South Umpqua Watershed Analysis and Water Quality Restoration Plan

Roseburg District
South River Resource Area

Second Iteration March 2, 2001

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Characterization

The South Umpqua WAU covers approximately 141,455 acres. Approximately 18,821 acres (13 percent) of the WAU is in nonforested conditions, mainly agricultural. About three percent (approximately 3,945 acres) of the WAU are dominated by hardwoods. The rest of the WAU is considered to be conifer forests.

The Bureau of Land Management administers approximately 58,027 acres (41 percent) of the WAU. The South River Resource Area manages approximately 57,511 acres and the Glendale Resource Area manages approximately 504 acres of the BLM-administered lands. The Tiller Ranger District on the Umpqua National Forest manages approximately 2,797 acres (two percent) of the WAU. Approximately 18,290 acres (32 percent) of BLM-administered lands are available for intensive forest management. This is about 13 percent of the WAU.

Timber harvesting, agriculture, transportation, mining, recreation, service-related activities, and residential dwellings have been some of the human uses in the WAU. The communities of Canyonville, Days Creek, Milo, and Tiller are located in the WAU.

The watershed analysis uses the format presented in the Ecosystem Analysis at the Watershed Scale, Federal Guide for Watershed Analysis. The Key Issues, Findings, and Recommendations and Restoration Opportunities summarize the information included in the watershed analysis.

Key Issues

The following issues and concerns were identified during the analysis.

Potential areas for timber harvesting on BLM-administered land in the WAU.

The amount of timber harvesting conducted in the past.

The amount of late-successional habitat in the WAU.

The distribution and condition of habitat used by Special Status Species.

Condition of Riparian Reserves (vegetation conditions and effects of roads).

Water quality.

The impacts roads have on streams due to sediment and road encroachment.

Restoration opportunities in the WAU.

Findings

Vegetation

Bureau of Land Management administered land comprises about 41 percent of the WAU.

About 32 percent of the BLM-administered land in the WAU is available for timber harvesting. About nine percent of the BLM-administered land in the WAU is estimated to be less than 30 years old in 2025 years.

Port-Orford cedar is not known to occur in the WAU.

The 1987 Canyon Mountain and Bland Mountain fires burned approximately 15,000 acres in the WAU. The burned areas have the same age classes and continuous fuel types, which affect land management within the WAU. The potential exists for a large fire to burn these areas again due to the continuous fuel types.

Soils

Approximately 21,041 acres on BLM-administered land are considered to have Category 1 Soils that are highly sensitive to prescribed slash burning.

Hydrology and Fisheries

Road densities in the WAU range from 1.89 to 9.76 miles per square mile. The average road density in the WAU is 4.56 miles per square mile.

Road densities on BLM-administered land range from 0.93 to 5.58 miles per square mile. The average road density on BLM-administered land in the WAU is 3.60 miles per square mile.

Beals Creek, Days Creek, and Shively Creek were on the water quality limited list for habitat modification. Fate Creek, Stouts Creek, and the East Fork of Stouts Creek were on the water quality limited list for temperature. The South Umpqua River through portions of the WAU was on the water quality limited list due to toxics, flow modification, aquatic weeds or algae, bacteria, biological criteria, dissolved oxygen, sediment, pH, and temperature.

Three stream reaches surveyed in the Aquatic Habitat Inventory were rated as being in good condition, 57 stream reaches were rated as being in fair condition, and 22 stream reaches were rated as being in poor condition.

Wildlife

There are approximately 32,663 acres of suitable northern spotted owl nesting, roosting, and foraging habitat in the WAU. This is about 54 percent of the Federally-administered land and 23 percent of the WAU.

There are 79 known spotted owl centers in the South Umpqua WAU representing nest locations for 50 northern spotted owl pairs.

Other Species of Concern

There is habitat within the WAU that some Survey and Manage species may use.

Neotropical Birds

Approximately 800 acres of private land, burned by the 1987 Canyon Mountain Fire, within the WAU were donated to the Roseburg BLM District in 1996. This area currently provides diverse habitats used by neotropical birds. Surveys from 1996 to 1998 indicated 62 bird species were present in this area. Over half (62 percent) of the bird species were neotropical migrants.

Recommendations and Restoration Opportunities

Vegetation

Conduct regeneration harvests on the Matrix Land Use Allocation in conformance with the RMP.

Manage young stands, including those in Riparian Reserves, to maintain or improve growth and vigor and improve stand structure and composition.

Soils

Appropriate methods should be used for reducing vegetative competition on Category 1 Soils. Consider using methods other than prescribed burning on Category 1 Soils unless considered essential for resource management, such as habitat improvement, tree seedling establishment, or reducing fire risks.

Best Management Practices (BMPs) should be applied during all ground and vegetation disturbing activities. See Appendix D, Roseburg District Record of Decision and Resource Management Plan (USDI 1995) for a list and explanation of BMPs. Along with the BMPs, the Standards and Guidelines in the SEIS Record of Decision (USDA and USDI 1994b) should be implemented in order to achieve proper soil management. Best Management Practices should be monitored for implementation and effectiveness to document that soil goals are being achieved.

Hydrology

Consider planting conifers in riparian areas, where they occurred naturally, but are not growing there now.

Consider adding LWD to increase habitat complexity and help restore streams impacted by timber harvesting and road construction. Thinning in Riparian Reserves would also allow trees adjacent to stream channels to grow and provide LWD in a shorter amount of time than without any management.

Use bioengineering techniques with stream restoration opportunities. Avoid using rip rap, gabion baskets, or check dams in the stream channel.

Monitor stream restoration projects for temperature, turbidity, sediment, and channel morphology changes.

Conduct stream surveys to help design stream restoration projects, such as removing culverts when decommissioning roads or replacing culverts on fish bearing streams.

Refer to the TMO file for a list of roads observed to be causing water quality problems. Some roads to consider fully decommissioning or improving are listed in Appendix G. Roads in Tier 1 Key Watersheds, Late-Successional Reserves, Riparian Reserves, identified as causing water quality problems, and Drainages with the highest road densities would be consider first for full decommissioning.

Determine where culverts block fish passage, need to be repaired or replaced, are inadequate to accommodate a 100-year flood, and where additional culverts, waterbars, or waterdips would reduce stream network extension from ditchlines and roads.

When fertilizing in the WAU, provide adequate buffers on streams and monitor activities. Where streams or other water bodies have a pH greater than 8.0 or in municipal watersheds, apply the fertilizer so the stream pH or primary productivity would not increase.

Consider the amount of forested land less than 30 years old, road density, amount of land in the TSZ when analyzing the potential impact of management activities.

Consider planning regeneration harvests and commercial thinnings where existing roads can be used to minimize the amount of new road construction.

Reduce road densities, improve roads, fully decommission roads, and identify stream restoration projects. Thinning in the Riparian Reserves should be considered where opportunities exist.

Consider opportunities to adjust Riparian Reserve widths within the WAU. The Riparian Reserve Evaluation Techniques and Synthesis module should be used as a guide when considering adjusting Riparian Reserve widths.

Fisheries

Streams with fair or good habitat condition ratings, high species diversity, low gradient, and easily accessible habitat should be priority areas for watershed restoration.

Follow the Terms and Conditions of the National Marine Fisheries Service (NMFS) March 18, 1997 Biological Opinion for road construction, maintenance, and decommissioning; livestock grazing; mining; and riparian rock quarry operation (USDC 1997).

Describe how projects within Riparian Reserves meets Aquatic Conservation Strategy objectives.

Analyze the amount of soil disturbance, timber falling, and yarding within late-successional timber stands in Riparian Reserves. Salvage activities in late-successional stands within Riparian Reserves should not retard or prevent attainment of Aquatic Conservation Strategy objectives.

Follow NMFS guidance on timber salvage activities in riparian areas. Salvage only the portion of tree in the road prism, leaving the portion of the tree that reached the stream.

Follow the Long Range Timber Sale Plan. Include new information from the Long Range Timber Sale Plan in the watershed analysis.

Consider reducing road densities where peak flows have negatively altered stream channel condition and impacted the fisheries resource. Prioritize the road restoration needs based on information in the Transportation Management Objectives (TMOs). Consider decommissioning roads in Drainages containing the most acres in the Transient Snow Zone and anadromous fish-bearing stream reaches. Priorities for road decommissioning would be valley bottom, midslope, and ridgetop roads.

Use existing roads, as much as possible, when planning land management activities in the WAU. Construct new stream crossings and roads within Riparian Reserves only when necessary.

Wildlife

The Northern Spotted Owl

Density management activities should be conducted to accelerate development of late-successional habitat to benefit northern spotted owl productivity and survival.

The American Bald Eagle

Consider conducting bald eagle winter surveys along the South Umpqua River. The limited amount of Federally-administered land along the South Umpqua River limits opportunities to conduct bald eagle nesting surveys from the ground. Surveys from the ground may help in determining if bald eagles are nesting in the WAU.

Fender's Blue Butterfly

Consider conducting general surveys to locate Kincaids lupine. Any Kincaids lupine populations discovered in the WAU should be surveyed for the presence of Fender's blue butterfly caterpillars.

The Peregrine Falcon

Prepare a management plan for any high potential peregrine falcon habitat identified in the WAU.

The Northern Goshawk

Consider evaluating habitat and conducting surveys to determine if northern goshawks are present in the WAU. Maintain 30 acre buffers around active and alternate nest sites.

Bat Species

Coordinate and support research to determine what habitat elements are used by bat species in the WAU, in accordance with the National Memorandum of Understanding (MOU) with Bat Conservation International (USDI 1993).

Amphibians and Reptiles

Consider surveying for western pond turtles on open, south aspects within 500 feet of the South Umpqua River to prevent damaging nests by management activities.

Consider renovating ponds or wetlands lacking habitat elements. Consider removing non-native species from ponds or wetlands. Activities, such as recontouring the bottoms, planting native vegetation, removing bullfrogs and non-native fish, could be conducted with routine maintenance activities or culvert repairs.

Tailed frog habitat may be limited in stream reaches with high stream temperatures. Protect stream temperatures from increasing in streams occupied by the tailed frog by maintaining shade. Reduce stream temperatures by planting, fertilizing, or thinning trees in Riparian Reserves to grow larger trees and provide shade in a shorter amount of time.

Mollusks

Consider conducting general surveys in the WAU.

Consider retaining down woody debris on steep, shallow soils. Maintain down woody debris at right angles to the slope to catch and hold organic material on the site.

Del Norte Salamander

Consider evaluating potential rocky habitat to determine if it is suitable Del Norte salamander habitat. Evaluate Del Norte salamander survey data to determine if this species might occur in the South Umpqua WAU.

The Red Tree Vole

Consider conducting general surveys for red tree voles in the WAU. Conduct clearance surveys for red tree voles prior to implementing ground disturbing activities. Follow the most recent protocol survey guides. Currently the most recent protocol guides are include in IM-OR-2000-037.

Neotropical Bird Species

Consider implementing projects impacting nesting habitat before April 1 or after July 30 of any given year.

Consider including different prescriptions when brushing or thinning in Riparian Reserves.

Consider retaining brush and non-commercial tree species that are not competing with the desired tree species.

Coordinate research to determine migratory pathways and monitor the effects of towers on neotropical birds in the WAU, in accordance with the State Office MOU OR 930-9510.

Consider surveying for cavity nesting birds to determine population trends in the WAU.

I. Introduction

The area covered by this watershed analysis was first analyzed in three different watershed analyses. The John/Days/Coffee Watershed Analysis was completed in September 1995. The Stouts/Poole/Shively-O'Shea Watershed Analysis was completed in January 1996. The Canyonville/Canyon Creek Watershed Analysis was completed in December 1998. This watershed analysis is intended to update information in the three previous analyses and analyze the fifth field watershed in one watershed analysis.

A number of changes have occurred since the previous three watershed analyses were written. The watershed boundaries have been changed since the John/Days/Coffee and Stouts/Poole/Shively-O'Shea watershed analyses were written. Due to the change in the watershed boundary, the Riparian Reserve widths were calculated using the average site tree potential heights within the new watershed boundary. Using the new watershed boundary, the average site tree potential height in the John/Days/Coffee and Stouts/Poole/Shively-O'Shea Watershed Analysis Units decreased from 180 feet to 160 feet. Other information, such as the roads and streams, has been updated in the Bureau of Land Management Geographic Information System and is used in this watershed analysis.

This document is also different from previous watershed analyses since it includes a Water Quality Restoration Plan. The Water Quality Restoration Plan is intended to address the prevention and control of water pollution from Bureau of Land Management (BLM) activities in the South Umpqua Fifth Field Watershed.

II. Characterization of the Watershed Analysis Unit

Watershed analysis is a systematic procedure to characterize a watershed. The information would be used for making management decisions to meet ecosystem management objectives. This watershed analysis follows the format presented in the Ecosystem Analysis at the Watershed Scale, Federal Guide for Watershed Analysis.

Watershed analysis is one component of the Aquatic Conservation Strategy (ACS). The other components of the Aquatic Conservation Strategy are Key Watersheds, Riparian Reserves, and Watershed Restoration. These components are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems. The South Umpqua Watershed Analysis Unit (WAU) includes part of the South Umpqua River Tier 1 Key Watershed. The Key Watershed includes the area upriver from where Days Creek flows into the South Umpqua River. Riparian Reserves are portions of the landscape where riparian-dependent and stream resources receive primary emphasis. Riparian Reserves help meet the Aquatic Conservation Strategy by maintaining streambank integrity, large woody debris (LWD), riparian shade and microclimate, and surface and groundwater systems (see Appendix H). Riparian Reserves also provide sediment filtration, travel and dispersal corridors, nutrient sources, pool habitat, and drainage network connections. Watershed Restoration would help in the recovery of fish habitat, riparian habitat, and water quality.

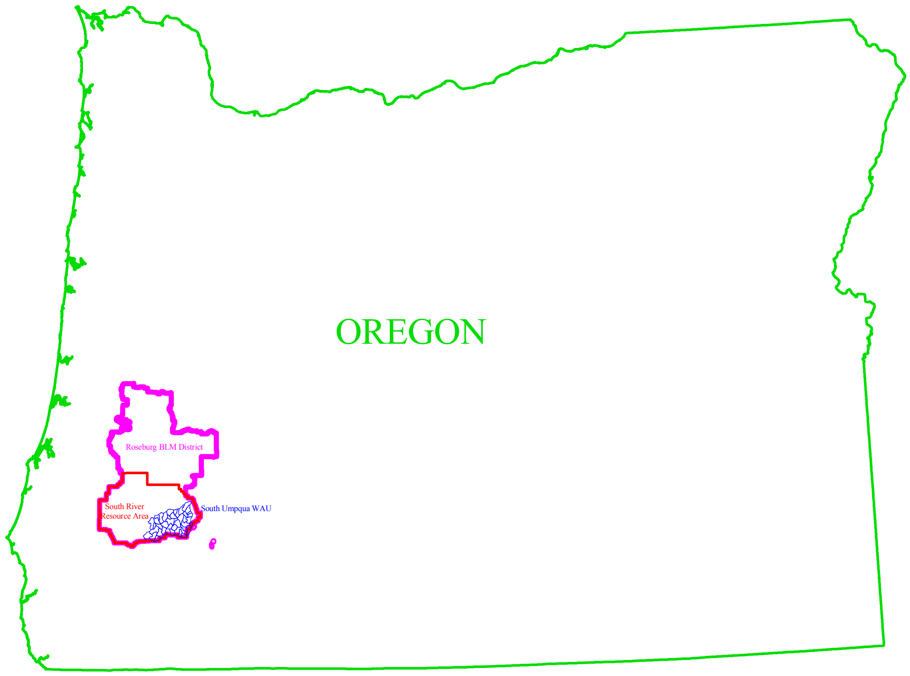
The South Umpqua Watershed Analysis Unit is located approximately 20 miles southeast of Roseburg in the southeast portion of the South River Resource Area on the Roseburg District Bureau of Land Management (see Map 1). The South Umpqua WAU also includes land managed by the Glendale Resource Area on the Medford District Bureau of Land Management and the Tiller Ranger District on the Umpqua National Forest. The Watershed Analysis Unit covers approximately 141,455 acres. Elevation ranges from about 640 feet where Cow Creek flows into the South Umpqua River in the northwest part of the WAU to about 4,040 feet at head of Days Creek in the northeastern portion of the WAU. The towns of Canyonville and Days Creek are located in the WAU.

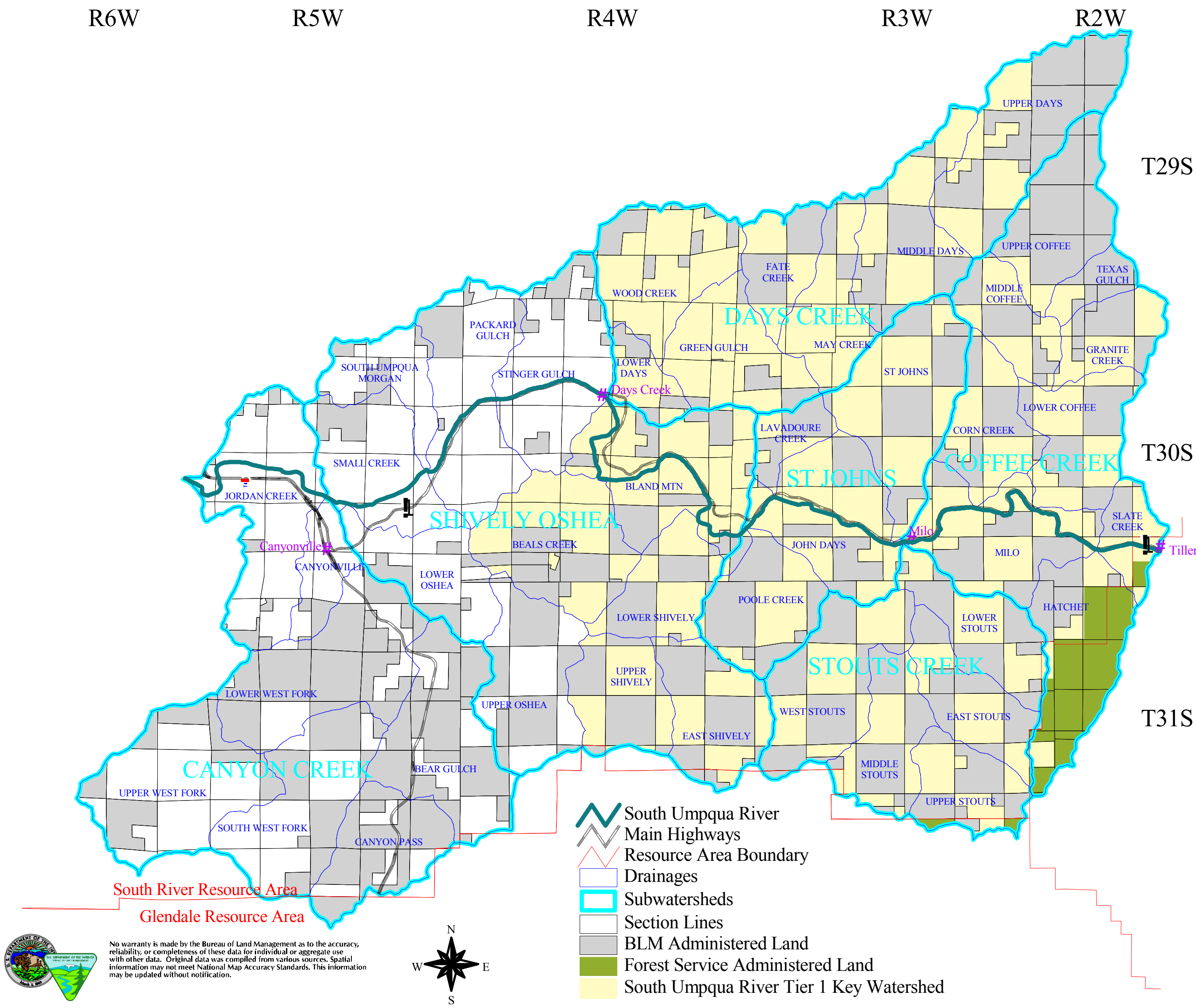
The South Umpqua Watershed Analysis Unit is interchangeable with the South Umpqua Watershed, which is a fifth field watershed. The fifth field watershed is the scale of analysis used when determining whether activities retard or prevent attainment of Aquatic Conservation Strategy objectives (USDI 1995). The South Umpqua Watershed Analysis Unit includes six subwatersheds, which are further divided into 43 drainages. The subwatersheds and their drainages are shown on Map 2 and the acres of each are listed in Table 1.

The Bureau of Land Management (BLM) administers approximately 58,027 acres (41 percent) of the South Umpqua WAU. The South River Resource Area manages approximately 57,511 acres and the Glendale Resource Area manages approximately 504 acres of the BLM-administered lands. The Tiller Ranger District manages approximately 2,797 acres (two percent) of the WAU. Privately owned lands cover approximately 80,626 acres (57 percent) of the WAU.

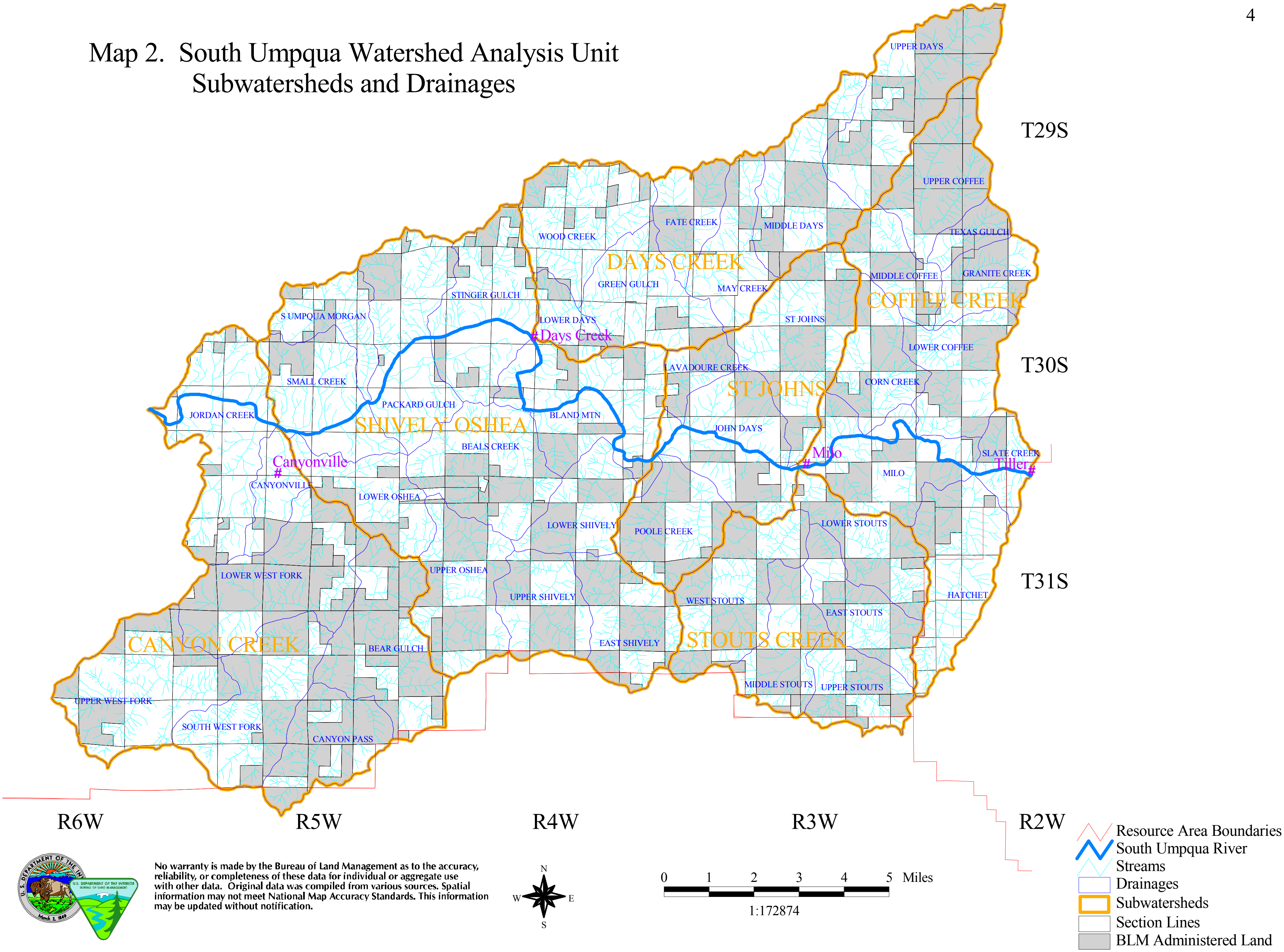
Federally administered lands are composed of Matrix, Late-Successional Reserve (LSR), District Defined Reserve (DDR), and Riparian Reserve Land Use Allocations established in the Northwest Forest Plan (USDA and USDI 1994b) and the Roseburg and Medford District Resource Management Plans (RMP). The District Defined Reserve Land Use Allocation will be managed following the same Northwest Forest Plan (NWFP) Standards and Guidelines and Roseburg District Resource Management Plan Management Directions for Late-Successional Reserves. The Matrix Land Use Allocation on BLM-administered land is further delineated as General Forest Management Areas (GFMA), Northern General Forest Management Areas (NGFMA) in the Medford BLM District, and Connectivity/Diversity Blocks (CONN). The GFMA and NGFMA will be grouped and considered as GFMA in this watershed analysis since the management directions are the same. Map 3 and Chart 1 show the percentage of GFMA, Connectivity/Diversity Blocks, LSR, DDR, and Riparian and Other Reserves and how they are distributed in the WAU. Table 2 and Chart 2 show the number of acres by Land Use Allocation.

Map 1. Vicinity Map
South Umpqua Watershed Analysis Unit





Map 2. South Umpqua Watershed Analysis Unit Subwatersheds and Drainages



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

Map 3. South Umpqua Watershed Analysis Unit
Land Use Allocations

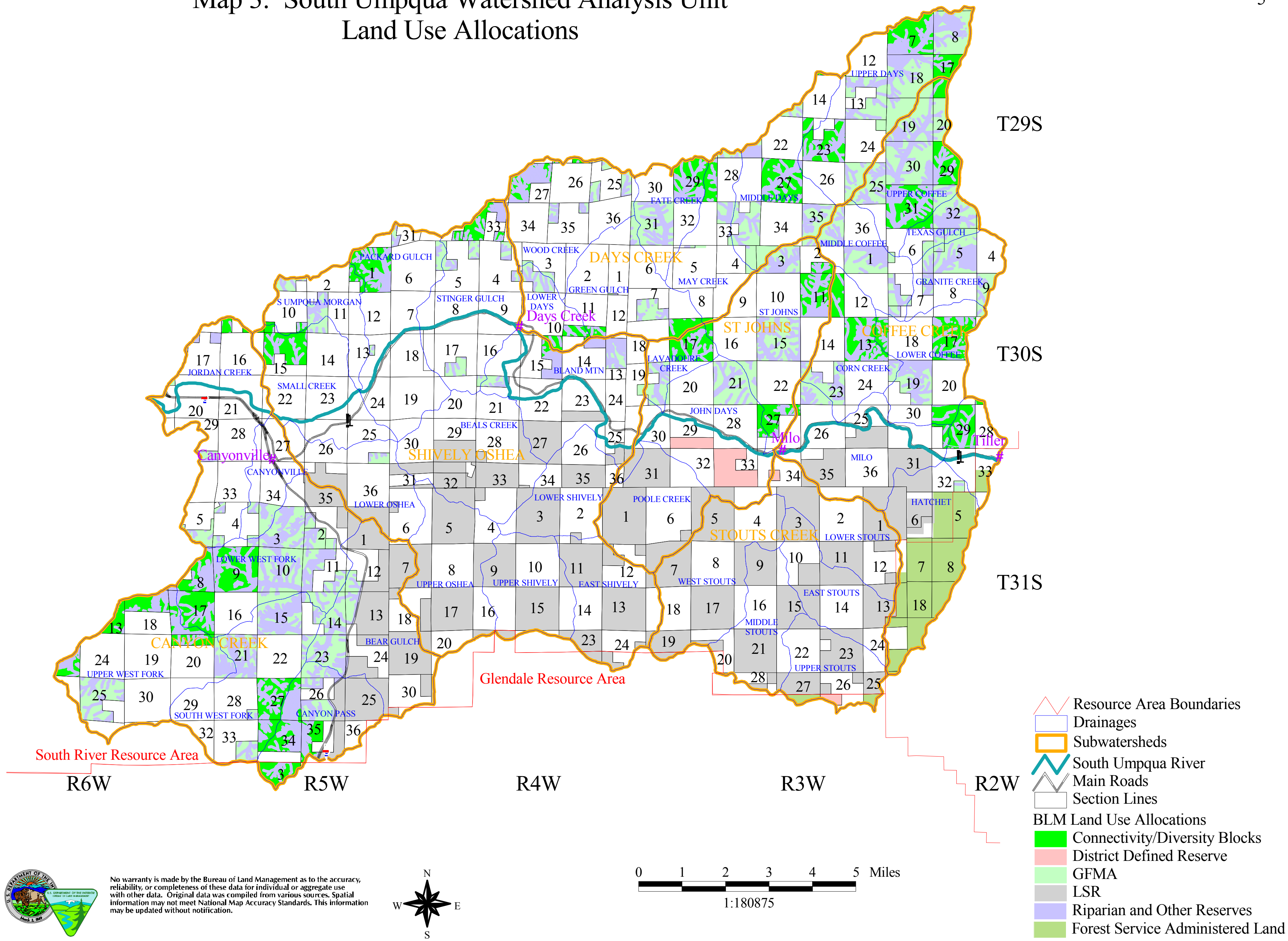


Table 1. Acres and Percent Ownership by Drainage and Subwatershed.

Drainage Name **Subwatershed Name**	BLM		Forest Service		Private		Total Acres
	Acres	Percent	Acres	Percent	Acres	Percent	
Bear Gulch	3,361	71	0	0	1,404	29	4,765
Canyon Pass*	2,316	77	0	0	670	22	2,986
Canyonville	201	14	0	0	1,207	86	1,408
Jordan Creek	423	8	0	0	4,765	92	5,188
Lower West Fork	4,021	76	0	0	1,289	24	5,310
South West Fork	1,889	42	0	0	2,626	58	4,515
Upper West Fork*	1,636	32	0	0	3,475	68	5,111
Canyon Creek Subwatershed	13,847	47	0	0	15,436	53	29,283
Corn Creek*	1,112	43	0	0	1,486	57	2,598
Granite Creek*	829	44	0	0	1,066	56	1,895
Hatchet*	880	22	2,509	63	643	16	4,032
Lower Coffee	1,340	43	0	0	1,796	57	3,136
Middle Coffee	887	43	0	0	1,155	57	2,042
Milo	1,508	36	0	0	2,637	64	4,145
Slate Creek	355	28	105	8	827	64	1,287
Texas Gulch*	658	72	0	0	252	28	910
Upper Coffee*	3,004	89	0	0	357	11	3,361
Coffee Creek Subwatershed	10,573	45	2,614	11	10,219	44	23,406
Fate Creek*	992	52	0	0	925	48	1,917
Green Gulch	503	15	0	0	2,897	85	3,400
Lower Days	362	30	0	0	830	70	1,192
May Creek	415	16	0	0	2,180	84	2,595
Middle Days	1,643	43	0	0	2,165	57	3,808
Upper Days*	3,338	64	0	0	1,872	36	5,210
Wood Creek*	729	19	0	0	3,155	81	3,884
Days Creek Subwatershed	7,982	36	0	0	14,024	64	22,006

Drainage Name **Subwatershed Name**	BLM		Forest Service		Private		Total Acres
	Acres	Percent	Acres	Percent	Acres	Percent	
Beals Creek*	1,642	38	0	0	2,656	62	4,298
Bland Mountain	1,290	25	0	0	3,861	75	5,151
East Shively*	1,780	56	0	0	1,393	44	3,173
Lower O’Shea	638	23	0	0	2,113	77	2,751
Lower Shively	1,086	44	0	0	1,402	56	2,488
Packard Gulch	663	14	0	0	3,988	86	4,651
South Umpqua Morgan*	400	20	0	0	1,625	80	2,025
Small Creek	544	15	0	0	2,999	85	3,543
Stinger Gulch	723	16	0	0	3,771	84	4,494
Upper O’Shea*	1,980	52	0	0	1,858	48	3,838
Upper Shively*	1,329	50	0	0	1,325	50	2,654
Shively-O’Shea Subwatershed	12,075	31	0	0	26,991	69	39,066
John Days	1,462	33	0	0	2,982	67	4,444
Lavadoure Creek*	672	62	0	0	405	38	1,077
Poole Creek*	1,805	59	0	0	1,271	41	3,076
St Johns*	1,981	42	0	0	2,763	58	4,744
St Johns Subwatershed	5,920	44	0	0	7,421	56	13,341
East Stouts*	1,344	53	28	1	1,180	46	2,552
Lower Stouts	1,404	52	13	0	1,298	48	2,715
Middle Stouts	1,511	57	0	0	1,126	43	2,637
Upper Stouts*	1,157	51	134	6	981	43	2,272
West Stouts	2,214	53	0	0	1,950	47	4,164
Stouts Creek Subwatershed	7,630	53	175	1	6,535	46	14,340
South Umpqua WAU	58,027	41	2,789	2	80,626	57	141,442

* = Discrete drainage.

Table 2. Acres and Percentage of Federally Managed Lands by Land Use Allocation.

Land Use Allocation	Acres in Roseburg District	Acres in Medford District	Acres in Umpqua National Forest	Total Acres of Federally Managed Lands	Percent of Federally Managed Lands	Percent of Watershed Analysis Unit
Late-Successional Reserve	24,173	256	2,416	26,845	44	19.0
District Defined Reserve	705	0	0	705	1	0.5
Riparian Reserves (Outside of LSR and DDR)	11,647	76	142	11,865	20	8.4
Other Reserved Areas (Owl Core Areas and TPCC Withdrawn Areas)	2,868	0	0	2,868	5	2.0
Connectivity/Diversity Blocks	7,049	165	0	7,214	12	5.1
General Forest Management Area (GFMA)	11,069	7	239 (Matrix)	11,315	19	8.0
Total	57,511	504	2,797	60,812	100	43.0

Chart 1. South Umpqua WAU

Land Use in the WAU

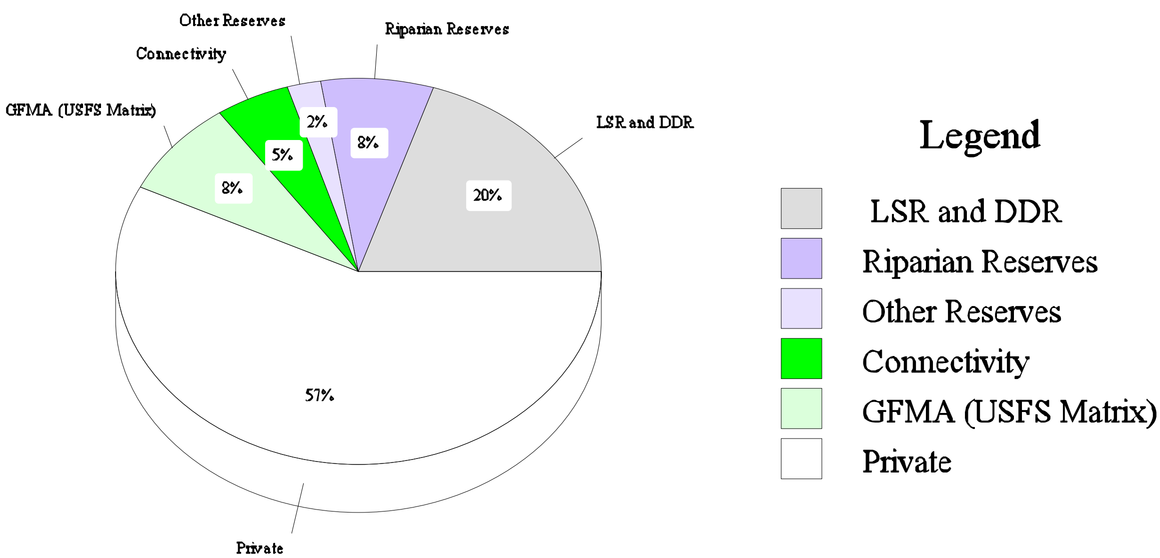
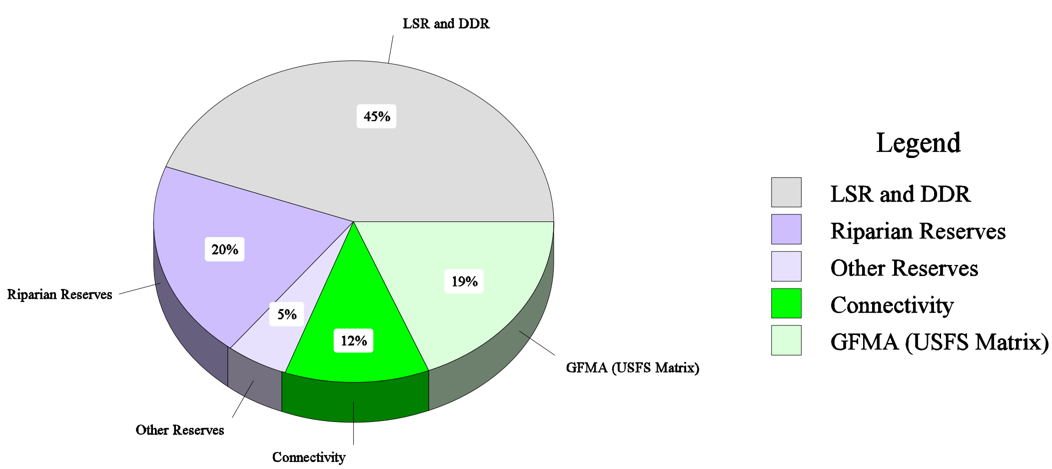


Chart 2. South Umpqua WAU

Federal Land Use Allocations



III. Issues and Key Questions

The purpose of developing issues is to focus the analysis on the key elements of the ecosystem that are relevant to the management questions, human values, or resource conditions within the WAU. Areas covered by this watershed analysis receive more in-depth analysis during project development and the National Environmental Policy Act (NEPA) process. New information gathered during the Interdisciplinary (ID) team process would be appended to the watershed analysis document as an update.

A. Issue 1 - Late-Successional Reserves

Late-Successional Reserves are to be managed to maintain a functional and interacting late-successional and old-growth ecosystem. The South Umpqua River/Galesville Late-Successional Reserve Assessment was developed to help facilitate implementation of appropriate management activities for the Late-Successional Reserve included in this WAU.

Key Questions

Vegetation Patterns

Where are the late-successional/old-growth stands within the LSR? See Map 7 on page 39.

Where are the stands that may be treated to maintain or promote late-successional habitat within the LSR? See Map 7 on page 39, Map 18 on page 91, Map I-1 in Appendix I, and pages 93 through 95.

Are there risk reduction activities that could occur in the WAU to protect late-successional/old-growth forests? See pages 93 through 95.

B. Issue 2 - Harvest Potential

Matrix lands are responsible for contributing to the Probable Sale Quantity (PSQ). Objectives in the Matrix include producing a sustainable supply of timber and other forest commodities, providing connectivity (along with other Land Use Allocations, such as Riparian Reserves) between Late-Successional Reserves, providing habitat for a variety of organisms associated with both late-successional and younger forests, providing for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, maintenance of ecologically valuable structural components such as down logs, snags, and large trees, and providing early-successional habitat.

Key Questions

Vegetation Patterns

What are the historic and current vegetation conditions? See pages 22 through 81.

What is the current age class distribution in the WAU? Where are the early and mid seral stands in the WAU? Where are the late-successional/old-growth stands within the WAU? See Table 9 on page 40 and Map 8 on page 43.

Where are the stands of harvestable age (at least 40 years old) within the Matrix Land Use Allocation? See Map 8 on page 43.

Can the scale, timing, and spacing of timber harvest areas be adjusted to minimize fragmentation and the effects on other resources while meeting the objectives for the Matrix Land Use Allocation established in the SEIS ROD and the Roseburg District RMP? See pages 82 through 95, pages 198 through 204, Map 16 on page 86, Appendix E, and Appendix I.

C. Issue 3 - Watershed Health and Restoration

Tier 1 Key Watersheds have been identified as priority areas for watershed restoration. Watershed restoration is an integral part of a program to aid recovery of fish habitat, riparian habitat, and water quality. One component of a watershed restoration program involves road treatments (such as decommissioning or upgrading), which would reduce sedimentation and erosion and improve water quality. A second component deals with riparian vegetation. Silvicultural treatments in Riparian Reserves, such as planting unstable areas along streams, thinning densely-stocked young stands, releasing young conifers overtopped by hardwoods, and reforesting shrub and hardwood dominated stands with conifers, would improve bank stabilization, increase shade, and accelerate recruitment of large wood desirable for future in-stream structure. A third watershed restoration component involves the design and placement of in-stream habitat structure in an effort to increase channel complexity and the number of pools. Other restoration opportunities may include mine reclamation or meadow or wetland restoration.

Opportunities may exist to promote the long-term health on lands outside of riparian areas. Management activities would be designed so forests remain productive, resilient, and stable over time to withstand the effects of periodic natural or human-caused stresses such as drought, insect attack, disease, climatic changes, flood, resource management practices, and resource demands.

Key Questions

a. Vegetation Patterns

What processes created the vegetation patterns? See pages 75 and 76.

Where are the opportunities to maintain or restore stand health or vigor in the upland areas of the WAU? See pages 87 through 95, page 198, and page 200.

What is the current condition of Riparian Reserves in the WAU? See pages 62 through 67.

What and where are the opportunities to restore late-successional conditions in Riparian Reserves? See pages 82, 198, and 199 and Map 14 on page 66.

b. Soils / Erosion

What are the dominant erosion processes within the WAU? Where have these erosion processes occurred in the past? Where might they occur in the future? See pages 99 through 114, Map 20 on page 101, Map 21 on page 108, and Map 22 on page 112.

Where are the soils that management activities could reduce soil productivity? See pages 114 through 118 and Map 23 on page 115.

c. Hydrology / Channel Processes

What are the dominant hydrologic characteristics (e.g. total discharge, and peak, base, and low flows) and other notable hydrologic features and processes in the WAU? See pages 119 through 163.

d. Water Quality

What beneficial uses dependant on aquatic resources occur in the WAU and which water quality parameters are critical to these uses? See pages 150 through 154 and Appendix K.

What are the effects of management activities on hydrologic processes? See pages 119 through 163.

Where are the opportunities to improve water quality and hydrologic conditions? See pages 150 through 163 and Appendix K.

e. Fisheries

Where are the historic and current locations of fish populations? See pages 164 through 169, Map 27 on page 168, and Appendix C.

How have fish habitat and populations been affected by hydrologic processes and human activities? See pages 164 through 171 and Appendix C.

What and where are the restoration opportunities that would benefit the fisheries resource? See page 199, Appendix G, and Appendix K.

f. Roads

What are the current conditions and distribution of roads in the WAU? See pages 128 through 142.

How are roads impacting other resources within the WAU? See pages 128 through 142, 148, 161, and 162, and Appendix K.

Are there road decommissioning or improvement opportunities in the WAU? Where are the road treatment opportunities? See pages 198 and 199, Appendix G, and Appendix K.

D. Issue 4 - Special Status Species

Key Questions

Special Status Species and Their Habitats

What are the species of concern important in the WAU (e.g. threatened or endangered species, special status species, or species emphasized in other plans)? See pages 164 through 197.

What is the distribution and character of their habitats? See pages 164 through 197, Map 27 on page 168, Map 28 on page 179, and Map 29 on page 181.

IV. Human Uses

A. Reference Conditions

The South Umpqua Watershed Analysis Unit has been used by humans for probably thousands of years. Uses in the WAU have included hunting and gathering, fur trapping, subsistence and commercial agriculture, mining, transportation, logging and lumbering, service related activities, residential dwellings, and recreation.

1. Pre-European Settlement

Little knowledge exists of prehistoric use in the WAU prior to European-American settlement. The indigenous people of the area, the Cow Creek Indians, followed a seasonal way of life hunting deer and elk, gathering nuts, berries, seeds, and roots, and fishing. They lived in villages in the valleys during the winter and in the higher elevations during the summer and early fall. The Cow Creek Indians changed the landscape very little. Although, early settlers indicated the Indians may have burned areas to control brush making hunting and the gathering of food easier.

Twenty-five archaeological sites have been identified in the South Umpqua WAU. The majority of sites occur on terraces along the South Umpqua River. Five sites are located along Days Creek and another seven sites are located on the ridges between Dompier and Coffee Creeks. There is a high probability many other sites exist but have not been discovered, yet. More intensive archaeological investigations may be necessary to completely understand the influence indigenous people had in the WAU.

2. European-American Exploration and Settlement

The 1800s marked the arrival of fur trappers and settlers into the South Umpqua River Valley. Exploration of the Umpqua Valley by fur trappers from the Hudson Bay Company began around 1820. Settlers transformed the life and countryside of the area and began shaping it into its current condition.

The discovery of gold brought miners to southern Oregon by 1851. Gold was first discovered in California and then Josephine and Jackson Counties in southern Oregon. This encouraged miners to search for gold in the South Umpqua WAU. Mining attracted an estimated 400 men to the Coffee Creek area in 1858 (Reinhart 1962). The small town of Coffeeville developed, including a general store and saloon. Placer mining claims were also established on Shively and Stouts Creeks. By 1890, the South Umpqua Mining District was formed with the headquarters at Saint John Creek.

Lindsay Applegate, along with others, surveyed the area in 1846. They were searching for a new route emigrants from the south could use on their journey to the Willamette Valley. This event, along with the passage of the Donation Land Claim Act in 1850, opened the region to settlers. John Fullerton, J. F.

Gazley, S.B. Briggs, I. Boyle, and Mr. Beckworth settled in the Canyonville area in 1851. Days Creek was settled by Patrick and George Day, at the same time.

Canyonville consisted of a log house and a blacksmith shop in 1852. By 1858, the town had two mercantile stores. In 1862, a telegraph line between Portland and Canyonville linked the area to the rest of the United States. Canyonville continued to grow and by 1883 had a drug store, a butcher shop, a grain warehouse, three hotels, two feed stables, two blacksmith shops, a hardware and tin shop, a cabinet shop, a wagon shop, and A. F. Schultz operated a grist mill (Walling 1884). Canyonville was incorporated in 1901 and had grown to a population of 1,260 people by 1985.

3. Agriculture/Grazing

Early settlers maintained a subsistence lifestyle until markets were established for grain, produce, and livestock. These agricultural products became the main sources of income throughout the 1880s and 1890s. Products were transported to markets by pack animals or wagons and the cattle were driven to market. Italian prunes were the main agricultural production crop in the area from the 1880s until the 1930s. Prune production declined in the 1930s when sheep and cattle grazing became more prominent.

4. Transportation

The earliest trails through the region were created by the seasonal migrations of the native people. A well-traveled route, running north and south through the WAU, developed after the arrival of European-Americans. The Applegate Trail was established as a transportation route for people to use, such as Ewing Young who drove 700 long horn cattle from California to the Willamette Valley in 1837 (Poole 1968).

Congress approved funding for the Scottsberg-Camp Stuart Wagon Road, which was constructed from the 1850s to the 1870s. The road work on the Applegate and Old Oregon-California Trails improved travel through the Umpqua Valley (Beckham 1986). In 1861, the California Stage Company of Oregon began operating a stage line from Sacramento to Portland. The stages ran seven days a week, April through December. The line operated 28 coaches and 30 stage wagons, utilizing 35 drivers and 500 horses. The stage stopped in Canyonville, Roseburg, and Oakland, Oregon. The stage line had ceased operating by 1865.

A ferry operated at Days Creek in the late 1800s, until a bridge was constructed over the South Umpqua River (McNeal 1938).

The Oregon and California railroad reached Roseburg in 1872, providing transportation of goods and people to the north. Ten years later, in 1882, construction was completed to the community of Riddle. By 1889, completion of a rail line south of Riddle through the Cow Creek canyon allowed access to markets in southern Oregon and California (Beckham 1986). The introduction of rail service allowed agriculture to have more influence on the local economy.

State officials approved construction of the Pacific Highway in 1915, which improved the Oregon-California Stage line road from Portland to Sacramento. By 1924, the Pacific Highway was paved through Douglas County, allowing all-weather travel. The Interstate Five freeway was constructed through Douglas County in the 1950s. During this period, the BLM, Forest Service, and private timber companies built more roads into their timbered lands. The transportation system improvements allowed faster transportation of commodities and year round timber harvesting. Receipts from the O&C lands contributed immensely to the improvement of roads throughout Douglas County (Beckham 1986 and Clough 1958).

5. Timber/Logging

Cadastral survey notes from the mid-nineteenth century mention the vegetation consisted of grasslands in the valleys, oak openings on the mid-slopes, and timber on the upper slopes of the WAU. The vegetation mosaic described appears to be similar to what occurred in the WAU in 1936 (see Map 4).

The first sawmill, operated by David Ransome, opened around 1853 (Reinhart 1962). In 1873, Pickett and Wilson opened two saw mills on Canyon Creek, one produced 300,000 board feet and the other 200,000 board feet of lumber annually (Walling 1884). In 1905, Duncan and Ross established a mill in Canyonville producing 283,000 board feet annually. Another sawmill was operated by Mr. Bailey upstream from the town of Days Creek. Abundant amounts of fir, cedar, and sugar pine grew along the creeks in the area (Walling 1884). After World War II, timber production became the major influence on the landscape in the South Umpqua WAU. The increased demand for lumber to build houses and the transportation system improvements generated a marked increase in timber harvesting in the WAU.

