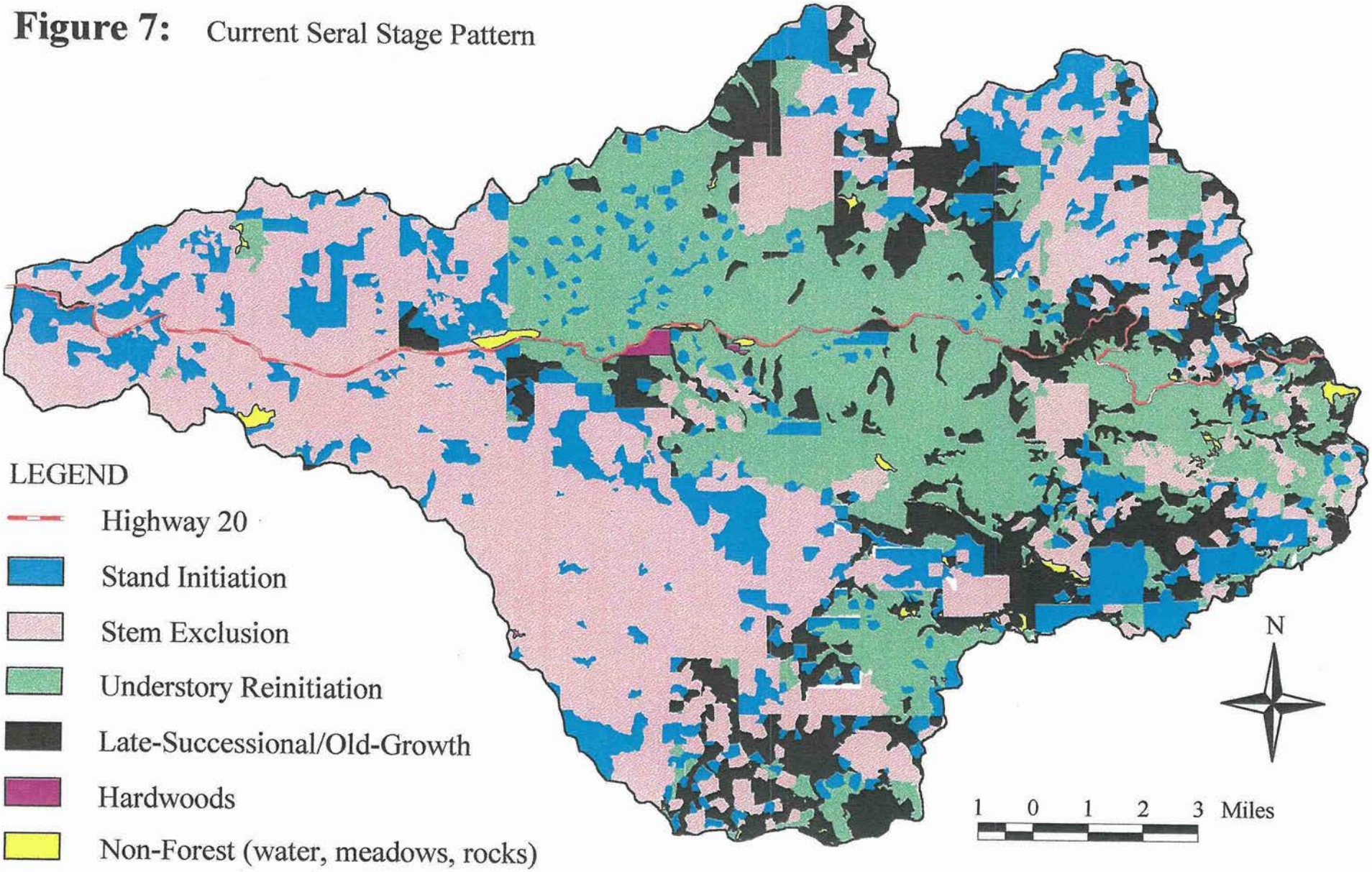
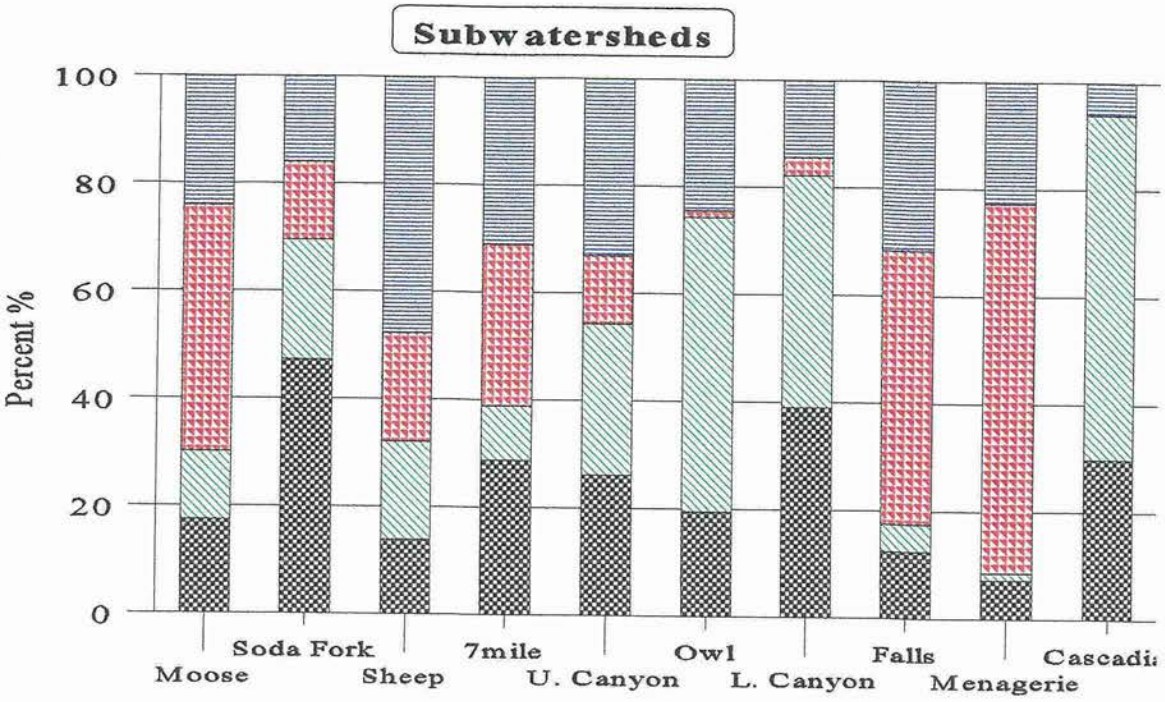


Figure 8: Riparian Reserve Seral Stages by Subwatershed and Area



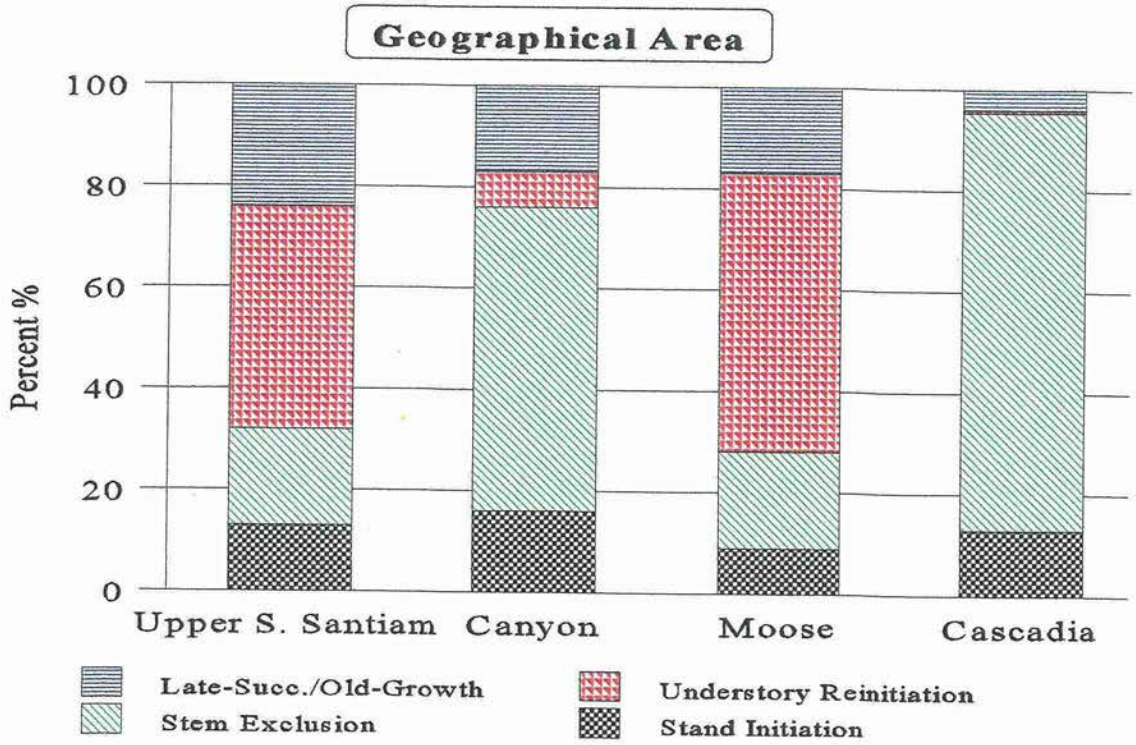
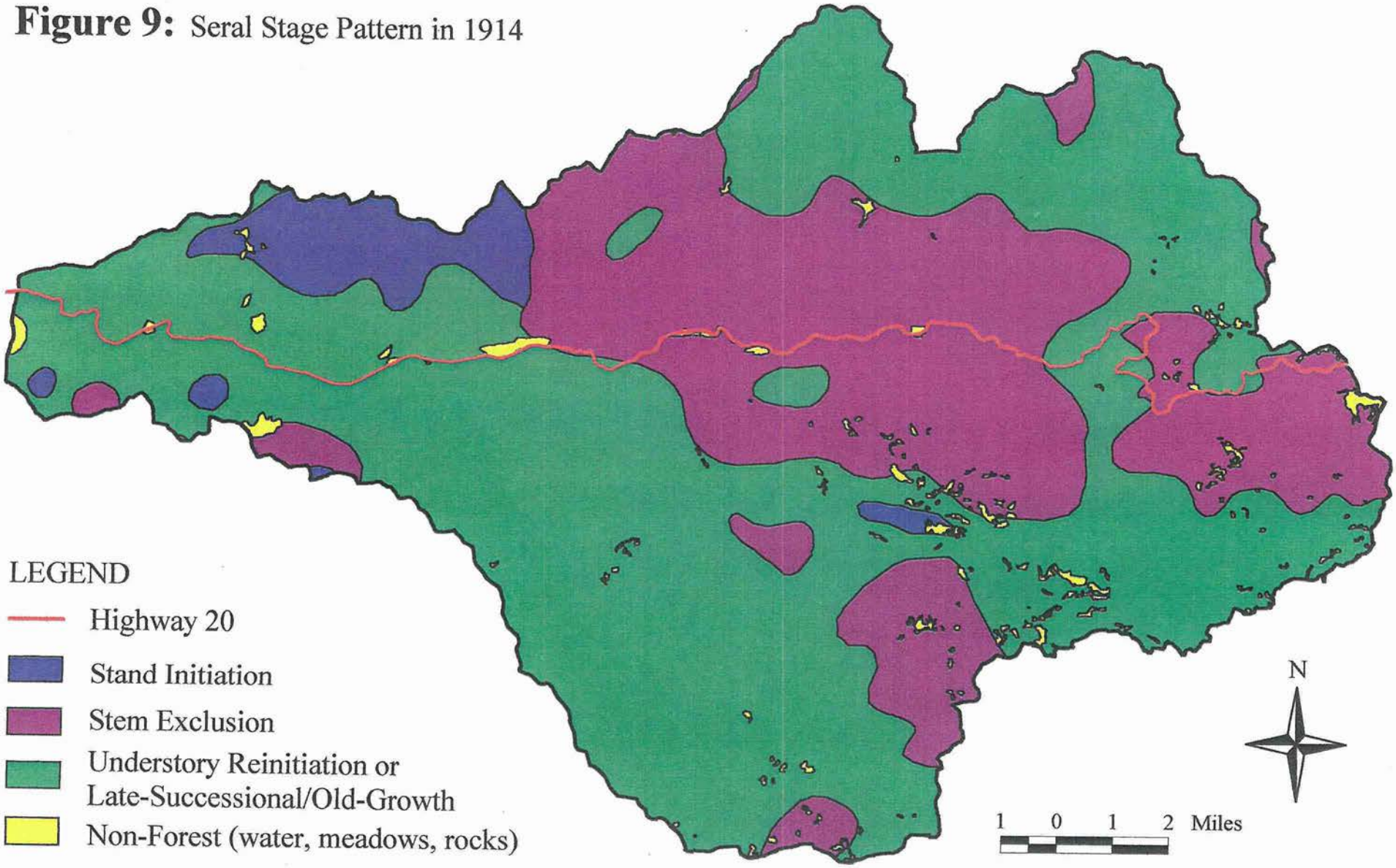