B. Current Conditions

The dominant human uses in the WAU have been timber production, transportation, agriculture, recreation, and service-related activities. The most recent economic development within the WAU is the Seven Feathers Casino and Resort. There are no treaty rights on BLM-administered land in the WAU. Although, individual tribal members may use the area.

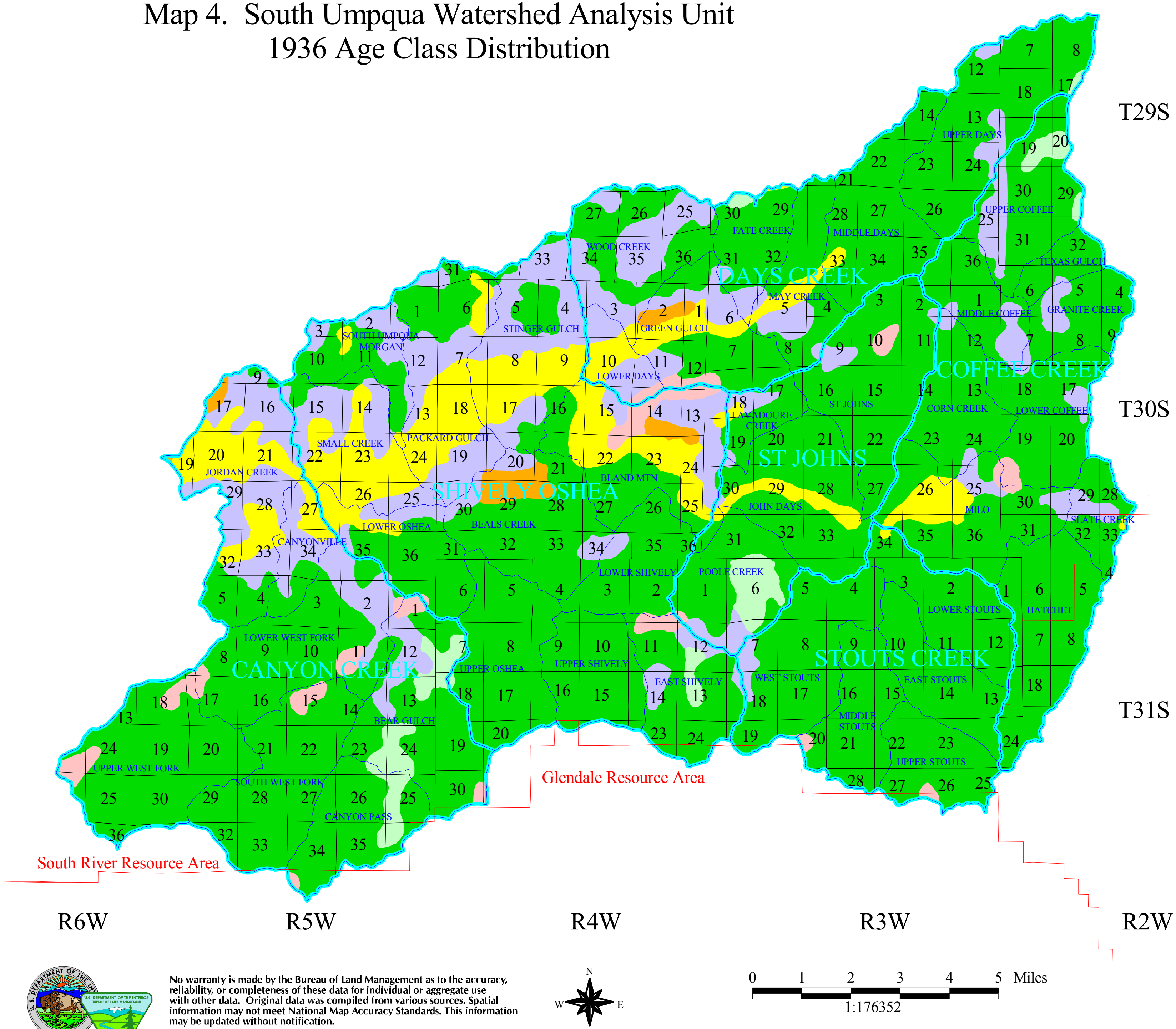
1. Timber

Timber harvesting has been a major influence in the WAU. Spurred by the demand for lumber after World War II, timber became the major influence within the WAU. Both private and Federally-administered lands have contributed to the timber harvest and lumber production over the last 45 years.

2. Agriculture

There are approximately 15,459 acres (11 percent) of agriculture/pasture lands in the WAU. A variety of grain and fruit crops were important agricultural products in the past. The production of livestock, both sheep and cattle, are the primary agricultural commodities now.

Map 4. South Umpqua Watershed Analysis Unit
1936 Age Class Distribution



0 1 2 3 4 5 Miles

1:176352

Resource Area Boundaries
Drainages
Subwatersheds
Section Lines

1936 Age Classes
- At Least 80 Years Old (Late Seral)
- 30 to 80 Years Old (Mid Seral)
- 0 to 30 Years Old (Early Seral)
- Hardwoods
- Burned Areas
- Agricultural Land

3. Mining and Minerals

The WAU has a moderate to high potential for locating gold, silver, copper, lead/zinc, chromium/nickel, mercury, and talc deposits. There are numerous mining sites located throughout the WAU. Many of the sites are located in the Coffee Creek, Canyon Creek, and Shively-O'Shea Subwatersheds.

Miners were drawn to the WAU following the discovery of gold in Josephine and Jackson Counties. The Golden Gate and Levans Ledge gold mines are located in the Canyon Creek Subwatershed. The Levans Ledge mine is patented and has seven adits. Placer gold is known to occur in the South Umpqua River and many of the main tributaries in the WAU. Gold is being produced from placer mines along Coffee Creek.

Other minerals discovered in the WAU include copper, talc, silver, and mercury. Copper was discovered in the Packard Gulch Drainage and in the southern parts of the Canyonville and Jordan Creek Drainages. Copper was also produced as a by-product from the Golden Gate gold mine located on the western edge of the Upper West Fork Drainage. Talc was discovered in the Lilya and Moyer prospects along the boundary between the Jordan Creek and Canyonville Drainages. Silver prospects occur in the Lower West Fork Drainage. Mercury prospects occur in the northern part of the Bear Gulch Drainage.

The known abandoned mines within the WAU include one site with potential water quality problems and safety concerns, two sites with potential safety concerns only, and the Mighty-Fine-Mine. The Mighty-Fine-Mine site was reclaimed by the BLM.

Salable minerals in the WAU include sand, gravel, and quarry rock. Sand and gravel have been mined from the South Umpqua River. Community Rock Pits are located throughout the WAU.

Road construction led to the development and mining of rock quarries to provide road surfacing material. The best sources of rock in the WAU occur south of the South Umpqua River and east of Interstate Five. This area happens to be located in the LSR Land Use Allocation, which could present problems with future development of these rock sources. The rock from these quarries could be used to upgrade existing roads causing problems, which could help meet Aquatic Conservation Strategy objectives. The potential benefits of attaining Aquatic Conservation Strategy objectives in the Tier 1 Key Watershed portion of the WAU may exceed the effect of removing late-successional habitat.

Some rock quarries in the WAU do not have useable amounts of rock remaining. These quarries could be closed and reclaimed. Reclamation plans have been developed for some of the quarries.

4. Special Forest Products

Another use in the WAU is the collection of Special Forest Products. Cedar boughs, greenery, and firewood were the main Special Forest Products collected in the South River Resource Area in 1999.

Special Forest Product sale prices are strongly influenced by product quality, which varies by product and the collection area. Salvaging dead and down trees for sawtimber near roads has been the Special Forest Product affecting the WAU the most. Areas where salvaging sawtimber has occurred often contain less large woody debris. Management direction in the RMP provides guidelines for the salvaging of sawtimber.

5. Recreation

Recreation use in the South Umpqua Watershed Analysis Unit is determined by the land ownership, topography, forest types, and age classes in the area. No developed recreation sites occur on BLM-administered land in the WAU at this time. Special Use Permits are not required for recreation use in the WAU.

a. Recreation Opportunity Spectrum (ROS)

The Recreation Opportunity Spectrum (ROS) considers the vast majority of the BLM-administered land in the WAU to be Roaded Natural. The WAU has a strong rural setting. The areas containing BLM-administered lands are characterized by predominantly natural appearing environments with moderate evidence of the sights and sounds of humans. Resource modification and utilization practices are evident but usually blend with the natural environment. Interaction between users may be low to moderate but with the evidence of other users prevalent. Rustic facilities are provided for user convenience as well as for safety and resource protection. Facilities are designed and constructed to provide for conventional motorized use.

b. Off Highway Vehicles (OHV)

The predominant OHV designation in the RMP for the South Umpqua WAU is 'Limited' to existing roads and trails. Under this designation, existing roads and trails are open to motorized access unless otherwise identified (i.e., hiking trails). Licensed vehicles may use maintained roads and natural surface roads and trails. Registered OHVs, such as All Terrain Vehicles (ATVs), and motorcycles not licensed for the public roads may only use existing roads and trails that are not maintained (graveled).

New roads and trails may be approved and constructed in limited areas, through the NEPA process. State funds from gas taxes and registrations may be available to BLM to develop OHV areas. If problems occur within road and trail systems, they may be closed on an emergency basis through 43 CFR 8341 and 8364.

c. Visual Resource Management (VRM)

Visual Resource Management classes are assigned through an inventory system and range from Class I through IV. Class I lands are reserved for their scenic quality and allow for very limited management.

Class IV lands allow for major modifications to the existing character of the landscape. These classes are based on the combination of scenic quality, sensitivity level, and distance zones.

The WAU contains VRM Class II, III, and IV lands. Under the Class II designation, low levels of change to the characteristics of the landscape would be allowed. Management on Class III designated lands should partially retain the visual character. A Class IV designation allows major modifications to the landscape. Class II lands occur within one mile of the Interstate 5 corridor, south of Canyonville, and within one half mile of County Road 1 between Canyonville and Tiller. The BLM-administered lands along Interstate Five probably receive the greatest visual scrutiny by non-local people of any area in the South River Resource Area. Class III lands are intermixed with Class II lands along County Road 1 between Canyonville and Tiller. The remainder of the WAU is designated as Class IV land.

Management recommendations within Class II lands stress using timber harvesting methods, which retain most of the trees, such as single tree selection, uneven aged harvest, retention of shelterwood overstory trees, or group selection. Regeneration harvests are not to exceed 6.6 percent of the land base per decade in visible areas of the Class II lands. The South Umpqua WAU has the largest amount of VRM Class II land in the South River Resource Area.

Management within Class III lands should employ short term retention of shelterwood overstory trees or regeneration harvests that have less than ten acres of seen area. No more than ten percent of the seen Class III lands should be harvested within any decade. Regeneration harvest units should be screened from key viewing points along major travel routes.

Under the Class IV designation, the extent of change to the character of the landscape can be high. Management activities may dominate the view and may be the major focus of the viewer's attention. However, every attempt should be made to minimize the impact of activities through careful unit location, minimal disturbance, and repetition of the basic elements of form, line, and texture.

d. Recreation Management

The WAU falls within the South River Extensive Recreation Management Area (ERMA). Within the ERMA, recreation is mainly unstructured and dispersed, where limited needs or responsibilities require minimal recreation investments. The ERMA, which constitutes the bulk of the public land, gives recreation visitors the freedom of choice with minimal regulatory constraints.

Forms of recreation commonly observed in the South Umpqua WAU include driving for pleasure, hunting, photography, picnicking, camping, shooting or target practice, and gathering (berries, flowers, mushrooms, greens, and rocks). Areas along major roads and the larger streams are common sites for these various forms of recreation. Some of the most popular sites for recreation in the WAU are the Myrtle Creek to Canyonville Scenic Historic Tour Route on County Road 1 and the Bear Gulch ACEC/RNA in T31S, R4W, Section 7 and T31S, R5W, Sections 1 and 12.

No Designated Recreation sites occur in the WAU, but some areas have greater use occurrence and potential. Potential trail sites extend from the Red Top pond area in T29S, R2W, Section 4 through the Windy Camp area in T29S, R2W, Section 17. The trails could continue in a southeast direction following the ridges toward Coffee Creek or Corn Creek. These trails have had historic use, and portions of them are still used. However, these trails need extensive renovation.

Other potential trail sites exist along Stouts Creek and the ridge top from the end of the 31-3-10.3 road to Green Butte. These areas are in the South Umpqua River/Galesville LSR. The proposed trails would be consistent with the semi-primitive nature of the area and LSR objectives.

V. Vegetation

A. Reference Conditions

Information used to characterize the reference (historic) vegetation conditions in the South Umpqua WAU were from 1900, 1914, and 1936 data in GIS. The data from the three maps were collected at different degrees of accuracy and scale. Consequently, the data are not directly comparable from one map to another, since they were not classified in the same way.

The data indicates the amount of merchantable timber ranged from about 50 to 87 percent of the South Umpqua WAU in the early 1900s (see Tables 3, 4, 5, and 6 and Maps 4, 5, and 6). The amount of land in nonforested or non-merchantable timber ranged from about 14 to 50 percent of the WAU during the early 1900s. In 1900, 1914, and 1936, the early and mid seral stages occurred as small patches, probably as a result of fires, within the larger late seral blocks.

The BLM-administered land occurs mainly in the upper elevations of the WAU. About six percent of the BLM-administered land was in nonforested or non-merchantable timber in 1936 because of the location of these lands (see Table 7). Table 7 shows about 94 percent of the BLM-administered land was in merchantable timber in 1936.

Table 3. 1900 Vegetation Data.

	Open (Nonforested)		Woodland (Hardwoods, Brush)		0 to 5 MBM per Acre (Early to Mid Seral)		5 to 10 MBM per Acre (Merchantable Timber, Mid Seral)		10 to 25 MBM per Acre (Merchantable Timber, Mid to Late Seral)		25 to 50 MBM per Acre (Merchantable Timber, Late Seral)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bear Gulch	4,174	88	417	9	171	4	0	0	0	0	0	0	4,762
Canyon Pass	1,845	62	0	0	1,146	38	0	0	0	0	0	0	2,991
Canyonville	1,366	97	43	3	0	0	0	0	0	0	0	0	1,409
Jordan Creek	2,915	56	1,055	20	0	0	0	0	1,219	23	0	0	5,189
Lower West Fork	4,427	83	882	17	0	0	0	0	0	0	0	0	5,309
South West Fork	3,281	73	1,122	25	113	3	0	0	0	0	0	0	4,516
Upper West Fork	4,057	79	722	14	332	6	0	0	0	0	0	0	5,111
Canyon Creek Subwatershed	22,065	75	4,241	14	1,762	6	0	0	1,219	4	0	0	29,287
Corn Creek	0	0	0	0	0	0	0	0	2,598	100	0	0	2,598
Granite Creek	332	18	0	0	0	0	1,528	81	35	2	0	0	1,895
Hatchet	0	0	0	0	0	0	503	12	839	21	2,690	67	4,032
Lower Coffee	0	0	0	0	0	0	2,335	74	801	26	0	0	3,136
Middle Coffee	0	0	0	0	0	0	4	0	2,038	100	0	0	2,042
Milo	0	0	0	0	0	0	365	9	3,781	91	0	0	4,146
Slate Creek	0	0	0	0	0	0	1,178	91	0	0	110	9	1,288
Texas Gulch	0	0	0	0	0	0	857	94	54	6	0	0	911
Upper Coffee	251	7	0	0	0	0	1,720	51	1,392	41	0	0	3,363
Coffee Creek Subwatershed	583	2	0	0	0	0	8,490	36	11,538	49	2,800	12	23,411
Fate Creek	575	30	0	0	0	0	1,342	70	0	0	0	0	1,917
Green Gulch	525	15	0	0	0	0	0	0	2,874	85	0	0	3,399
Lower Days	282	24	0	0	0	0	0	0	913	76	0	0	1,195
May Creek	1,056	41	0	0	0	0	0	0	1,536	59	0	0	2,592
Middle Days	1,008	26	0	0	0	0	0	0	2,800	74	0	0	3,808
Upper Days	656	13	0	0	0	0	790	15	3,766	72	0	0	5,212
Wood Creek	338	9	0	0	0	0	0	0	3,546	91	0	0	3,884
Days Creek Subwatershed	4,440	20	0	0	0	0	2,132	10	15,435	70	0	0	22,007

	Open (Nonforested)		Woodland (Hardwoods, Brush)		0 to 5 MBM per Acre (Early to Mid Seral)		5 to 10 MBM per Acre (Merchantable Timber, Mid Seral)		10 to 25 MBM per Acre (Merchantable Timber, Mid to Late Seral)		25 to 50 MBM per Acre (Merchantable Timber, Late Seral)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Beals Creek	2,136	50	324	8	0	0	1,837	43	0	0	0	0	4,297
Bland Mountain	4,297	83	0	0	0	0	665	13	187	4	0	0	5,149
East Shively	3,173	100	0	0	0	0	0	0	0	0	0	0	3,173
Lower O'Shea	655	24	2,093	76	0	0	0	0	0	0	0	0	2,748
Lower Shively	1,908	77	0	0	0	0	580	23	0	0	0	0	2,488
Packard Gulch	1,810	39	124	3	0	0	0	0	2,717	58	0	0	4,651
South Umpqua Morgan	463	23	0	0	0	0	0	0	1,564	77	0	0	2,027
Small Creek	2,057	58	1,016	29	0	0	0	0	471	13	0	0	3,544
Stinger Gulch	730	16	0	0	0	0	0	0	3,763	84	0	0	4,493
Upper O'Shea	2,354	61	145	4	0	0	1,339	35	0	0	0	0	3,838
Upper Shively	2,043	77	0	0	0	0	610	23	0	0	0	0	2,653
Shively-O'Shea Subwatershed	21,626	55	3,702	9	0	0	5,031	13	8,702	22	0	0	39,061
John Days	1,291	29	0	0	0	0	0	0	3,154	71	0	0	4,445
Lavadoure Creek	440	41	0	0	0	0	0	0	638	59	0	0	1,078
Poole Creek	3,077	100	0	0	0	0	0	0	0	0	0	0	3,077
St Johns	96	2	0	0	0	0	0	0	4,648	98	0	0	4,744
St Johns Subwatershed	4,904	37	0	0	0	0	0	0	8,440	63	0	0	13,344
East Stouts	639	25	0	0	0	0	0	0	1,548	61	364	14	2,551
Lower Stouts	0	0	0	0	0	0	0	0	2,428	89	287	11	2,715
Middle Stouts	2,263	86	0	0	0	0	0	0	373	14	0	0	2,636
Upper Stouts	1,972	87	0	0	0	0	0	0	0	0	301	13	2,273
West Stouts	3,308	79	0	0	0	0	0	0	857	21	0	0	4,165
Stouts Creek Subwatershed	8,182	57	0	0	0	0	0	0	5,206	36	952	7	14,340
South Umpqua WAU	61,800	44	7,943	6	1,762	1	15,653	11	50,540	36	3,752	3	141,450

Table 4. 1914 Vegetation Data.

	Non-timber		Brush		Burned, not restocked		Burned, restocking		Cut Over, not restocked		Merchantable timber		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bear Gulch	0	0	0	0	0	0	2,774	58	0	0	1,988	42	4,762
Canyon Pass	0	0	221	7	0	0	998	33	0	0	1,772	59	2,991
Canyonville	615	44	522	37	0	0	0	0	0	0	272	19	1,409
Jordan Creek	3,665	71	271	5	0	0	0	0	0	0	1,253	24	5,189
Lower West Fork	0	0	977	18	0	0	2,036	38	6	0	2,289	43	5,308
South West Fork	0	0	0	0	0	0	764	17	663	15	3,090	68	4,517
Upper West Fork	0	0	56	1	0	0	0	0	498	10	4,558	89	5,112
Canyon Creek Subwatershed	4,280	15	2,047	7	0	0	6,572	22	1,167	4	15,222	52	29,288
Corn Creek	150	6	0	0	214	8	0	0	0	0	2,234	86	2,598
Granite Creek	0	0	0	0	0	0	0	0	0	0	1,895	100	1,895
Hatchet	0	0	0	0	0	0	0	0	0	0	4,031	100	4,031
Lower Coffee	249	8	0	0	0	0	0	0	0	0	2,887	92	3,136
Middle Coffee	0	0	0	0	30	1	0	0	0	0	2,012	99	2,042
Milo	2,440	59	0	0	199	5	0	0	0	0	1,508	36	4,147
Slate Creek	558	43	0	0	0	0	0	0	0	0	730	57	1,288
Texas Gulch	0	0	0	0	0	0	0	0	0	0	911	100	911
Upper Coffee	0	0	0	0	0	0	0	0	0	0	3,363	100	3,363
Coffee Creek Subwatershed	3,397	15	0	0	443	2	0	0	0	0	19,571	84	23,411
Fate Creek	9	0	635	33	0	0	0	0	0	0	1,274	66	1,918
Green Gulch	731	22	513	15	0	0	0	0	0	0	2,155	63	3,399
Lower Days	1,033	87	161	13	0	0	0	0	0	0	0	0	1,194
May Creek	7	0	43	2	44	2	0	0	0	0	2,497	96	2,591
Middle Days	0	0	0	0	38	1	0	0	0	0	3,771	99	3,809
Upper Days	0	0	0	0	42	1	0	0	0	0	5,170	99	5,212
Wood Creek	1,820	47	383	10	0	0	0	0	0	0	1,681	43	3,884
Days Creek Subwatershed	3,600	16	1,735	8	124	1	0	0	0	0	16,548	75	22,007

	Non-timber		Brush		Burned, not restocked		Burned, restocking		Cut Over, not restocked		Merchantable timber		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Beals Creek	0	0	637	15	389	9	0	0	0	0	3,270	76	4,296
Bland Mountain	2,304	45	1,830	36	0	0	0	0	0	0	1,016	20	5,150
East Shively	0	0	0	0	0	0	0	0	0	0	3,173	100	3,173
Lower O’Shea	1,000	36	284	10	0	0	0	0	0	0	1,465	53	2,749
Lower Shively	0	0	0	0	0	0	0	0	0	0	2,488	100	2,488
Packard Gulch	3,247	70	1,399	30	0	0	0	0	0	0	6	0	4,652
South Umpqua Morgan	2,026	100	0	0	0	0	0	0	0	0	0	0	2,026
Small Creek	3,478	98	66	2	0	0	0	0	0	0	0	0	3,544
Stinger Gulch	3,035	68	1,457	32	0	0	0	0	0	0	2	0	4,494
Upper O’Shea	0	0	0	0	0	0	86	2	0	0	3,752	98	3,838
Upper Shively	0	0	0	0	0	0	0	0	0	0	2,653	100	2,653
Shively-O’Shea Subwatershed	15,090	39	5,673	15	389	1	86	0	0	0	17,825	46	39,063
John Days	2,294	52	0	0	0	0	0	0	0	0	2,152	48	4,446
Lavadoure Creek	210	19	0	0	0	0	0	0	0	0	868	81	1,078
Poole Creek	144	5	0	0	0	0	0	0	0	0	2,932	95	3,076
St Johns	343	7	0	0	661	14	0	0	0	0	3,740	79	4,744
St Johns Subwatershed	2,991	22	0	0	661	5	0	0	0	0	9,692	73	13,344
East Stouts	0	0	0	0	373	15	0	0	0	0	2,179	85	2,552
Lower Stouts	2	0	0	0	437	16	0	0	0	0	2,275	84	2,714
Middle Stouts	0	0	0	0	118	4	0	0	0	0	2,519	96	2,637
Upper Stouts	0	0	0	0	0	0	0	0	0	0	2,273	100	2,273
West Stouts	0	0	0	0	16	0	0	0	0	0	4,149	100	4,165
Stouts Creek Subwatershed	2	0	0	0	944	7	0	0	0	0	13,395	93	14,341
South Umpqua WAU	29,360	21	9,455	7	2,561	2	6,658	5	1,167	1	92,253	65	141,454

Table 5. 1936 Age Class Distribution in the South Umpqua WAU.

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (30 to 80 Years Old)		Late Seral (At Least 80 Years Old)		Hardwoods		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bear Gulch	0	0	1,025	22	643	13	3,095	65	0	0	4,763
Canyon Pass	0	0	465	16	0	0	2,526	84	0	0	2,991
Canyonville	351	25	0	0	669	47	389	28	0	0	1,409
Jordan Creek	1,912	37	0	0	2,311	45	838	16	128	2	5,189
Lower West Fork	0	0	266	5	892	17	4,151	78	0	0	5,309
South West Fork	0	0	176	4	0	0	4,340	96	0	0	4,516
Upper West Fork	0	0	417	8	0	0	4,695	92	0	0	5,112
Canyon Creek Subwatershed	2,263	8	2,349	8	4,515	15	20,034	68	128	0	29,289
Corn Creek	21	1	0	0	138	5	2,439	94	0	0	2,598
Granite Creek	0	0	0	0	337	18	1,558	82	0	0	1,895
Hatchet	4	0	0	0	0	0	4,028	100	0	0	4,032
Lower Coffee	0	0	124	4	158	5	2,853	91	0	0	3,135
Middle Coffee	0	0	0	0	406	20	1,636	80	0	0	2,042
Milo	748	18	83	2	364	9	2,952	71	0	0	4,147
Slate Creek	27	2	0	0	258	20	1,003	78	0	0	1,288
Texas Gulch	0	0	0	0	21	2	890	98	0	0	911
Upper Coffee	0	0	352	10	584	17	2,425	72	0	0	3,361
Coffee Creek Subwatershed	800	3	559	2	2,266	10	19,784	85	0	0	23,409

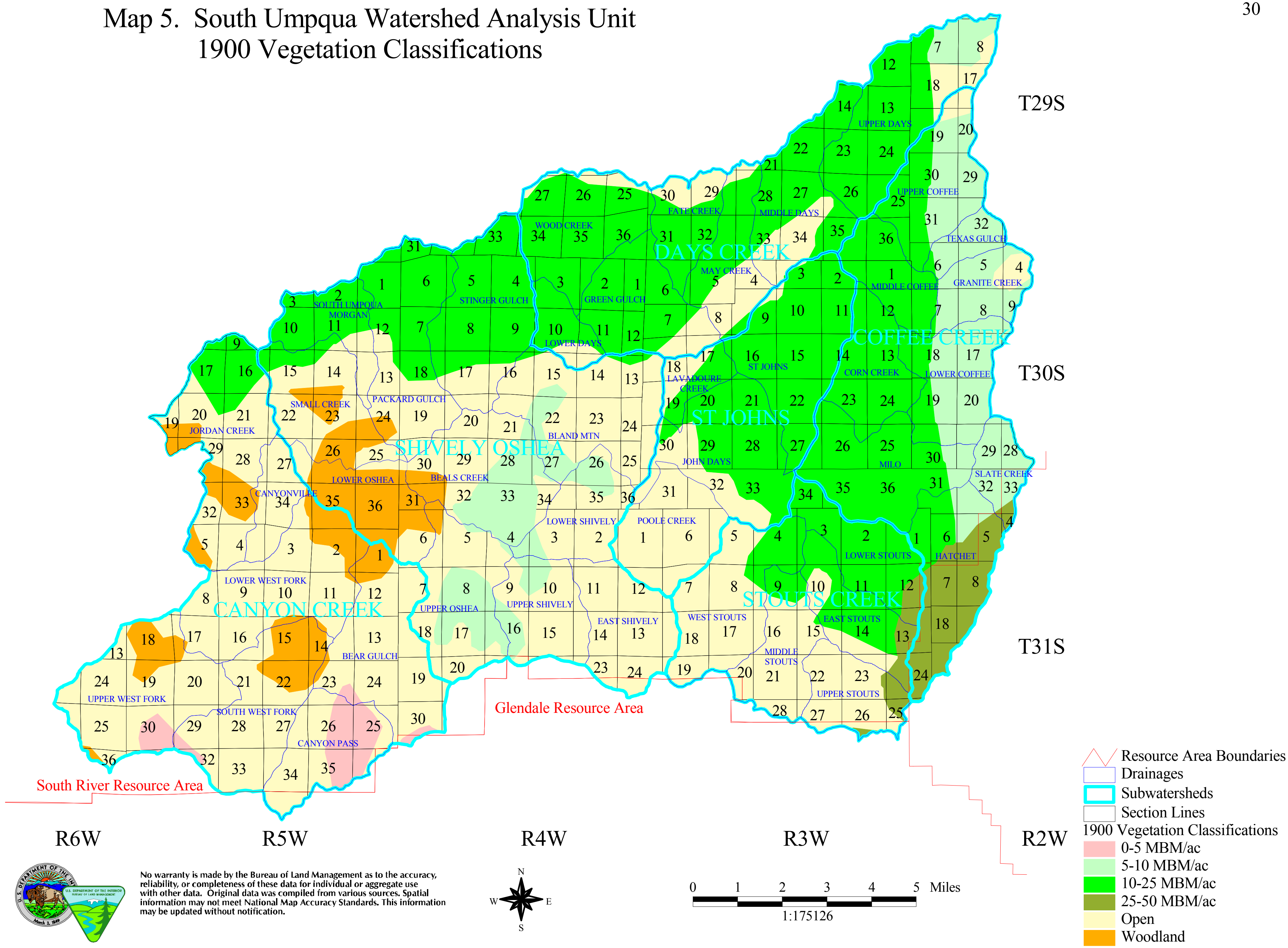
	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (30 to 80 Years Old)		Late Seral (At Least 80 Years Old)		Hardwoods		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Fate Creek	38	2	84	4	209	11	1,585	83	0	0	1,916
Green Gulch	608	18	165	5	682	20	1,741	51	203	6	3,399
Lower Days	420	35	92	8	682	57	0	0	0	0	1,194
May Creek	339	13	0	0	465	18	1,787	69	0	0	2,591
Middle Days	97	3	0	0	0	0	3,712	97	0	0	3,809
Upper Days	0	0	48	1	369	7	4,795	92	0	0	5,212
Wood Creek	59	2	0	0	1,858	48	1,959	50	9	0	3,885
Days Creek Subwatershed	1,561	7	389	2	4,265	19	15,579	71	212	1	22,006
Beals Creek	12	0	0	0	510	12	3,194	74	581	14	4,297
Bland Mountain	1,710	33	496	10	1,053	20	1,670	32	221	4	5,150
East Shively	0	0	410	13	438	14	2,325	73	0	0	3,173
Lower O’Shea	459	17	17	1	353	13	1,919	70	0	0	2,748
Lower Shively	0	0	14	1	114	5	2,361	95	0	0	2,489
Packard Gulch	1,665	36	0	0	1,840	40	1,143	25	4	0	4,652
South Umpqua Morgan	121	6	0	0	681	34	1,224	60	0	0	2,026
Small Creek	1,748	49	0	0	1,485	42	311	9	0	0	3,544
Stinger Gulch	1,514	34	0	0	2,057	46	923	21	0	0	4,494
Upper O’Shea	0	0	23	1	0	0	3,815	99	0	0	3,838
Upper Shively	0	0	0	0	10	0	2,643	100	0	0	2,653
Shively-O’Shea Subwatershed	7,229	19	960	2	8,541	22	21,528	55	806	2	39,064

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (30 to 80 Years Old)		Late Seral (At Least 80 Years Old)		Hardwoods		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
John Days	571	13	0	0	44	1	3,831	86	0	0	4,446
Lavadoure Creek	59	5	0	0	204	19	814	76	0	0	1,077
Poole Creek	18	1	767	25	322	10	1,969	64	0	0	3,076
St Johns	1	0	142	3	223	5	4,379	92	0	0	4,745
St Johns Subwatershed	649	5	909	7	793	6	10,993	82	0	0	13,344
East Stouts	0	0	0	0	0	0	2,551	100	0	0	2,551
Lower Stouts	28	1	0	0	0	0	2,687	99	0	0	2,715
Middle Stouts	0	0	53	2	0	0	2,584	98	0	0	2,637
Upper Stouts	0	0	63	3	0	0	2,210	97	0	0	2,273
West Stouts	0	0	10	0	216	5	3,939	95	0	0	4,165
Stouts Creek Subwatershed	28	0	126	1	216	2	13,971	97	0	0	14,341
South Umpqua WAU	12,530	9	5,292	4	20,596	15	101,889	72	1,146	1	141,453

Table 6. Comparison of 1900, 1914, and 1936 Vegetation Type Percentages in the South Umpqua WAU.

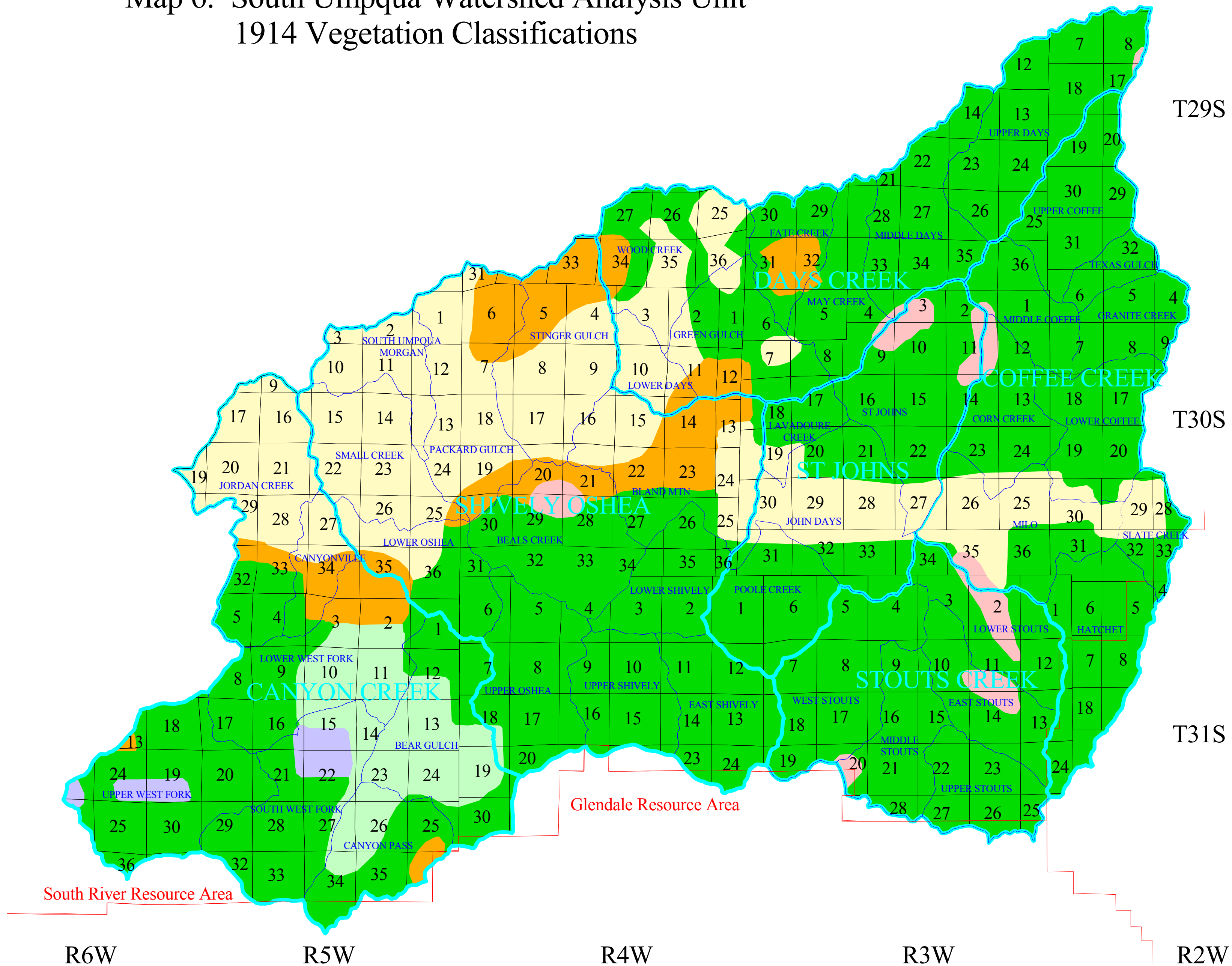
Vegetation Types	1900	1914	1936
Open, Non-timber, Brush and Hardwoods	49%	30%	10%
Burned, Early Seral	1%	5%	4%
Merchantable Timber, Mid and Late Seral	50%	65%	87%

Map 5. South Umpqua Watershed Analysis Unit
1900 Vegetation Classifications



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

Map 6. South Umpqua Watershed Analysis Unit
1914 Vegetation Classifications



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

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0 1 2 3 4 5 Miles

1:177566

- Resource Area Boundaries
- Drainages
- Subwatersheds
- Section Lines

1914 Vegetation Classifications
- Brush
- Burned Areas not restocking
- Burned Areas restocking
- Cutover Areas not restocking
- Merchantable Timber
- Non-timber Areas

Table 7. 1936 Vegetation Types on BLM Administered Land in the South Umpqua WAU.

	Nonforest		Burned		< 6"		6 to 20"		20 to 40"		Old Growth		Hardwoods		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bear Gulch	0	0	173	5	715	21	380	11	450	13	1,644	49	0	0	3,362
Canyon Pass	0	0	39	2	327	14	0	0	847	37	1,102	48	0	0	2,315
Canyonville	0	0	0	0	0	0	52	26	21	10	128	64	0	0	201
Jordan Creek	11	3	0	0	0	0	157	37	103	24	131	31	21	5	423
Lower West Fork	0	0	214	5	0	0	377	9	1,949	48	1,481	37	0	0	4,021
South West Fork	0	0	176	9	0	0	0	0	210	11	1,502	80	0	0	1,888
Upper West Fork	0	0	251	15	0	0	0	0	320	20	1,066	65	0	0	1,637
Canyon Creek Subwatershed	11	8	853	6	1,042	15	966	7	3,900	28	7,054	68	21	0	13,847
Corn Creek	0	0	0	0	0	0	46	4	4	0	1,063	96	0	0	1,113
Granite Creek	0	0	0	0	0	0	227	27	15	2	587	71	0	0	829
Hatchet	0	0	0	0	0	0	0	0	41	5	839	95	0	0	880
Lower Coffee	0	0	0	0	0	0	127	9	101	8	1,111	83	0	0	1,339
Middle Coffee	0	0	0	0	0	0	196	22	353	40	337	38	0	0	886
Milo	134	9	0	0	0	0	90	6	77	5	1,207	80	0	0	1,508
Slate Creek	0	0	0	0	0	0	151	43	157	44	47	13	0	0	355
Texas Gulch	0	0	0	0	0	0	21	3	42	6	595	90	0	0	658
Upper Coffee	0	0	0	0	352	12	429	14	10	0	2,213	74	0	0	3,004
Coffee Creek Subwatershed	134	1	0	0	352	3	1,287	12	800	8	7,999	76	0	0	10,572

	Nonforest		Burned		< 6"		6 to 20"		20 to 40"		Old Growth		Hardwoods		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Fate Creek	21	2	0	0	7	1	51	5	0	0	913	92	0	0	992
Green Gulch	0	0	58	12	0	0	46	9	359	71	40	8	0	0	503
Lower Days	7	2	24	7	0	0	331	91	0	0	0	0	0	0	362
May Creek	6	1	0	0	0	0	0	0	36	9	373	90	0	0	415
Middle Days	70	4	0	0	0	0		0	362	22	1,211	74	0	0	1,643
Upper Days	0	0	0	0	48	1	193	6	0	0	3,096	93	0	0	3,337
Wood Creek	0	0	0	0	0	0	430	59	0	0	299	41	0	0	729
Days Creek Subwatershed	104	1	82	1	55	1	1,051	13	757	9	5,932	74	0	0	7,981
Beals Creek	0	0	0	0	0	0	27	2	774	47	840	51	0	0	1,641
Bland Mountain	69	5	221	17	0	0	281	22	599	46	119	9	0	0	1,289
East Shively	0	0	135	8	125	7	146	8	146	8	1,228	69	0	0	1,780
Lower O'Shea	0	0	17	3	0	0	40	6	580	91	0	0	0	0	637
Lower Shively	0	0	7	1	0	0	0	0	42	4	1,037	95	0	0	1,086
Packard Gulch	17	3	0	0	0	0	140	21	0	0	505	76	0	0	662
South Umpqua Morgan	8	2	0	0	0	0	149	37	9	2	234	59	0	0	400
Small Creek	5	1	0	0	0	0	315	58	92	17	132	24	0	0	544
Stinger Gulch	15	2	0	0	0	0	553	76	99	14	56	8	0	0	723
Upper O'Shea	0	0	0	0	1	0	0	0	228	12	1,751	88	0	0	1,980
Upper Shively	0	0	0	0	0	0	0	0	0	0	1,329	100	0	0	1,329
Shively-O'Shea Subwatershed	114	1	380	3	126	1	1,651	14	2,569	21	7,231	60	0	0	12,071

	Nonforest		Burned		< 6"		6 to 20"		20 to 40"		Old Growth		Hardwoods		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
John Days	31	2	0	0	0	0	7	0	1,272	87	153	10	0	0	1,463
Lavadoure Creek	4	1	0	0	0	0	97	14	571	85	0	0	0	0	672
Poole Creek	1	0	23	1	91	5	184	10	480	27	1,027	57	0	0	1,806
St Johns	0	0	0	0	0	0	38	2	1,116	56	827	42	0	0	1,981
St Johns Subwatershed	36	1	23	0	91	2	326	6	3,439	58	2,007	34	0	0	5,922
East Stouts	0	0	0	0	0	0	0	0	0	0	1,344	100	0	0	1,344
Lower Stouts	0	0	0	0	0	0	0	0	103	7	1,301	93	0	0	1,404
Middle Stouts	0	0	35	2	0	0	0	0	660	44	816	54	0	0	1,511
Upper Stouts	0	0	57	5	0	0	0	0	280	24	821	71	0	0	1,158
West Stouts	0	0	10	0	0	0	152	7	700	32	1,353	61	0	0	2,215
Stouts Creek Subwatershed	0	0	102	1	0	0	152	2	1,743	23	5,635	74	0	0	7,632
South Umpqua WAU	399	1	1,440	2	1,666	3	5,433	9	13,208	23	35,858	62	21	0	58,025

B. Current Vegetation Conditions

Various seral stages, plant communities, and landscape patterns occur in the South Umpqua WAU. For this watershed analysis, 2000 vegetation conditions on BLM-administered land is described by the age of the dominant tree species in each stand (see Table 8 and Map 7). Agricultural uses and hardwood stands occur along the South Umpqua River in the WAU. In the forested areas, structural classes range from early to late seral (see Table 9 and Map 8).

Vegetation could also be determined using 1993 satellite imagery (from the Western Oregon Digital Image Project or WODIP). Table 10 and Map 9 show the vegetation data for the South Umpqua WAU from the 1993 satellite imagery grouped into three forested age classes and nonforested classifications. Table 11 and Map 10 show the same data for BLM-administered land only. The satellite imagery data displays the information in cells called pixels. Comparing the 1993 and 2000 vegetation maps shows the 1993 data is separated into smaller areas than the 2000 data. Tables 12 and 13 compare the 1993 and 2000 vegetation data for the entire WAU and on BLM-administered land, respectively.

Table 8. 2000 BLM Age Class Distribution.

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Bear Gulch	161	5	130	4	112	3	380	11	177	5	87	3	428	13	339	10	1,545	46	3,359
Canyon Pass	78	3	115	5	63	3	201	9	205	9	130	6	164	7	801	35	557	24	2,314
Canyonville	2	1	0	0	1	0	7	3	4	2	4	2	0	0	157	78	26	13	201
Jordan Creek	3	1	0	0	64	15	50	12	42	10	3	1	129	30	49	12	83	20	423
Lower West Fork	250	6	447	11	851	21	51	1	202	5	490	12	50	1	757	19	917	23	4,015
South West Fork	67	4	40	2	212	11	192	10	337	18	162	9	0	0	254	13	624	33	1,888
Upper West Fork	31	2	20	1	86	5	74	5	334	20	132	8	329	20	245	15	384	23	1,635
Canyon Creek Subwatershed	592	4	752	5	1,389	10	955	7	1,301	9	1008	7	1,100	8	2,602	19	4,136	30	13,835
Corn Creek	0	0	27	2	231	21	131	12	131	12	0	0	150	14	177	16	264	24	1,111
Granite Creek	3	0	32	4	0	0	52	6	76	9	0	0	20	2	1	0	644	78	828
Hatchet	0	0	0	0	108	12	21	2	1	0	23	3	38	4	300	34	388	44	879
Lower Coffee	6	0	0	0	81	6	33	2	421	31	8	1	59	4	715	53	18	1	1,341
Middle Coffee	27	3	0	0	99	11	72	8	129	15	0	0	36	4	233	26	291	33	887
Milo	15	1	102	7	269	18	0	0	26	2	14	1	116	8	51	3	913	61	1,506
Slate Creek	6	2	92	26	58	16	0	0	0	0	33	9	4	1	62	17	101	28	356
Texas Gulch	6	1	111	17	44	7	13	2	9	1	0	0	12	2	31	5	432	66	658
Upper Coffee	0	0	47	2	183	6	207	7	117	4	44	1	259	9	577	19	1,569	52	3,003
Coffee Creek Subwatershed	63	1	411	4	1,073	10	529	5	910	9	122	1	694	7	2,147	20	4,620	44	10,569

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Fate Creek	0	0	211	21	184	19	49	5	3	0	6	1	31	3	55	6	447	45	986
Green Gulch	0	0	66	13	6	1	0	0	99	20	58	12	34	7	170	34	69	14	502
Lower Days	0	0	2	1	9	2	0	0	32	9	11	3	51	14	229	63	28	8	362
May Creek	0	0	141	34	0	0	57	14	4	1	4	1	32	8	28	7	146	35	412
Middle Days	0	0	120	7	78	5	142	9	508	31	149	9	170	10	0	0	474	29	1,641
Upper Days	1	0	104	3	342	10	376	11	456	14	94	3	82	2	427	13	1,454	44	3,336
Wood Creek	0	0	33	5	119	16	0	0	9	1	0	0	194	27	107	15	265	36	727
Days Creek Subwatershed	1	0	677	8	738	9	624	8	1,111	14	322	4	594	7	1,016	13	2,883	36	7,966
Beals Creek	40	2	80	5	133	8	418	26	372	23	181	11	28	2	20	1	367	22	1,639
Bland Mountain	38	3	48	4	86	7	9	1	487	38	281	22	32	2	219	17	88	7	1,288
East Shively	0	0	5	0	332	19	200	11	683	38	23	1	101	6	160	9	274	15	1,778
Lower O'Shea	27	4	0	0	0	0	0	0	5	1	67	11	29	5	173	27	335	53	636
Lower Shively	0	0	134	12	94	9	249	23	33	3	41	4	107	10	15	1	413	38	1,086
Packard Gulch	0	0	0	0	88	13	101	15	79	12	0	0	35	5	92	14	268	40	663
South Umpqua Morgan	1	0	2	1	0	0	41	10	161	40	0	0	24	6	142	36	29	7	400
Small Creek	2	0	0	0	0	0	0	0	52	10	20	4	45	8	311	57	115	21	545
Stinger Gulch	0	0	85	12	1	0	0	0	15	2	32	4	63	9	485	67	41	6	722
Upper O'Shea	0	0	226	11	172	9	140	7	215	11	94	5	27	1	158	8	946	48	1,978
Upper Shively	3	0	82	6	199	15	204	15	364	27	26	2	36	3	0	0	415	31	1,329
Shively-O'Shea Subwatershed	111	1	662	5	1,105	9	1,362	11	2,466	20	765	6	527	4	1,775	15	3,291	27	12,064

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
John Days	5	0	122	8	636	44	0	0	90	6	0	0	15	1	483	33	110	8	1,461
Lavadoure Creek	19	3	168	25	173	26	0	0	80	12	0	0	19	3	55	8	158	24	672
Poole Creek	0	0	286	16	71	4	0	0	3	0	75	4	34	2	573	32	763	42	1,805
St Johns	0	0	147	7	92	5	491	25	264	13	0	0	109	6	456	23	420	21	1,979
St Johns Subwatershed	24	0	723	12	972	16	491	8	437	7	75	1	177	3	1,567	26	1,451	25	5,917
East Stouts	0	0	104	8	198	15	21	2	85	6	8	1	47	3	158	12	723	54	1,344
Lower Stouts	0	0	144	10	92	7	67	5	244	17	60	4	204	15	98	7	495	35	1,404
Middle Stouts	0	0	663	44	27	2	0	0	0	0	15	1	14	1	79	5	712	47	1,510
Upper Stouts	2	0	42	4	135	12	0	0	120	10	0	0	72	6	236	20	550	48	1,157
West Stouts	0	0	481	22	261	12	27	1	18	1	85	4	242	11	67	3	1,032	47	2,213
Stouts Creek Subwatershed	2	0	1,434	19	713	9	115	2	467	6	168	2	579	8	638	8	3,512	46	7,628
South Umpqua WAU	793	1	4,659	8	5,990	10	4,076	7	6,692	12	2,460	4	3,671	6	9,745	17	19,893	34	57,979

Map 7. South Umpqua Watershed Analysis Unit
2000 BLM Age Class Distribution

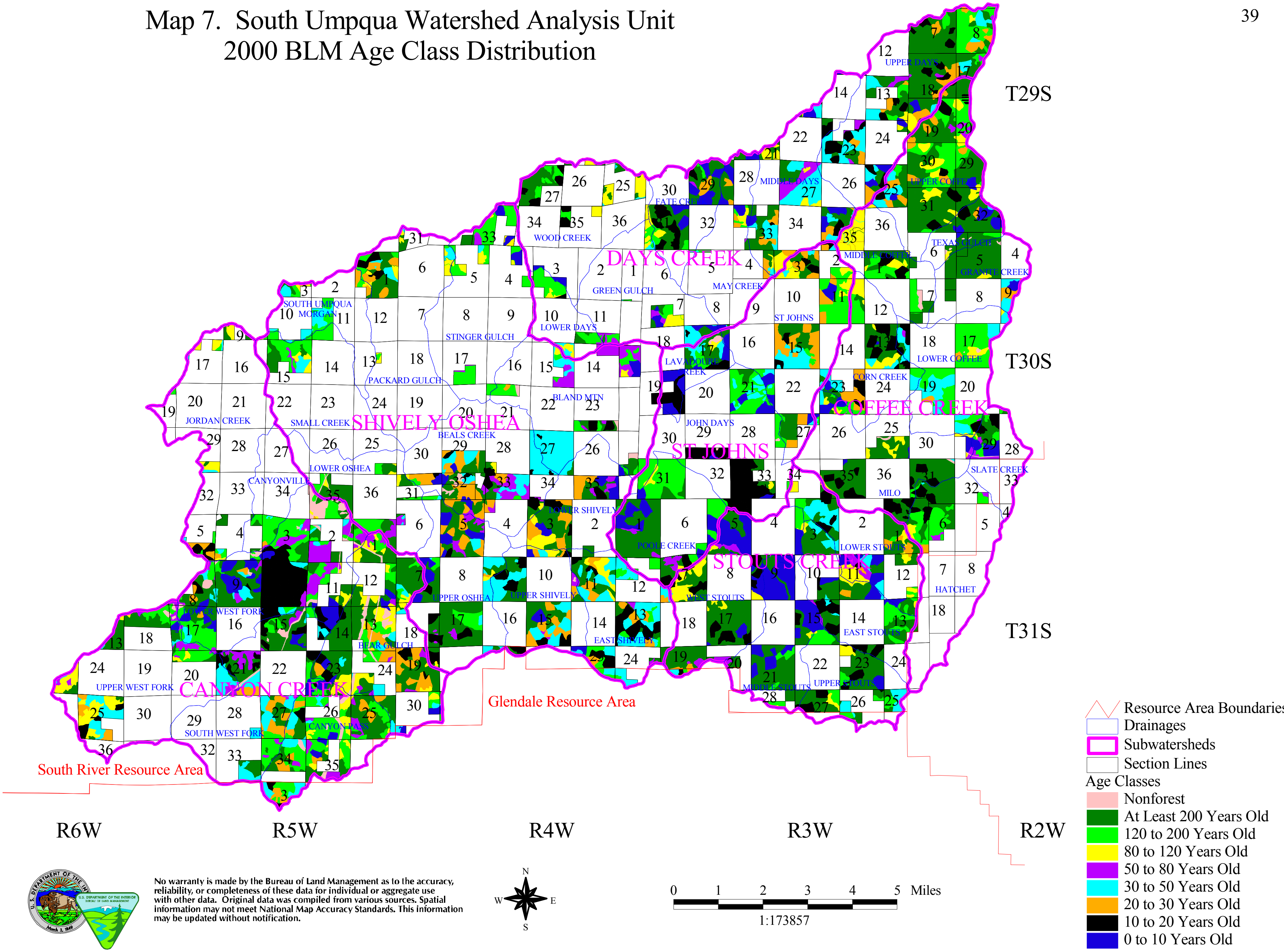

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Table 9. 2000 Age Class Distribution in the South Umpqua WAU.