Figure 9: Seral Stage Pattern in 1914



Aquatic Wildlife

This watershed supports many fish species, from warmwater game fish and kokanee within Foster Reservoir to sculpin, dace, and native and anadromous salmonids in mainstem and tributary streams. Aquatic habitats also support a wide diversity of other aquatic dependent species, such as caddis flies, the red-legged frog and the harlequin ducks.

The South Santiam Watershed is home to the remnants of a run of wild winter steelhead which, prior to construction of Green Peter and Foster dams, numbered in excess of 2600 returning adult fish. The sixty percent of the run which spawned in the Middle Santiam no longer exists, as no adults pass over Green Peter. Of the other 40% of the historic run only two to three hundred adults pass over Foster and into the South Santiam watershed to spawn each year.

Spring chinook is the only race of salmon native to the entire Santiam watershed. Of the historic spring chinook production in the entire South Santiam system, 85% occurred above the Foster Dam site (ODFW 1992). This production was lost with the construction of Foster Dam and only partially mitigated by the construction of Foster Dam fish hatchery. Prior to reintroduction of chinook upstream from Foster Reservoir in 1994, adult chinook were not passed over Foster Dam as Oregon Department of Fish and Wildlife had concerns about disease interactions between the downstream hatchery-raised chinook and the wild run above Foster.

Bull trout has been eliminated or seriously reduced in abundance throughout most of its range (Meehan and Bjornn, 1991) due to habitat altered by land management activities, fishing pressure, and interactions with introduced fish species (USDA 1994). The last reported sighting of bull trout in the South Santiam system was in 1953 (Oregon State Game Commission 1953).

Terrestrial Wildlife

Habitat conditions are the prime determinants of wildlife abundance, both in the number of species and the number of individuals, and is directly dependent upon the condition of that habitat. Some species, such as the ubiquitous deer mouse and Roosevelt elk are found living equally well in early as well as late seral stage forest stands within the watershed. Most mammals have one habitat to which they seem better adapted and in which they are found in greater numbers (Ingles 1965). Late-successional/old-growth dependent species such as the northern spotted owl nest, forage and rear young, within the watershed where such habitats occur. Townsend's big-eared bat has been found in two caves, and a pair of peregrine falcons have successfully nested on cliffs within the watershed.

Riparian areas and freshwater wetlands are among the most heavily used wildlife habitats occurring in forest lands of western Oregon and Washington (USDA 1985). Harlequin ducks have successfully nested in the South Santiam River, and have been seen with young in Moose, Soda Fork and Canyon Creeks. Red-legged frogs, western toads, Northwestern and

Pacific giant salamanders, and many mollusk species have been found in or near many of the streams within the watershed.

Dead and down woody materials are important components of wildlife habitats in western forests which furnish cover and serve as sites for feeding, reproduction, and resting for many wildlife species. The fire and timber harvest histories within the watershed have resulted in a landscape generally deficient in large snag habitat necessary for such cavity nesting birds as the Western blue bird and pileated woodpecker. Also missing in many stands is the large down wood in various stages of decay necessary as habitat for such species as the Oregon slender salamander.