Area	Number of Acres by Age Class and Percent of Total																				
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Hardwoods		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Bear Gulch	296	6	176	4	133	3	380	8	1,240	26	138	3	470	10	376	8	1,554	33	0	0	4,763
Canyon Pass	117	4	150	5	127	4	201	7	556	19	156	5	245	8	833	28	557	19	42	1	2,984
Canyonville	586	42	74	5	36	3	35	2	423	30	4	0	0	0	224	16	26	2	0	0	1,408
Jordan Creek	1,814	35	240	5	66	1	165	3	2,016	39	63	1	129	2	49	1	83	2	563	11	5,188
Lower West Fork	499	9	531	10	1,031	19	51	1	748	14	515	10	85	2	815	15	921	17	108	2	5,304
South West Fork	97	2	186	4	422	9	233	5	2,380	53	162	4	0	0	254	6	624	14	156	3	4,514
Upper West Fork	70	1	89	2	127	2	136	3	3,555	70	136	3	355	7	245	5	391	8	6	0	5,110
Canyon Creek Subwatershed	3,479	12	1,446	5	1,942	7	1,201	4	10,918	37	1,174	4	1,284	4	2,796	10	4,156	14	875	3	29,271
Corn Creek	99	4	42	2	530	20	338	13	857	33	140	5	150	6	177	7	264	10	0	0	2,597
Granite Creek	45	2	32	2	17	1	80	4	617	33	422	22	28	1	9	0	644	34	0	0	1,894
Hatchet	25	1	0	0	250	6	35	1	913	23	40	1	287	7	756	19	1,725	43	0	0	4,031
Lower Coffee	68	2	82	3	302	10	33	1	890	28	645	21	59	2	878	28	18	1	162	5	3,137
Middle Coffee	109	5	38	2	188	9	75	4	873	43	142	7	36	2	246	12	335	16	0	0	2,042
Milo	734	18	448	11	352	8	135	3	1,188	29	155	4	143	3	51	1	931	22	6	0	4,143
Slate Creek	72	6	114	9	131	10	0	0	466	36	84	7	4	0	169	13	106	8	142	11	1,288
Texas Gulch	7	1	111	12	45	5	13	1	12	1	232	25	12	1	45	5	433	48	0	0	910
Upper Coffee	1	0	47	1	263	8	207	6	322	10	52	2	259	8	633	19	1,576	47	0	0	3,360
Coffee Creek Subwatershed	1,160	5	914	4	2,078	9	916	4	6,138	26	1,912	8	978	4	2,964	13	6,032	26	310	1	23,402

Area	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Hardwoods		Total
	Number of Acres by Age Class and Percent of Total																				
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Fate Creek	82	4	606	32	222	12	49	3	376	20	6	0	31	2	55	3	447	23	37	2	1,911
Green Gulch	1,025	30	237	7	15	0	0	0	860	25	696	20	149	4	189	6	69	2	159	5	3,399
Lower Days	497	42	2	0	9	1	66	6	163	14	131	11	51	4	234	20	28	2	11	1	1,192
May Creek	420	16	150	6	7	0	57	2	1,235	48	340	13	38	1	28	1	146	6	171	7	2,592
Middle Days	123	3	127	3	78	2	213	6	2,417	64	149	4	170	4	6	0	474	12	49	1	3,806
Upper Days	7	0	112	2	450	9	444	9	2,025	39	94	2	82	2	441	8	1,536	29	17	0	5,208
Wood Creek	246	6	33	1	123	3	0	0	2,348	60	255	7	467	12	107	3	265	7	38	1	3,882
Days Creek Subwatershed	2,400	11	1,267	6	904	4	829	4	9,424	43	1,671	8	988	4	1,060	5	2,965	13	482	2	21,990
Beals Creek	1,098	26	91	2	140	3	485	11	1,612	38	234	5	28	1	20	0	367	9	220	5	4,295
Bland Mountain	2,268	44	119	2	268	5	30	1	858	17	878	17	32	1	233	5	88	2	375	7	5,149
East Shively	0	0	10	0	386	12	200	6	1,889	60	150	5	102	3	160	5	274	9	0	0	3,171
Lower O'Shea	542	20	60	2	177	6	158	6	820	30	333	12	29	1	207	8	335	12	88	3	2,749
Lower Shively	0	0	142	6	94	4	249	10	1,383	56	85	3	107	4	15	1	413	17	0	0	2,488
Packard Gulch	1,649	35	59	1	124	3	255	5	1,167	25	34	1	77	2	92	2	276	6	918	20	4,651
South Umpqua Morgan	528	26	33	2	39	2	101	5	1,033	51	0	0	24	1	142	7	125	6	0	0	2,025
Small Creek	2,183	62	7	0	0	0	6	0	660	19	20	1	45	1	311	9	115	3	197	6	3,544
Stinger Gulch	2,256	50	85	2	54	1	0	0	940	21	334	7	63	1	485	11	41	1	235	5	4,493
Upper O'Shea	0	0	226	6	228	6	228	6	1,878	49	94	2	72	2	158	4	946	25	6	0	3,836
Upper Shively	3	0	82	3	199	7	329	12	1,522	57	26	1	64	2	0	0	429	16	0	0	2,654
Shively-O'Shea Subwatershed	10,527	27	914	2	1,709	4	2,041	5	13,762	35	2,188	6	643	2	1,823	5	3,409	9	2,039	5	39,055

Area	Number of Acres by Age Class and Percent of Total																				
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Hardwoods		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
John Days	961	22	445	10	1,596	36	0	0	614	14	138	3	22	0	483	11	110	2	74	2	4,443
Lavadoure Creek	190	18	280	26	250	23	0	0	125	12	0	0	19	2	55	5	158	15	0	0	1,077
Poole Creek	3	0	286	9	208	7	0	0	994	32	171	6	78	3	573	19	763	25	0	0	3,076
St Johns	19	0	160	3	95	2	674	14	2,220	47	589	12	109	2	456	10	420	9	0	0	4,742
St Johns Subwatershed	1,173	9	1,171	9	2,149	16	674	5	3,953	30	898	7	228	2	1,567	12	1,451	11	74	1	13,338
East Stouts	0	0	337	13	740	29	21	1	430	17	8	0	47	2	158	6	736	29	75	3	2,552
Lower Stouts	27	1	160	6	122	4	67	2	1,455	54	61	2	217	8	111	4	495	18	0	0	2,715
Middle Stouts	0	0	806	31	502	19	0	0	473	18	15	1	14	1	79	3	747	28	0	0	2,636
Upper Stouts	55	2	108	5	144	6	0	0	823	36	5	0	149	7	236	10	662	29	90	4	2,272
West Stouts	0	0	926	22	1,402	34	27	1	105	3	125	3	305	7	67	2	1,206	29	0	0	4,163
Stouts Creek Subwatershed	82	1	2,337	16	2,910	20	115	1	3,286	23	214	1	732	5	651	5	3,846	27	165	1	14,338
South Umpqua WAU	18,821	13	8,049	6	11,692	8	5,776	4	47,481	34	8,057	6	4,853	3	10,861	8	21,859	15	3,945	3	141,394

Map 8. South Umpqua Watershed Analysis Unit
2000 Age Class Distribution

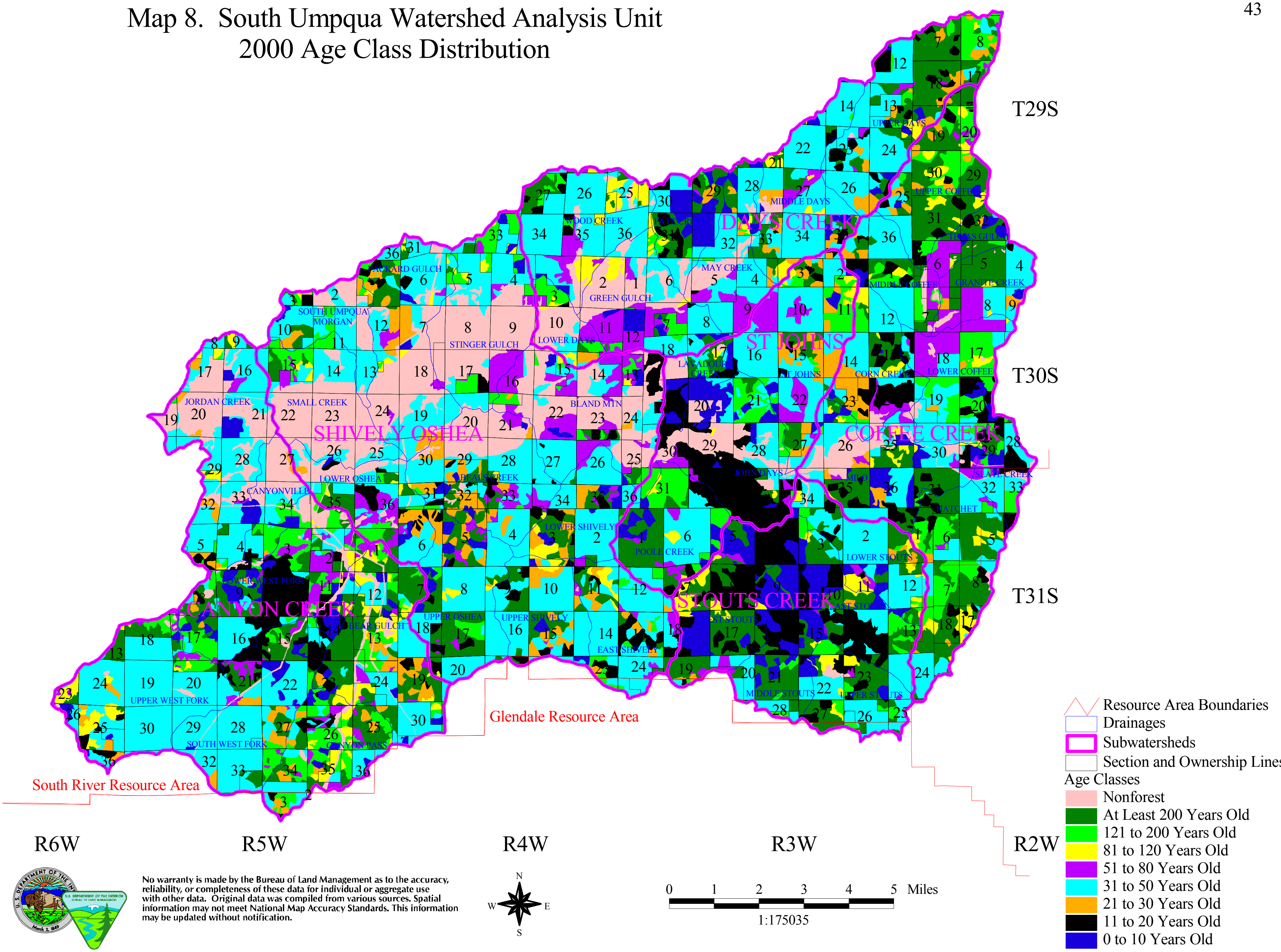

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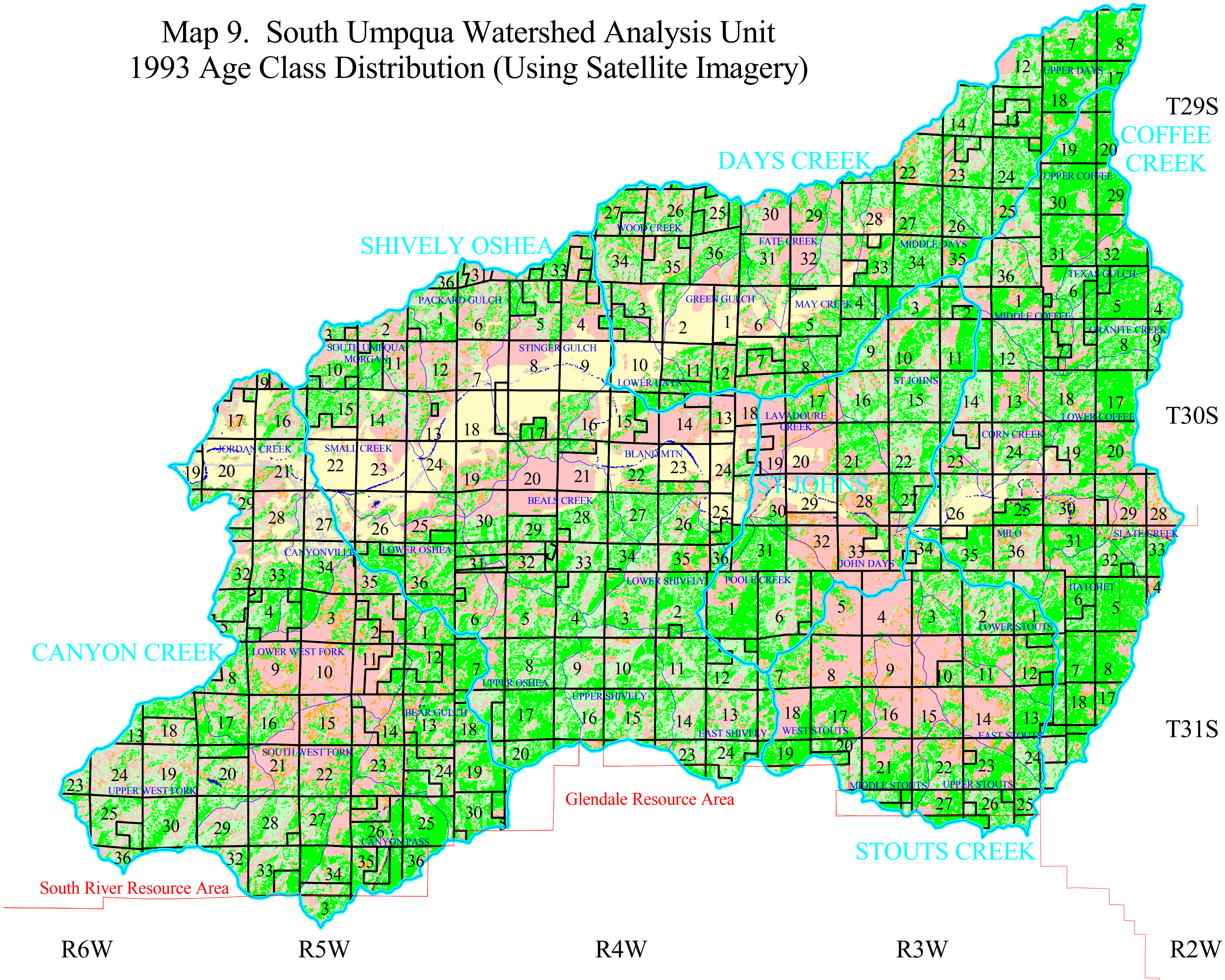
Table 10. 1993 Age Class Distribution in the South Umpqua WAU. (Using Satellite Imagery Data).

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bear Gulch	212	4	1,070	23	975	21	2,495	53	4,752
Canyon Pass	110	4	745	25	471	16	1,656	56	2,982
Canyonville	541	38	189	13	188	13	489	35	1,407
Jordan Creek	1,829	35	1,433	28	879	17	1,030	20	5,171
Lower West Fork	336	6	3,149	59	541	10	1,275	24	5,301
South West Fork	167	4	1,936	43	1,152	26	1,253	28	4,508
Upper West Fork	87	2	1,655	32	2,016	40	1,337	26	5,095
Canyon Creek Subwatershed	3,282	11	10,177	35	6,222	21	9,535	33	29,216
Corn Creek	117	5	836	32	858	33	784	30	2,595
Granite Creek	15	1	192	10	594	31	1,088	58	1,889
Hatchet	57	1	427	11	763	19	2,775	69	4,022
Lower Coffee	99	3	748	24	668	21	1,613	52	3,128
Middle Coffee	36	2	597	29	581	29	824	40	2,038
Milo	780	19	1,275	31	696	17	1,389	34	4,140
Slate Creek	81	6	591	46	235	18	375	29	1,282
Texas Gulch	3	0	85	9	204	22	617	68	909
Upper Coffee	21	1	478	14	598	18	2,259	67	3,356
Coffee Creek Subwatershed	1,209	5	5,229	22	5,197	22	11,724	50	23,359

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Fate Creek	111	6	1,038	54	321	17	441	23	1,911
Green Gulch	1,046	31	922	27	433	13	994	29	3,395
Lower Days	512	43	156	13	136	11	389	33	1,193
May Creek	423	16	495	19	760	29	910	35	2,588
Middle Days	208	5	623	16	1,201	32	1,768	47	3,800
Upper Days	41	1	723	14	1,620	31	2,814	54	5,198
Wood Creek	307	8	1,082	28	1,182	31	1,301	34	3,872
Days Creek Subwatershed	2,648	12	5,039	23	5,653	26	8,617	39	21,957
Beals Creek	163	4	1,646	38	1,195	28	1,289	30	4,293
Bland Mountain	1,912	37	1,799	35	637	12	796	15	5,144
East Shively	22	1	629	20	1,479	47	1,035	33	3,165
Lower O’Shea	384	14	766	28	471	17	1,124	41	2,745
Lower Shively	48	2	588	24	855	34	994	40	2,485
Packard Gulch	1,366	29	1,832	39	674	15	772	17	4,644
South Umpqua Morgan	72	4	1,014	50	471	23	462	23	2,019
Small Creek	1,754	50	853	24	434	12	500	14	3,541
Stinger Gulch	1,732	39	1,325	30	530	12	900	20	4,487
Upper O’Shea	32	1	658	17	1,378	36	1,764	46	3,832
Upper Shively	35	1	524	20	1,229	46	860	32	2,648
Shively-O’Shea Subwatershed	7,520	19	11,634	30	9,353	24	10,496	27	39,003

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
John Days	914	20	2,560	56	266	6	860	19	4,600
Lavadoure Creek	53	4.9	789	73	52	5	184	17	1,078
Poole Creek	53	2	703	23	755	25	1,563	51	3,074
St Johns	63	1	1,092	23	1,745	37	1,837	39	4,737
St Johns Subwatershed	1,083	8	5,144	38	2,818	21	4,444	33	13,489
East Stouts	101	4	1,208	47	359	14	880	35	2,548
Lower Stouts	109	4	649	24	618	23	1,334	49	2,710
Middle Stouts	78	3	1,453	55	351	13	751	29	2,633
Upper Stouts	66	3	538	24	448	20	1,214	54	2,266
West Stouts	126	3	2,327	56	331	8	1,375	33	4,159
Stouts Creek Subwatershed	480	3	6,175	43	2,107	15	5,554	39	14,316
South Umpqua WAU	16,222	11	43,398	31	31,350	22	50,370	36	141,340

Map 9. South Umpqua Watershed Analysis Unit
1993 Age Class Distribution (Using Satellite Imagery)



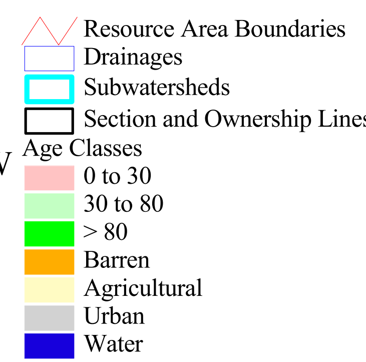


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Table 11. 1993 BLM Age Class Distribution in the South Umpqua WAU. (Using Satellite Imagery Data).

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bear Gulch	136	4	853	25	588	18	1,777	53	3,354
Canyon Pass	61	3	561	24	328	14	1,359	59	2,309
Canyonville	2	1	20	10	15	7	164	82	201
Jordan Creek	16	4	133	32	120	29	150	36	419
Lower West Fork	212	5	2,518	63	350	9	936	23	4,016
South West Fork	113	6	848	45	283	15	640	34	1,884
Upper West Fork	28	2	438	27	544	33	621	38	1,631
Canyon Creek Subwatershed	568	4	5,371	39	2,228	16	5,647	41	13,814
Corn Creek	23	2	369	33	264	24	455	41	1,111
Granite Creek	1	0	26	3	159	19	641	78	827
Hatchet	17	2	128	15	150	17	584	66	879
Lower Coffee	17	1	217	16	274	20	829	62	1,337
Middle Coffee	14	2	206	23	203	23	463	52	886
Milo	32	2	313	21	213	14	948	63	1,506
Slate Creek	18	5	219	62	25	7	93	26	355
Texas Gulch	3	0	74	11	62	9	519	79	658
Upper Coffee	17	1	341	11	478	16	2,163	72	2,999
Coffee Creek Subwatershed	142	1	1,893	18	1,828	17	6,695	63	10,558

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Fate Creek	26	3	469	47	174	18	320	32	989
Green Gulch	14	3	93	19	72	14	323	64	502
Lower Days	7	2	38	10	75	21	242	67	362
May Creek	9	2	182	44	70	17	153	37	414
Middle Days	34	2	293	18	328	20	984	60	1,639
Upper Days	34	1	513	15	657	20	2,122	64	3,326
Wood Creek	16	2	191	26	131	18	388	53	726
Days Creek Subwatershed	140	2	1,779	22	1,507	19	4,532	57	7,958
Beals Creek	25	2	387	24	551	34	677	41	1,640
Bland Mountain	94	7	464	36	304	24	427	33	1,289
East Shively	15	1	384	22	736	41	640	36	1,775
Lower O'Shea	6	1	65	10	73	11	494	77	638
Lower Shively	26	2	361	33	271	25	428	39	1,086
Packard Gulch	7	1	164	25	197	30	293	44	661
South Umpqua Morgan	4	1	89	22	116	29	189	47	398
Small Creek	5	1	73	13	162	30	303	56	543
Stinger Gulch	18	2	134	19	133	18	436	60	721
Upper O'Shea	23	1	403	20	473	24	1,077	55	1,976
Upper Shively	23	2	347	26	473	36	483	36	1,326
Shively-O'Shea Subwatershed	246	2	2,871	24	3,489	29	5,447	45	12,053

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
John Days	80	5	791	54	123	8	466	32	1,460
Lavadoure Creek	41	6	408	61	47	7	175	26	671
Poole Creek	32	2	360	20	216	12	1,195	66	1,803
St Johns	16	1	507	26	528	27	928	47	1,979
St Johns Subwatershed	169	3	2,066	35	914	15	2,764	47	5,913
East Stouts	53	4	416	31	176	13	696	52	1,341
Lower Stouts	41	3	297	21	277	20	788	56	1,403
Middle Stouts	44	3	850	56	88	6	527	35	1,509
Upper Stouts	30	3	279	24	161	14	684	59	1,154
West Stouts	82	4	901	41	220	10	1,007	46	2,210
Stouts Creek Subwatershed	250	3	2,743	36	922	12	3,702	49	7,617
South Umpqua WAU	1,515	3	16,723	29	10,888	19	28,787	50	57,913

Map 10. South Umpqua Watershed Analysis Unit
1993 BLM Age Class Distribution (Using Satellite Imagery)

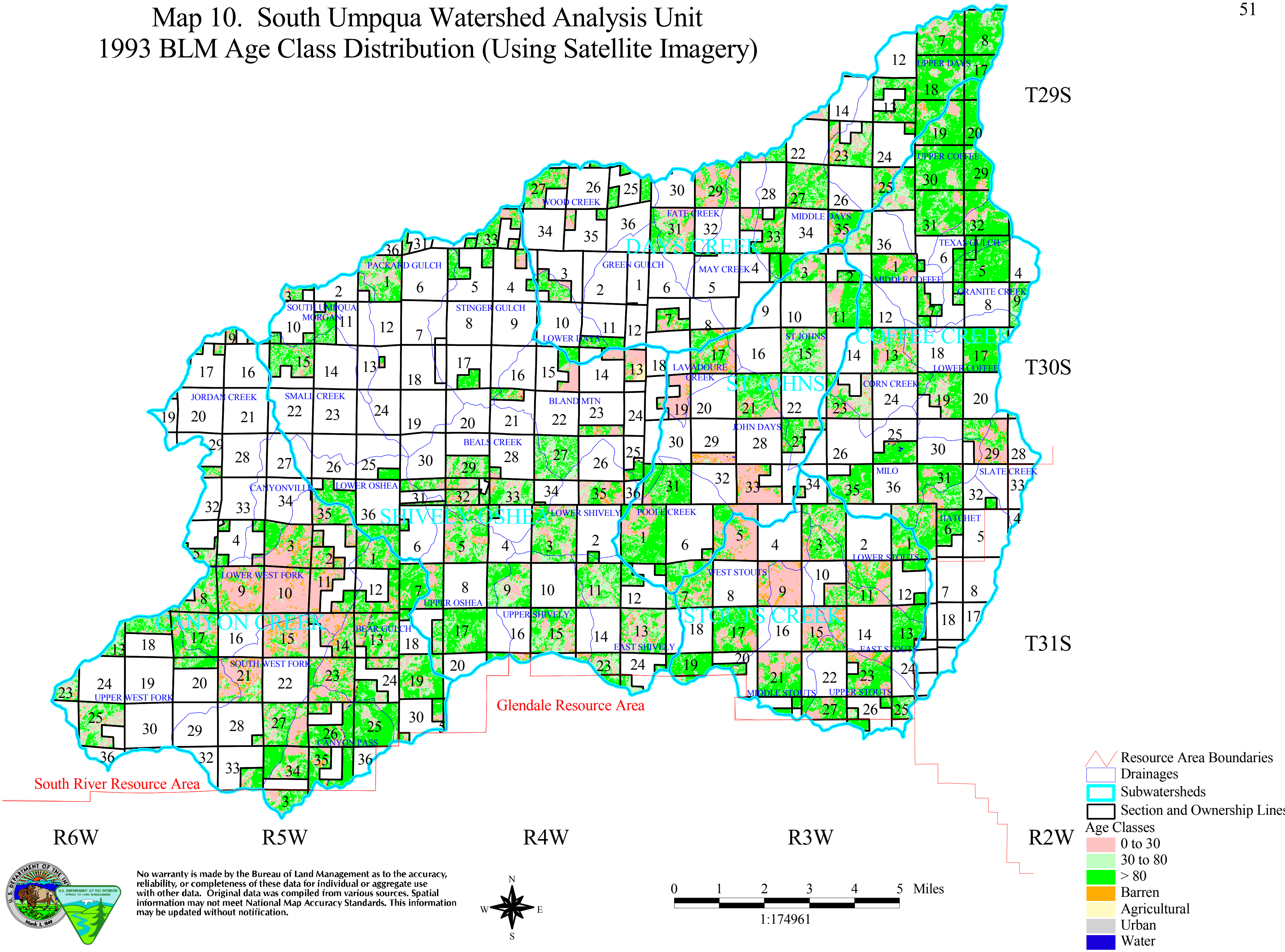

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Table 12. Comparison of 1993 Satellite Imagery and 2000 Operations Inventory Vegetation Data in the South Umpqua WAU.

Seral Stage	Age Class	1993		2000	
		Acres	Percent	Acres	Percent
Early	0 to 30 Years Old	43,398	31	25,517	18
Mid	30 to 80 Years Old	31,350	22	55,538	39
Late	At Least 80 Years Old	50,370	36	37,573	27
Nonforested	Nonforested	16,222	11	18,821	13
Hardwoods	Hardwoods	Not Determined	Not Determined	3,945	3
Total		141,340	100	141,394	100

Table 13. Comparison of 1993 Satellite Imagery and 2000 Operations Inventory Vegetation Data on BLM Administered Land in the South Umpqua WAU.

Seral Stage	Age Class	1993		2000	
		Acres	Percent	Acres	Percent
Early	0 to 30 Years Old	16,723	29	14,725	25
Mid	30 to 80 Years Old	10,888	19	9,152	16
Late	At Least 80 Years Old	28,787	50	33,309	57
Nonforested	Nonforested	1,515	3	793	1
Total		57,913	100	57,979	100

1. Vegetative Characterization

Vegetation zones in the South Umpqua Watershed Analysis Unit were characterized from the Natural Resources Conservation Service Soil Survey report by Gene Hickman (Hickman 1994). Vegetation zones may cover large geographical areas but always have a single set of potential native plant communities repeated throughout the zone. The patterns are predictable since they are related to local landscape features such as aspect, soil, and landform. Microclimate would be relatively similar throughout a given zone. Vegetation zones give an approximate guide to complex local vegetation patterns, natural plant succession, and stand development processes. A wide variety of soils and related geologic features directly affect local plant distribution and the resulting plant communities.

Five vegetation zones occur in the South Umpqua WAU (see Map 11). The Grand Fir, Western Hemlock, and Interior Valleys and Foothills Zones make up 80 percent of the WAU. The remaining 20 percent of the WAU is comprised of the Douglas-Fir/Chinkapin and Cool Douglas-Fir/Hemlock Zones.

a. Grand Fir Zone

The Grand Fir Zone forms a transition between moist hemlock forests and the drier central valleys. This zone makes up about 37 percent of the South Umpqua WAU. This area of mountains and foothills receives from 40 to 55 inches average annual precipitation. Elevation remains below about 3,200 feet.

Douglas-fir dominates the older stands, with grand fir being common on the northern aspects and minor or absent on the south aspects. Golden chinkapin occurs regularly on north aspects, with Pacific madrone and occasionally California black oak on south aspects. Incense cedar and big leaf maple are often present. Western redcedar and red alder are more common in very moist areas. The area is generally too dry for western hemlock except in some drainages or on very moist north aspects.

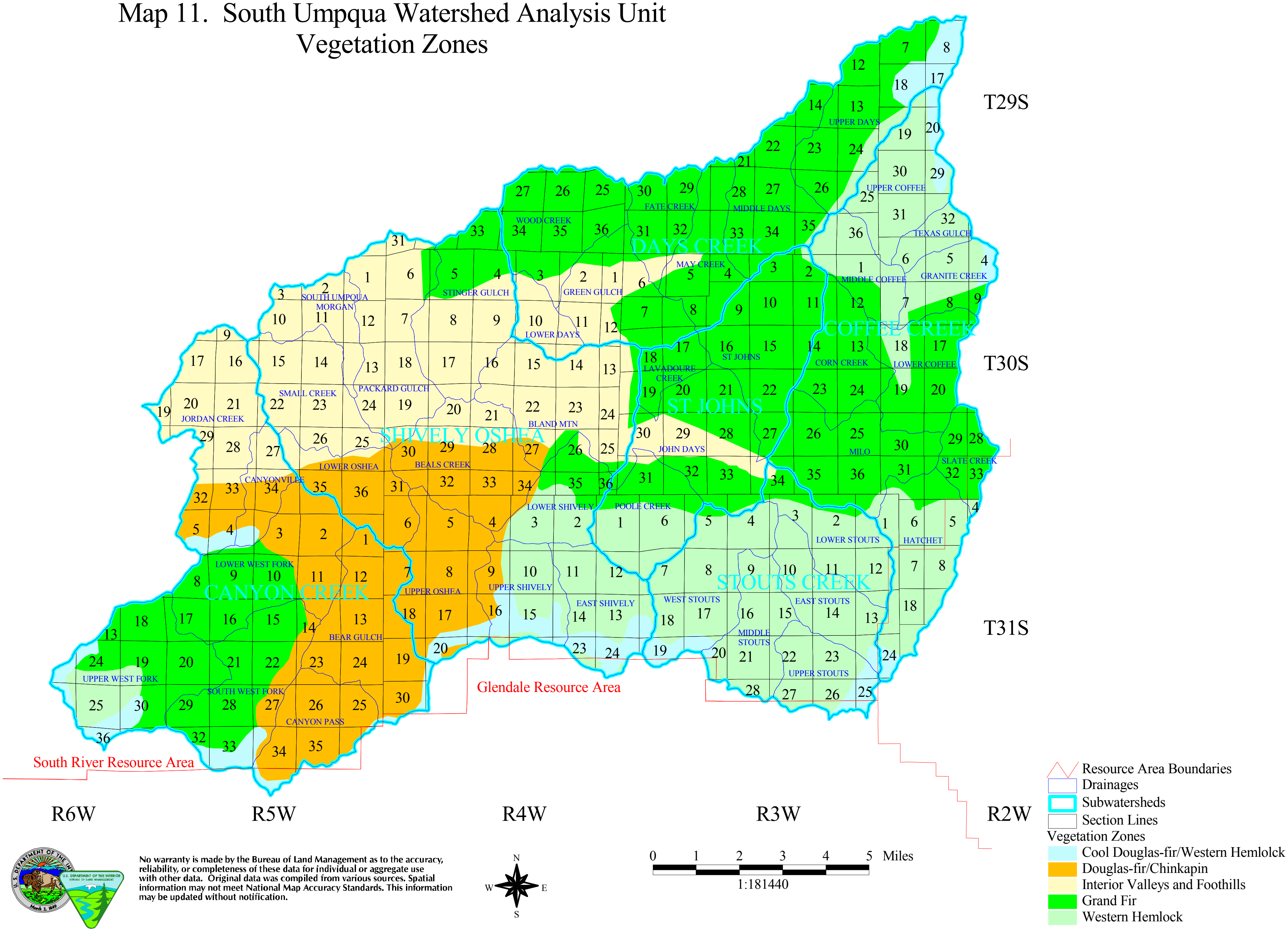
Understory shrubs on north aspects include salal, cascade Oregon grape, western hazel, creambush oceanspray, red huckleberry, western prince's pine, whipplevine, yerba buena, and hairy honeysuckle. South aspects support any of the above, although red huckleberry, cascade Oregon grape, and salal, which require more moisture, have minor species occurrence. Grasses and poison oak also become more abundant on south aspects. Where the drier edge of the zone approaches the Interior Valleys and Foothills Zone, salal, red huckleberry, and even grand fir may drop out. Some key indicator species for the zone, such as Oregon grape, golden chinkapin, wild ginger, and inside-out-flower, remain present.

The Grand Fir Zone in the South Umpqua WAU resembles forests in Josephine and Jackson counties. Geological differences and climatic changes result in more species diversity and the increasing importance of California black oak, sugar pine, ponderosa pine, canyon live oak, incense cedar, and grasses in the southern portion of the WAU.

b. Western Hemlock Zone

This zone occupies about 23 percent of the South Umpqua WAU, mostly in the eastern and southeastern portions of the WAU. The average annual precipitation about 55 inches. Douglas-fir is the dominant species. Western hemlock is a significant understory or dominant overstory species in older stands on north aspects. It may be present in minor amounts on south aspects. Grand fir, western redcedar, and chinkapin may also occur. Red alder and bigleaf maple occur in favorable locations. Understory species include western sword fern, oxalis, vine maple, currant, western hazel, creambush oceanspray, Pacific rhododendron, salal, red huckleberry, cascade Oregon grape, and evergreen huckleberry.

Map 11. South Umpqua Watershed Analysis Unit Vegetation Zones



c. Interior Valleys and Foothills Zone

The Interior Valleys and Foothills Zone occupies approximately 20 percent of the South Umpqua WAU. Much of the zone is composed of hills and low mountains extending into the interior from both the Cascade and Coast Range Mountains. The average annual precipitation ranges from about 35 to 50 inches.

This zone is separated ecologically from the adjacent vegetative zones by its dry, warm climate, the high proportion of hardwoods in the uplands, and the absence of indicator species from the Grand Fir Zone. Much of the natural vegetation of this zone has been affected by settlement, grazing, or converted to crop lands.

Uplands with the most favorable soils have coniferous forests of Douglas-fir and subordinate species, such as Pacific madrone, bigleaf maple, California black oak, ponderosa pine, incense cedar and sometimes Oregon white oak. More droughty soils in the uplands support hardwood dominated stands of Pacific madrone, Oregon white oak, some California black oak, and minor amounts of Douglas-fir, ponderosa pine, and incense cedar. Some hillsides, with shallow soils, support only scattered Oregon white oak and grass or shrubs, such as wedgeleaf ceanothus and Pacific poison oak.

Bottomland vegetation varies with soil texture, drainage class, terrace level, and geographic location. Overstories range from black cottonwood on deep sandy, gravelly floodplains to Oregon white oak and Oregon ash dominated stands on poorly drained, clayey floodplains and terraces. Understories vary with soil conditions but usually contain common snowberry and Pacific poison oak. Vine maple, mockorange, viburnum, Pacific ninebark, blue elderberry, creambush oceanspray, and western hazel may occur, depending on site conditions. Some areas were naturally treeless meadows where species such as sedge, rush, and tufted hairgrass probably dominated very wet soil conditions.

Serpentine soils present in this area are unique and the vegetation is not necessarily characteristic of the Interior Valleys and Foothills Zone. The overstory vegetation on serpentine soils consists mainly of Jeffrey pine, Incense-cedar, and some Douglas-fir and ponderosa pine. Dwarf ceanothus, coffeeberry, rock fern, huckleberry, oak, and grasses grow in the understory. The stocking capacity of serpentine soils is severely limited resulting in very low productivity.

d. Douglas-fir/Chinkapin Zone

The Douglas-fir/Chinkapin Zone makes up about 15 percent of the South Umpqua WAU. This zone extends south into northeastern Josephine County and northwestern Jackson County. Average annual precipitation ranges between 35 and 60 inches. The elevation ranges up to 3,200 feet.

Douglas-fir is the dominant species on upland slopes except for shallow soils and soils with high amounts of rock fragments where Oregon white oak, canyon live oak, or drought tolerant shrubs occur. On south aspects, Douglas-fir is joined by Pacific madrone, California black oak, canyon live oak, sugar pine, ponderosa pine, and incense cedar. Grand fir is generally absent in the uplands but frequently occurs on the bottom lands throughout the zone.

e. Cool Douglas-fir/Hemlock Zone

This zone makes up five percent of the South Umpqua WAU. This zone occupies high elevations on mountain peaks and ridges, generally above 3,000 feet in elevation on the northeastern, southern, and southwestern edges of the WAU. Average annual precipitation ranges from 50 to 120 inches with a major portion coming in the form of snow.

Douglas-fir is the dominant species. Western hemlock may also occur in areas where soils are moist most of the year. Some areas also include sporadic occurrences of western redcedar, incense cedar, sugar pine, Pacific yew, and white fir. Canyon live oak is found on soils with high amounts of rock fragments. Rhododendron, Oregon grape, salal, chinkapin, and red huckleberry occur in the understory.

Forest managers can expect lower tree growth rates, climatic limitations for regeneration, and severe competition from evergreen shrubs in this zone. Areas burned or with the overstory removed develop dense brush fields. The brush fields may contain Pacific rhododendron, salal, cascade Oregon grape, red huckleberry, or golden chinkapin.

2. Fire History and Natural Fire Regimes

Fire has been an important disturbance factor in Pacific Northwest forests for thousands of years. The "unmanaged" or "natural" forests, those that developed before widespread logging or fire protection existed, were initiated by fire and most have been altered by fire since establishment. Early accounts suggest that fires were highly variable, occurring frequently or infrequently and killed all of the trees at times or left the mature trees unscathed (Agee 1990).

Fire regimes of the Pacific Northwest have been described by Agee (1981). Fire regimes are broad, artificially grouped categories, which overlap considerably with one another. Forests are considered to have a similar fire regime when fires occur with similar frequency, severity, and extent. Effects of forest fires can be more precisely described if forest types can be grouped by fire regimes. Because fire regimes are based on unmanaged forests the affects of fire suppression, timber harvesting, and human introduced fire (prescribed or accidental fire) need to be considered when using fire regimes as the basis for altering the structure of existing forests. Numerous and periodic forest management treatments may be necessary to restore or maintain a forest stand in a condition considered to be within the natural range of variability for a particular fire regime.

Fire regimes are influence by such variables as elevation, aspect, distance from the coast, annual rainfall, and soil types. Generally, fire regimes would progress from low severity in the lower elevations to high severity fire regimes in the higher elevations of the WAU.

Forest series and plant association groups are used by Agee to discuss fire regimes in southwestern Oregon (Agee and Huff 2000). Broader vegetation zones are used to discuss fire regimes in the WAU to remain consistent with other discussions in this watershed analysis. The percentage each vegetation zone covers in the WAU and on BLM-administered land is shown in Table 14. The corresponding forest series and fire regimes are based on the methodology used by Agee and Huff.

Table 14. Percentage of Vegetation Zone in the South Umpqua WAU and on BLM Administered Land and the Relationship to Fire Regimes.

Vegetation Zone	Forest Series	Fire Regime	Percent of WAU	Percent of BLM Administered Land
Interior Valleys and Foothills	Pine/Oak	Low Severity	20	7
Douglas-fir/Chinkapin	Douglas-fir	Low to Moderate Severity	15	22
Grand Fir	White Fir	Moderate Severity	37	36
Cool Douglas-fir/Hemlock	Western Hemlock	High Severity	5	6
Western Hemlock	Western Hemlock	High Severity	23	29

a. Low Severity Fire Regime

Fires occur frequently with low intensity in a low severity fire regime. The driest areas might burn annually. Areas where pine and oak intermix may have an average fire return interval of ten years (Agee and Huff 2000). The vegetation in the Interior Valleys and Foothills Zone would gradually transition from grassland, to Oregon white oak, to oak mixed with ponderosa pine and Douglas-fir without human influence. Because these areas occur primarily in the populated valleys and foothills, most of the natural vegetation has been affected by agricultural or residential uses. The Interior Valleys and Foothills Zone is the hottest and driest area of the WAU. Although, the Interior Valleys and Foothills Zone comprises approximately 20 percent of the WAU only seven percent of the BLM-administered land occurs in this zone.

b. Low to Moderate Severity Fire Regime

Moderate severity fire regimes have quite variable fires. Some fires burn under the tree canopy and thin stands and other burn as stand replacing fires (Agee and Huff 2000). Fires ranging from low to high severity create a complex mosaic of forest age classes across the landscape in a moderate severity fire regime. A fire occurring in a low to moderate severity fire regime may leave large diameter trees unharmed while burning surface and ladder fuels on one occasion and be a stand replacing fire if it occurred during extremely hot, dry, and windy weather conditions.

Substantial differences exist between the wet and dry forest series included in the moderate severity fire regime. The vegetation transitions gradually along climatic gradients and abruptly along geologic boundaries in the South Umpqua WAU, making mapping of vegetation types difficult. The fire regimes are also difficult to map. Stands on serpentine soils have very low productivity and tend to be more open, dominated by Jeffrey pine, incense-cedar, and some Douglas-fir. Some serpentine sites (especially on south aspects) might be considered to have a low severity or low to moderate severity fire regime.

Fires occur less frequently in the wetter White Fir and Grand Fir vegetation types. These vegetation types transition between the Douglas-fir series in the lower elevations and the cool, wet, western hemlock series in the higher elevations of the WAU.

Approximately 15 percent of the South Umpqua WAU is in the Douglas-fir/Chinkapin Zone and would be considered to have a low to moderate severity fire regime. The Grand Fir Zone (White Fir Series), which comprises approximately 37 percent of the WAU, is the wettest forest series classified as having a low to moderate fire regime (Agee and Huff 2000). The Grand Fir Zone would transition from a low to moderate severity fire regime at low elevations through a moderate severity fire regime at middle elevations to a moderate to high severity fire regime at the highest elevations. Forest management activities to restore or maintain ecosystem health, if based on natural fire regime, need to consider the variable fire regimes that may occur throughout the Grand Fir Zone.

c. High Severity Fire Regime

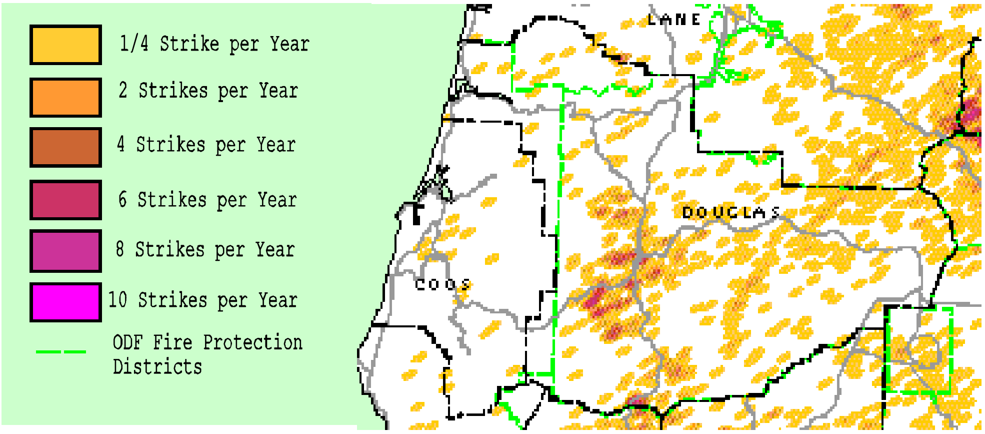
High severity fire regime have infrequent (more than 100 years between fires) fires. Fires are usually high intensity, stand replacing fires. High severity fire regimes typically occur in moist and cool areas. Fires in a high severity fire regime occur under unusual conditions, such as during drought years, hot and dry wind weather events (east foehn winds), and have an ignition source, such as lightning.

The Western Hemlock Zone occupies about 23 percent of the South Umpqua WAU and the Cool Douglas-fir/Hemlock Zone occupies about five percent. The western hemlock series is well distributed in western Oregon and Washington, coastal Canada and Alaska, and certain cool, moist locations east of the Cascade Mountain Range (Franklin and Dryness 1984).

3. Recent Fire History

Lightning is the primary natural source of forest fires in the world. The Pacific Northwest has relatively mild thunderstorm activity compared to the southeastern United States. Although, the average annual number of lightning caused fires is greater in the West because less precipitation accompanies the thunderstorms (Agee 1993). Considerable variation in thunderstorm tracking patterns exists from year to year and from storm to storm. Some thunderstorms are widespread and others consist of localized events (Morris 1934). The lightning strike frequency map (see Map 12) shows less than one lightning strike per year occurred over most of Douglas County between 1992 and 1996. This map graphically displays the widespread and random distribution of lightning across Douglas County but gives no indication which lightning strikes may have ignited wildfires.

Map 12. Number of Lightning Strikes in Douglas County from 1992 to 1996.