There are 35 known northern spotted owl sites within the watershed. Surveys during the past four years indicate that sites may not always be occupied from year to year. However, northern spotted owls have successfully reproduced in younger seral stage stands that have remnant large trees and snags and older seral stage stands within the watershed. Land ownership patterns within the watershed have created a mosaic of mixed aged forest stands which in turn has resulted in impediments to dispersal of this owl. Connectivity between suitable habitats and especially patterns of late successional/old growth is essential for providing biological and ecological flows that sustain animal and plant species dependent on successional/old growth (FEMAT 1993). The connectivity between Late Successional Reserve 215 (within the watershed) and 213 to the north is hampered by the checker board land ownership pattern in the Harter Mountain area. The U.S. Fish and Wildlife Service recognizes the Upper South Santiam Area as an area of concern, and is concerned that populations of northern spotted owls may become geographically isolated

This watershed is located within two Roosevelt elk management units identified by Oregon Department of Fish and Wildlife (ODFW) where elk numbers are managed to provide the optimum recreational and aesthetic benefits while maintaining elk numbers compatible with primary land uses. The area north of Highway 20 is within the South Santiam Wildlife Management Unit and the area south of Highway 20 is in McKenzie Wildlife Management Unit. Elk numbers within the South Santiam unit are estimated to be close to the management objectives of 3900 animals. In the McKenzie unit, the management objective is 5200 animals. The 1994 census estimates that there are currently 2600 animals but ODFW considers this part of the unit to be meeting their population objectives.

Within the watershed, elk utilize Moose Creek Area, Cascadia Area and the lower portions of the Canyon Creek Area during the winter (High Emphasis Winter Range). They utilize the Upper South Santiam Area the heaviest during the summer. The High Emphasis designation for this area may need to be reassessed as Forest Plan objectives for the area are no longer compatible with ODFW management direction since much of the area is now Late-Successional Reserve and will not supply very much elk forage in the future.

Social Characterization

The South Santiam watershed has a long and rich history of human activity. Humans have used this watershed as a place to live, work, and play. Evidence from Cascadia caves shows use from at least last 8,000 years ago. That use has changed over time in ways that are similar to much of the Western Cascades. Nearly 120 recorded prehistoric archaeological sites with a corollary extensive historic trail system have been recorded within the watershed suggesting an active landscape of human resource use and adaptation to changing environmental conditions. Botanical and subsistence analyses have indicated that the watershed evolved from one of moist post-glacial conditions to one of much drier conditions approximately 4500 years ago. The archaeological record suggests that as the climate, environment, and recent geology shifted, human adaptation kept pace on a broad and local scale. A detailed account of the history of the Sweet Home area from about 1850 to the 1960's can be found in "Sweet Home In The Oregon Cascades" (Carey and Hainline 1979)

Native Americans

Three tribes of Native Americans used this watershed; the Mollala; the Kalapooya; and one of the bands of the Warm Springs. Winter camps were used in the Cascadia subwatershed. Summer base camps were found in Owl, Sevenmile, and Upper Canyon subwatersheds. Major travelways for trade and subsistence consisted of the South Santiam River corridor (east/west) and the Mollala trail, a north/ south route that followed Canyon Creek and Moose Ridge between Tidbits Mountain and Cougar Rock. The benches and terraces along these major trail systems provided locations for bases camps from which foraging, hunting, and religious activities occurred. There is some evidence that these tribes used fire as a tool to maintain the productivity of area for food. Native use of fire to increase both hunting and gathering success and resource diversity is documented in early trapper journals in the Willamette Valley and in tribal oral traditions for both the valley and uplands. In the 1840's and 1850's settlers began moving into the area. Tribal populations collapsed as a result of disease. Descendants of these tribes are currently part of the Siletz, Grande Ronde, and Warm Springs reservations.