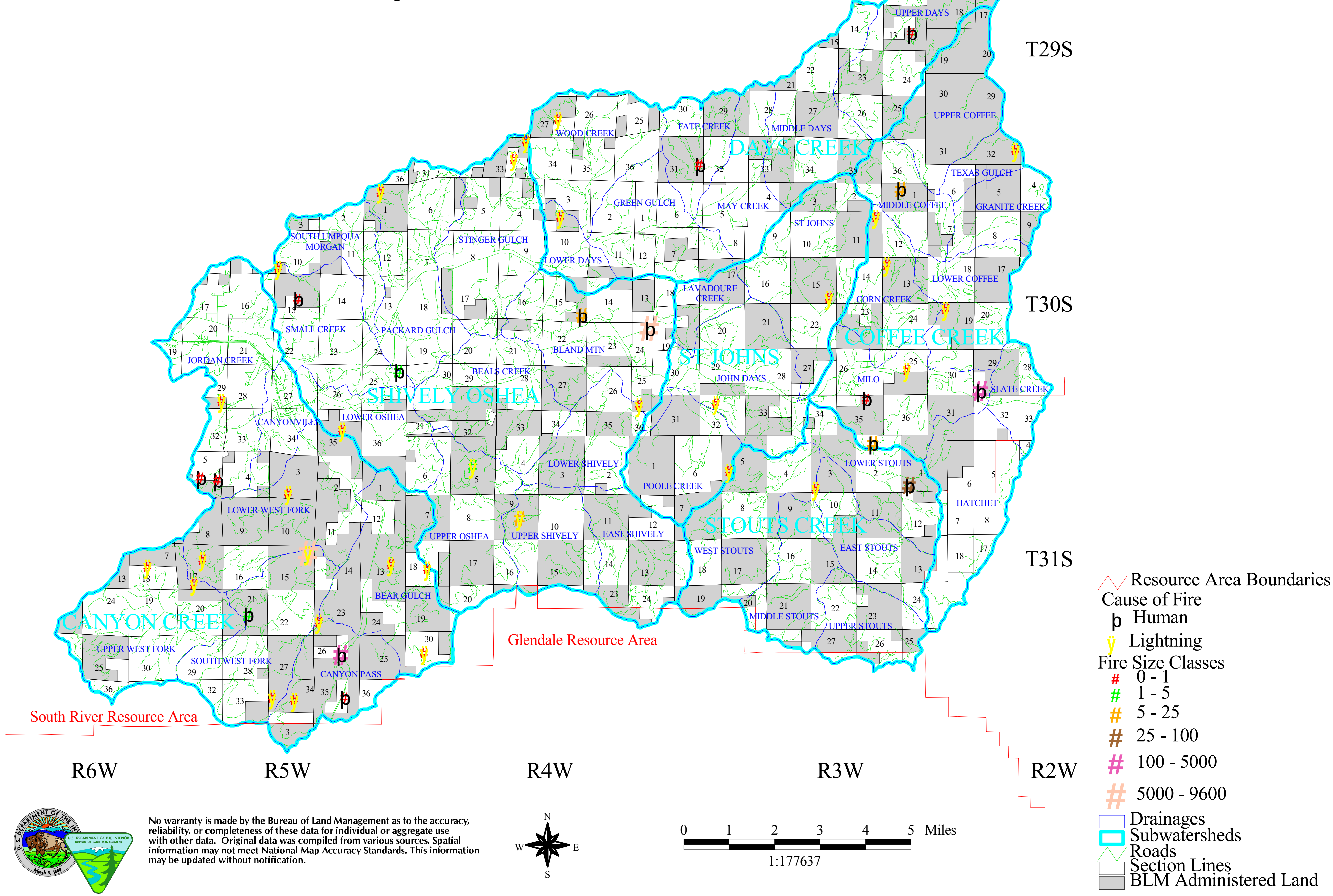


Nineteen eighty-seven was considered to be a year of severe fires in Oregon. However, only 30 percent of the average number of acres historically burned by wildfire in Oregon were burned in 1987. Modern fire suppression and fire management strategies have had a profound effect on natural fire frequency, intensity, species composition, vegetation density, and forest structure in many Pacific Northwest forests (Norris 1990). From 1980 to 1995, 47 fires burned approximately 15,329 acres in the South Umpqua WAU (see Map 13). Most of the fires were caused by lightning but the human caused fires burned the most number of acres. The 31 fires started by lightning burned approximately 5,277 acres with approximately 5,247 acres burned in the Canyon Mountain Fire. The 16 human caused fires burned approximately 10,052 acres with approximately 9,593 acres burned in the Bland Mountain Fire. The Bland Mountain and Canyon Mountain Fires burned about ten percent of the WAU in the summer of 1987.

4. Insects and Diseases

Insects and diseases are capable of causing both large and small-scale disturbances across the landscape. Intensive management practices can reduce the risk of large scale habitat loss due to insects and diseases in the WAU. Maintaining forest ecosystem processes functioning can keep a forest healthy with a high degree of resistance and resilience to disturbance (Filip 1994). Native forest pests are often the result, not the cause of poor forest health (Filip 1994). The magnitude of insect and disease-related disturbance is greatly influenced by species composition, age class, stand structure, and history of other disturbances on the same site.

Map 13. South Umpqua Watershed Analysis Unit
Location of Fires Occurring in the WAU From 1980 to 1995



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a. Insects

Insect activity within stands in the WAU is present at endemic levels. Insect attacks and outbreaks are almost always associated with conditions that stress the tree. There is a common association between root diseases and bark beetles. A high proportion of laminated root rot infected trees are actually killed by bark beetles and not by the fungus. Laminated root rot plays a large part in maintaining endemic bark beetle populations over time.

Bark Beetles

Douglas-fir bark beetle populations are most likely to increase and attack live trees the year after a minimum of three Douglas-fir trees per acre, which are at least ten inches in diameter at breast height (DBH) are blow down (Goheen 1996). A windstorm on December 12, 1995 and heavy, wet snowfalls in late January 1996 resulted in many broken, uprooted, or downed trees in the WAU and some of the surrounding watersheds. Many of the blown down trees were invaded by Douglas-fir bark beetles in the spring of 1997. A large number of bark beetles emerged in the spring of 1998. The bark beetles killed and weakened trees in T29S- R2W Sections 8and 17 in the Days Creek Subwatershed. The bark beetles also attacked and killed trees in T29S-R2W Section 27 in the adjacent Deadman Subwatershed, which is east of the WAU. The Douglas-fir bark beetle may travel up to five miles from the incubation area, so bark beetles in the Deadman Subwatershed could infest trees in the WAU. The damage and of number of Douglas-fir bark beetles has declining since 1998. Additional mortality may continue to occur as trees weakened by the bark beetle die. A Plant Pathologist/Entomologist, Don Goheen, from the Southwest Oregon Forest Insect and Disease Technical Center (SWOFIDTC) determined the approximately 150 year old Douglas-fir trees were infested and killed mainly by Douglas-fir bark beetles. Two other bark beetles, the Ambrosia and Predator bark beetles were also infesting some trees. The Douglas-fir bark beetles also introduce the sap rot pouch fungus (<u>Cryptoporus</u> <u>voluatus</u>).

Mountain pine and western pine beetles also attack trees stressed by drought or root disease. However, infestations are more strongly correlated with low host vigor resulting from overstocking. The major hosts of the mountain pine beetle are ponderosa and sugar pines. Western pine beetle infests ponderosa pine.

When epidemic insect populations are reached, healthy trees may be attacked and killed. Direct control measures are impractical and generally not recommended. Damage can be reduced indirectly by thinning. Keeping trees in a healthy, vigorous condition is the most practical means of reducing the impact from bark beetles (Filip and Schmitt 1990).

b. Diseases

(1) White Pine Blister Rust

White pine blister rust is an introduced disease that infects sugar pines in the WAU. All other diseases known to occur in the WAU are native to the region and have evolved with their hosts. White pine blister rust is caused by the fungus Cronartium ribicola. The pathogen girdles and kills infected stems and branches causing top and branch death in larger trees and outright mortality in seedling, sapling, and pole-sized trees. Infections in larger trees can predispose these trees to bark beetle attack. Ribes (gooseberry and currant plants) are alternate hosts for the fungus and under the right environmental conditions release spores that infect sugar pines. Moist cool weather in summer and fall favor the disease, whereas warm dry weather is unfavorable. Infection of pine requires at least two days of saturated atmosphere and maximum temperatures not exceeding 68 degrees Fahrenheit (Scharpf 1993). Pruning lower limbs of small sugar pines can reduce the chance of infection by affecting the micro-habitat.

Tree improvement programs have developed resistant sugar pine trees that can tolerate infection by the fungus. Rust resistant stock would be used to reforest stands with sugar pines. Sugar pine is desirable tree to maintain in stands where it naturally occurs because it is highly resistant to laminated root rot and is a preferred species for planting in root disease centers.

(2) Root Diseases

Root diseases are present at endemic levels and are not considered to be a concern in the WAU. Laminated root rot (Phellinus weirii), annosus root disease (Heterobasidion annosum), armillaria root disease (Armillaria ostoyae), and black stain root disease (Leptographium wageneri) are common root diseases that may be present in the WAU. Root diseases can cause scattered mortality of individual trees or create openings devoid of susceptible mature trees.

Root pathogens are extremely difficult to eradicate from the site once they become established. Depending on the disease the damage can be minimized by increasing host vigor, favoring disease-tolerant conifer species, or reducing inoculum (Filip and Schmitt 1990).

5. Riparian Reserves

There are approximately 21,852 acres of Riparian Reserves on BLM-administered land in the WAU (see Table 15 and Map 14). Riparian Reserves within the South Umpqua WAU and outside of the LSR and DDR account for approximately 11,865 acres (20 percent) of the Federally administered land. There are approximately 142 acres of Riparian Reserves on Forest Service administered land. The remaining 11,723 acres of Riparian Reserves are on BLM-administered land (76 acres are in the Medford BLM District and 11,647 acres are in the Roseburg BLM District). The purpose of Riparian Reserves is to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide greater connectivity of the watershed (USDA and USDI 1994b). Silvicultural treatments applied within Riparian Reserves would be to control stocking or reestablish, establish, or maintain desired vegetation characteristics to attain Aquatic Conservation Strategy objectives.

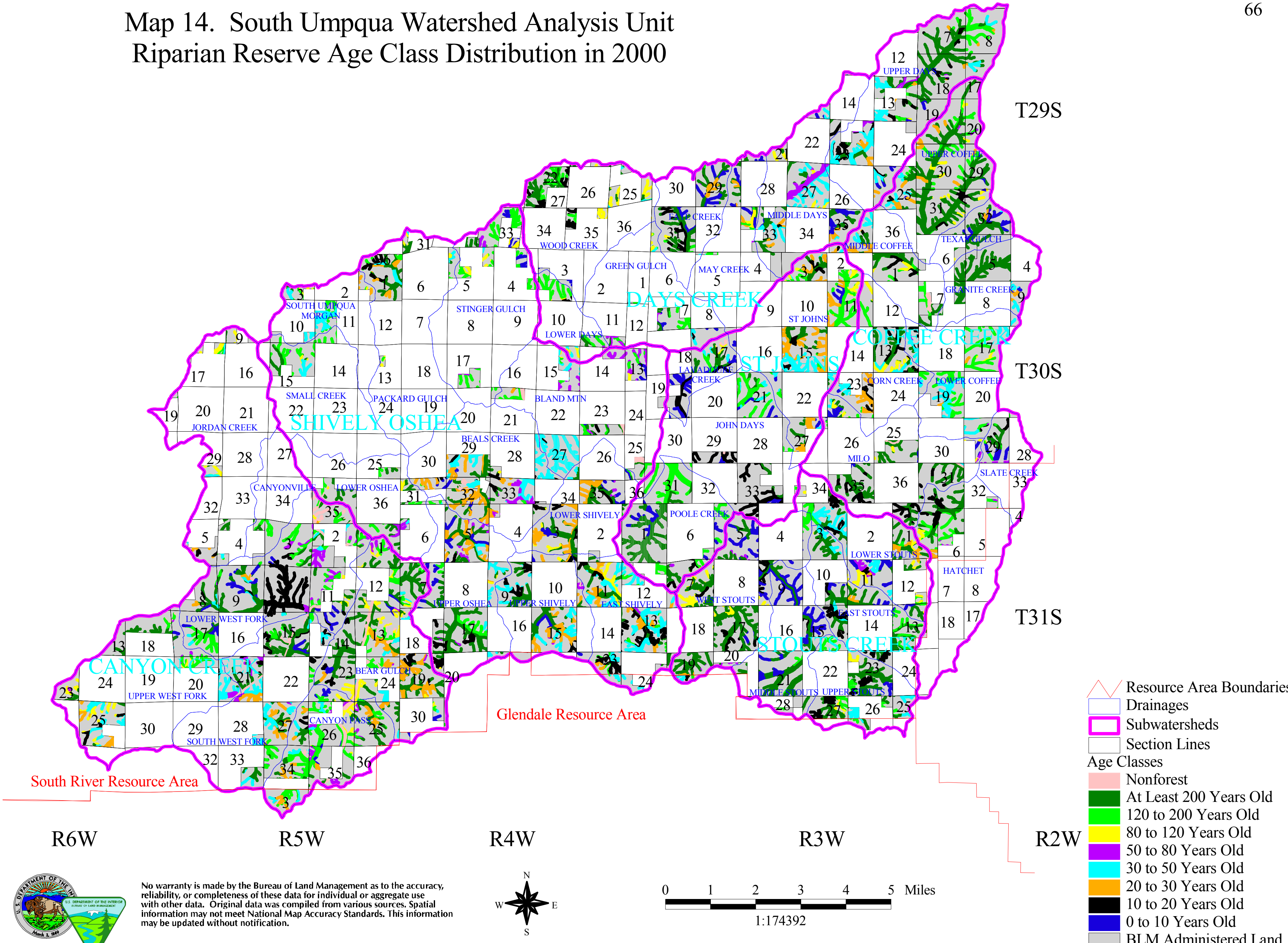
Table 15. 2000 Riparian Reserve Age Class Distribution on BLM Administered Land.

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Bear Gulch	94	7	39	3	63	5	229	17	62	5	22	2	141	11	138	10	548	41	1,336
Canyon Pass	55	7	26	3	15	2	99	12	65	8	47	6	40	5	307	38	158	19	812
Canyonville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	83	7	18	40
Jordan Creek	0	0	0	0	13	12	8	7	19	18	0	0	40	37	6	6	21	20	107
Lower West Fork	84	6	129	10	345	27	21	2	54	4	108	8	11	1	256	20	287	22	1,295
South West Fork	35	4	26	3	68	9	95	12	160	20	33	4	0	0	90	11	283	36	790
Upper West Fork	9	2	7	1	33	7	40	8	134	28	26	5	70	15	67	14	94	20	480
Canyon Creek Subwatershed	277	6	227	5	537	11	492	10	494	11	236	5	302	6	897	19	1,398	29	4,860
Corn Creek	0	0	3	1	82	19	69	16	67	15	0	0	56	13	48	11	108	25	433
Granite Creek	0	0	4	1	0	0	13	4	24	8	0	0	0	0	0	0	274	87	315
Hatchet	0	0	0	0	69	21	15	5	0	0	4	1	16	5	84	26	135	42	323
Lower Coffee	1	0	0	0	19	4	11	2	196	41	2	0	9	2	230	49	6	1	474
Middle Coffee	24	7	0	0	39	11	35	10	37	11	0	0	19	5	49	14	144	41	347
Milo	14	3	46	9	120	22	0	0	9	2	6	1	25	5	8	1	312	58	540
Slate Creek	2	2	41	32	16	12	0	0	0	0	9	7	1	1	12	9	48	37	129
Texas Gulch	1	0	60	29	2	1	10	5	1	0	0	0	1	0	0	0	134	64	209
Upper Coffee	0	0	7	1	42	4	87	8	37	4	6	1	56	5	128	12	685	65	1,048
Coffee Creek Subwatershed	42	1	161	4	389	10	240	6	371	10	27	1	183	5	559	15	1,846	48	3,818

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Fate Creek	0	0	87	21	76	18	34	8	1	0	0	0	5	1	10	2	200	48	413
Green Gulch	0	0	12	9	4	3	0	0	18	14	18	14	8	6	46	36	22	17	128
Lower Days	0	0	0	0	5	3	0	0	9	6	2	1	14	9	111	72	14	9	155
May Creek	0	0	49	34	0	0	21	14	0	0	2	1	23	16	18	12	32	22	145
Middle Days	0	0	57	11	20	4	33	6	167	32	94	18	31	6	0	0	125	24	527
Upper Days	0	0	27	3	109	10	53	5	254	24	38	4	2	0	126	12	456	43	1,065
Wood Creek	0	0	5	1	83	23	0	0	8	2	0	0	72	20	63	18	126	35	357
Days Creek Subwatershed	0	0	237	8	297	11	141	5	457	16	154	6	155	6	374	13	975	35	2,790
Beals Creek	18	3	20	3	57	8	221	32	187	27	55	8	3	0	5	1	128	18	694
Bland Mountain	37	8	18	4	11	2	5	1	208	44	75	16	8	2	82	17	26	6	470
East Shively	0	0	0	0	205	24	116	14	319	37	7	1	57	7	36	4	119	14	859
Lower O’Shea	3	2	0	0	0	0	0	0	4	2	29	16	11	6	42	24	89	50	178
Lower Shively	0	0	47	11	33	7	155	35	9	2	7	2	17	4	5	1	170	38	443
Packard Gulch	0	0	0	0	50	19	33	12	37	14	0	0	12	4	24	9	111	42	267
South Umpqua Morgan	0	0	0	0	0	0	13	8	104	64	0	0	7	4	34	21	4	2	162
Small Creek	0	0	0	0	0	0	0	0	31	20	1	1	6	4	76	49	40	26	154
Stinger Gulch	0	0	43	14	0	0	0	0	3	1	21	7	32	11	179	60	22	7	300
Upper O’Shea	0	0	88	10	89	11	85	10	80	9	26	3	5	1	86	10	385	46	844
Upper Shively	2	0	29	5	76	14	119	22	126	23	10	2	4	1	0	0	184	33	550
Shively-O’Shea Subwatershed	60	1	245	5	521	11	747	15	1,108	23	231	5	162	3	569	12	1,278	26	4,921

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
John Days	2	0	41	9	186	42	0	0	23	5	0	0	0	0	165	37	30	7	447
Lavadoure Creek	8	3	81	30	69	26	0	0	14	5	0	0	9	3	25	9	63	23	269
Poole Creek	0	0	73	11	24	4	0	0	0	0	4	1	0	0	220	34	334	51	655
St Johns	0	0	44	5	52	6	282	33	121	14	0	0	35	4	197	23	136	16	867
St Johns Subwatershed	10	0	239	11	331	15	282	13	158	7	4	0	44	2	607	27	563	25	2,238
East Stouts	0	0	30	5	114	19	14	2	51	9	0	0	4	1	60	10	322	54	595
Lower Stouts	0	0	63	10	70	11	45	7	134	22	27	4	64	10	48	8	164	27	615
Middle Stouts	0	0	243	42	5	1	0	0	0	0	0	0	0	0	16	3	310	54	574
Upper Stouts	0	0	20	4	100	18	0	0	60	11	0	0	26	5	104	19	248	44	558
West Stouts	0	0	109	12	98	11	7	1	11	1	14	2	70	8	34	4	540	61	883
Stouts Creek Subwatershed	0	0	465	14	387	12	66	2	256	8	41	1	164	5	262	8	1,584	49	3,225
South Umpqua WAU	389	2	1,561	7	2,379	11	1,941	9	2,823	13	669	3	985	5	3,232	15	7,611	35	21,852

Map 14. South Umpqua Watershed Analysis Unit
Riparian Reserve Age Class Distribution in 2000



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

Riparian Reserve widths are defined based on the most limiting criteria of the extent of unstable or potentially unstable areas, the top of the inner gorge, the extent of riparian vegetation, the outer edges of the 100 year floodplain, or the site potential tree height. The site potential tree height defines the widest Riparian Reserves in the WAU.

Riparian Reserve widths were developed using the Regional Ecosystem Office approved methodology in determining site tree heights. This methodology uses average site index computed from inventory plots throughout the fifth field watershed (South Umpqua Watershed), which corresponds with this WAU. For this watershed analysis, Riparian Reserve widths use a potential tree height of 160 feet. All first and second order streams, which are considered to be non-fish bearing streams for this watershed analysis, were analyzed using a Riparian Reserve width of 160 feet on each side of the stream. Third order and larger streams, which are considered to be fish bearing streams for this watershed analysis, were analyzed using a Riparian Reserve width of 320 feet (two time the site potential tree height) on each side of the stream. Actual projects would use site specific information, such as if a stream was fish bearing, to determine if a stream needed a Riparian Reserve width of 160 or 320 feet.

Riparian Reserve widths may be adjusted following watershed analysis, a site specific analysis, and describing the rationale for the adjustment through the appropriate NEPA decision making process (USDA and USDI 1994b and USDI 1995). Critical hillslope, riparian, channel processes and features, and the contribution of Riparian Reserves to benefit aquatic and terrestrial species would be the basis for the analysis. As a minimum, a fisheries biologist, soil scientist, hydrologist, botanist, and wildlife biologist would be expected to conduct the analysis for adjusting Riparian Reserve widths. The Riparian Reserve Module could be used to evaluate adjusting Riparian Reserve widths.

6. Forest Service Managed Lands

There are approximately 2,789 acres of Forest Service managed lands in the South Umpqua WAU (see Table 16). Most of the Forest Service managed land in the WAU is in reserved Land Use Allocations (Late-Successional and Riparian Reserves). Approximately 2,416 acres of Forest Service managed land is in Late-Successional Reserves and approximately 142 acres are in Riparian Reserves. Approximately 239 acres are in the Matrix Land Use Allocation. The Forest Service managed lands are also within the South Umpqua Tier 1 Key Watershed.

The Forest Service managed lands in the LSR are part of the South Umpqua River/Galesville LSR and would be expected to be managed following the guidelines presented in the South Umpqua River/Galesville Late-Successional Reserve Assessment. The Forest Service Matrix lands would be expected to be managed according to the Standards and Guidelines in the Northwest Forest Plan.

Table 16. 2000 Vegetation Age Classes on Forest Service Managed Land, in Riparian Reserves, and on Withdrawn (LSRs and Riparian Reserves) Land.

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Hatchet	25	1	0	0	124	5	12	0	334	13	0	0	247	10	455	18	1,312	52	2,509
Hatchet Riparian Reserve	1	0	0	0	25	3	0	0	149	15	0	0	70	7	189	19	542	56	976
Hatchet Withdrawn	25	1	0	0	124	5	12	0	279	11	0	0	247	10	455	19	1,291	53	2,433
Slate Creek	0	0	0	0	1	1	0	0	2	2	0	0	0	0	98	93	4	4	105
Slate Creek Riparian Reserve	0	0	0	0	0	0	0	0	1	3	0	0	0	0	37	95	1	3	39
Slate Creek Withdrawn	0	0	0	0	0	0	0	0	1	2	0	0	0	0	37	88	4	10	42
Coffee Creek Subwatershed	25	1	0	0	125	5	12	0	336	13	0	0	247	9	553	21	1,316	50	2,614
Coffee Creek Subwatershed Riparian Reserve	1	0	0	0	25	2	0	0	150	15	0	0	70	7	226	22	543	53	1,015
Coffee Creek Subwatershed Withdrawn	25	1	0	0	124	5	12	0	280	11	0	0	247	10	492	20	1,295	52	2,475
East Stouts	0	0	0	0	0	0	0	0	15	54	0	0	0	0	0	0	13	46	28
East Stouts Riparian Reserve	0	0	0	0	0	0	0	0	8	100	0	0	0	0	0	0	0	0	8
East Stouts Withdrawn	0	0	0	0	0	0	0	0	8	42	0	0	0	0	0	0	11	58	19

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Lower Stouts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	100	0	0	13
Lower Stouts Riparian Reserve	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	0	0	1
Lower Stouts Withdrawn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	100	0	0	13
Upper Stouts	0	0	0	0	0	0	0	0	45	34	0	0	1	1	0	0	88	66	134
Upper Stouts Riparian Reserve	0	0	0	0	0	0	0	0	12	35	0	0	0	0	0	0	22	65	34
Upper Stouts Withdrawn	0	0	0	0	0	0	0	0	12	35	0	0	0	0	0	0	22	65	34
Stouts Creek Subwatershed	0	0	0	0	0	0	0	0	60	34	0	0	1	1	13	7	101	58	175
Stouts Creek Subwatershed Riparian Reserve	0	0	0	0	0	0	0	0	20	47	0	0	0	0	1	2	22	51	43
Stouts Creek Subwatershed Withdrawn	0	0	0	0	0	0	0	0	20	30	0	0	0	0	13	20	33	50	66
South Umpqua WAU	25	1	0	0	125	4	12	0	396	14	0	0	248	9	566	20	1,417	51	2,789
South Umpqua WAU Riparian Reserve	1	0	0	0	25	2	0	0	170	16	0	0	70	7	227	21	565	53	1,058
South Umpqua WAU Withdrawn	25	1	0	0	124	5	12	0	300	12	0	0	247	10	505	20	1,328	52	2,541

7. Private Lands

Private lands account for approximately 57 percent (80,626 acres) of the South Umpqua WAU (see Table 17 and Map 15). Private ownership in the South Umpqua River Valley consists mainly of agricultural and urban (residential) lands. The upland areas are mainly forested lands intermingled with BLM-administered lands.

Although private lands are a major component of this Watershed Analysis Unit (57 percent), the focus of this analysis is on BLM-administered land. Timber harvesting on private forest lands could be expected to be influenced by tree maturity, market conditions, and other economic factors. The Oregon Forest Practices Act addresses timber harvesting on private lands.

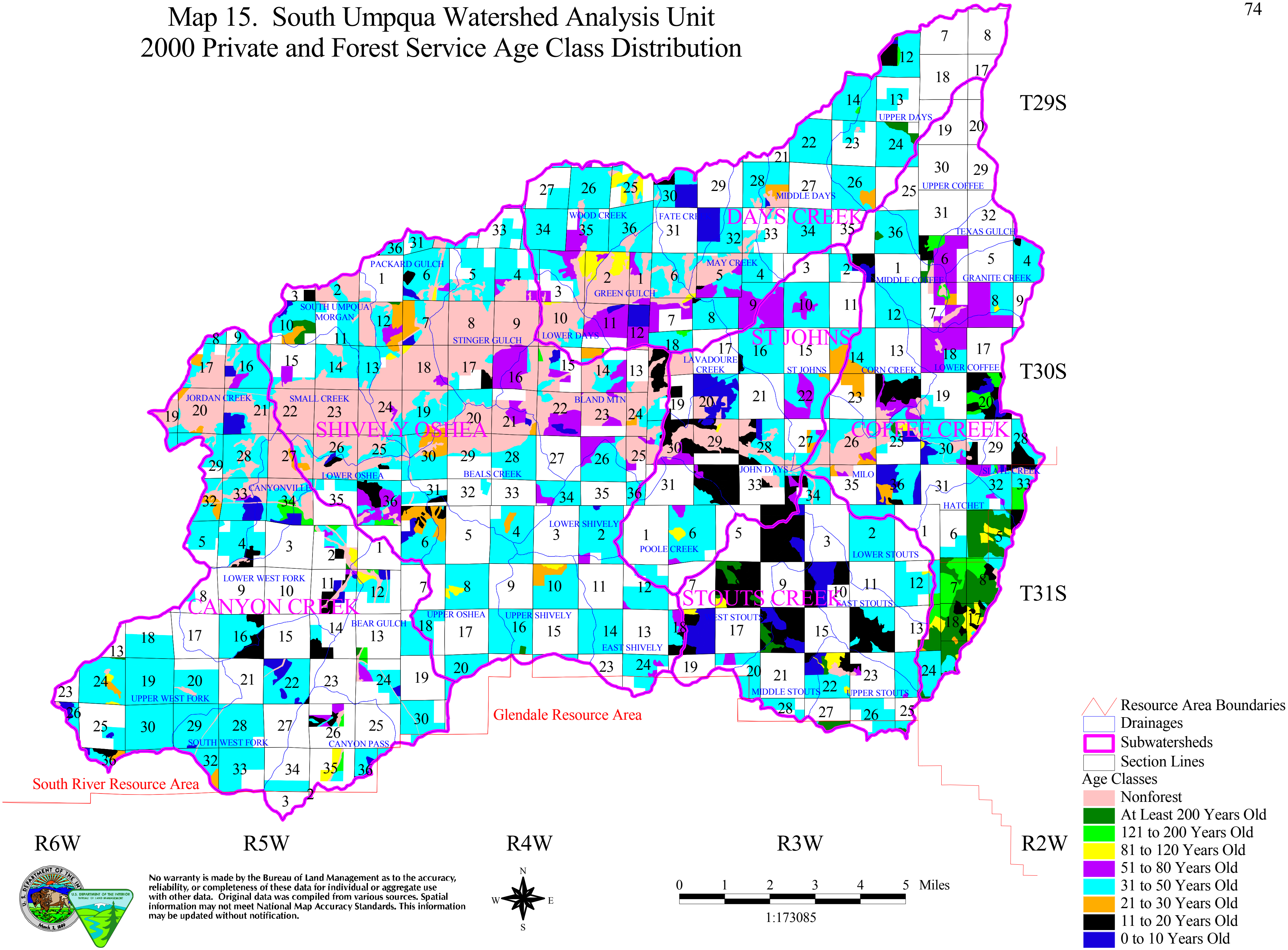
Table 17. 2000 Private Land Age Class Distribution in the South Umpqua WAU.

Area	Number of Acres by Age Class and Percent of Total																				
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Hardwoods		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Bear Gulch	135	10	46	3	21	1	0	0	1,063	76	51	4	42	3	37	3	9	1	0	0	1,404
Canyon Pass	39	6	35	5	64	10	0	0	351	52	26	4	81	12	32	5	0	0	42	6	670
Canyonville	584	48	74	6	35	3	28	2	419	35	0	0	0	0	67	6	0	0	0	0	1,207
Jordan Creek	1,811	38	240	5	2	0	115	2	1,974	41	60	1	0	0	0	0	0	0	563	12	4,765
Lower West Fork	249	19	84	7	180	14	0	0	546	42	25	2	35	3	58	4	4	0	108	8	1,289
South West Fork	30	1	146	6	210	8	41	2	2,043	78	0	0	0	0	0	0	0	0	156	6	2,626
Upper West Fork	39	1	69	2	41	1	62	2	3,221	93	4	0	26	1	0	0	7	0	6	0	3,475
Canyon Creek Subwatershed	2,887	19	694	4	553	4	246	2	9,617	62	166	1	184	1	194	1	20	0	875	6	15,436
Corn Creek	99	7	15	1	299	20	207	14	726	49	140	9	0	0	0	0	0	0	0	0	1,486
Granite Creek	42	4	0	0	17	2	28	3	541	51	422	40	8	1	8	1	0	0	0	0	1,066
Hatchet	0	0	0	0	18	3	2	0	578	90	17	3	2	0	1	0	25	4	0	0	643
Lower Coffee	62	3	82	5	221	12	0	0	469	26	637	35	0	0	163	9	0	0	162	9	1,796
Middle Coffee	82	7	38	3	89	8	3	0	744	64	142	12	0	0	13	1	44	4	0	0	1,155
Milo	719	27	346	13	83	3	135	5	1,162	44	141	5	27	1	0	0	18	1	6	0	2,637
Slate Creek	66	8	22	3	72	9	0	0	464	56	51	6	0	0	9	1	1	0	142	17	827
Texas Gulch	1	0	0	0	1	0	0	0	3	1	232	92	0	0	14	6	1	0	0	0	252
Upper Coffee	1	0	0	0	80	22	0	0	205	57	8	2	0	0	56	16	7	2	0	0	357
Coffee Creek Subwatershed	1,072	10	503	5	880	9	375	4	4,892	48	1,790	18	37	0	264	3	96	1	310	3	10,219

Area	Number of Acres by Age Class and Percent of Total																				
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Hardwoods		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Fate Creek	82	9	395	43	38	4	0	0	373	40	0	0	0	0	0	0	0	0	37	4	925
Green Gulch	1,025	35	171	6	9	0	0	0	761	26	638	22	115	4	19	1	0	0	159	5	2,897
Lower Days	497	60	0	0	0	0	66	8	131	16	120	14	0	0	5	1	0	0	11	1	830
May Creek	420	19	9	0	7	0	0	0	1,231	56	336	15	6	0	0	0	0	0	171	8	2,180
Middle Days	123	6	7	0	0	0	71	3	1,909	88	0	0	0	0	6	0	0	0	49	2	2,165
Upper Days	6	0	8	0	108	6	68	4	1,569	84	0	0	0	0	14	1	82	4	17	1	1,872
Wood Creek	246	8	0	0	4	0	0	0	2,339	74	255	8	273	9	0	0	0	0	38	1	3,155
Days Creek Subwatershed	2,399	17	590	4	166	1	205	1	8,313	59	1,349	10	394	3	44	0	82	1	482	3	14,024
Beals Creek	1,058	40	11	0	7	0	67	3	1,240	47	53	2	0	0	0	0	0	0	220	8	2,656
Bland Mountain	2,230	58	71	2	182	5	21	1	371	9.6	597	15	0	0	14	0	0	0	375	10	3,861
East Shively	0	0	5	0	54	4	0	0	1,206	87	127	9	1	0	0	0	0	0	0	0	1,393
Lower O'Shea	515	24	60	3	177	8	158	7	815	39	266	13	0	0	34	2	0	0	88	4	2,113
Lower Shively	0	0	8	1	0	0	0	0	1,350	96	44	3	0	0	0	0	0	0	0	0	1,402
Packard Gulch	1,649	41	59	1	36	1	154	4	1,088	27	34	1	42	1	0	0	8	0	918	23	3,988
South Umpqua Morgan	527	32	31	2	39	2	60	4	872	54	0	0	0	0	0	0	96	6	0	0	1,625
Small Creek	2,181	73	7	0	0	0	6	0	608	20	0	0	0	0	0	0	0	0	197	7	2,999
Stinger Gulch	2,256	60	0	0	53	1	0	0	925	25	302	8	0	0	0	0	0	0	235	6	3,771
Upper O'Shea	0	0	0	0	56	3	88	5	1,663	90	0	0	45	2	0	0	0	0	6	0	1,858
Upper Shively	0	0	0	0	0	0	125	9	1,158	87	0	0	28	2	0	0	14	1	0	0	1,325
Shively-O'Shea Subwatershed	10,416	39	252	1	604	2	679	3	11,296	42	1,423	5	116	0	48	0	118	0	2,039	8	26,991

Area	Number of Acres by Age Class and Percent of Total																				
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Hardwoods		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
John Days	956	32	323	11	960	32	0	0	524	18	138	5	7	0	0	0	0	0	74	2	2,982
Lavadoure Creek	171	42	112	28	77	19	0	0	45	11	0	0	0	0	0	0	0	0	0	0	405
Poole Creek	3	0	0	0	137	11	0	0	991	78	96	8	44	3	0	0	0	0	0	0	1,271
St Johns	19	1	13	0	3	0	183	7	1,956	71	589	21	0	0	0	0	0	0	0	0	2,763
St Johns Subwatershed	1,149	15	448	6	1,177	16	183	2	3,516	47	823	11	51	1	0	0	0	0	74	1	7,421
East Stouts	0	0	233	20	542	46	0	0	330	28	0	0	0	0	0	0	0	0	75	6	1,180
Lower Stouts	27	2	16	1	30	2	0	0	1,211	93	1	0	13	1	0	0	0	0	0	0	1,298
Middle Stouts	0	0	143	13	475	42	0	0	473	42	0	0	0	0	0	0	35	3	0	0	1,126
Upper Stouts	53	5	66	7	9	1	0	0	658	67	5	1	76	8	0	0	24	2	90	9	981
West Stouts	0	0	445	23	1,141	59	0	0	87	4.5	40	2	63	3	0	0	174	9	0	0	1,950
Stouts Creek Subwatershed	80	1	903	14	2,197	34	0	0	2,759	42	46	1	152	2	0	0	233	4	165	3	6,535
South Umpqua WAU	18,003	22	3,390	4	5,577	7	1,688	2	40,393	50	5,597	7	934	1	550	1	549	1	3,945	5	80,626

Map 15. South Umpqua Watershed Analysis Unit
2000 Private and Forest Service Age Class Distribution



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C. Interpretation

The differences between the historic and current vegetation conditions are due to land ownership patterns, fire suppression, timber harvesting, residential development, and natural disturbances. Historically, the early seral stage was created by natural disturbances, primarily fire. Timber harvesting and stand replacing fires created the early seral vegetative structure and pattern that currently exists in the forested upland areas of the WAU.

Tables 18 and 19 compare the 1936 vegetation with the 2000 vegetation in the WAU and on BLM-administered lands. Although, the data may be correlated, a direct comparison can not be made because the 1936 vegetation data is based on diameter and the 2000 vegetation data is based on age class.

Table 18. Comparison of 1936 Cover Type with 2000 Age Classes in the South Umpqua WAU.

Approximate Seral Stage	1936 Cover Type			2000 Age Class		
		Acres	Percent		Acres	Percent
Early	Burned, Cut < 1920, Less Than 6"	5,292	4	0 to 30 Years Old	25,517	18
Mid	Conifer 6-20"	20,596	14	30 to 80 Years Old	55,538	39
Late	Conifer 20-40", Greater Than 22"	101,889	72	At Least 80 Years Old	37,573	27
Interior Valley Hardwoods	Hardwoods	1,146	1	Hardwoods	3,945	3
Non-forest	Non-forest, Agricultural	12,530	9	Non-forest	18,821	13
Total		141,453	100		141,394	100

Table 19. Comparison of 1936 Cover Type with 2000 Age Classes on BLM Administered Land in the South Umpqua WAU.

Seral Stage	1936 Cover Type			Current Vegetation		
		Acres	Percent		Acres	Percent
Early	Burned, Cut < 1920, Less Than 6"	3,106	5	0 to 30 Years Old	14,725	25
Mid	Conifer 6-20"	5,433	9	30 to 80 Years Old	9,152	16
Late	Conifer 20-40", Greater Than 22"	49,066	85	At Least 80 Years Old	33,309	57
Interior Valley Hardwoods	Hardwoods	21	0	Hardwoods	0	0
Non-forest	Non-forest	399	1	Non-forest	793	1
Total		58,025	100		57,979	100

Bureau of Land Management administered lands available for intensive forest management are those lands outside of LSRs, DDRs, Riparian Reserves, and other areas reserved or withdrawn from timber harvesting. The WAU contains approximately 18,319 acres (32 percent) of BLM-administered lands that are available for intensive forest management (see Table 20). Silvicultural practices including prescribed fire could be used to obtain desired vegetation conditions in special habitat areas.

Management direction from the Northwest Forest Plan and the Roseburg and Medford District RMPs state that 15 percent of all Federal lands, considering all Land Use Allocations, within fifth field watersheds should remain in late-successional forest stands. The South Umpqua Watershed is a fifth field watershed. Approximately 58 percent (35,540 acres out of 60,812 acres) of the Federally administered land in the South Umpqua Watershed (the fifth field watershed) is in forest stands at least 80 years old (late-successional) (see Tables 8 and 16). The South Umpqua Watershed meets the Standard and Guideline to retain 15 percent of all Federal lands within fifth field watersheds in late-successional forest stands. Approximately 40 percent (24,517 acres out of 60,812 acres) of the Federally administered land in the South Umpqua Watershed is in late-successional forest stands and in reserved or withdrawn areas (see Tables 16 and 21). Maintaining about 9,122 acres of late-successional forest stands on Federally administered land would meet the Standard and Guideline to retain 15 percent of all Federal lands within fifth field watersheds in late-successional forest stands.

Table 20. Acres of BLM Administered Land by Land Use Allocation.

	Reserved or Withdrawn		Connectivity/Diversity Block		GFMA		
Area	Acres	Percent	Acres	Percent	Acres	Percent	Total Acres
Bear Gulch	2,806	84	0	0	553	16	3,359
Canyon Pass	1,579	68	462	20	273	12	2,314
Canyonville	60	30	0	0	141	70	201
Jordan Creek	155	37	55	13	212	50	422
Lower West Fork	2,081	52	783	20	1,151	29	4,015
South West Fork	1,042	55	294	16	553	29	1,889
Upper West Fork	784	48	466	28	386	24	1,636
Canyon Creek Subwatershed	8,507	61	2,060	15	3,269	24	13,836
Corn Creek	509	46	375	34	228	21	1,112
Granite Creek	403	49	0	0	426	51	829
Hatchet	826	94	0	0	53	6	879
Lower Coffee	602	45	537	40	200	15	1,339
Middle Coffee	404	46	0	0	482	54	886
Milo	1,347	89	57	4	104	7	1,508
Slate Creek	133	37	222	63	0	0	355
Texas Gulch	256	39	51	8	351	53	658
Upper Coffee	1,217	41	580	19	1,207	40	3,004
Coffee Creek Subwatershed	5,697	54	1,822	17	3,051	29	10,570
Fate Creek	483	49	197	20	306	31	986
Green Gulch	135	27	177	35	191	38	503
Lower Days	157	43	102	28	103	28	362
May Creek	145	35	135	33	130	32	410
Middle Days	605	37	390	24	647	39	1,642
Upper Days	1,302	39	668	20	1,366	41	3,336
Wood Creek	430	59	105	14	193	27	728
Days Creek Subwatershed	3,257	41	1,774	22	2,936	37	7,967

	Reserved or Withdrawn		Connectivity/Diversity Block		GFMA		
Area	Acres	Percent	Acres	Percent	Acres	Percent	Total Acres
Beals Creek	1,640	100	0	0	0	0	1,640
Bland Mountain	1,128	88	30	2	130	10	1,288
East Shively	1,778	100	0	0	0	0	1,778
Lower O'Shea	580	91	0	0	56	9	636
Lower Shively	1,085	100	0	0	0	0	1,085
Packard Gulch	336	51	233	35	94	14	663
South Umpqua Morgan	163	41	86	22	151	38	400
Small Creek	154	28	328	60	62	11	544
Stinger Gulch	323	45	160	22	239	33	722
Upper O'Shea	1,978	100	0	0	0	0	1,978
Upper Shively	1,328	100	0	0	0	0	1,328
Shively-O'Shea Subwatershed	10,493	87	837	7	732	6	12,062
John Days	1,037	71	57	4	367	25	1,461
Lavadoure Creek	286	43	253	38	133	20	672
Poole Creek	1,804	100	0	0	0	0	1,804
St Johns	952	48	415	21	613	31	1,980
St Johns Subwatershed	4,079	69	725	12	1,113	19	5,917
East Stouts	1,343	100	0	0	0	0	1,343
Lower Stouts	1,403	100	0	0	0	0	1,403
Middle Stouts	1,510	100	0	0	0	0	1,510
Upper Stouts	1,157	100	0	0	0	0	1,157
West Stouts	2,213	100	0	0	0	0	2,213
Stouts Creek Subwatershed	7,626	100	0	0	0	0	7,626
South Umpqua WAU	39,659	68	7,218	12	11,101	19	57,978

Table 21. Age Class Distribution in Reserved or Withdrawn Areas on BLM Administered Land Within the South Umpqua WAU.

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Bear Gulch	161	6	112	4	77	3	361	13	163	6	87	3	388	14	333	12	1,123	40	2,805
Canyon Pass	76	5	26	2	33	2	127	8	113	7	126	8	130	8	514	33	433	27	1,578
Canyonville	1	2	0	0	0	0	0	0	2	3	1	2	0	0	45	76	10	17	59
Jordan Creek	3	2	0	0	16	10	9	6	26	17	1	1	68	44	10	6	23	15	156
Lower West Fork	245	12	149	7	399	19	29	1	88	4	282	14	22	1	431	21	436	21	2,081
South West Fork	67	6	26	2	70	7	99	10	172	17	106	10	0	0	127	12	375	36	1,042
Upper West Fork	31	4	7	1	33	4	40	5	185	24	97	12	113	14	138	18	139	18	783
Canyon Creek Subwatershed	584	7	320	4	628	7	665	8	749	9	700	8	721	8	1,598	19	2,539	30	8,504
Corn Creek	0	0	5	1	84	17	69	14	67	13	0	0	62	12	59	12	163	32	509
Granite Creek	3	1	4	1	0	0	13	3	24	6	0	0	0	0	0	0	357	89	401
Hatchet	0	0	0	0	108	13	21	2	1	0	18	2	38	4	274	32	388	46	848
Lower Coffee	6	1	0	0	19	3	11	2	208	35	2	0	10	2	340	56	6	1	602
Middle Coffee	27	7	0	0	42	10	35	9	37	9	0	0	30	7	58	14	176	43	405
Milo	15	1	49	4	269	20	0	0	9	1	6	0	95	7	17	1	887	66	1,347
Slate Creek	6	5	41	31	16	12	0	0	0	0	9	7	1	1	12	9	48	36	133
Texas Gulch	2	1	60	23	2	1	10	4	1	0	0	0	1	0	0	0	181	70	257
Upper Coffee	0	0	7	1	42	3	89	7	37	3	6	0	85	7	162	13	788	65	1,216
Coffee Creek Subwatershed	59	1	166	3	582	10	248	4	384	7	41	1	322	6	922	16	2,994	52	5,718

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
Fate Creek	0	0	88	18	76	16	48	10	0	0	0	0	5	1	10	2	256	53	483
Green Gulch	0	0	13	10	4	3	0	0	18	13	21	16	8	6	49	36	22	16	135
Lower Days	0	0	0	0	5	3	0	0	9	6	3	2	14	9	112	71	14	9	157
May Creek	0	0	49	34	0	0	21	14	0	0	3	2	23	16	17	12	32	22	145
Middle Days	0	0	57	9	20	3	42	7	168	28	97	16	70	12	0	0	149	25	603
Upper Days	1	0	28	2	110	8	58	4	274	21	38	3	14	1	186	14	594	46	1,303
Wood Creek	0	0	4	1	83	19	0	0	8	2	0	0	72	17	70	16	194	45	431
Days Creek Subwatershed	1	0	239	7	298	9	169	5	477	15	162	5	206	6	444	14	1,261	39	3,257
Beals Creek	40	2	80	5	133	8	418	26	372	23	181	11	28	2	20	1	367	22	1,639
Bland Mountain	38	3	19	2	58	5	5	0	480	43	276	24	11	1	152	13	88	8	1,127
East Shively	0	0	5	0	332	19	200	11	683	38	23	1	101	6	160	9	274	15	1,778
Lower O'Shea	27	5	0	0	0	0	0	0	5	1	67	12	21	4	157	27	303	52	580
Lower Shively	0	0	134	12	94	9	249	23	33	3	41	4	107	10	15	1	413	38	1,086
Packard Gulch	0	0	0	0	51	15	36	11	38	11	0	0	12	4	24	7	176	52	337
South Umpqua Morgan	0	0	0	0	0	0	13	8	104	63	0	0	8	5	34	21	5	3	164
Small Creek	0	0	0	0	0	0	0	0	31	20	1	1	6	4	76	49	40	26	154
Stinger Gulch	0	0	43	13	0	0	0	0	4	1	21	6	32	10	202	62	22	7	324
Upper O'Shea	0	0	226	11	172	9	140	7	215	11	94	5	27	1	158	8	946	48	1,978
Upper Shively	3	0	82	6	199	15	204	15	364	27	26	2	36	3	0	0	415	31	1,329
Shively-O'Shea Subwatershed	108	1	589	6	1,039	10	1,265	12	2,329	22	730	7	389	4	998	10	3,049	29	10,496

Area	Number of Acres by Age Class and Percent of Total																		
	Nonforest		0 to 10		10 to 20		20 to 30		30 to 50		50 to 80		80 to 120		120 to 200		200 +		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	
John Days	5	0	54	5	616	59	0	0	23	2	0	0	16	2	253	24	71	7	1,038
Lavadoure Creek	19	7	82	29	69	24	0	0	14	5	0	0	13	5	25	9	64	22	286
Poole Creek	0	0	286	16	71	4	0	0	3	0	75	4	34	2	573	32	763	42	1,805
St Johns	1	0	44	5	52	5	282	30	121	13	0	0	53	6	263	28	137	14	953
St Johns Subwatershed	25	1	466	11	808	20	282	7	161	4	75	2	116	3	1,114	27	1,035	25	4,082
East Stouts	0	0	104	8	198	15	21	2	85	6	8	1	47	3	158	12	723	54	1,344
Lower Stouts	0	0	144	10	92	7	67	5	244	17	60	4	204	15	98	7	495	35	1,404
Middle Stouts	0	0	663	44	27	2	0	0	0	0	15	1	14	1	79	5	712	47	1,510
Upper Stouts	2	0	42	4	135	12	0	0	120	10	0	0	72	6	236	20	550	48	1,157
West Stouts	0	0	481	22	261	12	27	1	18	1	85	4	242	11	67	3	1,032	47	2,213
Stouts Creek Subwatershed	2	0	1,434	19	713	9	115	2	467	6	168	2	579	8	638	8	3,512	46	7,628
South Umpqua WAU	779	2	3,214	8	4,068	10	2,744	7	4,567	12	1,876	5	2,333	6	5,714	14	14,390	36	39,685

Matrix lands in the South Umpqua WAU are to be managed for timber production to help meet the Probable Sale Quantity (PSQ) established in the Roseburg and Medford BLM District RMPs. If all of the Matrix lands greater than 80 years old were to be harvested about 19 percent (10,872 acres) of the BLM-administered land would be affected. Table 22 and Map 16 show what the age class distribution would be based on a timber harvesting plan through the year 2024. The timber harvesting plan went through a rigorous process to identify suitable locations while evaluating impacts to wildlife, fisheries, and hydrology resources. The process attempted to adjust the scale, timing, and spacing of timber harvesting to minimize the effects on other resources. The planning process is described in more detail in Appendix I. The results of the process are shown on Map I-1. Table 23 compares the 2000 and 2025 age class distribution based on the same timber harvesting plan. The timber harvesting plan would maintain about 54 percent of the BLM-administered land in the WAU in late-successional forest in 2025.