The Homestead Era

The early settlers tended to occupy the broad river terraces that are found along the South Santiam River as well as other low elevation areas that had gentle slopes. Some of these terraces are now under Foster Reservoir. Their use of the resources found in the watershed was also mainly for subsistence. Soon the need for a better transportation system was recognized and in 1864 the Santiam Wagon Road was completed. It became one of the main east\west travel corridors for the area, taking stock to be grazed in Eastern Oregon. This road allowed people to move farther up into the watershed (Walton Ranch) and settlement in the communities of Cascadia and Upper Soda. Cascadia became a popular mountain resort because of its mineral springs, abundant fish and game, camping and swimming opportunities. The first sawmills were built in the 1850's mainly to supply lumber for homebuilding in the local area.

In the 1880's there was a mining boom in the area. Most of the mining took place in the Quartzville and Calapooia watersheds since mineralization is rare in this watershed. However, hunting to support the mining population increased dramatically. Elk was hunted extensively for its hide and antlers as well as for food. Grazing of domestic livestock in Gordon Meadows probably began around this time. The need for wood from the forests in the watershed also increased but was still minimal. Most logging occurred in the areas closest to the Santiam Wagon Road and in the westernmost part of the Cascadia subwatershed. In the 1890's logs were floated from Sweet Home to mills in Lebanon.

Early Twentieth Century

Around the turn of the century mining activity died out. Homesteads in the upper parts of the watershed were abandoned because they couldn't support the families trying to live there. At this time the current ownership pattern began to take shape. The Hill family (now known as Timber Service Company) purchased the alternate sections along the South Santiam River that had been granted by the Federal government to the company that built the Santiam Wagon Road. The Cascade Forest Reserve was established in the area that is now the Willamette National Forest. Fire suppression efforts started and way trails, lookouts and phone lines were built. In 1905, the first automobile to cross the continent came down the Santiam Wagon Road and through this watershed. Construction of Highway 20 as far as Cascadia was completed in 1930. Not much timber harvest occurred in the watershed because wood was more accessible and more economical to log west of the watershed and many of the stands that were accessible to the Santiam Wagon Road/Highway 20 had burned in the 1856 and 1911 fires and consisted of relatively small trees. Agriculture was the economic mainstay of the community.

The Depression Era

The railroad made it to the area in 1931. The population of Sweet Home at that time was 189. The Civilian Conservation Corps had a camp at Canyon Creek and a work camp at House Rock. They built and improved trails and lookouts and the first roads in the watershed besides the Santiam Wagon Road/Highway 20. These roads were built mainly to access lookouts on Iron Mountain and Jumpoff Joe Mountain but also provided access for some of the first timber harvest that took place in the watershed in the 1940's. Longbow Organizational Camp was built to provide a place for Boy Scouts from the Eugene area to camp in the forest. The Ranger Station was built in Cascadia. The resort business in Cascadia became unprofitable and in 1940 the land was sold to the State of Oregon to eventually become Cascadia State Park. Construction of Highway 20 pushed farther east until it was completed in 1939. Much of this part of the highway followed the same route as the Santiam Wagon Road. A large part of the Sevenmile subwatershed burned in 1936 (?) as a result of highway construction activities . The watershed was no longer just a conduit for east/west commerce and trade but was becoming an important part of the economic base of the community. By 1939 there were 4 major sawmills operating in Sweet Home.

World War II and Post-War Era

The Sweet Home area went through a boom time. Timber harvest in the watershed increased in order to support the war effort and national post-war housing needs. The 1950 census placed the population at 3,603. By 1950, there were 8 large mills and numerous smaller ones depending on this and other nearby watersheds for their timber supply. The timber industry replaced agriculture as the economic base of the local communities. Initially, most of the harvest occurred on private lands. In the late 1940's, timber harvest began on public lands in the watershed as well. Gordon Road, Canyon Creek Road, Soda Fork Road, and Moose Mountain Road, main access roads in the watershed, were built during the 1950's. The 1950's also brought the consolidation of many smaller mills and land-holdings into the large industrial ownerships found in the watershed today.