1. Silviculture Actions

Silviculture actions would be based on Land Use Allocations. Intensive forest management activities would occur on General Forest Management Areas. Silviculture actions within Riparian Reserves would focus on stands regenerated following timber harvesting or stands that were thinned. Silvicultural practices applied within Riparian Reserves would be to control stocking, reestablish and manage stands, establish and maintain desired non-conifer vegetation, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives (USDI 1995).

a. Riparian Reserves

Commercial thinning or density management within overstocked Riparian Reserves would promote tree survival and growth. These activities would maintain or restore tree growth and vigor, reduce the probability of an insect infestation, maintain or enhance the existing diversity, and attain larger trees in a shorter time period. Excluding Riparian Reserves from commercial thinning/density management would limit tree growth, maintaining smaller diameter trees from which snags and down logs would be created. Activities within Riparian Reserves would be to acquire desired vegetative characteristics and to achieve Aquatic Conservation Strategy objectives.

Table 22. Potential 2025 BLM Age Class Distribution.

	Number of Acres by Age Class and Percent of Total										
Area	Nonforest	%	0 to 30	%	30 to 60	%	60 to 80	%	At least 80 Years Old	%	Total
Bear Gulch	161	5	215	6	664	20	136	4	2,184	65	3,360
Canyon Pass	78	3	158	7	458	20	124	5	1,499	65	2,317
Canyonville	3	1	62	31	5	2	15	7	116	58	201
Jordan Creek	3	1	65	15	112	26	39	9	204	48	423
Lower West Fork	255	6	32	1	1,357	34	230	6	2,143	53	4,017
South West Fork	67	4	155	8	496	26	284	15	887	47	1,889
Upper West Fork	31	2	383	23	197	12	312	19	713	44	1,636
Canyon Creek Subwatershed	598	4	1,070	8	3,289	24	1,140	8	7,746	56	13,843
Corn Creek	0	0	130	12	449	40	40	4	494	44	1,113
Granite Creek	3	0	127	15	53	6	63	8	583	70	829
Hatchet	0	0	0	0	125	14	1	0	771	86	897
Lower Coffee	6	0	89	7	173	13	327	24	746	56	1,341
Middle Coffee	30	3	244	27	172	19	129	14	315	35	890
Milo	15	1	77	5	339	22	27	2	1,051	70	1,509
Slate Creek	6	2	17	5	143	40	0	0	189	53	355
Texas Gulch	7	1	174	26	174	26	0	0	304	46	659
Upper Coffee	0	0	424	14	408	14	114	4	2,057	68	3,003
Coffee Creek Subwatershed	67	1	1,282	12	2,036	19	701	7	6,510	61	10,596

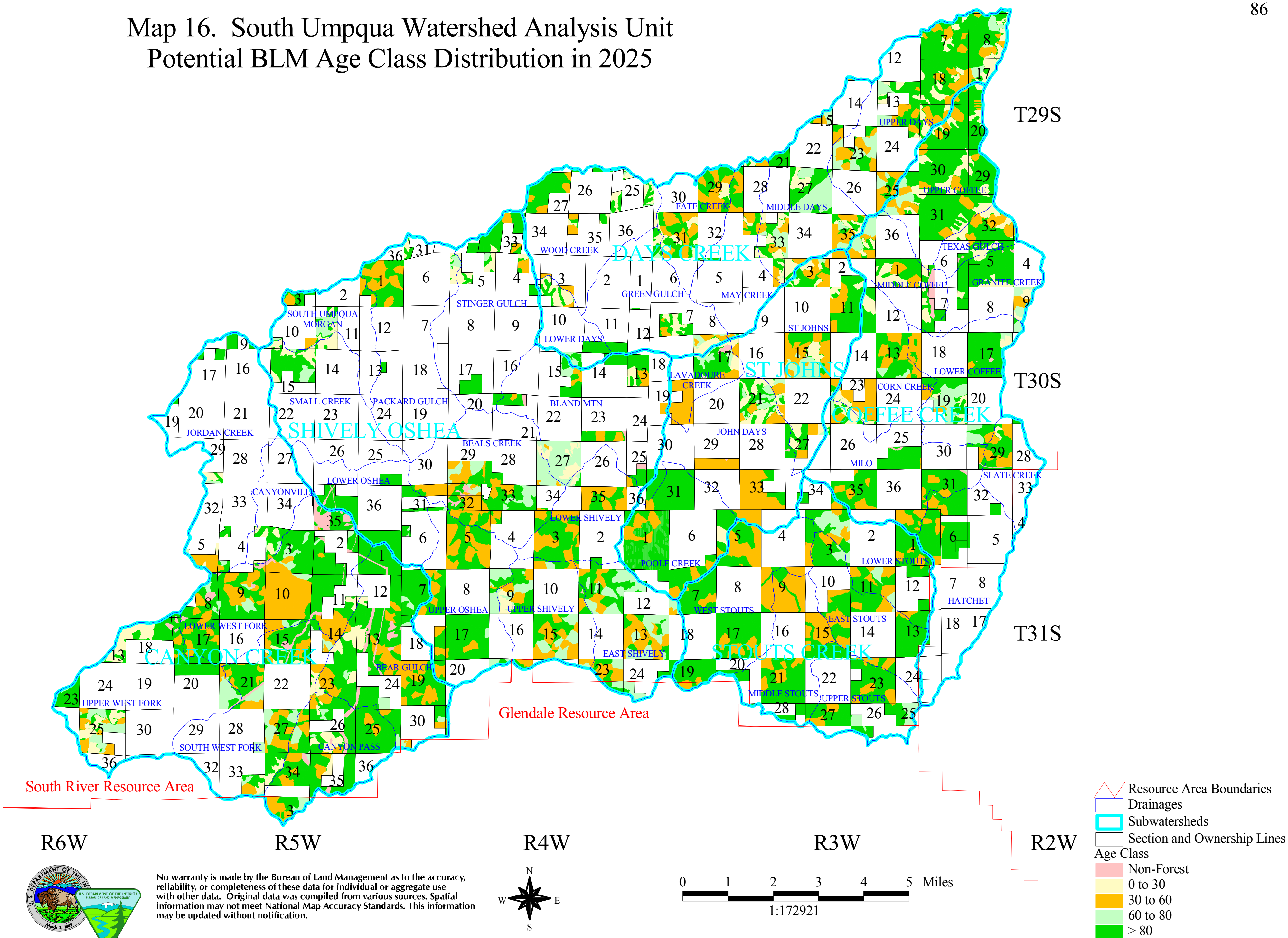
	Number of Acres by Age Class and Percent of Total										
Area	Nonforest	%	0 to 30	%	30 to 60	%	60 to 80	%	At least 80 Years Old	%	Total
Fate Creek	0	0	147	15	438	44	4	0	403	41	992
Green Gulch	0	0	166	33	69	14	51	10	218	43	504
Lower Days	0	0	118	33	11	3	32	9	201	56	362
May Creek	0	0	50	12	196	47	6	1	163	39	415
Middle Days	0	0	314	19	335	20	492	30	502	31	1,643
Upper Days	1	0	437	13	835	25	437	13	1,629	49	3,339
Wood Creek	0	0	136	19	153	21	9	1	431	59	729
Days Creek Subwatershed	1	0	1,368	17	2,037	26	1,031	13	3,547	44	7,984
Beals Creek	40	2	11	1	627	38	361	22	602	37	1,641
Bland Mountain	38	3	147	11	175	14	351	27	579	45	1,290
East Shively	0	0	0	0	537	30	682	38	560	31	1,779
Lower O’Shea	30	5	0	0	0	0	5	1	602	95	637
Lower Shively	0	0	18	2	488	45	16	1	564	52	1,086
Packard Gulch	0	0	63	10	232	35	34	5	334	50	663
South Umpqua Morgan	0	0	48	12	105	26	99	25	148	37	400
Small Creek	2	0	207	38	0	0	51	9	283	52	543
Stinger Gulch	0	0	118	16	86	12	15	2	504	70	723
Upper O’Shea	0	0	0	0	569	29	184	9	1,227	62	1,980
Upper Shively	3	0	72	5	483	36	299	22	473	36	1,330
Shively-O’Shea Subwatershed	113	1	684	6	3,302	27	2,097	17	5,876	49	12,072

	Number of Acres by Age Class and Percent of Total										
Area	Nonforest	%	0 to 30	%	30 to 60	%	60 to 80	%	At least 80 Years Old	%	Total
John Days	5	0	168	11	751	51	88	6	450	31	1,462
Lavadoure Creek	25	4	66	10	305	45	63	9	213	32	672
Poole Creek	0	0	52	3	307	17	3	0	1,443	80	1,805
St Johns	1	0	303	15	742	37	218	11	718	36	1,982
St Johns Subwatershed	31	1	589	10	2,105	36	372	6	2,824	48	5,921
East Stouts	0	0	0	0	369	27	39	3	937	70	1,345
Lower Stouts	0	0	0	0	318	23	229	16	858	61	1,405
Middle Stouts	0	0	0	0	691	46	0	0	821	54	1,512
Upper Stouts	2	0	0	0	177	15	120	10	859	74	1,158
West Stouts	0	0	0	0	749	34	4	0	1,461	66	2,214
Stouts Creek Subwatershed	2	0	0	0	2,304	30	392	5	4,936	65	7,634
South Umpqua WAU	812	1	4,993	9	15,073	26	5,733	10	31,439	54	58,050

Table 23. Comparison of Age Class Distributions on BLM Administered Land in the South Umpqua WAU Between 2000 and 2025 (based on a timber harvesting plan through 2024).

Age Classes	2000		2024	
	Acres	Percent	Acres	Percent
0 to 30 Years Old	14,725	25	4,993	9
30 to 80 Years Old	9,152	16	20,806	36
At Least 80 Years Old	33,309	57	31,439	54
Nonforest	793	1	812	1

Map 16. South Umpqua Watershed Analysis Unit
Potential BLM Age Class Distribution in 2025



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

In about 60 years, approximately 80 percent of the Riparian Reserves on BLM-administered land would be at least 80 years old (see Table 24 and Map 17). In approximately 80 years, all of the forested Riparian Reserves on BLM-administered land would be at least 80 years old. Approximately two percent of the Riparian Reserves are considered to be nonforested.

Table 24. Percent of Riparian Reserves at Least 80 Years Old on BLM Administered Land in the South Umpqua Watershed (Fifth Field).

Year	2000	2010	2020	2030	2040	2050	2055	2060	2070	2080
Percent	55	55	57	58	62	71	75	80	91	98

b. Matrix Land Use Allocation

Providing a sustainable supply of timber and other forest products and early-successional habitat is are some of the objectives of the Matrix Land Use Allocation. Silvicultural prescriptions would be planned to produce, over time, forests with the desired species compositions, structural characteristics, and a distribution of seral classes. The Matrix Land Use Allocation is composed of approximately 11,101 acres in General Forest Management Areas and approximately 7,218 acres in Connectivity/Diversity Blocks.

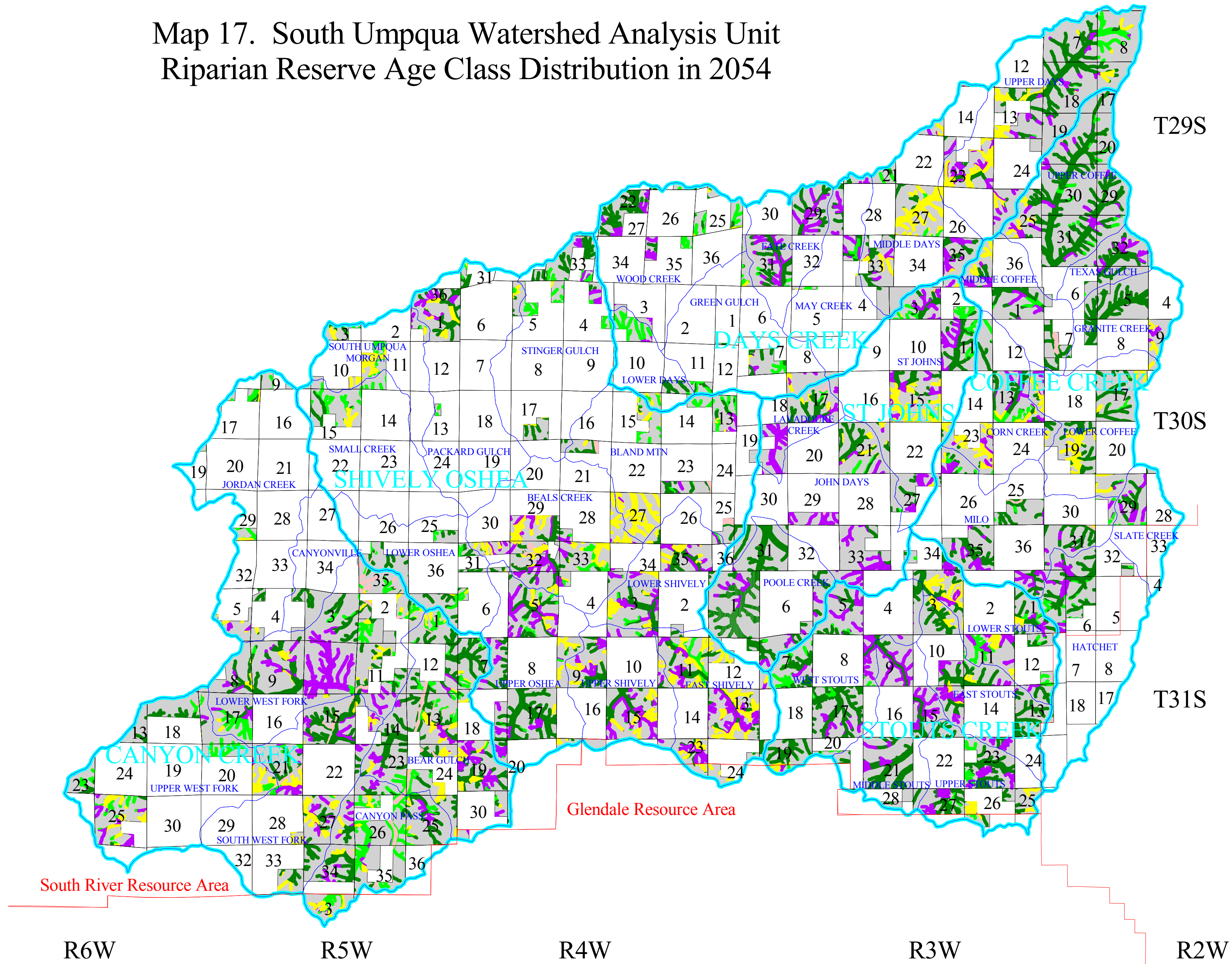
(1) Site Preparation, Reforestation, and Maintenance

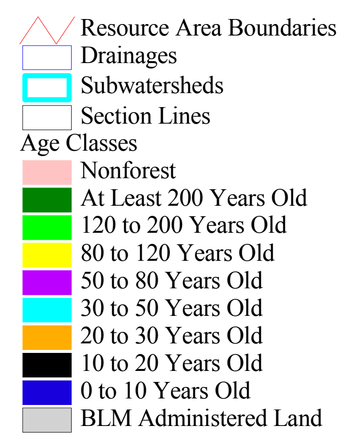
Regeneration of recently harvested areas is usually achieved by planting seedlings following site preparation. Genetically selected stock would be planted, when available. A mixture of species appropriate to the site would be planted, monitored, and maintained. Vegetation treatments may be necessary to allow seedlings to become established. Mulching to reduce competition from grass may be necessary at lower elevations where grass can affect seedling survival. Brush competition may affect seedling survival in the higher elevations of the WAU. Competition from undesired vegetation may be reduced by cutting, burning, spraying, digging, or pulling. Stands harvested in the past 30 years are considered to be in an early seral stage. The early seral stage comprises approximately 23 percent of the Matrix Land Use Allocation on BLM-administered land (5,057 acres in GFMA and 2,658 acres in Connectivity/Diversity Blocks, including Riparian Reserve and owl core area acres).

(2) Precommercial Thinning

Precommercial thinning maintains stand vigor and controls species composition and stand density. Stands between five and 15 years old with high tree densities (greater than 400 trees per acre) are the typical precommercially thinned stand. Stand density is usually reduced to about 250 trees per acre. About 4,325 acres in the WAU are between five and 15 years old and could be precommercially thinned. Stands may be fertilized following precommercial thinning.

Map 17. South Umpqua Watershed Analysis Unit Riparian Reserve Age Class Distribution in 2054





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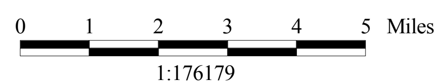


(3) Fertilization

Thinned stands could be fertilized to increase diameter and height growth, improve tree vigor, and maintain live crown ratio. Fertilization may also maintain or accelerate the development of desired habitat components, such as large trees. Fertilization actions would be designed to apply 200 pounds of available nitrogen per acre (USDI 1995).

(4) Pruning

Pruning young stands increases wood quality through the production of clear wood in shorter amount of time than would be required without the action. Stands on higher quality sites could be pruned following precommercial thinning. The mortality risks of sugar pine, due to white pine blister rust, can be reduced by pruning trees to a height of ten feet above the ground.

(5) Commercial Thinning/Density Management

Approximately 17 percent of the BLM-administered land in the Matrix Land Use Allocation (3,091 acres in GFMA and 2,386 acres in Connectivity including Riparian Reserves and owl core areas) are in the mid seral stage. About 83 percent of mid seral stands are in the 30 to 60 year age class, while approximately 17 percent (954 acres) are in the 60 to 80 year age class. One objective of the Matrix Land Use Allocation is to provide a sustainable supply of timber and other forest commodities.

Commercial thinning in GFMA or density management in Connectivity/Diversity Blocks would be conducted where practical and where increased gains in timber production are likely. Thinning intervals would range from ten to 30 years, depending on site class. Stands growing on poor sites would have longer intervals between thinnings. Locations where potential commercial thinnings or density management activities could occur are shown on Map 18. Based on 1998 and 1999 stand exam data, approximately 228 acres are recommended for commercial thinning and approximately 200 acres are recommended for density management within the next ten years.

Commercial thinning usually occurs in 40 to 60 year old stands. Stands considered suitable for commercial thinning generally have a closed canopy, dead lower limbs, dead standing and down trees, and slowed tree growth. These conditions indicate mortality is occurring in the suppressed and intermediate sized trees. Suppression mortality occurs in stands with a relative density index greater than 65 percent (using the Organon growth and yield model), which is the lower limit of competition mortality. Thinning would maintain the stand at a relative density index between 40 and 65 percent (using the Organon growth and yield model). Stand exams to collect information, such as species composition, size, density, and standing and downed dead material, would help prioritize potential commercial thinnings.

In Connectivity/Diversity Blocks, density management would provide habitat for a variety of organisms associated with both late-successional and younger forests. Density management would accelerate development into a multilayered stand with large trees, canopy gaps for spatial diversity and understory development, snags, and large down wood. Unthinned patches could be retained to provide wildlife habitat. Treatments would optimize habitat for late-successional forest related species in the short term. Density management could occur in stands less than 120 years old. There are approximately 1,950 acres of 40 to 120 year old stands in Connectivity/Diversity Blocks within the WAU. Stands between 80 and 120 years old that exhibit late-successional or old-growth characteristics could be retained without density management, unless they are identified as needing treatment as part of a risk reduction effort.

(6) Regeneration Harvests

Late seral stands comprise about 59 percent of the BLM-administered land in the Matrix Land Use Allocation in the WAU. Most regeneration harvest would occur in the late seral stands. These stands would help provide a sustainable supply of timber and other forest commodities.

The GFMA Land Use Allocation contains approximately 10,994 acres greater than 80 years old. Regeneration harvests would be programmed for stands at least 60 years old. Long term rotation age would be planned for culmination of mean annual increment (CMAI), which generally occurs when a stand is between 80 and 110 years old in this WAU. The modified reserve seed-tree method of harvest used in GFMA removes the majority of a stand in a single entry except for six to eight conifer trees per acre. Coarse woody debris and snags would be retained to meet management objectives.

Connectivity/Diversity Blocks contain approximately 5,790 acres greater than 80 years old. Connectivity/Diversity Blocks provide important ecological functions, such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components, such as down logs, snags, and large trees. Regeneration harvests would be programmed in late-successional stands. Connectivity/Diversity Blocks would be managed using a 150 year area control rotation. Between 12 and 18 green conifer trees per acre and 120 linear feet of viable down logs per acre would be left within regeneration harvest units. At least 25 percent of each Connectivity/Diversity Block would be maintain in late-successional forests.

Some portion of 30 Connectivity/Diversity Blocks occur in the South Umpqua WAU. Twenty-eight of the 30 Connectivity/Diversity Blocks contain more than 25 percent in late-successional forests (see Table 25). These 28 Connectivity/Diversity Blocks meet the Standard and Guideline to maintain at least 25 percent of each Connectivity/Diversity Block in late-successional forests. Sixteen Connectivity/Diversity Blocks have at least 25 percent of the reserved areas in late-successional forests.

Map 18. South Umpqua Watershed Analysis Unit Potential Commercial Thinning or Density Management Stands on BLM Administered Land

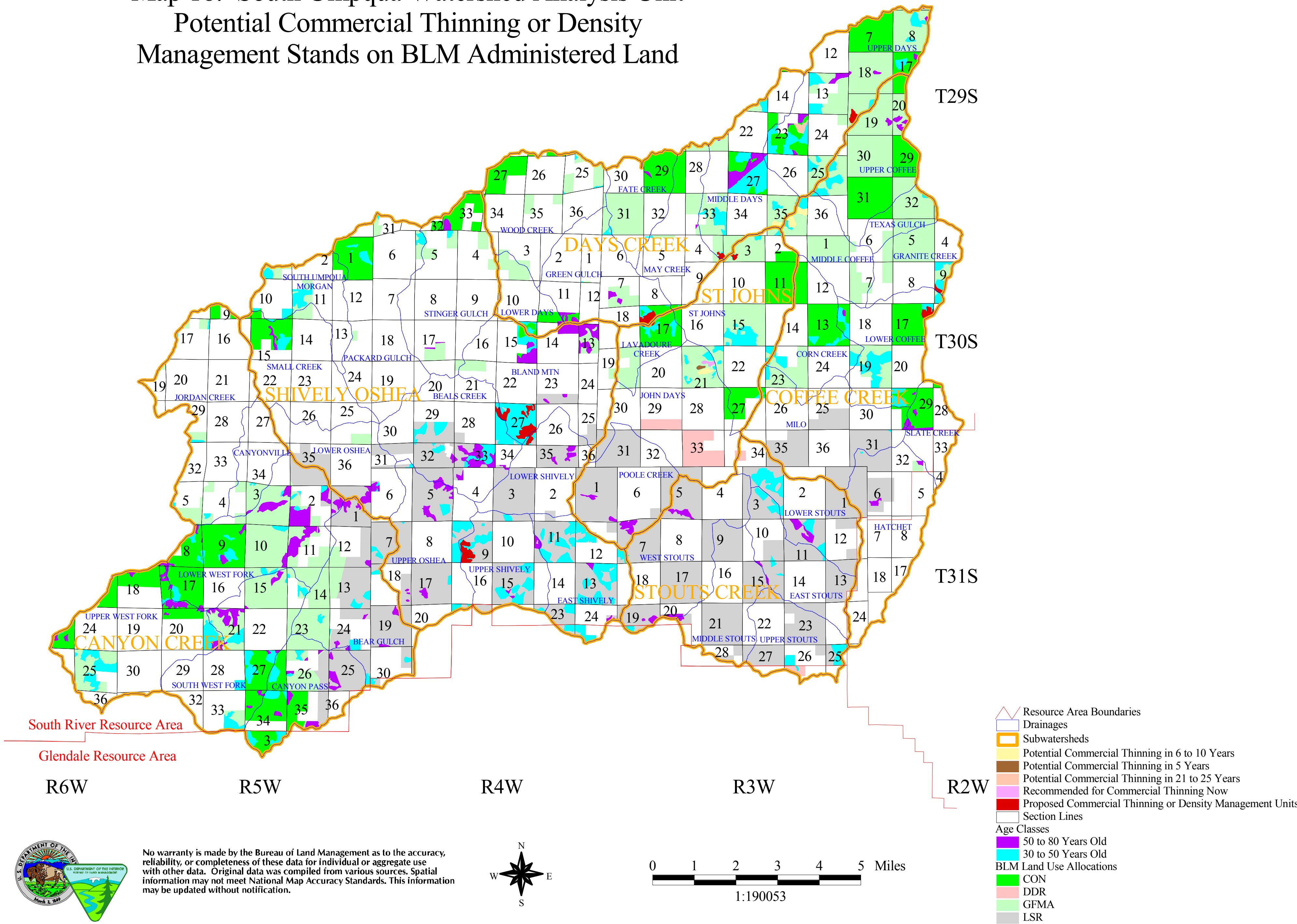


Table 25. Acres of Late Successional Stands in Connectivity/Diversity Blocks in the South Umpqua WAU.

Connectivity/Diversity Block	Total Acres in Block	Amount of Reserved or Withdrawn Areas 80 Years Old or Older		Total Area 80 Years Old or Older	
		Acres	Percent	Acres	Percent
Block 7	811	258	32	561	69
Block 8	735	168	23	559	76
Block 9	506	75	15	190	38
Block 10	733	275	38	606	83
Block 11	1,169	518	44	834	71
Block 16	986	406	41	759	77
Block 26	611	121	20	236	39
Block 28	640	135	21	373	58
Block 32	641	168	26	511	80
Block 33	696	336	48	633	91
Block 34	504	31	6	77	15
Block 35	599	40	7	133	22
Block 36	648	151	23	321	50
Block 37	599	174	29	321	54
Block 38	635	101	16	285	45
Block 39	323	34	11	219	68
Block 40	651	215	33	314	48
Block 41	637	190	30	509	80
Block 42	356	159	45	244	69
Block 43	563	75	13	234	42
Block 44	253	75	30	178	70
Block 45	466	172	37	329	71

Connectivity/Diversity Block	Total Acres in Block	Amount of Reserved or Withdrawn Areas 80 Years Old or Older		Total Area 80 Years Old or Older	
		Acres	Percent	Acres	Percent
Block 46	616	128	21	228	37
Block 47	684	192	28	368	54
Block 48	523	144	28	257	49
Block 50	609	131	22	295	48
Block 51	338	131	39	287	85
Block 52	656	97	15	350	53
Block 54	642	160	25	360	56
T32S, R5W, Section 3 (in Medford BLM District)	641	Data is not available	Data is not available	236	37

c. Late-Successional Reserves (LSR)

The northern portion of the South Umpqua River/Galesville LSR (LSR #RO223) lies within the South Umpqua WAU. The South Umpqua River/Galesville Late-Successional Reserve Assessment (LSRA) outlines management strategies for the LSR portion of the WAU. Approximately 25,134 acres of BLM-managed lands are designated as LSR and District Defined Reserves (DDR). Approximately 2,416 acres of Forest Service administered lands in the WAU are included in the South Umpqua River/Galesville LSR. Federally managed lands would be expected to be managed similarly, following the South Umpqua River/Galesville LSRA.

Silvicultural systems proposed in LSRs have two principal objectives. They are: 1) development of old-growth characteristics including snags, logs on the forest floor, large trees, and canopy gaps that enable establishment of multiple tree layers and diverse species composition and 2) prevention of large-scale disturbances by fire, wind, insects, and diseases that would destroy or limit the ability of the reserves to sustain viable forest species populations.

Approximately 43 percent of the Federally managed lands in the South Umpqua River/Galesville LSR are in late-successional stands. The management objective in the South Umpqua River/Galesville LSR is to attain and maintain 60 to 75 percent of the Federally managed lands in late-successional stands.

Stand management in LSRs would focus on stands regenerated following timber harvesting, stands that have been thinned, or unmanaged even-aged stands. The overall criteria for silviculture treatments is that they are beneficial to the creation of late-successional forest conditions. Approximately 10,602 acres in the LSR within the WAU do not have late-successional or old-growth conditions, but are capable of developing those conditions. Silvicultural manipulation of younger stands can accelerate the development of desired stand characteristics. The South Umpqua River/Galesville LSRA details the benefits, stand selection criteria, and desired conditions of various silviculture treatments.

The South Umpqua River/Galesville LSR lies between two large valley systems. The Rogue River Valley lies to the south and the South Umpqua River Valley is north of the LSR. Most of the LSR has a checkerboard ownership pattern of intermingled BLM-administered and private land. The Forest Service managed lands in the eastern portion of the LSR is mostly contiguous. The lack of forest lands in the I-5 corridor across most of western Oregon makes the LSR in this WAU an important link between major physiographic provinces. The topography, pattern of land management, and conditions of the existing stands allow the northern portion of the LSR to provide connectivity between LSRs in the Coast Range and the Cascade Physiographic Provinces.

The checkerboard ownership pattern in the LSR prevents development of large contiguous blocks of late-successional/old-growth habitat. Because of this limitation and the location of the LSR in an area of concern for owl movement between physiographic provinces, the emphasis would be to maintain or enhance existing contiguous late-successional/old-growth habitat. Management priorities for the portion of the LSR in the South Umpqua WAU are to create blocks of late successional habitat where absent, improve habitat connections between the Cascade, Siskiyou, and Coast Range Physiographic Provinces, and maintain or improve habitat connections at both the stand and landscape levels.

(1) LSRA Treatment Recommendations

(a) Early Seral (0 to 29 years old)

Stands less than 30 years old would be the highest priorities for treatment due to their high growth rates. Most of early seral stands were regenerated following timber harvesting. The SEIS ROD encourages the use of silvicultural practices to accelerate the development of overstocked young plantations into stands with late-successional and old-growth characteristics. There are approximately 6,929 acres of early seral stands in the LSR or DDR BLM-administered land. The LSRA details the benefits, stand selection criteria, and desired conditions of various silviculture treatments. Reforestation, maintenance, release, precommercial thinning, pruning, and fertilization are possible activities in the early seral stands. Approximately 1,000 acres could be precommercially thinned on the Roseburg BLM District within the WAU. Pruning in the LSRs could reduce the risk of blister rust infection on sugar pine. Fertilization would be a low priority and is not planned to be conducted in the near future within the Roseburg BLM District LSRs.

(b) Mid Seral (30 to 49 years old)

The LSRA considers these stands to be a high priority for treatment. Some of these stands are beginning to provide connections between stands and may be on an acceptable developmental trajectory. Opportunities exist for treatments which maintain or accelerate stand development toward achieving late-successional characteristics, especially diversity of canopy structure. There are approximately 2,733 acres in this mid seral age class on BLM-administered land in the LSR or DDR. Density management, fertilization, and tree culturing are possible activities in mid seral stands.

(c) Mid Seral (50 to 79 years old)

The LSRA considers these stands to be a low priority for treatment. There are approximately 938 acres in this age class on BLM-administered land in the LSR or DDR. Most of these stands regenerated naturally following a stand replacing event, such as fire, and only a few have been thinned. Most of these stands currently provide connectivity habitat and may be on an acceptable trajectory toward late-successional habitat. Opportunities exist to maintain or accelerate stand development of late-successional habitat or reduce the risk of large-scale disturbance and loss of habitat.

(d) Late Seral (80 years old and older)

There are approximately 14,031 acres of late seral stands on BLM-administered land in the LSR or DDR. Stands older than 80 years would be retained, except for risk reduction efforts or salvage as outlined in the South Umpqua River/Galesville LSRA. Risk reduction treatments would be designed to protect more acres than are treated.

(e) Priority Areas Based on Landscape-level Criteria Identified in the South Umpqua River/Galesville Late-Successional Reserve Assessment

1) Bland Mountain Fire area on Roseburg BLM District administered land
2) Northern spotted owl sites having less than 30 percent suitable habitat and in or near the Bland Mountain Fire area.
3) Early seral stands
4) Mid seral stands that would benefit from treatment to achieve late-successional characteristics
5) Stand level treatments to reduce the risk of habitat loss and loss of function at the landscape level.

2. Fire and Fuels Management

The combined effects of fire suppression, timber harvesting followed by prescribed burning, and occasional wildfires have helped shaped vegetative conditions the South Umpqua WAU. Discussing these forests in terms of the natural fire regime helps explain why species composition and forest density has changed with human management dating back thousands of years when native Indians set fires as a means of improving areas for foraging. In many forests of the West, years of successful fire suppression have created unnatural fuel accumulations causing fires to be more destructive, burning with greater intensity and in fire regimes where stand replacement fires would rarely occur in a "natural" forest. Forest health has declined in many areas because fire has been excluded. Although, fire suppression has probably had little or no effect on fuel accumulation in the forests west of the Cascade Mountains, where the natural fire regime has a long return interval (with the exception of southwest Oregon where the fire return interval is shorter) (Norris 1990).

Fire suppression during the past 75 years has been successful at minimizing the number of acres burned by wildfires. During this same period, prescribed fire has been used extensively. The pattern of prescribed fire use has evolved in the last 50 years. Originally, prescribed fire was used almost exclusively for reducing fire hazards. More recently the emphasis has shifted to using prescribed fire for site preparation prior to reforestation (Norris 1990).

Treatments of natural fuels may be planned near areas with high recreation use, along heavily traveled road corridors, or in forest stands to reduce the risks of a wildfire, improve habitat of special status species, or improve forest health. Prescribed underburning, pile burning, and manual or mechanical treatments could be used in areas where wildfire exclusion has resulted in natural fuel accumulations considered to be unnatural and wildfire is considered to be a high risk to forest resources. Extensive fuels management treatments are difficult to justify for the sole reason of wildfire risk reduction. Other site specific resource objectives would normally be the basis for prescribing a fuels treatment on natural forest fuels. Prescribed broadcast burning poses risks that in many cases would outweigh potential risk reduction benefits. Prescribed broadcast burning, pile burning, manual or mechanical fuels treatments, or fuels removal would be applied primarily on activity fuels created from timber management operations.

Fire management in the South Umpqua WAU would continue to require an aggressive suppression strategy on all unplanned wildland fires. The Roseburg District Fire Management Plan, prepared June 1998, identified appropriate fire management activities for Matrix, Riparian Reserve, and Late-Successional Reserve Land Use Allocations. The Fire Management Plan also identified three categories of fire management or protection that covers all Land Use Allocations. The fire prevention contract with the Oregon Department of Forestry requires all unplanned wildland fires to be suppressed. Additionally, the initial attack standards are to control 94 percent of all fires before they reach ten acres in size.

VI. Geology, Soils, and Erosion Processes

A. Geology

Soils in the South Umpqua WAU have developed dominantly from sedimentary, igneous, metamorphic, and volcanic rocks. Geology of the WAU is shown on Map 19. Unit descriptions are from the Geologic Map of Oregon by George W. Walker and Norman S. MacLeod (1991).

Js

Sedimentary rocks (Jurassic) - Black and gray mudstone, shale, siltstone, graywacke, andesitic to dacitic water-laid tuff, porcelaneous tuff, and minor interlayers and lenses of limestone and fine-grained sediments metamorphosed to phyllite or slate. Locally includes some felsite, andesite and basalt flows, breccia, and agglomerate.

Ju

Ultramafic and related rocks of ophiolite sequences (Jurassic) - Predominantly harzburgite and dunite with both cumulate and tectonite fabrics. Locally altered to serpentinite. Includes gabbroic rocks and sheeted diabasic dike complexes.

Jv

Volcanic rocks (Jurassic) - Lava flows, flow breccia, and agglomerate dominantly of plagioclase, pyroxene, and hornblende porphyritic and aphyric andesite. Includes flow rocks that range in composition from basalt to rhyolite as well as some interlayered tuff and tuffaceous sedimentary rocks. Commonly metamorphosed to greenschist facies; locally foliated, schistose or gneissic.

KJds

Dothan Formation and related rocks (Lower Cretaceous and Upper Jurassic) - Sedimentary rocks - Sandstone, conglomerate, graywacke, rhythmically banded chert lenses.

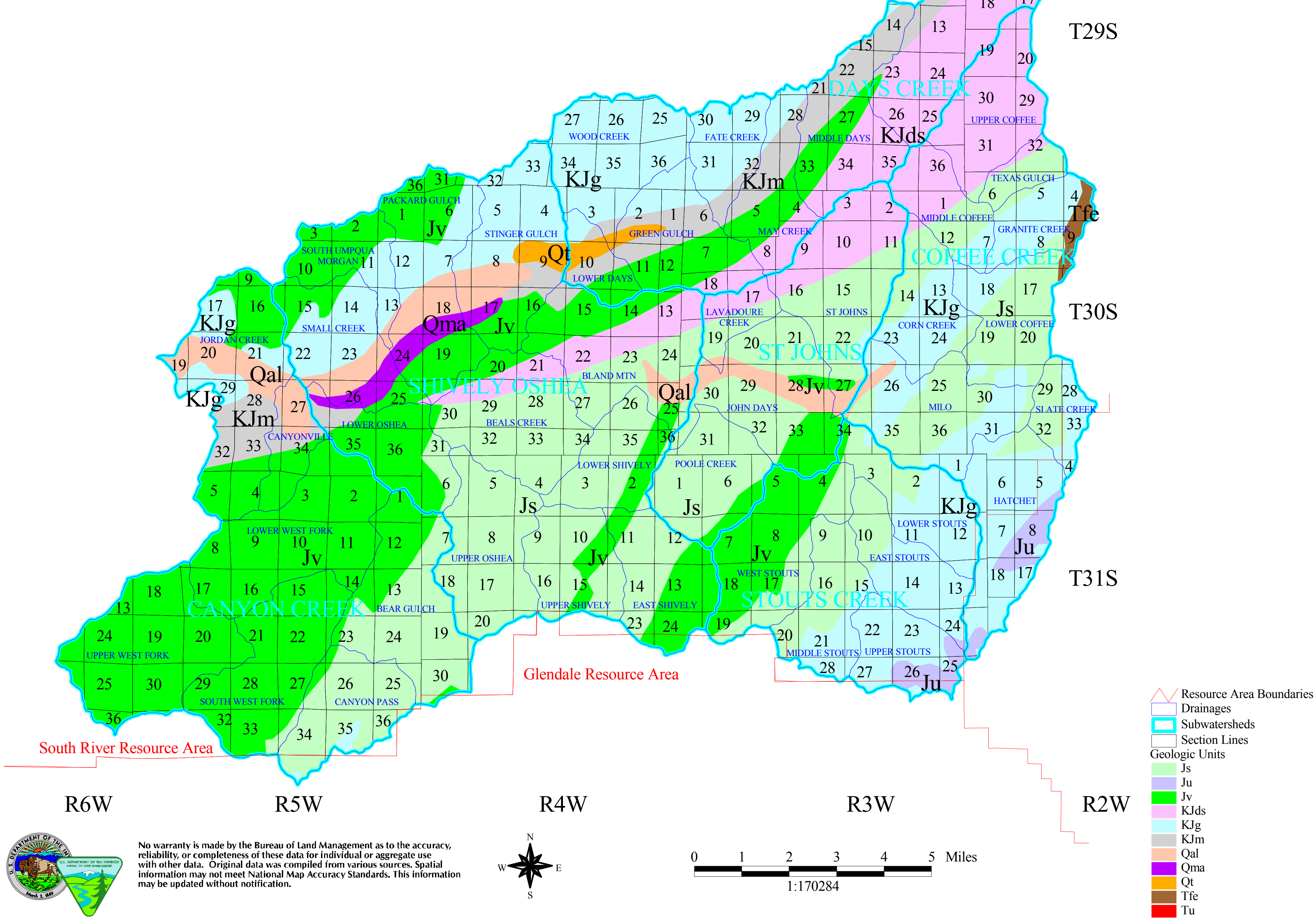
KJg

Granitic rocks (Cretaceous and Jurassic) - Mostly tonalite and quartz diorite but including lesser amounts of other granitoid rocks.

KJm

Myrtle Group (Lower Cretaceous and Upper Jurassic) - Conglomerate sandstone, siltstone, and limestone. Locally fossiliferous.

Map 19. South Umpqua Watershed Analysis Unit Geology



Qal

Alluvial deposits (Holocene) - Sand, gravel, and silt forming flood plains and filling channels of present streams. In places includes talus and slope wash. Locally includes soils containing abundant organic material and thin peat beds.

Qma

Mazama ash-flow deposits (Holocene) - Rhyodacitic to andesitic ash-flow deposits related to climactic eruptions of Mount Mazama about 6,845 yr before the present time.

Qt

Terrace, pediment, and lag gravels (Holocene and Pleistocene) - Unconsolidated deposits of gravel, cobbles, and boulders intermixed and locally interlayered with clay, silt, and sand. Mostly on terraces and pediments above present flood plains. Locally fossiliferous.

Tfe

Fisher and Eugene Formations and correlative rocks (Oligocene and upper Eocene) - Thin to moderately thick bedded, coarse- to fine-grained arkosic and micaceous sandstone and siltstone, locally highly pumiceous.

Tu

Undifferentiated tuffaceous sedimentary rocks, tuffs, and basalt (Miocene and Oligocene) - Heterogeneous assemblage of continental, largely volcanogenic deposits of basalt and basaltic andesite, including flows and breccia, complexly interstratified with epiclastic and volcaniclastic deposits of basaltic to rhyodacitic composition.

B. Soils

1. Historic and Current Conditions

The main sources of information for the soils section are the National Cooperative Soil Survey (NCSS) of Douglas County, conducted by the Natural Resources Conservation Service (NRCS), and the Timber Production Capability Classification (TPCC) conducted by the Bureau of Land Management. Interpretations for most of the chemical and physical soil characteristics are included in the NCSS. Tables and maps built from NCSS data include information on private and BLM-administered lands. Tables and maps built from TPCC data include information only on BLM-administered lands.

Soils in the South Umpqua WAU have developed dominantly from sedimentary, igneous, metamorphic, and volcanic parent materials mostly in the Klamath Mountains Geomorphic Province. The WAU contains minor influences from the Cascade Province.

Soils are influenced by five soil forming factors consisting of climate (hot, cold, wet, dry), geologic parent material (the rocks and minerals which soil is made from), topography (aspect, slope, elevation, and landforms), biological (vegetation and animals), and time (interaction of the four previous properties to develop soil types). Human influence could be considered the sixth soil forming factor. Management actions can affect soil depth, structure, organic matter content, texture, pH, infiltration, permeability, and drainage properties. These soil properties can be improved or degraded depending on the type and degree of management.

Human influences started affecting in the South Umpqua WAU before the 1700s. Native Americans used fire to burn grass in the valleys and lower hill sides. They also set many small circumscribed fires in portions of the upland forests (Boyd 1899). Cooler burning fires affect the soil less than fires that burn under hot, dry, and windy conditions. Hot fires may burn organic matter, destroy the soil food web complexity contained in the upper soil layers, and remove the protective vegetative cover.

European-Americans began settling in the WAU around 1850. They were in search of gold and land for farming. Placer mining for gold along Coffee, Shively, St John, and Stouts Creeks removed vegetative cover and top soil from the streambanks and floodplains. Removing vegetation from hillsides and along creeks and streams for agriculture purposes and from heavy grazing has probably increased soil compaction, surface erosion, and runoff flowing into streams.

Extensive timber harvesting in the WAU began during the 1940s. Roads were constructed to transport logs to the lumber mills. Roads cover about one percent of the WAU. Ground based timber harvesting (pulling logs along the ground behind horses, oxen, or tractors) is generally the most economical way to transport trees to the road. Soil compaction and displacement can occur with this type of harvesting. Ground based harvesting generally occurs on slopes less than 45 percent. Less than half of the South Umpqua WAU has slopes less than 45 percent.

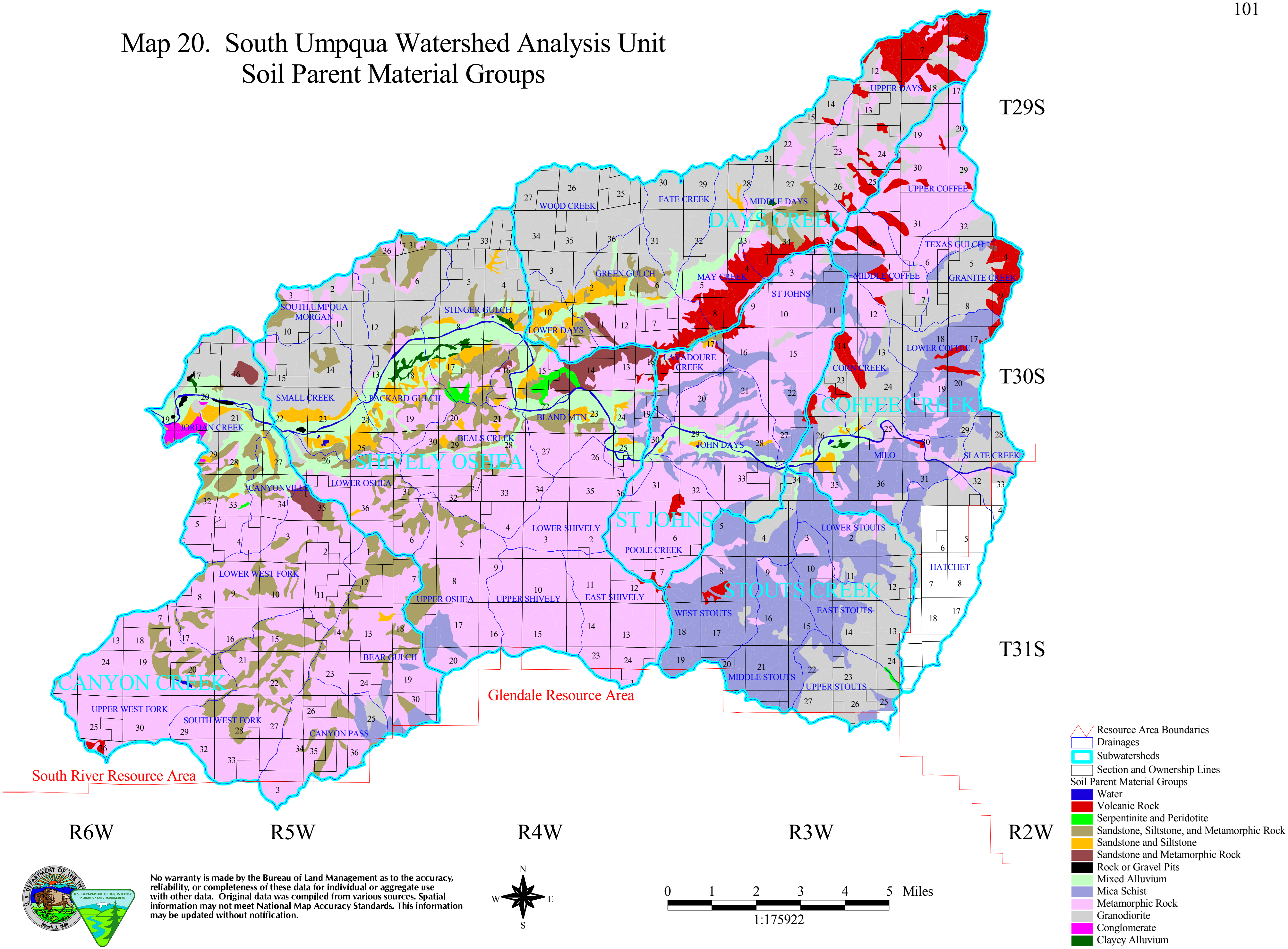
a. General Soil Groups as Defined by Parent Material

The NCSS of Douglas County was used to group soils by parent material type (see Map 20 and Appendix J). The soil characteristics, qualities, and properties are described.

(1) Clayey Alluvium

The clayey alluvium parent material covers less than one percent of the WAU. They are found on floodplains and terraces of the South Umpqua River. Soil depths average greater than 60 inches to bedrock. Clayey alluvium soils are poorly drained with an average subsoil clay content of 46 percent. Soil permeability is low, resulting in a high potential for surface runoff.

Map 20. South Umpqua Watershed Analysis Unit
Soil Parent Material Groups



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

(2) Conglomerate

Conglomerate parent materials cover less than one percent of the WAU. These soils are located on hills above the South Umpqua River in the western portion of the WAU. Soil depths average 29 inches to hard bedrock. Conglomerate soils are well drained with an average subsoil clay content of 18 percent. High rock fragment content can occur on the surface and in the subsoil. Soil permeability is moderate and the surface runoff potential is slight.

(3) Serpentinite and Peridotite

Serpentinite and peridotite parent materials cover less than one percent of the WAU. These soils are found on hill slopes south of the confluence of Days Creek with the South Umpqua River. Soil depths average 30 inches to hard bedrock. These soils are well drained and have an average subsoil clay content of 45 percent. Soil permeability is low, resulting in a high potential for surface runoff.

(4) Sandstone and Metamorphic Rock

Sandstone and metamorphic rock parent materials cover about one percent of the WAU. They are found on upland hill slopes and ridges associated with metamorphic rocks. Soil depth averages 20 inches to hard bedrock. These soils are somewhat excessively drained with an average subsoil clay content of 23 percent. Soil permeability is moderate and the surface runoff potential is moderate.

(5) Sandstone and Siltstone

Sandstone and siltstone parent materials cover about two percent of the WAU. They occur on upland foot slopes along the South Umpqua River and Days Creek. Soil depths average 53 inches to hard and soft bedrock. These soils are somewhat poorly drained with an average subsoil clay content of 48 percent. Soil permeability is low and the surface runoff potential is high. Bare soil erodibility is high.

(6) Volcanic Rock

Volcanic rock parent materials cover about four percent of the WAU. They occur on ridges and mountain slopes from the middle to the east side of the WAU. Soil depths average 57 inches to hard bedrock. These soils are well drained with an average subsoil clay content of 37 percent. Soil permeability is low and the surface runoff potential is high.

(7) Mixed Alluvium

Mixed alluvium parent materials cover about five percent of the WAU. They occur mostly on alluvial fans and high terraces along the South Umpqua River. Soils depths average greater than 60 inches to bedrock. These soils are well drained with an average subsoil clay content of 24 percent. Soil permeability is moderate and the surface runoff potential is moderate.

(8) Sandstone, Siltstone, and Metamorphic Rock

Sandstone, siltstone, and metamorphic rock parent materials cover about seven percent of the WAU. They occur on hill slopes scattered from the middle to the western portion of the WAU. Soil depths average 47 inches to hard and soft bedrock. These soils are well drained with an average subsoil clay content of 33 percent. Soil permeability is moderate and the surface runoff potential is moderate.

(9) Mica Schist Parent Material

Mica schist parent materials cover about 13 percent of the WAU. They occur on upland hill slopes in the southeast portion of the WAU. Soil depths average 47 inches to soft bedrock. These soils are well drained with an average subsoil clay content of 26 percent. Soil permeability is moderate and the surface runoff potential is moderate. Bare soil erodibility is high.

(10) Granodiorite Parent Material

Granodiorite parent materials cover about 23 percent of the WAU. They occur in upland areas in the north and east portions of the WAU. Soil depths average 54 inches to soft bedrock. These soils are well drained with an average subsoil clay content of 31 percent. Soil permeability is moderate and the surface runoff potential is moderate. Bare soil erodibility is high.

(11) Metamorphic Parent Material

Metamorphic parent materials cover about 44 percent of the WAU. They occur on upland hill slopes, primarily in a band running through the center of the WAU. Soil depths average 40 inches to hard bedrock. These soils are well drained with an average subsoil clay content of 28 percent. Soil permeability is moderate and the surface runoff potential is moderate.

b. National Cooperative Soil Survey (NCSS) Information

The main soils related properties consider to be of concern for planning and analysis are hydric, floodplain, somewhat poorly drained, conglomerate, serpentine, granitic, and prime farmland soils (see Table 26 and Map 21).

(1) Prime Farmland Soils

There are approximately 4,354 acres of prime farmland soils on private lands and 103 acres on BLM-administered land in the WAU. Prime farmland has the combination of soil properties, low slope gradient, growing season, and moisture supply to produce sustained high crop yields. The Farmland Protection Policy Act, published in the Federal Register, Vol. 43, No. 21, January 31, 1978, directs federal agencies to identify and take into account the adverse effects of federal programs on the preservation of prime farmland.

(2) Floodplain Soils

There are approximately 3,104 acres of floodplain soils on private land and 70 acres on BLM-administered land in the WAU. Floodplain management objectives on BLM-administered lands include reducing the risk of flood loss or damage to property, minimizing the impact of flood loss on human safety, health, and welfare and restoring, maintaining, and preserving the natural and beneficial functions of floodplains. These objectives originate from Executive Order 11988, Floodplain Management, Section 1, May 24, 1977.

(3) Somewhat Poorly Drained (SWP) Soils

There are approximately 2,046 acres of somewhat poorly drained soils on private land and 2,371 acres on BLM-administered land in the WAU. Somewhat poorly drained soils usually have a seasonal high water table within 18 inches of the soil surface. These soil types are frequently associated with riparian areas and areas with slope stability problems. Timber is more susceptible to windthrow on these soils.

(4) Somewhat Poorly Drained - Floodplain Soils

There are approximately 121 acres of somewhat poorly drained - floodplain soils on private land in the WAU. BLM-administered land in the WAU does not have any soils classified as somewhat poorly drained - floodplain.

(5) Hydric Soils

There are approximately 1,636 acres of hydric soils on private land and 55 acres on BLM-administered land in the WAU. Hydric soils generally have a watertable within ten inches of the soil surface for at least five percent of the growing season. The current definition of a hydric soil from the NRCS is "a soil that is sufficiently wet in the upper part to develop anaerobic conditions during the growing season." These areas have the greatest potential to be classified as wetlands. Hydric or wet soil areas too small for mapping (NCSS standards <5 acres) exist as minor components within areas mapped as somewhat poorly drained.

(6) Hydric - Floodplain Soils

There are approximately 239 acres of hydric - floodplain soils on private land and 9 acres on BLM-administered land in the WAU.

(7) Serpentine Soils

There are approximately 208 acres of serpentine soils on private land and 12 acres on BLM-administered land in the WAU. Serpentine soils may contain high amounts of magnesium, chromium, cobalt, nickel, or iron. These soils may also have low amounts of nitrogen, phosphorus, potassium, and molybdenum.

Productivity of Douglas-fir is poor. However, grasses grow rapidly. Conversion from native forest vegetation to other commercial forest types is difficult. Serpentine areas are usually associated with geologic contact zones, indicating an increase in the amount of groundwater present and decreased slope stability.

(8) Somewhat Poorly Drained - Serpentine Soils

There are approximately 73 acres of somewhat poorly drained - serpentine soils on private land and 24 acres on BLM-administered land in the WAU.

(9) Granitic Soils

There are approximately 19,295 acres of granitic soils on private land and 8,659 acres on BLM-administered land. Granitic soils are highly susceptible to surface erosion and shallow slope failure. They have low organic carbon reserves and are not very resilient. Resiliency is the ability of a soil to recover from a disturbance, whether it is natural or human caused. Management options on these soils are reduced.

Approximately 5,660 acres of the granitic soils on BLM-administered land occur on slopes greater than 35 percent. These soils are classified as Category 1 soils, as defined in Monitoring Western Oregon Records of Decision (USDI 1988).

(10) Somewhat Poorly Drained - Granitic Soils

There are approximately 1,148 acres of somewhat poorly drained - granitic soils on private land and 1,845 acres on BLM-administered land in the WAU.

(11) Conglomerate Soils

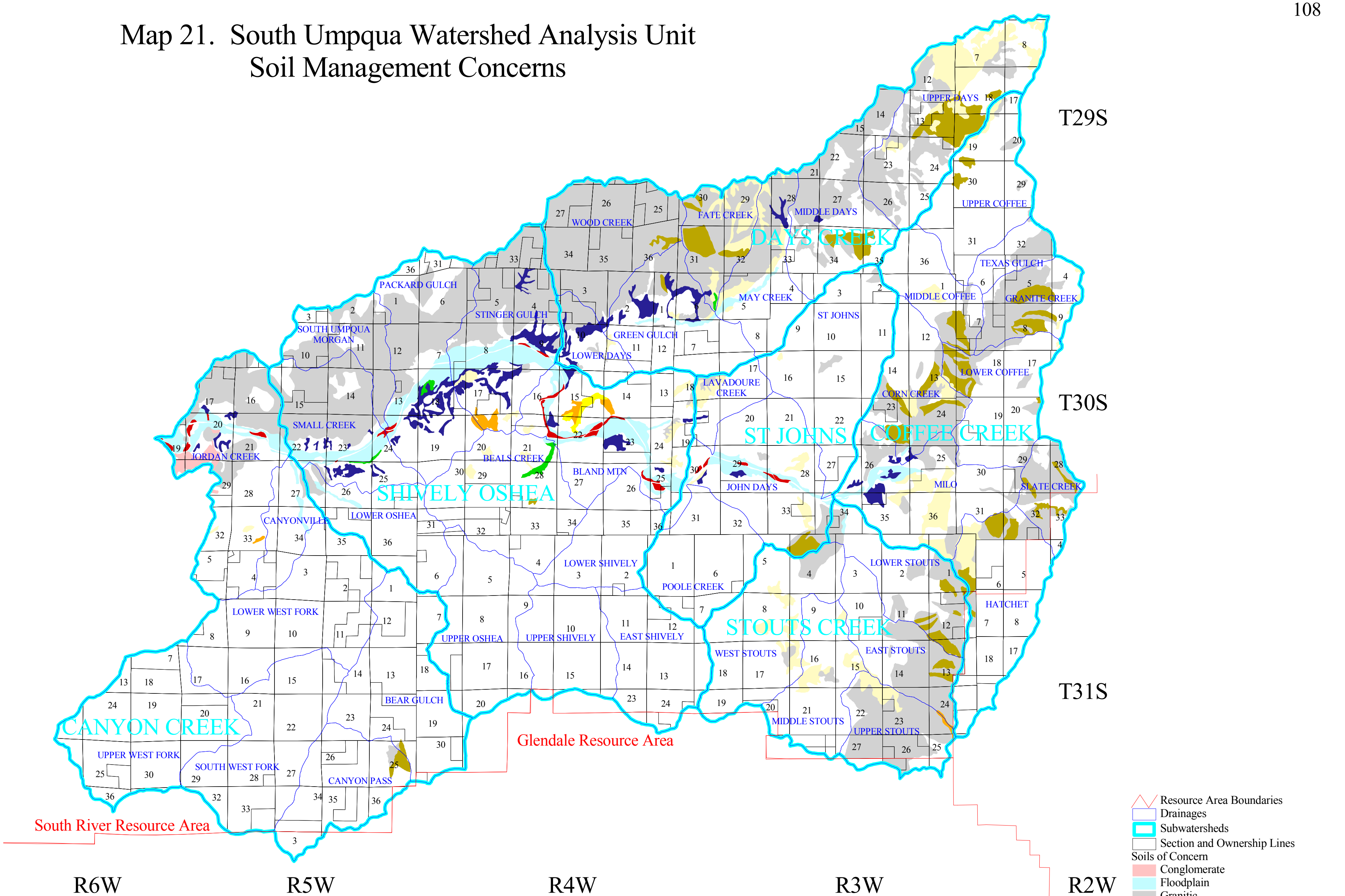
There are approximately 226 acres of conglomerate soils on private land and six acres on BLM-administered land in the WAU. Conglomerates tend to weather rapidly and unevenly when exposed. Slope stability is unpredictable because of parent material and cementing agent variability. Dry ravel erosion may occur on steep slopes producing high coarse fragment content on the surface and in the soil. Droughtiness, seedling mortality, road maintenance needs, and sediment potential increase as dry ravel increases.

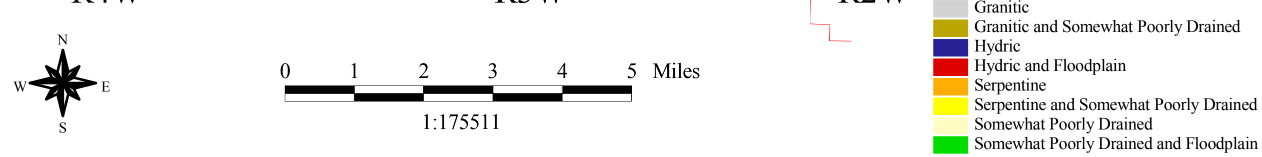
Table 26. Soil Management Concerns Within the South Umpqua WAU.

Drainage **Subwatershed**	Acres of Prime Farmland Soils		Acres of Floodplain Soils		Acres of Somewhat Poorly Drained Soils		Acres of Somewhat Poorly Drained - Floodplain Soils		Acres of Hydric Soils		Acres of Hydric - Floodplain Soils		Acres of Serpentine Soils		Acres of Somewhat Poorly Drained - Serpentine Soils		Acres of Granitic Soils		Acres of Somewhat Poorly Drained - Granitic Soils		Acres of Conglomerate Soils	
	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private
Bear Gulch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	18	0	0	0
Canyon Pass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	0	76	0	0	0
Canyonville	0	280	0	59	0	0	0	0	0	0	0	0	0	0	0	0	0	37	0	0	0	0
Jordan Creek	0	556	0	384	0	20	0	0	0	59	0	56	0	10	0	0	116	1,402	0	0	5	226
Lower West Fork	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South West Fork	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper West Fork	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Canyon Creek Subwatershed	0	839	0	445	0	20	0	0	0	59	0	56	0	10	0	0	156	1,440	94	0	5	226
Corn Creek	0	3	1	22	90	71	0	0	0	18	0	0	0	0	0	0	272	642	222	95	0	0
Granite Creek	0	0	0	0	23	31	0	0	0	0	0	0	0	0	0	0	464	509	139	154	0	0
Hatchet	0	0	0	0	234	0	0	0	0	0	0	0	0	0	0	0	158	168	159	81	0	0
Lower Coffee	0	0	0	0	24	4	0	0	0	0	0	0	0	0	0	0	134	301	71	159	0	0
Middle Coffee	0	0	0	0	73	0	0	0	0	0	0	0	0	0	0	0	76	219	95	49	0	0
Milo	6	304	1	186	271	297	0	0	2	138	0	0	0	0	0	0	247	452	10	0	0	0
Slate Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	242	513	24	93	0	0
Texas Gulch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	295	4	0	0	0	0
Upper Coffee	0	0	0	0	97	0	0	0	0	0	0	0	0	0	0	0	92	1	69	1	0	0
Coffee Creek Subwatershed	6	307	1	208	811	404	0	0	2	156	0	0	0	0	0	0	1,979	2,810	789	631	0	0
Fate Creek	0	12	0	0	200	236	0	12	0	9	0	0	0	0	0	0	587	589	206	78	0	0
Green Gulch	0	225	0	33	0	28	0	0	0	248	0	0	0	0	0	0	78	682	0	17	0	0
Lower Days	0	109	0	110	0	16	0	0	2	132	0	0	0	0	0	0	196	135	0	0	0	0
May Creek	3	245	0	100	140	174	0	0	5	45	0	0	0	0	0	0	195	679	0	0	0	0
Middle Days	21	46	0	0	0	1	0	0	4	8	0	0	0	0	0	0	593	1,210	52	133	0	0
Upper Days	0	0	0	0	791	329	0	0	0	0	0	0	0	0	0	0	571	862	487	34	0	0
Wood Creek	0	5	0	0	0	0	0	0	0	21	0	0	0	0	0	0	726	3,068	3	52	0	0
Days Creek Subwatershed	24	642	0	242	1,130	785	0	12	10	463	0	0	0	0	0	0	2,946	7,225	747	314	0	0

Drainage **Subwatershed**	Acres of Prime Farmland Soils		Acres of Floodplain Soils		Acres of Somewhat Poorly Drained Soils		Acres of Somewhat Poorly Drained - Floodplain Soils		Acres of Hydric Soils		Acres of Hydric - Floodplain Soils		Acres of Serpentine Soils		Acres of Somewhat Poorly Drained - Serpentine Soils		Acres of Granitic Soils		Acres of Somewhat Poorly Drained - Granitic Soils		Acres of Conglomerate Soils	
	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private
Beals Creek	4	169	0	11	0	74	0	67	0	0	0	0	0	0	0	0	0	0	0	10	0	0
Bland Mtn	23	612	23	624	1	129	0	1	0	148	9	114	5	76	24	73	0	59	0	0	0	0
East Shively	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lower O'Shea	0	120	0	46	0	0	0	0	0	0	0	0	0	0	0	0	0	104	0	0	0	0
Lower Shively	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Packard Gulch	1	429	0	325	0	0	0	24	0	270	0	12	0	15	0	0	378	1,308	0	0	0	0
S Umpqua Morgan	0	0	0	10	0	0	0	0	0	0	0	1	0	0	0	0	180	1,191	0	0	0	0
Small Creek	0	262	0	333	0	0	0	17	0	119	0	9	0	0	0	0	426	1,407	0	0	0	0
Stinger Gulch	45	703	45	538	18	49	0	0	43	381	0	11	6	79	0	0	579	1,569	0	0	0	0
Upper O'Shea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Shively	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shively-O'Shea Subwatershed	73	2,296	69	1,887	19	253	0	109	43	918	9	146	11	170	24	73	1,563	5,638	0	10	0	0
John Days	0	269	0	285	32	111	0	0	0	32	0	37	0	0	0	0	25	151	8	127	0	0
Lavadoure Creek	0	0	0	0	29	96	0	0	0	8	0	0	0	0	0	0	6	62	0	0	0	0
Pool Creek	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
St Johns	0	1	0	5	0	8	0	0	0	0	0	0	0	0	0	0	56	26	0	0	0	0
St Johns Subwatershed	0	271	0	290	61	216	0	0	0	40	0	37	0	0	0	0	86	240	8	127	0	0
East Stouts	0	0	0	0	14	2	0	0	0	0	0	0	0	7	0	0	536	565	82	2	0	0
Lower Stouts	0	0	0	33	3	0	0	0	0	0	0	0	0	0	0	0	519	385	141	62	0	0
Middle Stouts	0	0	0	0	88	145	0	0	0	0	0	0	0	0	0	0	3	37	0	0	0	0
Upper Stouts	0	0	0	0	142	52	0	0	0	0	0	0	1	21	0	0	871	733	0	0	0	0
West Stouts	0	0	0	0	103	170	0	0	0	0	0	0	0	0	0	0	0	223	2	2	0	0
Stouts Creek Subwatershed	0	0	0	33	350	369	0	0	0	0	0	0	1	28	0	0	1,929	1,943	225	66	0	0
South Umpqua WAU	103	4,354	70	3,104	2,371	2,046	0	121	56	1,636	9	239	12	208	24	73	8,659	19,296	1,863	1,148	6	226

Map 21. South Umpqua Watershed Analysis Unit
Soil Management Concerns





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c. Timber Production Capability Classification (TPCC) Information, Fragile Sites

Soil related data for planning and analysis, using the Timber Production Capability Classification (TPCC), are the Fragile-Suitable and Fragile-Nonsuitable Classifications (see Table 27 and Map 22). Timber Production Capability Classification Fragile sites refer to those areas where the timber growing potential may be reduced due to inherent soil properties and landform characteristics. The TPCC groups sites into Fragile-Suitable and Fragile-Nonsuitable for timber production classifications. Fragile-Suitable sites have the potential for unacceptable soil productivity losses as a result of forest management activities unless mitigating measures are applied to protect the soil/site productivity (see Best Management Practices, Appendix D, Roseburg District Resource Management Plan, USDI 1995). Fragile-Nonsuitable sites are considered to be unsuitable for timber production. Table 27 lists the number of acres in each classification on BLM-administered land within the WAU.

Table 27. Acres of Fragile Site Classifications on BLM administered Lands From the Timber Production Capability Classification.

Drainage	Acres by Fragile Site Classification							
Subwatershed	FSR	FSNW	FGR	FGNW	FPR	FPNW	FMR	FWR
Bear Gulch	0	241	1,017	3	0	4	47	0
Canyon Pass	0	286	32	0	0	0	114	0
Canyonville	0	28	0	0	0	0	0	0
Jordan Creek	0	73	19	0	0	0	0	0
Lower West Fork	0	980	41	0	0	1	0	0
South West Fork	0	360	0	0	0	1	0	0
Upper West Fork	0	301	0	0	27	0	0	0
Canyon Creek Subwatershed	0	2,270	1,109	3	27	6	161	0
Corn Creek	0	0	407	18	217	0	290	0
Granite Creek	0	0	429	0	0	0	352	0
Hatchet	0	0	568	0	0	1	311	0
Lower Coffee	0	29	863	79	103	0	221	0
Middle Coffee	0	52	172	0	0	0	212	0
Milo	0	0	907	5	43	9	370	0
Slate Creek	0	0	348	0	0	1	0	0
Texas Gulch	0	0	310	0	0	0	57	0
Upper Coffee	0	0	2,139	0	2	2	12	0
Coffee Creek Subwatershed	0	80	6,143	102	366	13	1,825	0
Fate Creek	0	0	541	0	0	0	0	12
Green Gulch	0	3	262	2	0	0	0	0
Lower Days	0	2	120	0	1	0	0	0
May Creek	0	0	33	0	0	0	79	0
Middle Days	0	13	945	1	11	0	35	0
Upper Days	0	0	141	15	2,283	101	0	0
Wood Creek	0	0	2	0	397	1	0	0
Days Creek Subwatershed	0	17	2,045	18	2,693	102	114	12

Drainage **Subwatershed**	Acres by Fragile Site Classification							
	FSR	FSNW	FGR	FGNW	FPR	FPNW	FMR	FWR
Beals Creek	0	35	187	0	0	2	0	0
Bland Mtn	0	366	102	0	0	0	0	0
East Shively	0	43	132	0	0	3	0	0
Lower O'Shea	48	73	173	1	0	0	0	0
Lower Shively	0	25	104	0	0	0	0	0
Packard Gulch	0	0	269	9	0	4	236	0
South Umpqua Morgan	0	0	184	0	0	0	64	0
Small Creek	0	0	145	0	0	0	0	0
Stinger Gulch	0	0	2	1	0	0	0	0
Upper O'Shea	0	0	217	0	0	4	0	0
Upper Shively	0	3	131	0	0	1	0	0
Shively-O'Shea Subwatershed	48	544	1,647	11	0	14	300	0
John Days	0	0	878	0	32	0	0	0
Lavadoure Creek	0	0	580	3	0	1	0	0
Pool Creek	0	0	457	5	63	0	0	0
St Johns	0	0	900	0	94	2	0	0
St Johns Subwatershed	0	0	2,815	8	189	3	0	0
East Stouts	0	0	985	25	0	2	332	0
Lower Stouts	0	0	809	5	0	2	588	0
Middle Stouts	0	0	468	0	0	0	0	0
Upper Stouts	0	2	37	182	0	2	266	0
West Stouts	0	5	881	3	70	2	0	0
Stouts Creek Subwatershed	0	7	3,179	215	70	8	1,186	0
South Umpqua WAU	48	2,918	16,939	357	3,344	146	3,587	12

(1) Soil Moisture (FS)

Soils on these sites are typically moisture deficient due to soil physical characteristics. These sites are not considered moisture deficient due to competing vegetation or annual precipitation.

(a) Suitable (FSR)

Soils on these sites typically have loamy fine sand and sandy loam textures with high amounts of coarse fragments. They generally have between one and one and a half inches of available water holding capacity in the top 12 inches of soil.

(b) Nonsuitable (FSNW)

Soils on these sites typically have textures that are skeletal or fragmental (greater than 35 percent rock fragment content). They have less than one inch of available water holding capacity in the top 12 inches of soil. These soil types occur primarily in the Canyon Creek and Shively-O'Shea Subwatersheds with scattered areas in the Lower Coffee, Middle Coffee and Middle Days Drainages.

(2) Slope Gradient (FG)

These sites have steep to extremely steep slopes with a high potential for debris type landslides. Gradients commonly range from 60 to more than 100 percent. Classifications are based on geology, geomorphology, physiographic position, climate (especially precipitation), and soil types.

(a) Suitable (FGR)

These sites are less fragile than the nonsuitable areas. Unacceptable soil and organic matter losses may occur from mass soil movement as a result of forest management activities unless mitigating measures (Best Management Practices) are used to protect the soil/growing site. This soil classification occurs in all of the subwatersheds.

(b) Nonsuitable (FGNW)

Unacceptable soil and organic matter losses could occur from mass soil movement as a result of forest management activities. These losses cannot be mitigated even using Best Management Practices. This classification type occurs mostly in the Upper Stouts and Lower Coffee Drainages.

(3) Mass Movement Potential (FP)

These sites consist of deep seated, slump, or earth flow types of mass movements with undulating topography and slope gradients generally less than 60 percent.

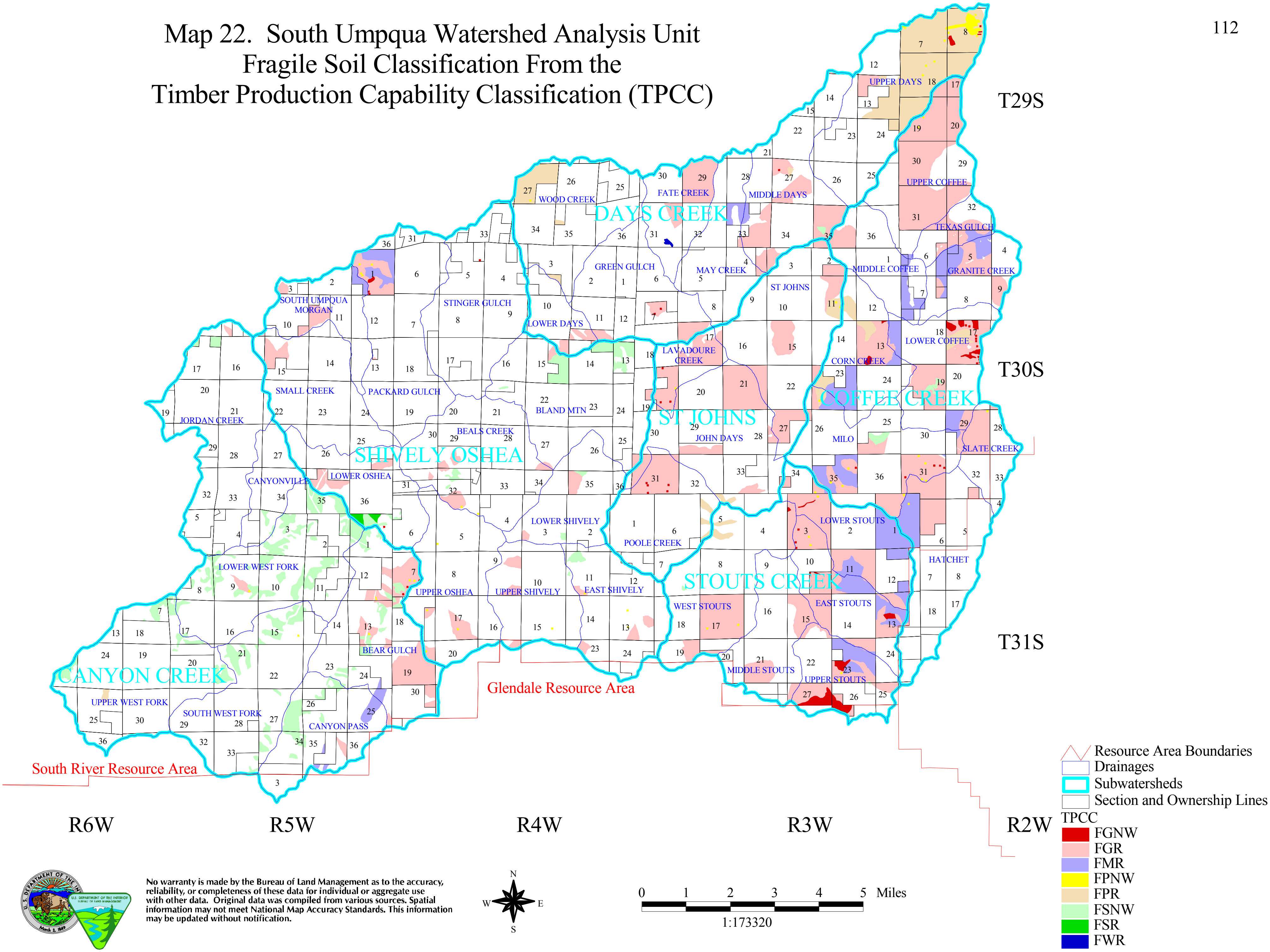
(a) Suitable (FPR)

These sites may contain soil tension cracks and/or sag ponds. Trees on these sites may be curved at the butt or along the stem. Forest management is feasible on these sites since the movement rate is slow. This classification type occurs mainly in the Upper Days Drainage.

(b) Nonsuitable (FPNW)

These sites have active, deep-seated slump-earthflow types of mass movements. They include areas where the soils have been removed and do not produce commercial forest stands. The rate of movement may result in jackstrawed trees. Forest management is not feasible on these sites due to the movement rate. These sites with this classification type are usually small in size.

Map 22. South Umpqua Watershed Analysis Unit Fragile Soil Classification From the Timber Production Capability Classification (TPCC)



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(4) Surface Erosion Potential (FM)

Soils on these sites have surface horizons that are highly erodible and susceptible to dry ravel. The maximum annual soil erosion rate for crop productivity to be sustained economically and indefinitely may be reached on these sites. The T Factor is used to evaluate levels of soil erosion (USDI 1986).

(a) Suitable (FMR)

This classification type occurs mostly in the Coffee Creek and Stouts Creek Subwatersheds. Forest management activities may increase surface erosion but site productivity losses, if they occurred, would be acceptable on these sites. Acceptable limits are defined as soil loss rates that do not exceed 20 times the T Factor for five years after timber harvesting.

(b) Nonsuitable (FMNW)

Forest management activities may increase surface erosion resulting in unacceptable site productivity losses on these sites. Unacceptable soil loss rates exceed 20 times the T Factor for five years after timber harvesting. Sites with this classification do not occur in the South Umpqua WAU.

(5) Groundwater (FW)

These soils contain water at or near the soil surface for sufficient periods of time that vegetation survival and growth are affected.

(a) Suitable (FWR)

Conifer production is usually limited because groundwater is close to the surface. Soils typically have high chroma mottles close to the surface. These sites may support water tolerant species. Depth to the water table, subsurface flow, or duration of the groundwater is usually altered when a site is disturbed but the productivity loss is considered to be acceptable. Forest management activities would not reduce site productivity below the threshold of commercial forest land of 20 cubic feet of wood production per acre per year or cause noncommercial forest land to be converted to nonforest land.

(b) Nonsuitable (FWNW)

Water tolerant tree and understory species grow on these sites. Commercial conifer survival and productivity are severely limited because groundwater is close to the surface. Soils typically have dark colored surface horizons and low chroma mottles at or near the surface. Depth to the water table, subsurface flow, or duration of the groundwater is altered when a site is disturbed resulting in unacceptable productivity losses and/or the loss of water tolerant tree species. Forest management activities could reduce site productivity below the threshold of commercial forest land of 20 cubic feet of wood production per acre per year or cause noncommercial forest land to be converted to nonforest land. Sites with this classification do not occur in the South Umpqua WAU.

d. Soil Productivity

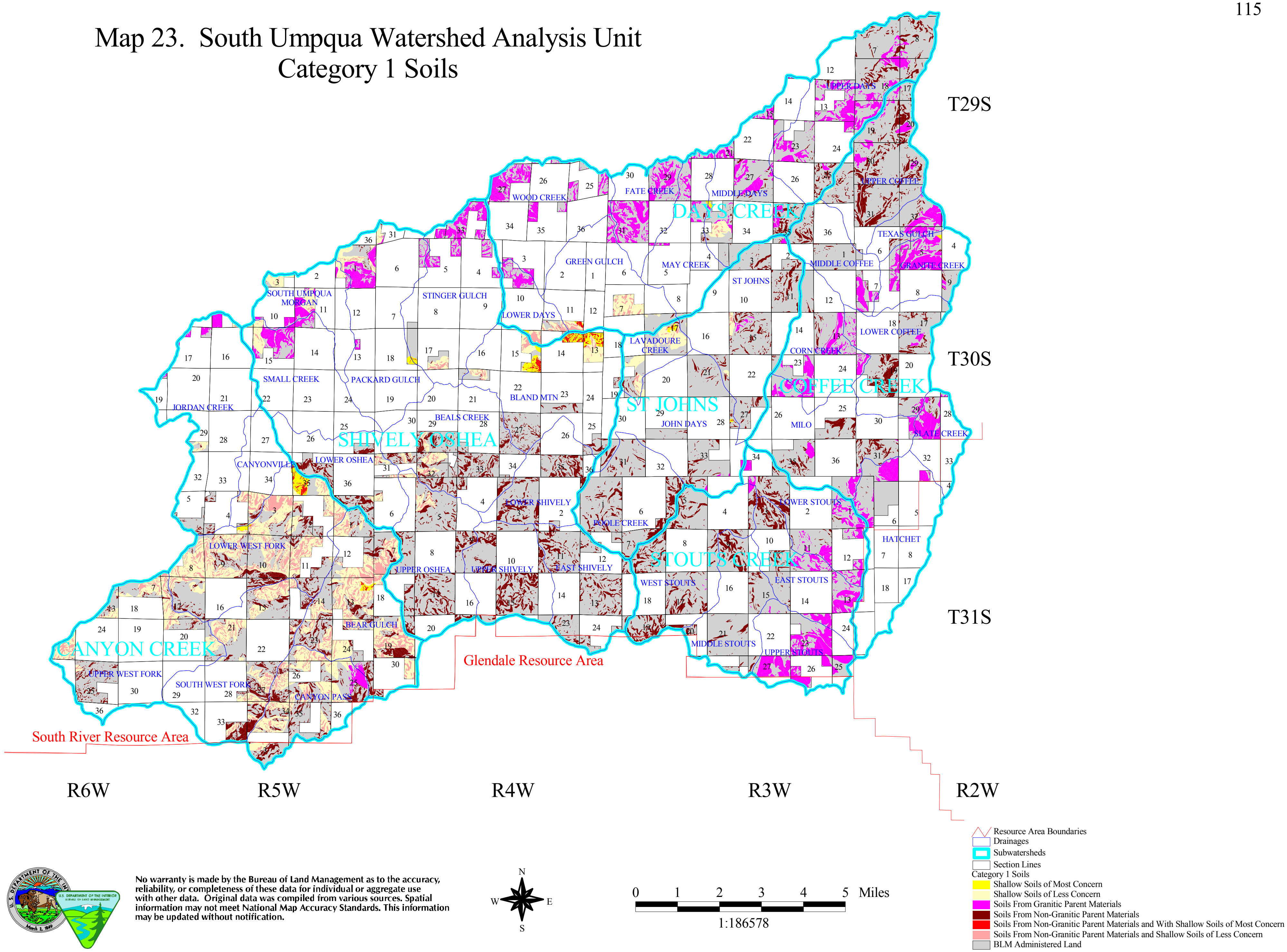
(1) Category 1 Soils

Category 1 Soils are defined as shallow soils (soils with a depth less than 20 inches to bedrock and comprising at least 20 percent of a soil map unit), soils with less than four inches of A horizon, soils formed from granitic or granitic like parent material on slopes greater than 35 percent, or non-granitic soils on slopes greater than 70 percent. Category 1 Soils are considered highly sensitive to prescribed fire (including burning of hand and machine piles) because they are unusually erodible, nutrient deficient, or low in organic matter (USDI1995). Approximately 21,041 acres of BLM-administered land may be characterized as Category 1 Soils, using GIS (see Table 28 and Map 23). The A horizon thickness property is not presented in Table 28 but is looked at in the field on a project level basis. Shallow soils (less than 20 inches deep to bedrock) were divided into groups that comprise 30 to 45 percent of the soil map unit (shallow soils of less concern) or 75 to 100 percent (shallow soils of most concern) of the soil map unit. Shallow soil groups were also combined with soils formed from non-granitic parent materials with slopes greater than 70 percent to create three groups of non-granitic soils. The information in Table 28 was developed using ten meter Digital Elevation Models (DEM), which were used to identify slope groups and the Douglas County Soil Survey, which was used to identify the geologic parent materials and areas with shallow soils.

Table 28. Category 1 Soils on BLM Administered Land in the South Umpqua WAU.

Drainage **Subwatershed**	Shallow Soils of Most Concern	Shallow Soils of Less Concern	Granitic Soils	Non-Granitic Soils	Non-Granitic Soils With Shallow Soils of Most Concern	Non-Granitic Soils With Shallow Soils of Less Concern
Bear Gulch	21	1,221	16	372	7	564
Canyon Pass	0	743	81	284	0	183
Canyonville	2	88	0	18	0	55
Jordan Creek	0	42	83	27	0	9
Lower West Fork	119	1,514	0	344	29	554
South West Fork	0	515	0	312	0	205
Upper West Fork	0	451	0	107	0	146
Canyon Creek Subwatershed	142	4,574	180	1,464	36	1,716
Corn Creek	0	0	304	28	0	0
Granite Creek	6	0	378	8	0	0
Hatchet	0	0	230	2	0	0
Lower Coffee	0	0	65	222	0	0
Middle Coffee	0	15	93	64	0	0
Milo	0	0	173	183	0	0
Slate Creek	0	0	211	13	0	0
Texas Gulch	0	0	192	24	0	0
Upper Coffee	0	18	135	489	0	0
Coffee Creek Subwatershed	6	33	1,781	1,033	0	0

Map 23. South Umpqua Watershed Analysis Unit
Category 1 Soils



Drainage **Subwatershed**	Shallow Soils of Most Concern	Shallow Soils of Less Concern	Granitic Soils	Non-Granitic Soils	Non-Granitic Soils With Shallow Soils of Most Concern	Non-Granitic Soils With Shallow Soils of Less Concern
Fate Creek	0	0	434	0	0	0
Green Gulch	5	185	31	2	9	69
Lower Days	10	55	94	1	1	66
May Creek	2	0	99	6	0	0
Middle Days	7	79	273	89	0	11
Upper Days	0	8	599	242	0	0
Wood Creek	0	0	381	0	0	0
Days Creek Subwatershed	24	327	1,911	340	10	146
Beals Creek	0	125	0	346	0	44
Bland Mtn	180	208	0	89	72	54
East Shively	0	0	0	272	0	0
Lower O’Shea	8	52	0	171	3	16
Lower Shively	0	0	0	263	0	0
Packard Gulch	0	138	245	8	0	22
South Umpqua Morgan	2	192	128	0	0	13
Small Creek	0	110	232	0	0	8
Stinger Gulch	0	50	327	1	0	22
Upper O’Shea	0	71	0	327	0	32
Upper Shively	0	0	0	324	0	0
Shively-O’Shea Subwatershed	190	946	932	1,801	75	211
John Days	3	11	18	106	1	0
Lavadoure Creek	16	281	1	19	3	30
Pool Creek	0	0	0	266	0	0
St Johns	0	41	28	228	0	8
St Johns Subwatershed	19	333	47	619	4	38
East Stouts	0	0	290	144	0	0
Lower Stouts	0	0	298	110	0	0
Middle Stouts	0	0	0	203	0	0
Upper Stouts	0	1	607	2	0	0
West Stouts	0	0	15	433	0	0
Stouts Creek Subwatershed	0	1	1,210	892	0	0
South Umpqua WAU	381	6,214	6,061	6,149	125	2,111

(2) Soil Compaction

Soil compaction is a soil productivity concern, which could occur from ground based timber harvesting operations. Management direction is to plan timber harvests using ground based yarding systems to have insignificant (less than one percent) growth loss (USDI 1995). Soil compaction and the removal or disturbance of humus layers and coarse woody debris may impact the soil food web. Minimizing soil and litter disturbance that may occur as a result of yarding and operation of heavy equipment would help maintain a healthy food web. The soil food web is the living component interacting with the nonliving (organic and mineral) component of the soil to produce a complex system of nutrient cycling, soil structure formation, decomposition, and pest cycles. The soil food web promotes healthy soil functions including biological activity, diversity, and productivity, regulates the flow of water and dissolved nutrients, stores and cycles nutrients and other elements, and filters, buffers, degrades, immobilizes, and detoxifies organic and inorganic materials that are potential pollutants (USDA 1999). Table 29 shows the amount of BLM-administered land with slopes less than 35 percent that could potentially be ground based harvested.

Table 29. Acres and Percent of BLM Administered Land With Slopes Less Than 35 Percent.

Drainage **Subwatershed**	Acres	Percent
Bear Gulch	374	11
Canyon Pass	265	11
Canyonville	8	4
Jordan Creek	101	24
Lower West Fork	470	12
South west Fork	247	13
Upper West Fork	196	12
Canyon Creek Subwatershed	1,661	12
Corn Creek	489	44
Granite Creek	330	40
Hatchet	360	41
Lower Coffee	378	28
Middle Coffee	293	33
Milo	396	26
Slate Creek	70	20
Texas Gulch	221	34
Upper Coffee	525	17
Coffee Creek Subwatershed	3,062	29
Fate Creek	583	59
Green Gulch	124	25
Lower Days	138	38
May Creek	273	66
Middle Days	571	35
Upper Days	1,231	37
Wood Creek	385	53
Days Creek Subwatershed	3,305	41

Beals Creek	176	11
Bland Mountain	257	20
East Shively	192	11
Lower O'Shea	60	9
Lower Shively	154	14
Packard Gulch	217	33
South Umpqua Morgan	91	23
Small Creek	234	43
Stinger Gulch	368	51
Upper O'Shea	333	17
Upper Shively	126	9
Shively-O'Shea Subwatershed	2,208	18
John Days	559	38
Lavadoure Creek	161	24
Poole Creek	286	16
St Johns	356	18
St Johns Subwatershed	1,362	23
East Stouts	486	36
Lower Stouts	535	38
Middle Stouts	467	31
Upper Stouts	464	40
West Stouts	409	18
Stouts Creek Subwatershed	2,361	31
South Umpqua WAU	13,959	24

VII. Hydrology

A. Introduction

The South Umpqua Watershed Analysis Unit (WAU) is about 221 square miles in size. The Roseburg BLM District and the city of Canyonville entered into a Memorandum of Understanding (MOU) in 1982 to protect the water quality of Canyon Creek for municipal water use. The water quality would be protected by following Best Management Practices (BMP). The BLM does not have an MOU with any other community for municipal water use in the WAU. However, the Milo Academy has a community water system for domestic water use supplied by Lick Creek in the Milo Drainage.

Much of the land along the South Umpqua River is used for agricultural purposes. In the agricultural areas many tributaries of the South Umpqua River have been straightened or had their flow patterns altered. Most of the native vegetation has been replaced with low growing vegetation, which generally are grasses. Riparian areas may have deciduous trees along the stream banks.

The higher elevations are a combination of Federally-administered and private timber land. Timber harvesting and road construction have probably affected channel complexity, water quality, and hydraulic processes in the WAU.

B. Climate

The South Umpqua WAU has a Mediterranean type climate, characterized by cool, wet winters and hot, dry summers. Most of the precipitation occurs as rainfall. However, the higher elevations (above 2,000 feet in elevation) in the WAU could receive a large amount of snow.

The closest National Oceanic and Atmospheric Administration (NOAA) weather station is located at Riddle. The Riddle weather station is located about one and one half miles north of the WAU. The weather station is located at about 680 feet in elevation, which is about the same as the lowest elevation in the WAU. The Riddle weather station was used to characterize temperature and precipitation in the WAU. Precipitation and temperature differences would be expected due to aspect and elevation differences that occur throughout the WAU.

Map 24 shows the range in average annual precipitation in the WAU. Annual precipitation ranges from about 30 inches at Canyonville to 60 inches at the highest elevations. The mean annual precipitation from 1961 to 1990 at the Riddle weather station was 31 inches (Owenby and Ezell 1992). The mean water year precipitation from 1914 to 1948 was 30 inches and from 1949 to 1999 it was 32 inches. Chart 3 shows water year precipitation at the Riddle weather station, with the year (1948) indicated when the station was moved. Chart 4 shows about 85 percent of the annual precipitation occurs between October and April and summer precipitation averages about four inches.

Map 24. South Umpqua Watershed Analysis Unit
Average Annual Precipitation

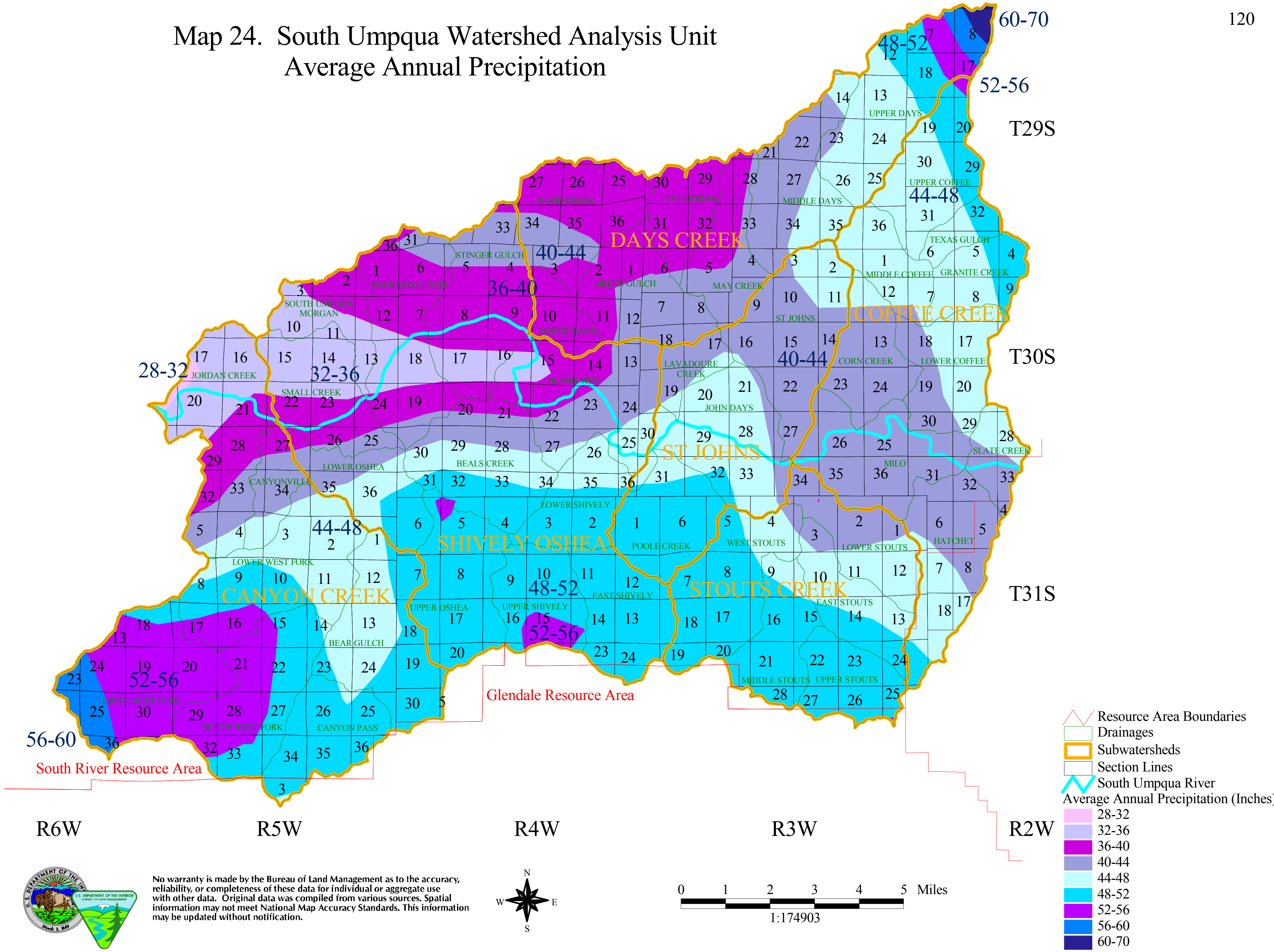


Chart 3. Water Year Precipitation at the Riddle, Oregon Weather Station From 1914 to 1999.

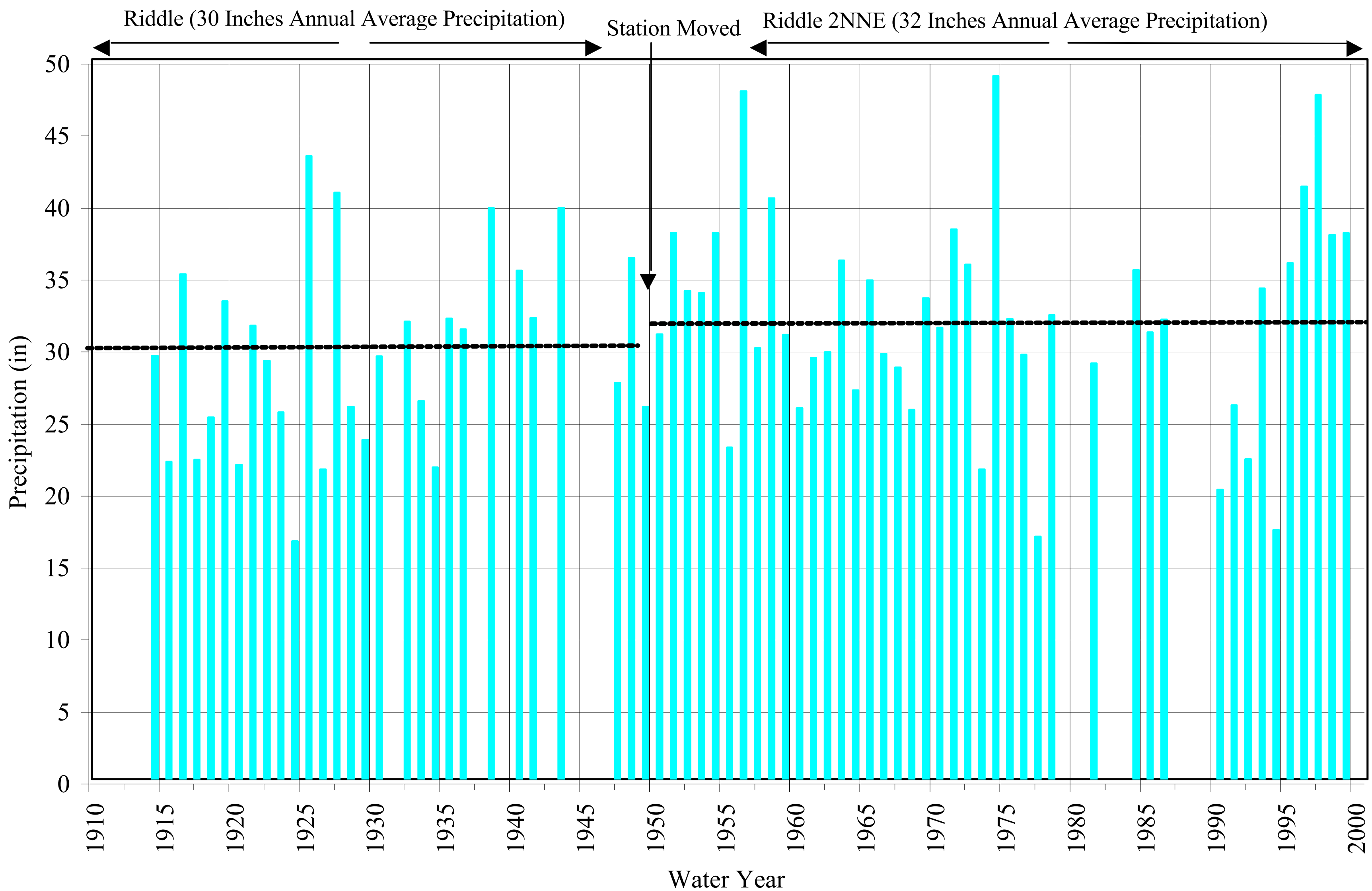


Chart 4. Average Monthly Precipitation at the Riddle, Oregon Weather Station From 1961 to 1990.