In the 1960's, timber harvest on public lands increased dramatically in response to the economic development needs of the nation and local communities. The community also began experiencing boom/bust cycles tied to the national housing market. From 1960 to 1990, the miles of roads in the watershed tripled in support of timber harvest. Most of these roads were built under cost share agreements with the intermingled industrial owners. Other uses of the forest increased at the same time. Trout Creek and Fernview campgrounds were built. The first ascents on many of the rocks in the Menagerie roadless area were recorded. Increases in all types of dispersed recreation paralleled the national trends. The 1964 flood took out a lot of the bridges and damaged other facilities in the watershed. Most accessible streams were cleared of large woody debris in the aftermath of the flood. Foster Dam, started in 1961 and completed in 1968, was built to provide flood control, electrical power and water recreation. The U. S. Forest Service began extensive use of broadcast burning to control fuel loadings on harvest units. *"We spent half the time lighting fires so we could spend the other half putting them out."* (firefighter observation 1995). Forest management practices were quite similar on both public and private lands in the watershed. This is particularly evident in the Soda Fork subwatershed which contains the largest area of checkerboard ownership in the watershed.

The 1970's and 1980's

The late 60's and the 1970's brought enactment of many of the environmental and land management laws that influence this landscape today. The first Willamette National Forest Land and Resource Management Plan was completed in 1977. Roadless areas were delineated on public lands. The Oregon Department of Fish and Wildlife started working with the U.S. Forest Service on elk management. There was increased motorized recreational use in the watershed. Heavy timber harvest continued on public and private lands. Unit size restrictions were put in place. By the early 1980's smoke management concerns were starting to influence fuels treatment in the watershed.

In the 1980's, Sweet Home area mills were producing 1% of all the softwood used nationally and this watershed became a microcosm of the conflicts developing over management of the National Forests. What had been local issues became national issues. The Menagerie

roadless area became a Congressionally-designated Wilderness Area in 1984. There were tree sitters in timber sales in the watershed. The growing debate over old-growth and the Northern Spotted Owl was highlighted by events in the Three Creeks area (Menagerie and Sheep subwatersheds) during second round of land management planning. Even individual old trees became an issue. Anadromous fish, and particularly salmon, became an issue. On National Forest lands in the watershed, instead of removing wood from the streams, wood was starting to be put back in the channels. Closing roads for protection of wildlife and other resource concerns also became an issue for those people that used these roads for recreation. The Falls Creek Hydroelectric plant and associated diversion structure was completed in 1985. It generates 4 megawatts of electricity, enough to serve 800 households.

During the 80's, forest management practices on public and private lands became substantially different. Silvicultural practices in the stand reinitiation and stem exclusion seral stages became much more intensive on private lands (thinning, fertilization, pruning, brush control, etc.). Use of herbicides was restricted on National Forest lands and logging prescriptions became more restrictive. Timber supply from public lands was curtailed. In the late 80's eastern Linn County hit economic hard times. Mill closures were a common occurrence and resulted in an unemployment rate that often exceeded 10%. Unlike previous downturns, this one was not tied to a national recession or bad housing market.

The Current Situation

In 1990 the second Willamette National Forest Land and Resource Management Plan went into effect. This plan identified the South Santiam River and Sevenmile as being eligible for designation under the Wild and Scenic Rivers Act. Guistina Land and Timber Co. has joined Timber Service Company and Willamette Industries as a major industrial land owner in the watershed. There has been an increasing awareness of the importance of working with Native American tribes on resource management issues on public lands. In 1994, the President's Forest Plan for Managing Federal Lands in the Range of the Northern Spotted Owl was put in place. The business community is diversifying and retirees are moving into the area. Economic recovery is slowly taking place and unemployment has dropped.

The 1990 Farm Bill gave the U.S. Forest Service a role in economic recovery of the area. The community of Sweet Home established the Sweet Home Economic Development Group and Linn County communities joined to establish the East Linn County Economic Development Alliance to respond to the need to diversify the local economy. The Sweet Home Ranger District is a member of both groups. These groups have identified the following strategic goals and objectives for developing a sustainable economic base for the area:

- Maintain and/or enhance the liveable environment.
- Maintain forest-based employment and diversify the uses of wood fiber.
- Expand the economic base by developing commercial and industrial sites.
- Develop recreation and tourism capacity with a focus around the lakes, rivers, and trail systems in the area.