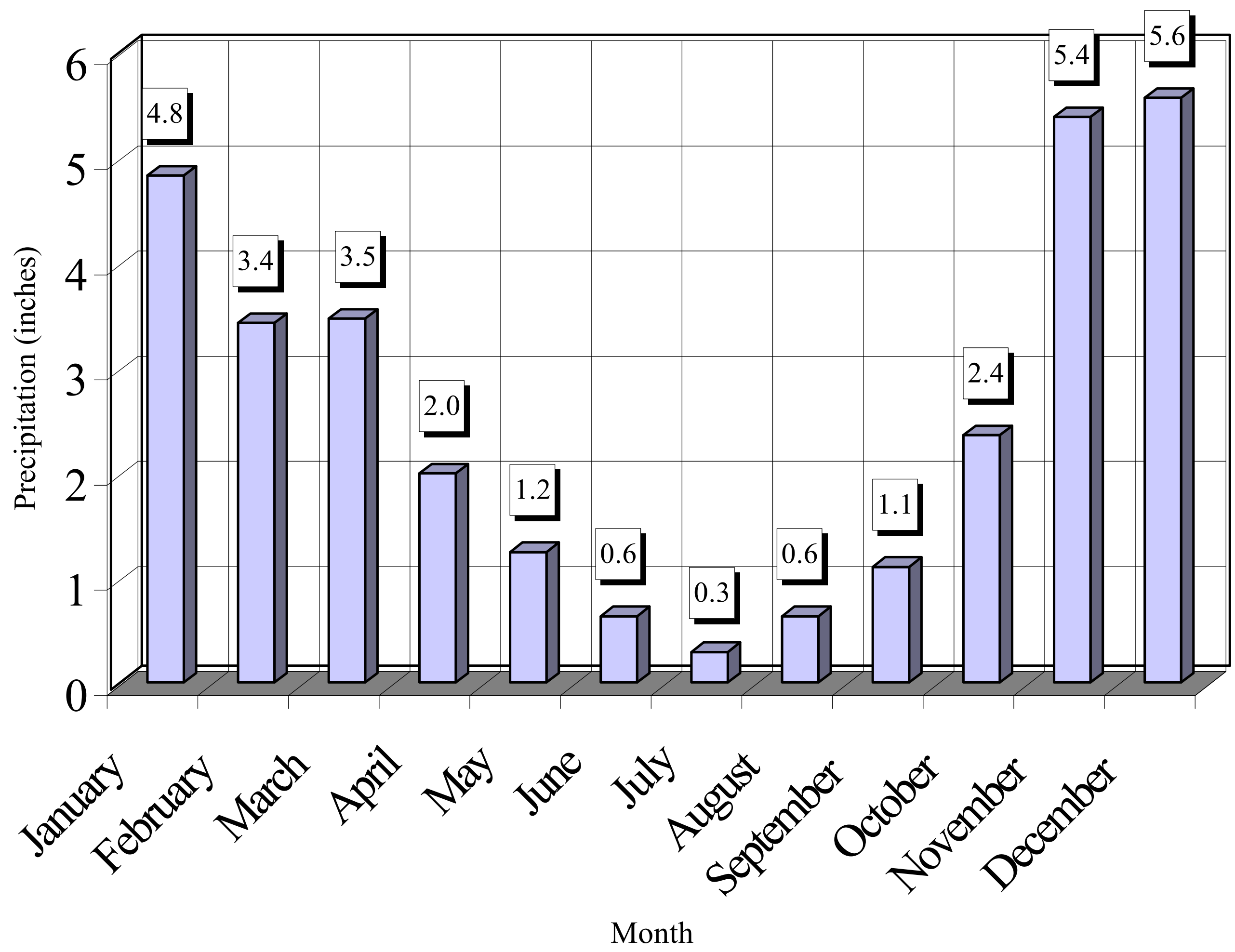


Chart 5 shows the water year precipitation deviation from the mean at the Riddle weather station from 1914 to 1948. Chart 6 shows the water year temperature and precipitation deviations from the mean from 1949 to 1998. Some cyclical patterns between warmer or cooler temperatures and drier or wetter precipitation are noticeable. Gaps in the data for Charts 3, 5, and 6 are years when at least 350 daily observations were not recorded.

Seven-day maximum air temperatures at the Riddle weather station are shown in Graph 1. Graph 1 compares the 1998 daily maximum air temperatures with daily mean temperatures between 1949 and 1999 and two standard deviations from the daily mean temperatures. The data can be used to evaluate stream temperatures as they relate to water quality limiting criteria.

Streams exceeding the seven-day maximum temperature of 64 degrees Fahrenheit are considered to be water quality limited, except when air temperatures exceed the 90th percentile. Two standard deviations are at 95 percent. Plotting stream temperature data with Graph 1can help determine if stream temperatures greater than 64 degrees Fahrenheit may be due to abnormally high air temperatures (when the air temperature is greater than two standard deviations higher than the mean seven-day maximum air temperature). On July 28, 1998 and from September 2 to September 7, 1998 air temperatures exceeded or nearly exceeded the mean seven-day maximum air temperature plus two standard deviations (were abnormally high). If stream temperatures exceed 64 degrees Fahrenheit only on days when the air temperatures were considered to be abnormally high the stream would not be included on the water quality limited list for temperature.

C. Streamflow

No active United States Geological Survey (USGS) gaging stations are operating in the South Umpqua WAU. Three USGS gaging stations had operated in the WAU. The South Umpqua River at Days Creek and Days Creek at Days Creek gaging stations were continuous recording stations. The Canyon Creek at Canyonville gaging station was a crest gage, which only measured annual peak flows.

The Douglas County Natural Resources Division operates a continuous recording gaging station on Days Creek above May Creek. Information from the three Days Creek gaging stations was used to characterize streamflow in the WAU. Streamflow from the three sites are considered to be representative of streamflow conditions in the WAU.

The State of Oregon Water Resources Department operated a continuous recording gaging station on the West Fork of Canyon Creek from 1984 to 1992. Information from this station was not used to characterize streamflow in the WAU, since nine years is not a long enough period of record to conduct a flood frequency analysis.

Table 30 presents flood frequencies for four gaging stations. The gaging stations did not have enough information to predict recurrence intervals for more than ten years. The data presented in Table 30 would be useful for estimating when a peak may occur. Flow magnitude is dependent on the size of the drainage area. The recurrence interval (sometimes called the return period) is used

Chart 5. Annual Precipitation Deviation From the Mean at the Riddle, Oregon Weather Station From 1914 to 1999.

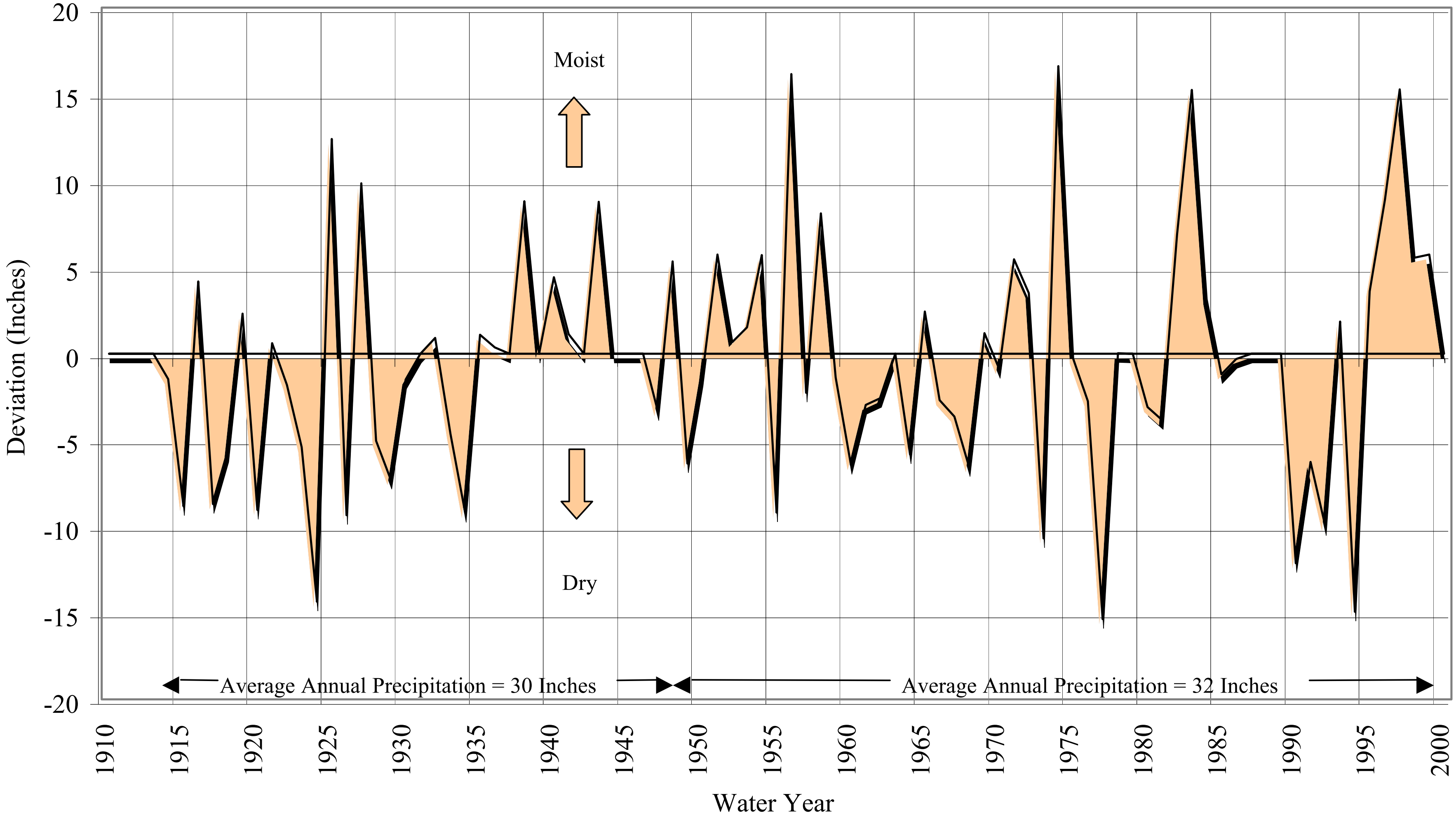
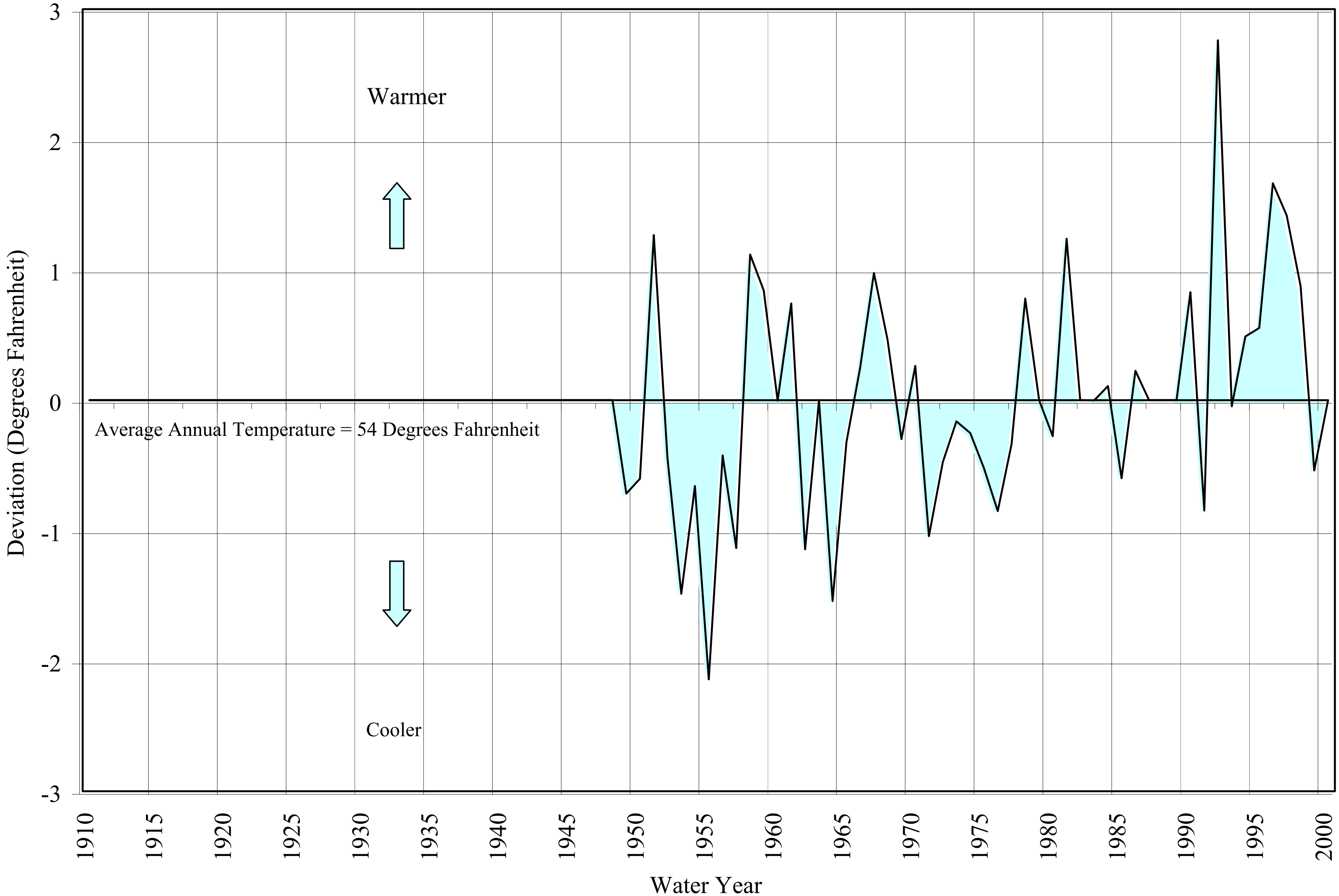
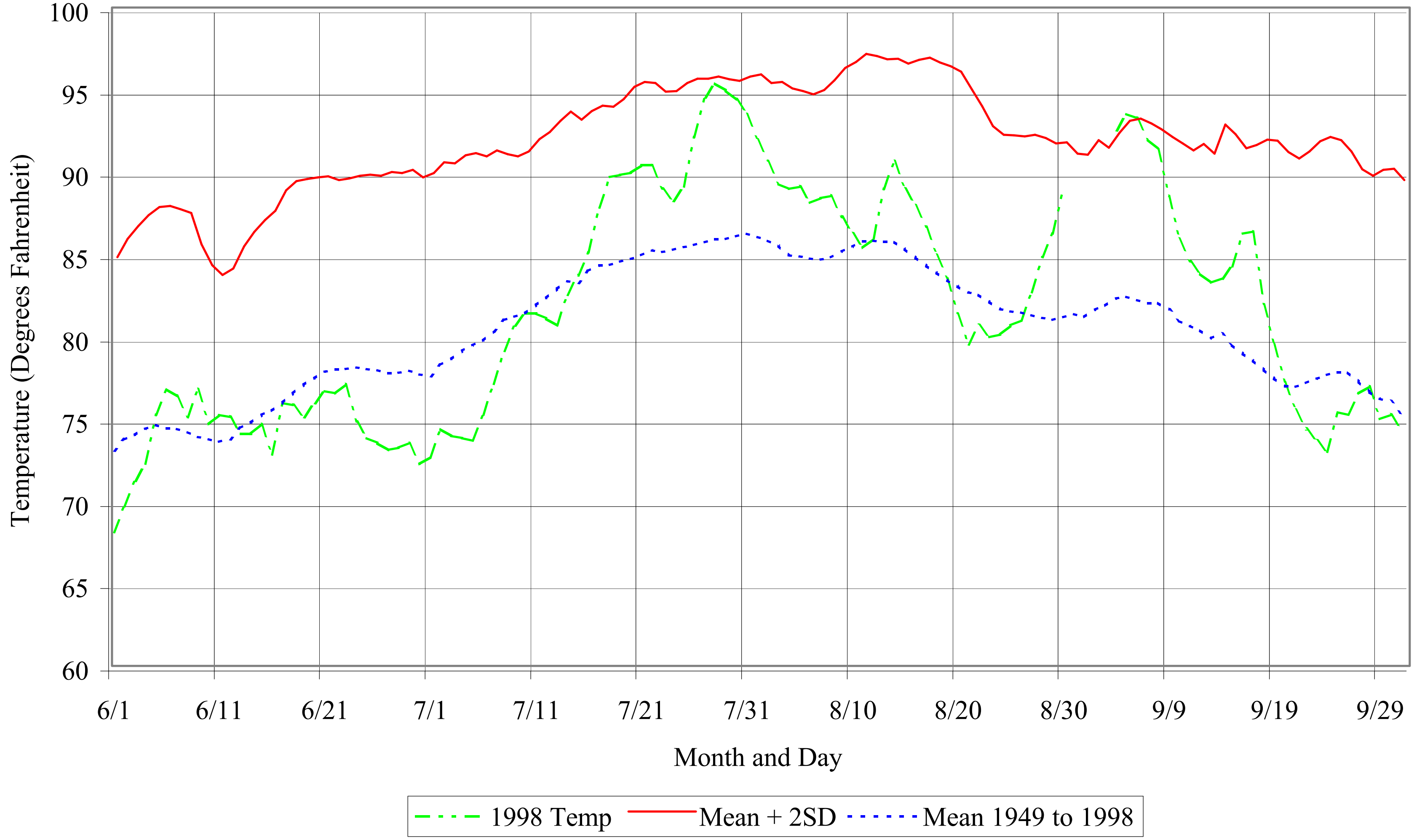


Chart 6. Annual Temperature Deviation From the Mean at the Riddle, Oregon Weather Station From 1949 to 1998.



Graph 1. Comparison of 1998 Air Temperatures With Mean Air Temperatures From 1949 to 1998 and Mean Air Temperatures From 1949 to 1998 Plus Two Standard Deviations at the Riddle, Oregon Weather Station.



more often than the exceedence probability. An example would be, an instantaneous peak flow exceeding 37,900 cubic feet per second (cfs) at the South Umpqua River at Days Creek gaging station would have a ten percent probability of occurring in any year, or a recurrence interval of one in ten, which is called a ten-year flood.

Table 30. Magnitude and Probability of Instantaneous Peak Flow for Stream Gaging Stations in the South Umpqua WAU.

Gaging Station Name (Number)	Drainage Area (square miles)	Period of Record	Discharge (cubic feet per second) for indicated recurrence interval (years) and annual exceedence probability (percent)			
			1.25	2	5	10
			80%	50%	20%	10%
South Umpqua River at Days Creek (14308600)	641	1976 to 1987	15,300	21,800	31,300	37,900
Days Creek above May Creek near Days Creek (14308685 ^)	13	1985 to 1998	130	350	1,000	1,500
Days Creek at Days Creek (14308700)	55	1957 to 1972	1,030	1,560	2,370	3,770
Canyon Creek at Canyonville (14308900 ^)	37	1953 to 1966	1,820	2,320	3,060	3,610

Data from Wellman et al. 1993
^ Recurrence interval determined by Roseburg District BLM using USGS or Douglas County data.

In general, streamflows follow the precipitation pattern with higher flows in the winter and lower flows in the summer. Most streamflow occurs from November through May with the maximum flow in January. Some streams may not flow for up to a week in August in normal years. Also in dry years, streams may not flow for a few days in July or September. Generally when a stream reach is dry, the water flows underground for a short distance then resurfaces downstream. Fourth order and larger streams probably flow year round.

Summer low flows may be affected by human water withdrawals. Most streams in the higher elevations of the WAU are not impacted by irrigation withdrawals. However, water is withdrawn from streams in the higher elevations for road maintenance and fire protection. An inventory of water rights listed 413 appropriated permits totaling approximately 68 cubic feet per second (cfs) of streamflow within the WAU (Oregon Water Resources Water Rights Information System). The water is used for domestic, irrigation, livestock, industrial, municipal, fish, mining, and forest management purposes. The restrictions on these water rights are unknown. Domestic water withdrawal, irrigation, industrial, and livestock watering use contribute to lower summertime streamflows. The largest use of appropriated water rights in the WAU is for irrigation. Water withdrawn during summer may decrease available habitat for aquatic life, increase summer water temperatures and pH, and decrease dissolved oxygen because less water is in the stream.

Twenty-five permits for water diversion or storage total 1,120 acre feet. Points of diversion and use are shown on Map 25. The City of Canyonville stores water in Win Walker Reservoir on the West Fork of Canyon Creek. This reservoir has a 58 foot high dam and a storage capacity of 300 acre feet of water. Water from the reservoir and Canyon Creek provide drinking water for the city of Canyonville. Canyonville also obtains water from O'Shea Creek.

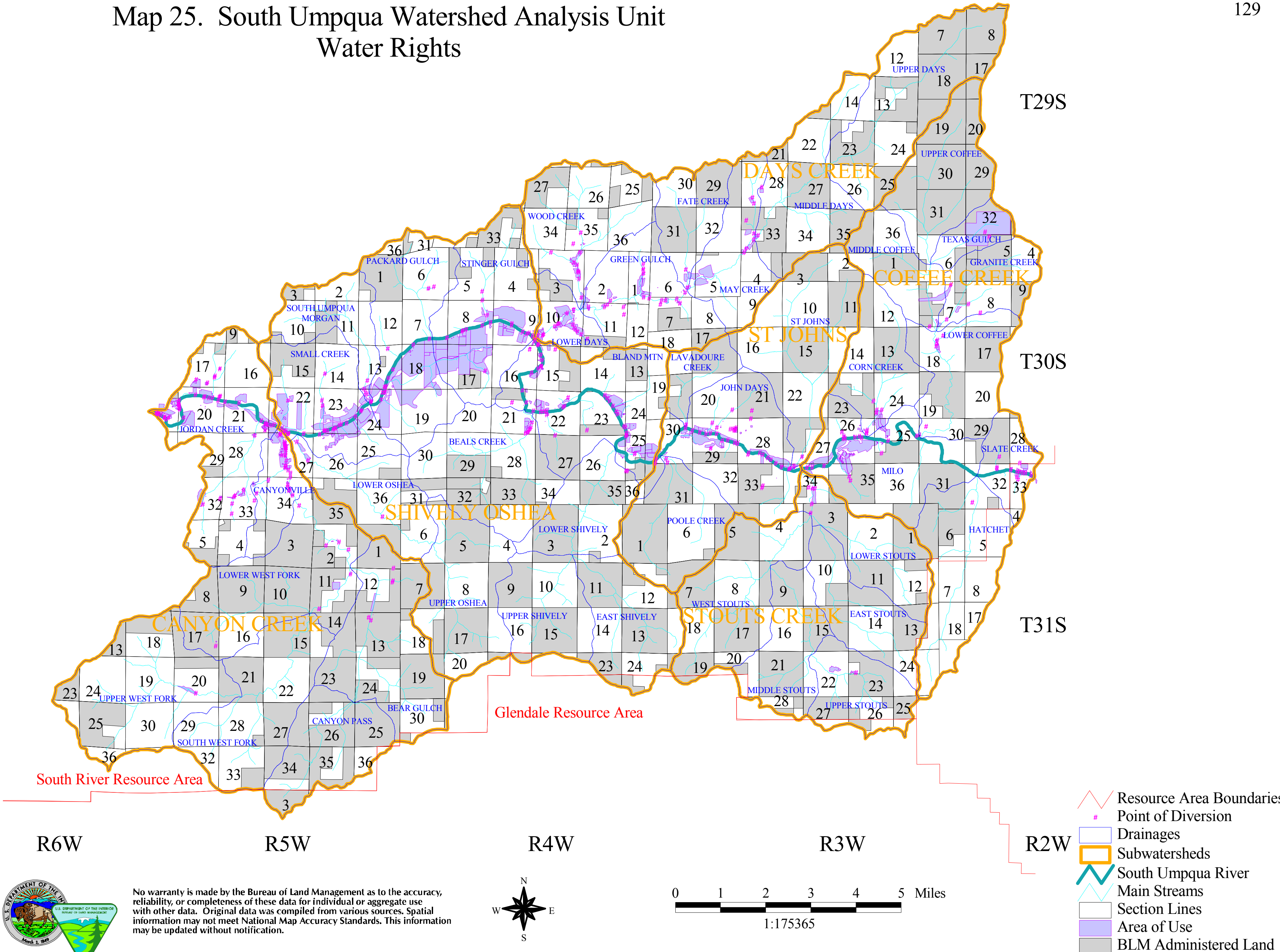
The United States Geological Survey (USGS) method of estimating floods could be used to estimate the magnitude and frequency of floods for ungaged streams in the South Umpqua WAU (Harris et al. 1979). The information could be used to determine the size of culvert to install in a particular stream to accommodate a 100-year flood event. The area of lakes and ponds, precipitation intensity, and drainage area are information needed to be able to use the USGS method. The area of lakes and ponds may be insignificant in some drainages of the WAU. Precipitation intensity is the maximum 24-hour rainfall having a recurrence interval of two years. Precipitation intensity can be determined using a map prepared by the National Oceanic and Atmospheric Administration (USDC 1973). The estimated precipitation intensity ranges from three inches at the lower elevations to four inches in the higher elevations of the WAU.

D. Roads

Timber harvesting and road construction can potentially contribute to increased peak flows above normal rates, add sediment to the stream, increase the risk of landslides, increase stream temperature, and change stream channel morphology (Beschta 1978, Harr and McCorison 1979, Jones and Grant 1996, and Wemple et al. 1996). Although many of these impacts can be mitigated or lessened with improved management techniques, past practices would continue having some impacts on the hydrology of the WAU.

There are about 1,009 miles of roads in the WAU. Road densities in the WAU range from 1.89 to 9.76 miles per square mile (see Table 31). The average road density in the WAU is 4.56 miles per square mile. There are approximately 2,985 stream crossings in the WAU. Stream crossing densities in the WAU range from 0.26 to 6.42 crossings per stream mile. The average number of stream crossings per stream mile in the WAU is 2.12.

Map 25. South Umpqua Watershed Analysis Unit
Water Rights



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

Table 31. Miles of Roads and Streams, Number of Stream Crossings, and Densities in the South Umpqua WAU.

Drainage Name **Subwatershed Name**	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)	Miles of Streams	Stream Density (Miles per Square Mile)	Number of Stream Crossings	Stream Crossings per Stream Mile
Bear Gulch	4,763	7.44	32.05	4.31	48.29	6.49	98	2.03
Canyon Pass	2,991	4.67	15.33	3.28	26.28	5.63	41	1.56
Canyonville	1,409	2.20	21.47	9.76	10.13	4.60	65	6.42
Jordan Creek	5,189	8.11	46.24	5.70	43.32	5.34	108	2.49
Lower West Fork	5,309	8.30	30.10	3.63	43.15	5.20	88	2.04
South West Fork	4,516	7.06	32.47	4.60	51.85	7.34	116	2.24
Upper West Fork	5,112	7.99	39.44	4.94	51.18	6.41	125	2.44
Canyon Creek Subwatershed	29,289	45.76	217.10	4.74	274.20	5.99	641	2.34
Corn Creek	2,598	4.06	23.25	5.73	28.46	7.01	82	2.88
Granite Creek	1,895	2.96	9.91	3.35	17.50	5.91	21	1.20
Hatchet	4,031	6.30	13.37	2.12	38.69	6.14	32	0.83
Lower Coffee	3,135	4.90	18.33	3.74	31.53	6.43	68	2.16
Middle Coffee	2,041	3.19	16.22	5.08	19.01	5.96	38	2.00
Milo	4,146	6.48	30.70	4.74	37.95	5.86	74	1.95
Slate Creek	1,288	2.01	9.56	4.76	14.75	7.34	28	1.90
Texas Gulch	911	1.42	2.72	1.92	7.79	5.49	2	0.26
Upper Coffee	3,363	5.25	9.94	1.89	27.47	5.23	13	0.47
Coffee Creek Subwatershed	23,408	36.58	134.00	3.66	223.15	6.10	358	1.60

Drainage Name **Subwatershed Name**	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)	Miles of Streams	Stream Density (Miles per Square Mile)	Number of Stream Crossings	Stream Crossings per Stream Mile
Fate Creek	1,917	3.00	14.41	4.80	18.91	6.30	38	2.01
Green Gulch	3,399	5.31	23.77	4.48	35.04	6.60	80	2.28
Lower Days	1,194	1.87	7.40	3.96	12.76	6.82	21	1.65
May Creek	2,592	4.05	11.66	2.88	23.28	5.75	40	1.72
Middle Days	3,809	5.95	26.51	4.46	34.18	5.74	62	1.81
Upper Days	5,212	8.14	35.81	4.40	40.17	4.93	78	1.94
Wood Creek	3,884	6.07	25.28	4.16	50.46	8.31	112	2.22
Days Creek Subwatershed	22,007	34.39	144.84	4.21	214.80	6.25	431	2.01
Beals Creek	4,297	6.71	33.96	5.06	47.17	7.03	116	2.46
Bland Mountain	5,150	8.05	36.92	4.59	49.03	6.09	96	1.96
East Shively	3,173	4.96	26.42	5.33	37.22	7.50	116	3.12
Lower O’Shea	2,749	4.30	19.15	4.45	25.92	6.03	58	2.24
Lower Shively	2,489	3.89	20.01	5.14	25.30	6.50	75	2.96
Packard Gulch	4,652	7.27	46.92	6.45	47.82	6.58	132	2.76
South Umpqua Morgan	2,026	3.17	18.57	5.86	24.11	7.61	77	3.19
Small Creek	3,544	5.54	23.49	4.24	33.00	5.96	60	1.82
Stinger Gulch	4,494	7.02	38.29	5.45	45.65	6.50	124	2.72
Upper O’Shea	3,838	6.00	26.67	4.45	41.88	6.98	64	1.53
Upper Shively	2,653	4.15	19.05	4.59	27.30	6.58	49	1.79
Shively-O’Shea Subwatershed	39,065	61.04	309.45	5.07	404.40	6.63	967	2.39

Drainage Name **Subwatershed Name**	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)	Miles of Streams	Stream Density (Miles per Square Mile)	Number of Stream Crossings	Stream Crossings per Stream Mile
John Days	4,446	6.95	41.30	5.94	39.34	5.66	86	2.19
Lavadoure Creek	1,078	1.68	6.26	3.73	10.92	6.50	21	1.92
Poole Creek	3,077	4.81	13.64	2.84	28.95	6.02	24	0.83
St Johns	4,744	7.41	34.54	4.66	50.82	6.86	117	2.30
St Johns Subwatershed	13,345	20.85	95.74	4.59	130.03	6.24	248	1.91
East Stouts	2,551	3.99	19.09	4.78	30.34	7.60	64	2.11
Lower Stouts	2,715	4.24	21.43	5.05	32.89	7.76	93	2.83
Middle Stouts	2,637	4.12	17.90	4.34	23.22	5.64	24	1.03
Upper Stouts	2,273	3.55	16.92	4.77	27.78	7.83	55	1.98
West Stouts	4,165	6.51	32.45	4.98	46.26	7.11	104	2.25
Stouts Creek Subwatershed	14,341	22.41	107.79	4.81	160.49	7.16	340	2.12
South Umpqua WAU	141,455	221.02	1,008.92	4.56	1,407.07	6.37	2,985	2.12

There are about 326 miles of roads on BLM-administered land in the WAU. Table 32 shows the number of miles and densities of roads on BLM-administered land in the WAU. Road densities on BLM-administered land range from 0.93 to 5.58 miles per square mile. The average road density on BLM-administered land in the WAU is 3.60 miles per square mile. There are approximately 801 stream crossings on BLM-administered land in the WAU. Stream crossing densities on BLM-administered land range from zero to 3.12 crossings per stream mile.

The National Marine Fisheries Service considers an area to be in a properly functioning condition when the road density is less than two miles per square mile. Two drainages in the WAU have less than two miles per square mile of roads. Six drainages have less than two miles per square mile of roads when only BLM-administered lands are considered.

Roads have the potential to increase peak flows by delivering water to the stream faster than in a non-roaded landscape. Roads can also increase the stream drainage network by routing water into culverts, which if not properly located can cause gullying, effectively acting as another stream channel (Wemple et al. 1996). Increased sedimentation from roads can occur if culverts drain onto unstable or erosive slopes or if too few culverts are placed along the road and erode the ditchline.

Drainages with the most stream crossings and subsequently the most number of culverts would have the greatest risk of culverts failing or becoming blocked during storm events. Blocked or failed culverts can increase erosion, road failures, or debris slides. Culverts can influence the stream channel by limiting stream meandering, changing stream gradient, limiting bedload movement, and increasing sediment. A limited number of the culverts in the WAU have been inspected and/or maintained. The Resource Management Plan (RMP) states new culverts should accommodate a 100-year flood event.

Table 33 shows the number of miles and densities of roads within Riparian Reserves and 100 feet of streams on BLM-administered land. About 109 miles of roads are located within Riparian Reserves and about 60 miles of roads are within 100 feet of a stream. Roads within 100 feet of a stream are more likely to add sediment to the stream, since the limited amount of vegetation between the road and stream cannot capture the sediment before it reaches the stream.

Many roads in the WAU are in need of some maintenance. Maintenance needing to be performed may include removing slides blocking ditch lines or culverts or installing additional cross drain culverts and/or waterbars on the roads to reduce the amount of runoff entering the stream. Installing cross drains would disperse the water flowing in the ditchline keeping it from flowing into the stream. This would decrease the potential for larger peak flows, increase the amount of subsurface flow, and provide more sediment filtration.

Maintenance needs may also include grading roads to reduce the amount of water flowing in ruts on the road. Water in a rut may flow past several culverts carrying sediment from the road surface into a stream. Mulching bare cutbanks and fill slopes, and limiting access on unsurfaced roads in the wet season could decrease surface erosion and minimize the amount of sediment flowing into streams from roads.

Table 32. Miles of Roads and Streams, Number of Stream Crossings, and Densities on BLM Administered Lands in the South Umpqua WAU.

Drainage Name **Subwatershed Name**	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)	Miles of Streams	Stream Density (Miles per Square Mile)	Number of Stream Crossings	Stream Crossings per Stream Mile
Bear Gulch	3,361	5.25	20.62	3.93	31.99	6.09	65	2.03
Canyon Pass	2,316	3.62	11.39	3.15	18.62	5.14	21	1.13
Canyonville	201	0.31	0.63	2.03	1.07	3.45	0	0
Jordan Creek	423	0.66	2.69	4.08	2.22	3.36	3	1.35
Lower West Fork	4,021	6.28	19.72	3.14	30.26	4.82	50	1.65
South West Fork	1,889	2.95	12.27	4.16	19.28	6.54	35	1.82
Upper West Fork	1,636	2.56	8.18	3.20	11.55	4.51	20	1.73
Canyon Creek Subwatershed	13,847	21.64	75.50	3.49	114.99	5.31	194	1.69
Corn Creek	1,112	1.74	8.73	5.02	10.14	5.83	28	2.76
Granite Creek	829	1.30	1.62	1.25	7.15	5.50	0	0
Hatchet	880	1.38	3.15	2.28	7.55	5.47	14	1.85
Lower Coffee	1,340	2.09	3.98	1.90	11.40	5.45	14	1.23
Middle Coffee	887	1.39	5.90	4.24	7.50	5.40	10	1.33
Milo	1,508	2.36	6.31	2.67	12.78	5.42	8	0.63
Slate Creek	355	0.55	2.74	4.98	2.95	5.36	4	1.36
Texas Gulch	658	1.03	2.37	2.30	4.90	4.76	2	0.41
Upper Coffee	3,004	4.69	7.86	1.68	24.45	5.21	7	0.29
Coffee Creek Subwatershed	10,573	16.52	42.66	2.58	88.82	5.38	87	0.98

Drainage Name **Subwatershed Name**	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)	Miles of Streams	Stream Density (Miles per Square Mile)	Number of Stream Crossings	Stream Crossings per Stream Mile
Fate Creek	992	1.55	8.46	5.46	10.21	6.59	29	2.84
Green Gulch	503	0.79	2.88	3.65	3.12	3.95	2	0.64
Lower Days	362	0.57	2.01	3.53	3.83	6.72	8	2.09
May Creek	415	0.65	2.61	4.02	3.20	4.92	5	1.56
Middle Days	1,643	2.57	12.25	4.77	12.34	4.80	24	1.94
Upper Days	3,338	5.22	21.91	4.20	25.49	4.88	49	1.92
Wood Creek	729	1.14	4.54	3.98	9.11	7.99	10	1.10
Days Creek Subwatershed	7,982	12.47	54.66	4.38	67.30	5.40	127	1.89
Beals Creek	1,642	2.57	12.83	4.99	16.51	6.42	37	2.24
Bland Mountain	1,290	2.02	7.28	3.60	10.89	5.39	12	1.10
East Shively	1,780	2.78	13.40	4.82	20.51	7.38	59	2.88
Lower O’Shea	638	1.00	0.93	0.93	4.19	4.19	2	0.48
Lower Shively	1,086	1.70	9.48	5.58	9.94	5.85	31	3.12
Packard Gulch	663	1.04	4.68	4.50	6.64	6.38	10	1.51
South Umpqua Morgan	400	0.63	2.97	4.71	3.47	5.51	9	2.59
Small Creek	544	0.85	1.61	1.89	3.72	4.38	0	0
Stinger Gulch	723	1.13	3.61	3.19	7.98	7.06	9	1.13
Upper O’Shea	1,980	3.09	12.45	4.03	19.71	6.38	18	0.91
Upper Shively	1,329	2.08	10.20	4.90	13.57	6.52	24	1.77
Shively-O’Shea Subwatershed	12,073	18.86	79.44	4.21	117.13	6.21	211	1.80

Drainage Name **Subwatershed Name**	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)	Miles of Streams	Stream Density (Miles per Square Mile)	Number of Stream Crossings	Stream Crossings per Stream Mile
John Days	1,462	2.28	9.38	4.11	10.46	4.59	16	1.53
Lavadoure Creek	672	1.05	2.88	2.74	6.10	5.81	6	0.98
Poole Creek	1,805	2.82	4.37	1.55	15.37	5.45	3	0.20
St Johns	1,981	3.10	11.93	3.85	21.06	6.79	42	1.99
St Johns Subwatershed	5,920	9.25	28.56	3.09	52.90	5.72	67	1.27
East Stouts	1,344	2.10	7.03	3.35	13.88	6.61	17	1.22
Lower Stouts	1,404	2.19	10.33	4.72	14.38	6.57	36	2.50
Middle Stouts	1,511	2.36	6.78	2.87	11.89	5.04	2	0.17
Upper Stouts	1,157	1.81	6.79	3.75	13.95	7.71	17	1.22
West Stouts	2,214	3.46	14.50	4.19	20.98	6.06	43	2.05
Stouts Creek Subwatershed	7,630	11.92	45.43	3.81	75.08	6.30	115	1.53
South Umpqua WAU	58,025	90.66	326.25	3.60	516.31	5.70	801	1.55

Table 33. Miles of Roads and Road Densities Within Riparian Reserves and Within 100 Feet of a Stream on BLM Administered Land in the South Umpqua WAU.

	Riparian Reserves				Within 100 Feet of a Stream			
Drainage Name **Subwatershed Name**	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)
Bear Gulch	1,337	2.09	8.38	4.01	753	1.18	4.98	4.22
Canyon Pass	812	1.27	2.98	2.35	444	0.69	1.83	2.65
Canyonville	40	0.06	0	0.00	26	0.04	0	0.00
Jordan Creek	108	0.17	0.76	4.47	58	0.09	0.35	3.89
Lower West Fork	1,294	2.02	6.86	3.40	717	1.12	3.41	3.04
South West Fork	791	1.24	4.94	3.98	455	0.71	2.82	3.97
Upper West Fork	481	0.75	2.55	3.40	282	0.44	1.19	2.70
Canyon Creek Subwatershed	4,864	7.60	26.47	3.48	2,736	4.28	14.58	3.41
Corn Creek	432	0.68	3.67	5.40	240	0.38	2.05	5.39
Granite Creek	317	0.50	0.49	0.98	166	0.26	0.06	0.23
Hatchet	322	0.50	1.23	2.46	178	0.28	0.61	2.18
Lower Coffee	473	0.74	1.88	2.54	276	0.43	0.77	1.79
Middle Coffee	348	0.54	1.57	2.91	177	0.28	0.69	2.46
Milo	540	0.84	1.39	1.65	313	0.49	0.56	1.14
Slate Creek	129	0.20	0.51	2.55	72	0.11	0.28	2.55
Texas Gulch	209	0.33	0.30	0.91	115	0.18	0.11	0.61
Upper Coffee	1,048	1.64	1.00	0.61	575	0.90	0.41	0.46
Coffee Creek Subwatershed	3,817	5.96	12.04	2.02	2,113	3.30	5.54	1.68

	Riparian Reserves				Within 100 Feet of a Stream			
Drainage Name **Subwatershed Name**	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)
Fate Creek	413	0.65	4.55	7.00	240	0.38	2.23	5.87
Green Gulch	129	0.20	0.23	1.15	77	0.12	0.08	0.67
Lower Days	154	0.24	0.94	3.92	94	0.15	0.62	4.13
May Creek	145	0.23	0.57	2.48	77	0.12	0.28	2.33
Middle Days	529	0.83	3.49	4.20	292	0.46	1.38	3.00
Upper Days	1,066	1.67	7.11	4.26	592	0.93	4.34	4.67
Wood Creek	355	0.55	2.02	3.67	212	0.33	1.09	3.30
Days Creek Subwatershed	2,791	4.36	18.91	4.34	1,584	2.48	10.02	4.04
Beals Creek	694	1.08	4.58	4.24	392	0.61	2.89	4.74
Bland Mountain	469	0.73	2.48	3.40	271	0.42	0.88	2.10
East Shively	859	1.34	7.17	5.35	481	0.75	5.03	6.71
Lower O’Shea	177	0.28	0.06	0.21	106	0.17	0.05	0.29
Lower Shively	442	0.69	4.38	6.35	229	0.36	2.06	5.72
Packard Gulch	268	0.42	1.34	3.19	153	0.24	0.58	2.42
South Umpqua Morgan	162	0.25	0.96	3.84	87	0.14	0.81	5.79
Small Creek	154	0.24	0.15	0.63	90	0.14	0.08	0.57
Stinger Gulch	300	0.47	1.22	2.60	183	0.29	0.63	2.17
Upper O’Shea	845	1.32	2.50	1.89	470	0.73	1.35	1.85
Upper Shively	550	0.86	3.05	3.55	315	0.49	1.57	3.20
Shively-O’Shea Subwatershed	4,918	7.68	27.89	3.63	2,778	4.34	15.93	3.67

	Riparian Reserves				Within 100 Feet of a Stream			
Drainage Name **Subwatershed Name**	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)	Area (Acres)	Area (Square Miles)	Miles of Roads	Road Density (Miles per Square Mile)
John Days	447	0.70	3.00	4.29	252	0.39	1.70	4.36
Lavadoure Creek	269	0.42	0.84	2.00	142	0.22	0.30	1.36
Poole Creek	656	1.03	0.90	0.87	357	0.56	0.79	1.41
St Johns	867	1.35	4.25	3.15	495	0.77	2.36	3.06
St Johns Subwatershed	2,238	3.50	8.99	2.57	1,246	1.95	5.15	2.64
East Stouts	595	0.93	2.61	2.81	331	0.52	2.31	4.44
Lower Stouts	615	0.96	4.88	5.08	345	0.54	2.57	4.76
Middle Stouts	575	0.90	0.63	0.70	281	0.44	0.31	0.70
Upper Stouts	557	0.87	1.98	2.28	326	0.51	1.21	2.37
West Stouts	883	1.38	4.70	3.41	498	0.78	2.45	3.14
Stouts Creek Subwatershed	3,226	5.04	14.80	2.94	1,781	2.78	8.85	3.18
South Umpqua WAU	21,854	34.15	109.10	3.19	12,238	19.12	60.07	3.14

Unsurfaced, spur, and jeep roads that need maintenance, improvements, or could be decommissioned occur in many sections on BLM-administered land in the WAU. The main water quality problems observed in the WAU were erosion and sedimentation, culverts restricting the stream causing excessive downcutting in the channel, and roads restricting the natural meandering of streams.

The Transportation Management Objectives (TMO) identified roads which could be decommissioned or improved to decrease the impact of roads in the WAU. Information derived from the TMO process for potential road treatments is presented in Appendix G. Only roads on BLM-administered land are addressed by the TMO process. Since 1997, about twelve miles of roads have been improved and approximately four miles of roads have been decommissioned in the WAU (see Table 34). Table 35 compares the miles and densities of roads and stream crossing information on BLM-administered land before and after road decommissioning occurred in some Drainages of the WAU. Table 36 compares the miles and densities of roads within Riparian Reserves and within 100 feet of a stream before and after road decommissioning occurred in some Drainages of the WAU.

Table 34. Comparison of Road Miles and Densities in Drainages Before and After Roads Were Decommissioned.

	Before				After			
Drainage Name	Miles of Roads	Road Density	Stream Crossings	Stream Crossings per Stream Mile	Miles of Roads	Road Density	Stream Crossings	Stream Crossings per Stream Mile
Corn Creek	23.79	5.86	82	2.88	23.25	5.73	82	2.88
Lower Coffee	18.35	3.74	68	2.16	18.33	3.74	68	2.16
Coffee Creek Subwatershed	134.56	3.68	358	1.60	134.00	3.66	358	1.60
Fate Creek	15.52	5.17	45	2.38	14.41	4.80	38	2.01
May Creek	12.69	3.13	40	1.72	11.66	2.88	40	1.72
Middle Days	26.71	4.49	62	1.81	26.51	4.46	62	1.81
Days Creek Subwatershed	147.18	4.28	438	2.04	144.84	4.21	431	2.01
John Days	41.55	5.98	86	2.19	41.30	5.94	86	2.19
Lavadoure Creek	6.96	4.14	24	2.20	6.26	3.73	21	1.92
St Johns	35.20	4.75	122	2.40	34.54	4.66	117	2.30
St Johns Subwatershed	97.35	4.67	256	1.97	95.74	4.59	248	1.91
South Umpqua WAU	1,013.43	4.59	3,000	2.13	1,008.92	4.56	2,985	2.12

Table 35. Comparison of Road Miles and Densities on BLM Administered Land in Drainages Before and After Roads Were Decommissioned.

	Before				After			
Drainage Name	Miles of Roads	Road Density	Stream Crossings	Stream Crossings per Stream Mile	Miles of Roads	Road Density	Stream Crossings	Stream Crossings per Stream Mile
Corn Creek	9.27	5.33	28	2.76	8.73	5.02	28	2.76
Lower Coffee	4.00	1.91	14	1.23	3.98	1.90	14	1.23
Coffee Creek Subwatershed	43.22	2.62	87	0.98	42.66	2.58	87	0.98
Fate Creek	9.57	6.17	36	3.53	8.46	5.46	29	2.84
May Creek	3.64	5.60	5	1.56	2.61	4.02	5	1.56
Middle Days	12.45	4.84	24	1.94	12.25	4.77	24	1.94
Days Creek Subwatershed	57.00	4.57	134	1.99	54.66	4.38	127	1.89
John Days	9.63	4.22	16	1.53	9.38	4.11	16	1.53
Lavadoure Creek	3.58	3.41	9	1.48	2.88	2.74	6	0.98
St Johns	12.59	4.06	47	2.23	11.93	3.85	42	1.99
St Johns Subwatershed	30.17	3.26	75	1.42	28.56	3.09	67	1.27
South Umpqua WAU	330.76	3.65	816	1.58	326.25	3.60	801	1.55

Table 36. Change in Road Miles and Densities in Riparian Reserves and Within 100 Feet of a Stream on BLM Administered Land in Drainages Before and After Roads Were Decommissioned.

	Riparian Reserves				Within 100 Feet of a Stream			
	Before		After		Before		After	
Drainage Name	Miles of Roads	Road Density	Miles of Roads	Road Density	Miles of Roads	Road Density	Miles of Roads	Road Density
Corn Creek	3.71	5.46	3.67	5.40	2.05	5.39	2.05	5.39
Lower Coffee	1.88	2.54	1.88	2.54	0.77	1.79	0.77	1.79
Coffee Creek Subwatershed	12.08	2.03	12.04	2.02	5.54	1.68	5.54	1.68
Fate Creek	5.42	8.34	4.55	7.00	2.79	7.34	2.23	5.87
May Creek	1.11	4.83	0.57	2.48	0.60	5.00	0.28	2.33
Middle Days	3.61	4.35	3.49	4.20	1.38	3.00	1.38	3.00
Days Creek Subwatershed	20.44	4.69	18.91	4.34	10.90	4.40	10.02	4.04
John Days	3.02	4.31	3.00	4.29	1.70	4.36	1.70	4.36
Lavadoure Creek	1.18	2.81	0.84	2.00	0.47	2.14	0.30	1.36
St Johns	4.77	3.53	4.25	3.15	2.59	3.36	2.36	3.06
St Johns Subwatershed	9.87	2.82	8.99	2.57	5.55	2.85	5.15	2.64
South Umpqua WAU	111.55	3.27	109.10	3.19	61.35	3.21	60.07	3.14

E. Peak Flows

Timber harvesting and road construction within the Transient Snow Zone (TSZ) can result in increased peak flows during warm rain-on-snow events. The Transient Snow Zone is defined as land between 2,000 and 5,000 feet in elevation. Harr and Coffin (1992) noted that snow stored under a forest canopy of at least 70 percent crown closure was less susceptible to rapid snowmelt than snow in openings. The rapid snowmelt may cause a large amount of water to flow into streams. Increased peak flows following timber harvesting in the TSZ could lead to an increase in landslides and erosion (Harr 1981).

Hydrologists on the Umpqua National Forest developed the Hydrologic Recovery Procedure (HRP) to evaluate the cumulative effects of timber harvesting in the TSZ on streamflow in the Umpqua River Basin (USDA 1990). The South Umpqua WAU is characterized as having a rain dominated precipitation regime, since 52 percent of the WAU is below 2,000 feet in elevation (see Table 37). The HRP assumes the area less than 2,000 feet in elevation is 100 percent recovered. However, rain-on-snow events could increase peak flows where more than 25 percent of a Drainage has been harvested in the TSZ (USDA 1990). Increased peak flows during a rain-on-snow event may occur if a Drainage is less than 75 percent hydrologically recovered, when determined by using the Hydrologic Recovery Procedure. Twenty-five Drainages have at least 25 percent of the area in the TSZ. However, all of the Drainages in the WAU are more than 75 percent hydrologically recovered, as determined by using the HRP.

Table 37. Amount of the South Umpqua WAU in the Transient Snow Zone (TSZ) and Hydrologic Recovery Procedure (HRP) Percentages.

Drainage Name **Subwatershed Name**	BLM Acres in Transient Snow Zone	Total Acres in Transient Snow Zone	Percent of Entire Drainage in the Transient Snow Zone	HRP (Percent of Drainage Recovered)
Bear Gulch	1,290	1,969	41	95
Canyon Pass	1,688	2,147	72	91
Canyonville	138	290	21	97
Jordan Creek	187	589	11	99
Lower West Fork	2,080	2,479	47	86
South West Fork	973	2,201	49	93
Upper West Fork	1,513	4,276	84	95
Canyon Creek Subwatershed	7,869	13,951	48	93
Corn Creek	240	618	24	98
Granite Creek	564	1,181	62	97
Hatchet	341	2,331	58	96
Lower Coffee	660	1,347	43	91
Middle Coffee	526	1,241	61	90
Milo	411	943	23	93
Slate Creek	93	231	18	92
Texas Gulch	609	696	76	83
Upper Coffee	2,670	2,911	87	91
Coffee Creek Subwatershed	6,113	11,499	49	93

Drainage Name **Subwatershed Name**	BLM Acres in Transient Snow Zone	Total Acres in Transient Snow Zone	Percent of Entire Drainage in the Transient Snow Zone	HRP (Percent of Drainage Recovered)
Fate Creek	0	0	0	100
Green Gulch	131	339	10	99
Lower Days	20	46	4	100
May Creek	38	381	15	99
Middle Days	456	973	26	97
Upper Days	2,328	3,377	65	91
Wood Creek	16	27	1	100
Days Creek Subwatershed	2,989	5,143	23	97
Beals Creek	415	758	18	98
Bland Mountain	146	272	5	99
East Shively	1,431	2,718	86	89
Lower O’Shea	172	409	15	98
Lower Shively	307	787	32	97
Packard Gulch	1	11	0	100
South Umpqua Morgan	24	25	1	100
Small Creek	10	10	0	100
Stinger Gulch	32	70	2	100
Upper O’Shea	1,335	2,669	70	93
Upper Shively	1,140	1,975	74	89
Shively-O’Shea Subwatershed	5,015	9,702	25	97
John Days	299	427	10	95
Lavadoure Creek	187	282	26	96
Poole Creek	923	1,542	50	90
St Johns	967	2,227	47	95
St Johns Subwatershed	2,377	4,478	34	94

Drainage Name **Subwatershed Name**	BLM Acres in Transient Snow Zone	Total Acres in Transient Snow Zone	Percent of Entire Drainage in the Transient Snow Zone	HRP (Percent of Drainage Recovered)
East Stouts	765	1,531	60	78
Lower Stouts	761	1,209	45	96
Middle Stouts	826	1,596	61	80
Upper Stouts	1,117	1,928	85	90
West Stouts	1,511	2,238	54	77
Stouts Creek Subwatershed	4,980	8,503	59	83
South Umpqua WAU	29,343	53,276	38	94

Approximately 21 percent of the forested land in the WAU is less than 30 years old (see Table 38). The Upper Shively and St. Johns Drainages and the Stouts Creek Subwatershed have more than 20 percent of the forested area less than 30 years old and have more than 45 percent in the TSZ. However, these areas are considered to be more than 75 percent hydrologically recovered, as determined by using the HRP.

Table 38. Acres and Percentages of Forested Land Less Than 30 Years Old by Drainage in the South Umpqua WAU.

Drainage	Total Forested BLM Acres	Percent of Total Forested BLM Acres Less Than 30 Years Old	Total Forested Non-BLM Acres	Percent of Total Forested Non-BLM Acres Less Than 30 Years Old	Total Forested Acres	Percent of Total Forested Acres Less Than 30 Years Old
Bear Gulch	3,198	19	1,269	5	4,467	15
Canyon Pass	2,236	17	631	16	2,867	17
Canyonville	199	4	623	22	822	18
Jordan Creek	420	27	2,954	12	3,374	14
Lower West Fork	3,765	36	1,040	25	4,805	34
South West Fork	1,821	24	2,596	15	4,417	19
Upper West Fork	1,604	11	3,436	5	5,040	7
Canyon Creek Subwatershed	13,243	23	12,549	12	25,792	18

Drainage	Total Forested BLM Acres	Percent of Total Forested BLM Acres Less Than 30 Years Old	Total Forested Non-BLM Acres	Percent of Total Forested Non-BLM Acres Less Than 30 Years Old	Total Forested Acres	Percent of Total Forested Acres Less Than 30 Years Old
Corn Creek	1,111	35	1,387	38	2,498	36
Granite Creek	825	10	1,024	4	1,849	7
Hatchet	879	15	3,127	5	4,006	7
Lower Coffee	1,335	9	1,734	17	3,069	14
Middle Coffee	860	20	1,073	12	1,933	16
Milo	1,491	25	1,918	29	3,409	27
Slate Creek	350	43	866	11	1,216	20
Texas Gulch	652	26	251	0	903	19
Upper Coffee	3,003	15	356	22	3,359	15
Coffee Creek Subwatershed	10,506	19	11,736	16	22,242	18
Fate Creek	986	45	843	51	1,829	48
Green Gulch	502	14	1,872	10	2,374	11
Lower Days	362	3	333	20	695	11
May Creek	412	48	1,760	1	2,172	10
Middle Days	1,641	21	2,042	4	3,683	11
Upper Days	3,335	25	1,866	10	5,201	19
Wood Creek	727	21	2,909	0	3,636	4
Days Creek Subwatershed	7,965	26	11,625	8	19,590	15

Drainage	Total Forested BLM Acres	Percent of Total Forested BLM Acres Less Than 30 Years Old	Total Forested Non-BLM Acres	Percent of Total Forested Non-BLM Acres Less Than 30 Years Old	Total Forested Acres	Percent of Total Forested Acres Less Than 30 Years Old
Beals Creek	1,599	39	1,598	5	3,197	22
Bland Mountain	1,250	11	1,631	17	2,881	14
East Shively	1,778	30	1,393	4	3,171	19
Lower O'Shea	609	0	1,598	25	2,207	18
Lower Shively	1,086	44	1,402	1	2,488	19
Packard Gulch	663	29	2,339	11	3,002	15
South Umpqua Morgan	399	11	1,098	12	1,497	12
Small Creek	543	0	818	2	1,361	1
Stinger Gulch	722	12	1,515	3	2,237	6
Upper O'Shea	1,978	27	1,858	8	3,836	18
Upper Shively	1,326	37	1,325	9	2,651	23
Shively-O'Shea Subwatershed	11,953	26	16,575	9	28,528	16
John Days	1,456	52	2,026	63	3,482	59
Lavadoure Creek	653	52	234	81	887	60
Poole Creek	1,805	20	1,268	11	3,073	16
St Johns	1,979	37	2,744	7	4,723	20
St Johns Subwatershed	5,893	37	6,272	29	12,165	33
East Stouts	1,344	24	1,208	64	2,552	43
Lower Stouts	1,404	22	1,284	4	2,688	13
Middle Stouts	1,510	46	1,126	55	2,636	50
Upper Stouts	1,155	15	1,062	7	2,217	11
West Stouts	2,213	35	1,950	81	4,163	57
Stouts Creek Subwatershed	7,626	30	6,630	47	14,256	38
South Umpqua WAU	57,186	26	65,387	17	122,573	21

Drainages with high road densities, high stream crossing densities, more than 25 percent in the TSZ, and a large percentage less than 30 years old may be susceptible to increased peak flows. During rain-on-snow events in the TSZ, water is routed to the streams faster because snow accumulation is greater in stands less than 30 years old and they have less canopy to intercept the rain. Management activities, such as regeneration harvesting and road construction, may magnify the effects of increased peak flows in these Drainages.

Roads have been found to extend the stream network 60 percent over winter base flow stream lengths and 40 percent over storm event stream lengths (Wemple 1994). Road densities were 1.6 miles per square mile in Wemple's study area. Road densities in the South Umpqua WAU averages 4.56 miles per square mile (see Table 31). However, road densities may be higher since all roads may not be on the Geographic Information System (GIS). Roads may increase winter peak flows in streams in the WAU. The majority of roads within the WAU were constructed with ditches and/or insloped road surfaces designed to carry water off of the road surface. Once the water is in the ditch, much of it may reach the stream faster than in an unroaded area. In fact, some ditchlines effectively function as stream channel extending the actual length of flowing streams during rain storms. Increased drainage density due to road construction may increase peak flows and mean annual floods. Drainages with fewer streams per square mile experience higher winter peak flows as a result of roads than drainages with a lot of streams. Fewer streams to carry the rapid runoff increases streamflow, potentially leading to down cutting, stream bank failures, stream bed scouring, and mass wasting where streams undercut adjacent slopes. The dominant factor affecting peak flow in the smaller drainages is how quickly the water gets to the stream channel. Land management and urban development activities may lead to increased surface runoff.

F. Stream Channel

There are approximately 1,407 miles of streams in the South Umpqua WAU (see Table 31). Stream density is about 6.37 miles of streams per square mile (see Table 31). Stream (or drainage) density can be related to erosion potential. A higher stream (drainage) density means the drainage is more complex and streamflow would respond faster to rainfall (Chow 1964). The faster response to rainfall may erode soils easier, causing streams to become wider or deeper. Also, steeper slopes may occur where the stream density is higher.

The Rosgen stream classification method may be used to characterize channel morphology for stream reaches in the WAU. The Rosgen Classification can be used as an indicator to determine stability, sensitivity to disturbance, recovery potential, sediment supply, streambank erosion potential, and influence of vegetation on the stream channel (Rosgen 1994). Streams may be divided into sediment source, transport, and depositional areas based on the slope or gradient of the stream channel. Stream channels tend to be steeper in the upper reaches and flatter in the lower reaches. High gradient streams (A and Aa+ type streams) are source areas for debris torrents. Medium gradient streams (B type streams) are transport areas that do not change much over time. Medium gradient streams probably lack Large Woody Debris

(LWD), since sediment passes through them rather than being deposited. Low gradient streams (C or F type streams) are the stream type most likely to change due to deposition and erosion of sediments. Low gradient streams provide the best quality fish habitat because they have meanders, under cut banks, deep pools, large woody debris, and gravel accumulates in these reaches. Many low gradient stream reaches in the WAU have been eroded to bedrock, probably due to increased peak flows as a result of timber harvesting, road construction, channel down cutting due to overgrazing on streambanks, and the lack of LWD due to stream cleaning practices.

Level I classification is a first look at determining stream types. The Level I characterization uses topographic maps, aerial photographs, or GIS to delineate stream types based on gradient and sinuosity (Rosgen 1996). Levels II through IV classifications require field surveys to determine priorities for restoration, potential for changes in stream morphology due to management activities, and design restoration projects.

Regional hydraulic geometry curves of bankfull streamflow, mean depth, width, and cross-sectional area were developed for the South Umpqua River Basin using Rosgen's Level II classification (see Appendix D). Regional curves can be used to refine the initial estimates of bankfull channel dimensions for ungaged streams, if the curves represent the hydro-physiographic province (Rosgen 1996). Correct and reliable interpretations of the interrelationships between dimension, pattern, profile, and streamflow depends upon correctly identifying bankfull stage or elevation and the related discharge. The Level II classification system can also be used to determine the feasibility of restoration projects, what structures are needed to enhance and promote channel stability, and the size of culverts or bridges to install. Regional curves are required to develop and conduct the Shadow Model, which may be used to develop a Water Quality Management Plan (WQMP) and establish Total Maximum Daily Loads (TMDLs).

Bankfull discharge transports most of the available sediment over time (Wolman and Miller 1960). Bankfull discharge influences channel formation and maintenance the most (Leopold et al. 1964). Bankfull flows provide the annual maintenance of transporting sediment supplied from upstream sources, forming and removing bars, and forming or changing bends that create the average morphologic characteristics of the channel (Dunne and Leopold 1978).

G. Proper Functioning Condition

Proper Functioning Condition (PFC) surveys were conducted in the WAU in 1997 and 1999 using methods established in Barrett et al. (1995). Stream reaches in the WAU ranged from proper functioning to functioning-at-risk with a downward trend, no stream reaches were considered to be non-functioning. Problems associated with channelization, road encroachment on the stream channel, and upstream channel conditions were noted on the PFC surveys. The PFC survey notes indicated some, but not all, of the problems could be corrected by the BLM.

The PFC survey results were extrapolated to similar stream reaches on BLM-administrated land in the WAU. Unknown ratings were assigned to streams where extrapolation was questionable, such as if a survey had not been conducted nearby, the closest survey was in a different riparian vegetation community or age class, or the stream flowed across private land before entering BLM-administered land. Twenty-nine percent of the stream segments on BLM-administered land were assigned the unknown rating. Approximately 55 percent of the stream segments on BLM-administered land were classified as properly functioning. The properly functioning stream segments included stream segments above a surveyed reach classified as properly functioning, when the vegetation did not change or the vegetation was considered to be at least 80 years old. Approximately thirteen percent of the stream segments on BLM-administered land were classified as functioning-at-risk with the trend not being apparent. Approximately two percent of the stream segments on BLM-administered land were classified as functioning-at-risk with a downward trend and approximately one percent were classified as functioning-at-risk with an upward trend.

Restoration activities could be conducted in areas the PFC surveys noted problems. However, higher priority restoration sites in the WAU may be identified during site specific analysis.

H. Water Quality

Water quality samples were collected by BLM hydrologists from eight streams in the summer and two streams in the winter of 1996 in the South Umpqua WAU (see Map 26 and Table 39). The chemicals tested for in the water samples did not exceed EPA drinking water standards. The water samples had such low ionic concentrations that the data in Table 39 probably has some errors due to the low detection levels. The non-suppressed ion chromatography laboratory method may have been the reason for the low concentrations of calcium and magnesium and the 30 percent imbalance between cations and anions (Michael T. Land, personnel communication, 2000).

1. Water Quality Standards Set by Law and Beneficial Uses

The Federal Clean Water Act of 1972, Section 303(d) directs each state to identify streams which do not meet the States water quality standards. Waters may be included in the 303(d) list if they are identified in Oregon’s Water Quality Status Assessment 305(b) Report; dilution calculations or predictive models indicate non-attainment of standards; water quality problems are reported by other agencies, institutions, or the public; or identified as impaired or threatened in the State's nonpoint assessment submitted to the Environmental Protection Agency (EPA) under Section 319 of the Clean Water Act (Oregon Department of Environmental Quality 1994). The objective of the Clean Water Act of 1977 is to restore and maintain the chemical, physical, and biological integrity of the nations' waters (Bureau of National Affairs 1977). Water quality would be managed to protect and recognize beneficial uses. The Oregon Department of Environmental Quality (DEQ) monitors water quality conditions of the streams in Oregon.

Map 26. South Umpqua Watershed Analysis Unit
Water Quality Data Collection Sites

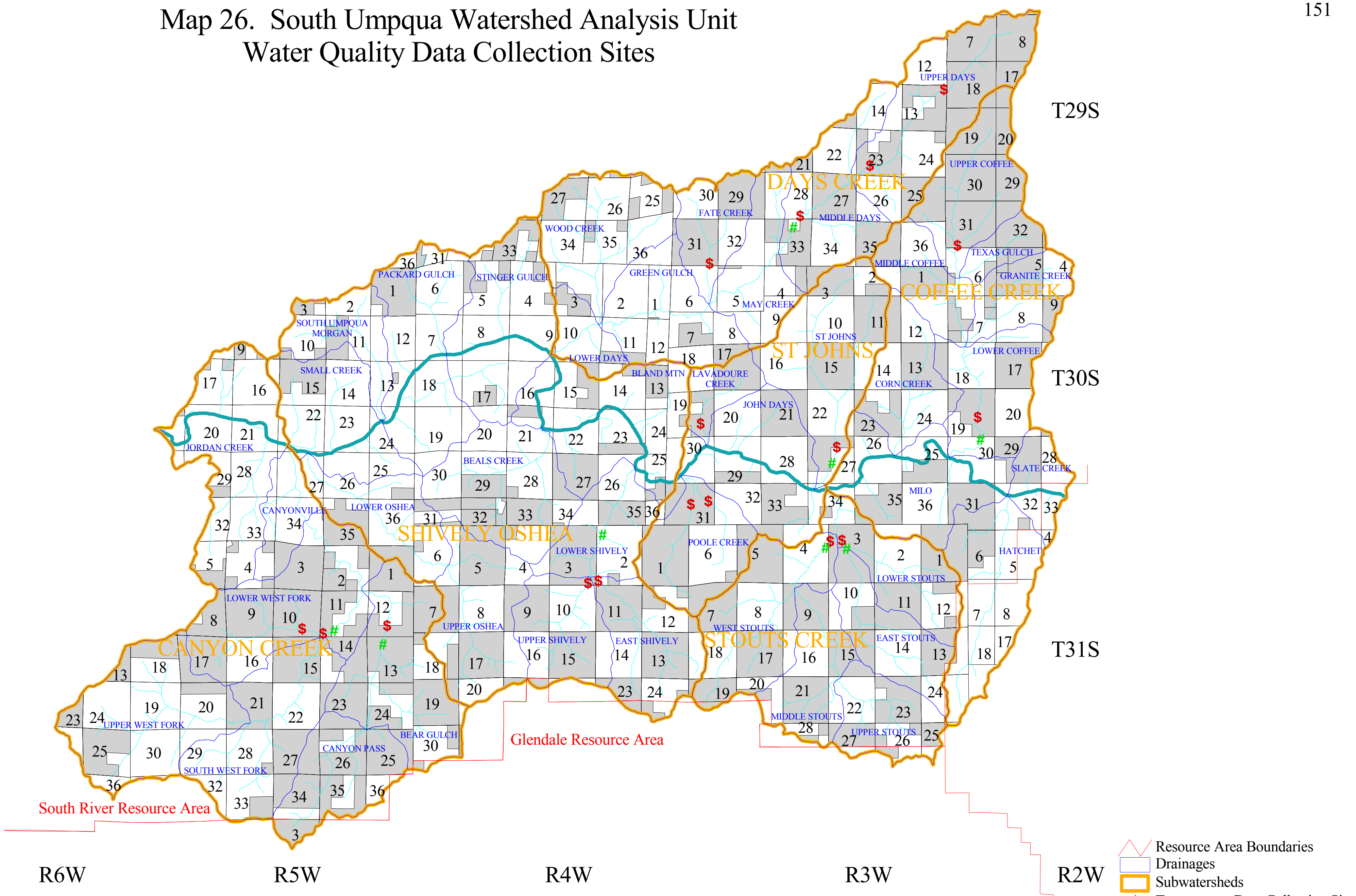


Table 39. Water Quality Data for Streams in the South Umpqua WAU.

	Canyon Creek	Coffee Creek	Days Creek	East Fork Stouts Creek	East Fork Stouts Creek	Shively Creek	St. Johns Creek	Stouts Creek	Stouts Creek (duplicate)	Stouts Creek	West Fork Canyon Creek
Date	8/21/96	8/13/96	8/21/96	3/7/96	8/13/96	8/22/96	8/22/96	3/7/96	3/7/96	8/13/96	8/21/96
Time	1100	1530	1230	1300	1300	1000	1200	1400	1405	1400	1000
Discharge (cfs)	0.07	0.67	0.01	7.2	0.23	0.91	0.02	19.9	19.9	1.5	2.02
Specific Conductance (uS/cm at 25ºC)	158	234	104	125	335	109	138	135	135	245	148
Dissolved Oxygen	8.3	8.9	7	10.2	8.2	9.7	9	10.1	10.1	8.4	8.8
pH (standard units)	7.6	8.4	6.8	7.9	8.1	7.7	7.8	8.1	8.1	8.3	8.1
Water Temperature (ºC)	14.0	23.0	16.0	8.5	18.0	11.5	14.0	20.5	20.5	20.5	14.0
Calcium	2.5	3.2	1.5	1.5	3.0	1.5	1.8	1.9	2.1	3.6	2.4
Magnesium	0.8	0.8	0.5	0.8	1.1	0.4	0.5	1.0	1.0	1.5	3.5
Sodium	5.8	14.9	5.3	6.7	18.0	5.6	7.8	4.6	4.7	10.0	5.1
Potassium	0.8	1.1	0.8	1.0	2.4	0.5	0.9	0.9	0.9	1.6	0.1
Alkalinity (as CaCO3)	63	78	54	45	72	49	51	57	57	97	62
Sulfate (as SO4)	18.9	7.4	2.4	7.9	20.7	6.5	4.4	6.8	6.3	7.1	11.7
Chloride	2.8	24.7	2.2	6.7	50.1	2.2	11.9	3.7	3.8	17.1	3.0
Fluoride	<0.2	0.2	<0.2	0.2	1.2	<0.2	0.2	0.2	0.2	0.3	<0.2
Nitrogen (as NO2)	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Nitrogen (as NO3)	0.06	<0.02	0.04	<0.02	0.08	0.07	0.11	<0.02	<0.02	0.02	0.03
Nitrogen (as NH3)	<0.05	<0.05	<0.05	<0.1	<0.2	<0.05	<0.05	<0.1	<0.1	<0.05	<0.05
Phosphate (as PO4)	<0.2	<0.2	<0.2	0.3	0.3	<0.2	<0.2	0.3	<0.3	<0.2	<0.2
Bromide	0.6	0.3	0.4	<0.2	0.5	<0.3	<0.3	<0.2	0.2	<0.3	0.6
Lithium	<0.05	<0.05	<0.05	<0.1	<0.2	<0.05	<0.05	<0.1	<0.1	<0.05	<0.05
Strontium	<1.0	<1.0	<1.0	<0.3	<1.0	<1.0	<1.0	<0.3	<0.3	<1.0	<1.0
Barium	<0.5	0.5	<0.5	<0.3	<0.5	<0.5	<0.5	<0.3	<0.3	<0.5	<0.5

*Units are in milligrams per liter unless specified.

The Oregon Administrative Rules Antidegradation Policy (OAR 340-41-026) is to prevent unnecessary degradation from point and nonpoint sources of pollution, protect, maintain, and enhance existing surface water quality, and protect all existing beneficial uses. The Oregon Administrative Rules (OAR 340-41-282) set the Standards to be used in the Umpqua River Basin. Beneficial Uses for surface waters in the Umpqua River Basin include public and private domestic water supply, industrial water supply, irrigation, livestock watering, anadromous fish passage, salmonid fish rearing, salmonid fish spawning, resident fish and aquatic life, wildlife, hunting, fishing, boating, water contact recreation, aesthetic quality, and hydroelectric power.

The Oregon DEQ water quality parameters and their affected beneficial uses are listed in Table 40. The criteria used to list a stream as water quality limited are in Listing Criteria for Oregon's 1998 303(d) List of Water Quality Limited Water Bodies (Oregon Department of Environmental Quality 1998).

Table 40. Water Quality Parameters and Beneficial Uses.

Water Quality Parameter	Beneficial Uses Affected
Aquatic Weeds or Algae	Water Contact Recreation, Aesthetics, Fishing
Bacteria (E. coli) or (Fecal Coliform)	Water Contact Recreation
Biological criteria	Resident Fish and Aquatic Life
Chlorophyll a	Water Contact Recreation, Aesthetics, Fishing, Water Supply, Livestock Watering
Dissolved Oxygen	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Habitat Modification	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Flow Modification	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Nutrients	Aesthetics or use identified under related parameters
pH	Resident Fish and Aquatic Life, Water Contact Recreation
Sedimentation	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Temperature	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Total Dissolved Gas	Resident Fish and Aquatic Life
Toxics	Resident Fish and Aquatic Life, Drinking Water
Turbidity	Resident Fish and Aquatic Life, Water Supply, Aesthetics

Table 41 shows water quality data for the South Umpqua River WAU from the 1998 303(d) list (Oregon Department of Environmental Quality 1998). Table 41 contains the site descriptions, the water quality limited parameter and criteria for listing, miles of stream listed (only the length within the WAU), season of concern, and the affected beneficial uses, as identified by the 1998 303(d) list. Beals Creek, Days Creek, Shively Creek, Fate Creek, Stouts Creek, the East Fork of Stouts Creek, and the South Umpqua River are the streams included in the 1998 303(d) list.

Table 41. Water Quality Limited Parameters in the South Umpqua WAU.

Name and Description	Parameter	Listing Criteria	Miles	Season	Beneficial Uses Affected
Beals Creek Mouth to Headwaters	Habitat Modification	--	3.87	--	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Days Creek Mouth to Headwaters	Habitat Modification	--	13.85	--	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Fate Creek Mouth to Headwaters	Temperature	Greater Than 64 Degrees Fahrenheit	2.46	Summer	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Shively Creek Mouth to Headwaters	Habitat Modification	--	5.21	--	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Stouts Creek Mouth to Headwaters	Temperature	Greater Than 64 Degrees Fahrenheit	7.92	Summer	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Stouts Creek, East Fork Mouth to Headwaters	Temperature	Greater Than 64 Degrees Fahrenheit	4.88	Summer	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Umpqua River, South Cow Creek to Elk Creek	Flow Modification	--	27.97	--	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Umpqua River, South Days Creek to Castle Rock/Black Rock Forks	pH	--	17.06	Summer	Resident Fish and Aquatic Life, Water Contact Recreation
Umpqua River, South Days Creek to Castle Rock/Black Rock Forks	Sedimentation	--	17.06	--	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Umpqua River, South Days Creek to Castle Rock/Black Rock Forks	Temperature	Greater Than 64 Degrees Fahrenheit	17.06	Summer	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Umpqua River, South Mouth to Canyonville	Toxics	Chlorine	4.02	Year Around	Resident Fish and Aquatic Life, Drinking Water
Umpqua River, South Roberts Creek to Days Creek	Aquatic Weeds or Algae	Periphyton	10.91	Summer	Water Contact Recreation, Aesthetics, Fishing
Umpqua River, South Roberts Creek to Days Creek	Bacteria	Fecal Coliform 1996 Standard	10.91	Summer	Water Contact Recreation
Umpqua River, South Roberts Creek to Days Creek	Bacteria	Fecal Coliform 1996 Standard	10.91	Fall, Winter, Spring	Water Contact Recreation
Umpqua River, South Roberts Creek to Days Creek	Biological Criteria		10.91		Resident Fish and Aquatic Life
Umpqua River, South Roberts Creek to Days Creek	Dissolved Oxygen (DO)	Cool-water Aquatic Life: DO < 8 mg/l or 90% sat.	10.91	April 1 to September 31	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Umpqua River, South Roberts Creek to Days Creek	pH	pH > 8.5	10.91	Summer	Resident Fish and Aquatic Life, Water Contact Recreation
Umpqua River, South Roberts Creek to Days Creek	Temperature	Greater Than 64 Degrees Fahrenheit	10.91	Summer	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing

2. Stream Temperature

Stream temperature is one of the most important parameters monitored in the WAU. Stream temperature affects resident fish, aquatic life, and salmonid fish spawning and rearing. Currently, streams with salmonids meet the Oregon DEQ water quality for stream temperature criteria when maintained at or below 64 degrees Fahrenheit (17.8 degrees Celsius) for the seven-day moving average daily maximum temperature.

The Roseburg BLM District has collected stream temperature data on 14 streams in the WAU (see Map 26 and Table 42). The number of sites has varied from year to year. For example, there were twelve sites in 1999 and 17 sites in 2000. The sites were selected to provide current stream conditions and water temperatures on BLM-administered land in the WAU.

Eight streams in the WAU had seven-day maximum temperatures exceeding 64 degrees Fahrenheit (17.8 degrees Celsius). Coffee Creek did have temperatures greater than 64 degrees Fahrenheit (17.8 degrees Celsius) for four days in 1998 but the seven-day maximum temperature was less than 64 degrees Fahrenheit (17.8 degrees Celsius). Also, the maximum water temperature on Coffee Creek occurred on July 28,1998, which happened to be when the air temperatures were abnormally high (see Graph 1).

Stream temperature data are separated by water year in Table 43. The seven-day maximum water temperatures correlated well with each other and with the seven-day maximum air temperatures at the Riddle weather station.

Table 42. Water Temperature Data Collected by the Roseburg BLM District in the South Umpqua WAU.

Stream Name	Year Data Collected	Range of Seven-Day Maximum Temperatures (°C)	Average of Seven-Day Maximum Temperature (°C)	Maximum Number of Days Temperature Exceeded 17.8 °C (Year)	Low Flow in 1999/2000 (cfs)	Drainage Area Above Site (acres)
Canyon Creek	1998, 1999	15.9 - 16.7	16.3	0	0.88/---	4,870
Coffee Creek	1992, 1994, 1995, 1997 to 1999	16.0 - 17.7	16.9	4 (1998)	---/---	3,130
Coffee Creek (lower site)	2000	20.2	20.2	49 (2000)	---/0.72	10,320
East Fork of Poole Creek	2000	17.8	17.8	6 (2000)	---/0.14	1,310
East Fork of Shively Creek	1999, 2000	17.0 - 17.3	17.2	0	0.11/0.11	3,170
East Fork of Stouts Creek	1992, 1994 to 1996, 1998 to 2000	18.0 - 20.0	19.1	33 (1992)	0.44/0.37	4,840
Fate Creek	1997 to 2000	17.6 - 18.0	17.9	11 (1997)	0.60/0.56	1,630
Lavadoure Creek	1998 to 2000	21.1 - 23.1	21.8	93 (1999)	0.06/0.07	1,000
Poole Creek	1999, 2000	16.4 - 16.9	16.7	0	0.44/0.41	1,700
Shively Creek	1999, 2000	15.8 - 16.1	16.0	0	0.74/0.82	2,640
St. John Creek	1999, 2000	17.3 - 18.0	17.7	8 (2000)	0.19/0.50	4,450
Stouts Creek	1992, 1995 to 1999	22.1 - 24.4	23.3	103 (1997)	1.64/---	9,030
Tributary to the West Fork of Canyon Creek	2000	19.3	19.3	25 (2000)	---/0.41	2,900
Upper Days Creek	1999, 2000	16.5 - 17.4	17.0	0	0.56/0.67	2,180
Days Creek (in Section 23)	2000	19.8	19.8	21 (2000)	---/0.82	4,960
Days Creek (at the gaging station)	2000	21.6	21.6	56 (2000)	---/0.1 (estimated)	8,300
West Fork of Canyon Creek	1998 to 2000	19.1 - 21.2	20.0	52 (1998)	1.46/2.48	12,530

Table 43. Summer Stream Temperature Data Summarized by Year Collected in the South Umpqua WAU by the Roseburg BLM District.

Steam Name	Date	Maximum Temperature (°C)	Date	Minimum Temperature (°C)	[a]T (°C)	Seven-Day Averages			Days Greater Than 17.8° C
						Maximum	Minimum	[a]T (°C)	
Canyon Creek	08/28/99	16.2	06/10/99	9.2	3.3	15.9	14.1	1.8	0
Canyon Creek	08/14/98	17.1	06/17/98	10.1	3.7	16.7	14.6	2.1	0
Coffee Creek	08/28/99	17.4	10/17/99	6.1	2.6	16.7	15.3	1.5	0
Coffee Creek	07/28/98	18.1	06/17/98	9.4	2.2	17.4	15.7	1.7	4
Coffee Creek	08/06/97	16.7	06/08/97	9.7	2.0	16.0	14.4	1.7	0
Coffee Creek	07/28/95	16.7	06/08/95	8.4	2.2	16.1	14.7	1.4	0
Coffee Creek	07/21/94	18.6	09/14/94	9.8	2.7	17.7	15.6	2.1	3
Coffee Creek	08/15/92	17.7	09/07/92	10.0	2.7	17.6	15.4	2.2	0
Coffee Creek (lower site)	7/31/00	21.0	6/11/00	9.8	6.3	20.2	15.5	4.7	49
East Fork of Poole Creek	8/8/00	18.1	9/24/00	9.1	3.6	17.8	15.3	2.4	6
East Fork of Shively Creek	8/8/00	17.8	9/24/00	8.7	3.3	17.3	15.0	2.4	0
East Fork of Shively Creek	08/28/99	17.6	05/09/99	5.6	4.9	17.0	15.1	1.8	0
East Fork of Stouts Creek	8/8/00	19.7	10/24/00	5.8	5.0	19.0	15.1	3.9	16
East Fork of Stouts Creek	08/28/99	18.6	09/28/99	7.6	4.5	18.0	15.7	2.3	9
East Fork of Stouts Creek	07/28/98	20.2	06/17/98	9.9	4.3	19.3	16.4	3.0	22
East Fork of Stouts Creek	07/27/96	19.4	09/22/96	9.1	4.0	19.1	16.4	2.7	17
East Fork of Stouts Creek	07/28/95	19.1	06/08/95	9.7	4.1	18.4	16.3	2.2	21
East Fork of Stouts Creek	07/21/94	21.6	09/14/94	9.5	4.3	19.9	16.5	3.4	15
East Fork of Stouts Creek	08/13/92	20.5	09/07/92	9.5	5.1	20.0	15.9	4.1	33
Fate Creek	7/31/00	18.7	10/24/00	6.4	4.9	18.0	13.9	4.0	8
Fate Creek	08/28/99	18.2	09/28/99	6.9	5.6	17.6	13.9	3.6	2
Fate Creek	07/28/98	18.7	06/17/98	9.9	4.8	17.9	14.4	3.4	4
Fate Creek	08/06/97	18.7	06/22/97	9.9	5.5	18.0	13.5	4.6	11
Lavadoure Creek	6/28/00	22.0	10/24/00	8.0	8.0	21.1	15.1	6.0	69
Lavadoure Creek	06/14/99	22.4	05/16/99	7.4	10.3	21.3	14.9	6.4	93
Lavadoure Creek	07/28/98	23.9	06/03/98	11.0	9.4	23.1	18.1	5.1	85
Poole Creek	8/8/00	17.4	9/24/00	9.1	2.9	16.9	14.7	2.2	0
Poole Creek	08/28/99	16.9	09/28/99	8.2	2.9	16.4	14.8	1.6	0
Shively Creek	8/9/00	16.0	9/24/00	8.9	2.8	15.8	14.2	1.6	0
Shively Creek	08/28/99	16.6	04/28/99	5.9	4.5	16.1	14.2	1.9	0
St. John Creek	8/8/00	18.4	6/11/00	10.3	4.4	18.0	15.8	2.2	8
St. John Creek	08/28/99	17.7	09/28/99	8.7	2.8	17.3	15.7	1.6	0
Stouts Creek	07/12/99	23.1	09/28/99	7.1	9.3	22.1	14.4	7.7	67
Stouts Creek	07/26/98	25.8	06/17/98	10.4	8.6	24.4	17.7	6.7	85
Stouts Creek	08/06/97	24.6	09/28/97	10.7	9.4	24.0	16.1	7.9	103
Stouts Creek	07/26/96	25.3	09/22/96	10.0	8.7	24.4	17.7	6.6	65
Stouts Creek	07/20/95	23.7	06/12/95	10.4	8.6	22.5	15.3	7.2	89
Stouts Creek	07/18/92	23.7	09/07/92	9.8	7.7	22.2	16.1	6.1	56

Steam Name	Date	Maximum Temperature (°C)	Date	Minimum Temperature (°C)	aT (°C)	Seven-Day Averages Maximum	Seven-Day Averages Minimum	Seven-Day Averages aT (°C)	Days Greater Than 17.8° C
Upper Days Creek	8/8/00	17.8	6/13/00	10.2	3.1	17.4	15.9	1.5	0
Upper Days Creek	08/28/99	16.9	05/09/99	4.8	2.8	16.5	15.7	0.8	0
Days Creek (in Section 23)	8/6/00	20.3	9/6/00	10.1	5.6	19.8	15.6	4.3	21
Days Creek (at the gaging station)	6/28/00	22.4	5/12/00	7.4	7.0	21.6	15.2	6.4	56
Tributary to the West Fork of Canyon Creek	8/8/00	20.2	10/24/00	5.8	5.5	19.3	16.0	3.3	25
West Fork of Canyon Creek	8/8/00	20.4	10/24/00	6.0	5.0	19.6	16.5	3.1	35
West Fork of Canyon Creek	08/28/99	19.6	10/03/99	7.9	4.8	19.1	16.5	2.5	41
West Fork of Canyon Creek	07/28/98	22.3	06/17/98	10.8	5.0	21.2	17.7	3.5	52

Definitions:
aT = Highest value of the daily difference between the maximum and minimum temperatures for the season.
Seven-Day Maximum = Average value of daily maximum temperatures for the highest consecutive seven days.
Seven-Day Minimum = Average value of daily minimum temperatures for the same seven days.
Seven-Day aT = Average of the daily difference between the maximum and minimum temperatures for the same seven days.

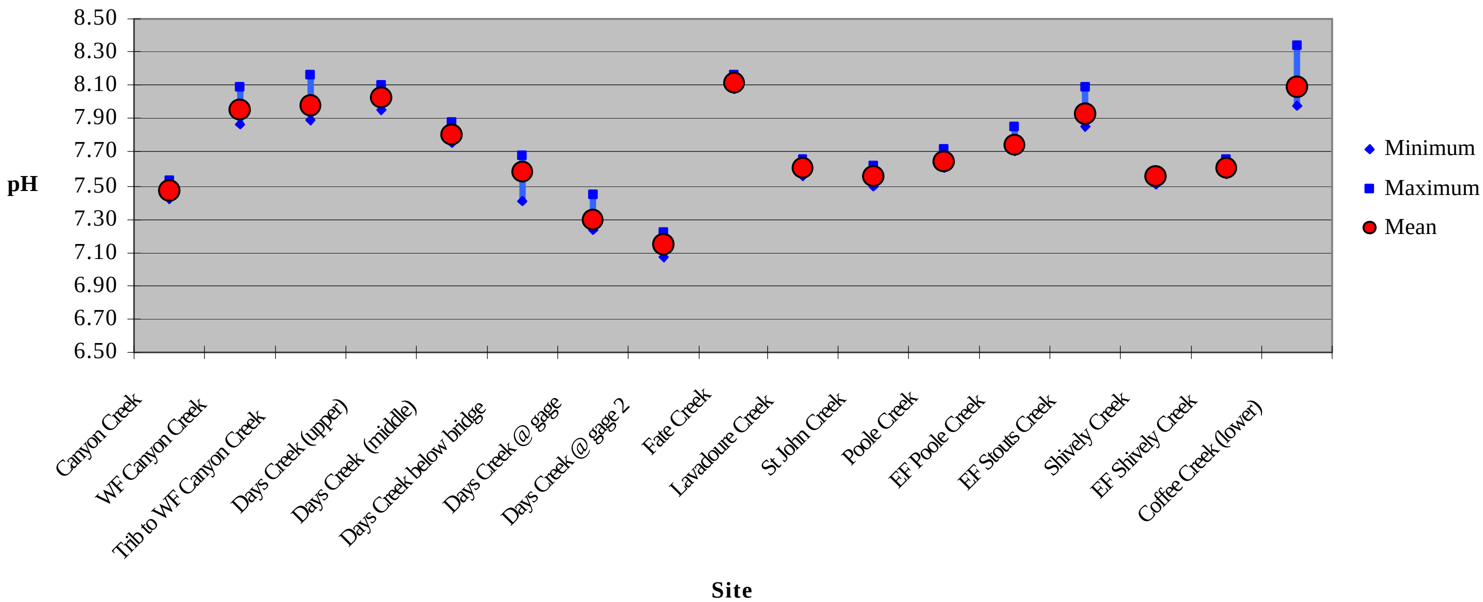
3. pH

The pH standard set by DEQ for aquatic life in the Umpqua River Basin is 6.5 to 8.5. MacDonald et al. (1990) found pH levels less than 6.5 and greater than 9 can have adverse affects on fish and aquatic insects. However, non-lethal affects of pH levels on fish are unknown.

The Little River Watershed Analysis (USDA and USDI 1995) reported algae accumulations in streams can affect pH. The process of photosynthesis by aquatic organisms uses dissolved carbon dioxide and consumes hydrogen ions during the daylight hours, raising pH levels (more alkaline). Respiration by aquatic organisms at night releases carbon dioxide, decreasing pH levels. Diurnal algae-driven pH cycles in Little River were found to range from 7.8 in the morning to 9.1 in the late afternoon. Photosynthesis occurs less on shaded stream reaches or on cloudy days and pH levels are lower. Maximum pH values of 9.0 may occur in streams unaffected by pollution (Hem 1985).

Bureau of Land Management hydrologists set out instruments to collect pH data on eight streams in the WAU. The pH data was collected every half-hour for three consecutive days in July and August 2000. The data are presented in Chart 7. The pH data met water quality standards. Data collected in 1999 also met the pH water quality standards. However, the South Umpqua River was placed on water quality limited list for pH based on the data DEQ collected (see Table 41).

Chart 7. South Umpqua Watershed Analysis Unit pH Data Collected in the Summer of 2000 by the Bureau of Land Management.

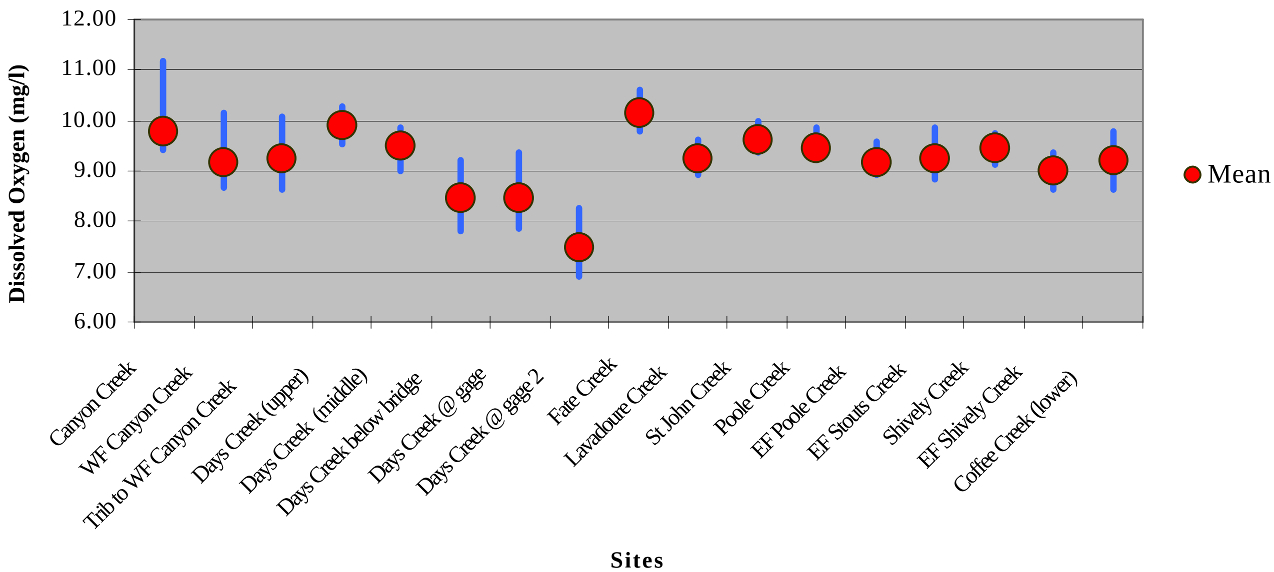


4. Dissolved Oxygen

Dissolved oxygen (DO) is required for resident fish and aquatic organism survival and salmonid spawning and rearing. Temperature and air pressure affect the amount of DO in water. The Oregon DEQ set minimum DO standards at 6.5 mg/l for cool-water aquatic resources, which became effective July 1, 1996. Greater than ten percent of the samples must exceed the standard with at least two samples collected per season in order for the stream to be considered water quality limited for DO. The minimum DO standards for salmonid spawning streams were set at eleven mg/l, except where barometric pressure, altitude, and naturally occurring temperatures preclude attainment of the standard, then DO levels should not be less than 95 percent saturation. The minimum DO standards for cold water aquatic resources were set at eight mg/l, unless the same conditions mentioned for salmonid spawning streams are present, then the DO levels should not be less than 90 percent saturation.

Bureau of Land Management hydrologists set out instruments to collect DO data in July and August 2000. Sites were selected based on spot measurements taken in 1999, which indicated more data was needed to determine if the streams are water quality limited for DO. Dissolved Oxygen data was collected every half-hour for three consecutive days at each site. The data are presented in Chart 8. The streams meet water quality standards for DO. However, the lower Days Creek site DO concentration was less than 8.0 mg/l after 8:30 p.m. on July 12, 2000. However, this one record would not meet the water quality limited standards to place the stream on the 303(d) list for DO. The South Umpqua River was listed as water quality limited for DO based on data collected by DEQ (see Table 41).

Chart 8. Dissolved Oxygen Data Collected at Sites in the South Umpqua Watershed Analysis Unit by the Bureau of Land Management in 2000.



5. Turbidity and Sedimentation

Turbidity is a function of suspended sediments and algal growth in a stream. Turbidity varies naturally from stream to stream depending upon geology, slope stability, rainfall, and temperature. Turbidity causing activities are allowed no more than a ten percent cumulative increase in stream turbidities, as measured relative to a control point upstream. High turbidity levels can impact salmonid feeding and fish growth (McDonald et al. 1990). Turbidity may also impact drinking water quality and recreational and aesthetic uses of water. Turbidity reduces the depth sunlight penetrates, altering the rate of photosynthesis, and impairing a fish's ability to capture food. Turbidity increases with, but not as fast as, suspended sediment concentrations. Turbidity data have not been collected by the BLM in the WAU. The DEQ did not identify any problems with turbidity.

Roads have the potential to affect the sediment regime. Erosional effects can occur when culverts become plugged or cannot handle peak flows, diverting streams to out of the original channel, flowing down the road, and entering another stream channel. Road surface erosion varies greatly with the type and amount of traffic, season of use, and the type and quality of road surfacing material (Reid and Dunne 1984). The types of road-related surface erosion were not quantified for this analysis. The quantity of sediment associated with mass wasting and potential stream crossing failures need to be evaluated. Sediment data have not been collected by the BLM in this WAU. However, the DEQ listed part of the South Umpqua River as water quality limited due to sediment (see Table 41).

6. Trace Metals

Trace metals should not be introduced into waters of the state in amounts, concentrations or combinations above natural background levels, which may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or bioaccumulate in aquatic life or wildlife to levels that adversely affect public health, safety, or welfare, aquatic life, wildlife, or other designated beneficial uses. Trace metal water quality criteria should not exceed the criteria established for the various metals by the Environmental Protection Agency (Environmental Protection Agency 1986). Trace metal data were collected in Days Creek by USGS in 1998. Other trace metal data have not been collected in the WAU.

Heavy metal outcrops are not common in most areas of the WAU. Areas, such as the South Umpqua River, Shively Creek, Canyon Creek, and Coffee Creek, where mining activity has occurred would probably be where trace metal toxicities might occur. No streams in the WAU have been listed as water quality limited due to trace metal toxicity.

7. Nitrogen

Forest fertilization can impact water quality by increasing nitrogen levels in streams. Nitrogen in streams can lead to an increase in primary productivity, particularly algal blooms. Algae accumulations in streams may affect pH. Aquatic organisms release carbon dioxide at night causing stream pH to decrease. During the day aquatic organisms use carbon dioxide and hydrogen during photosynthesis causing stream pH to increase. Aquatic organism respiration can lead to large changes in pH between night and day. Peak nitrogen concentrations coinciding with optimum growing conditions for aquatic organisms would have the greatest effect on a stream (Fredriksen et al. 1975). However, maximum nitrogen concentrations and losses have been measured in the winter when the water was cold and photosynthesis was minimal (Fredriksen et al. 1975).

Studies have measured less than 0.5 percent of the total nitrogen applied reached stream with adequate buffers, whereas two to three percent of the applied nitrogen was measured in streams with inadequate buffers (Moore 1975). Water samples collected from Days Creek in 1997 indicated nitrogen levels did not increase after fertilization.

I. Groundwater

Groundwater in the WAU is chemically diverse in character (Frank 1979). The water type is generally sodium bicarbonate. However, the water type for two water samples was sodium bicarbonate/sulfate. The variations depend mainly on the rock type forming the aquifer, the topography, and in some places, the depth of the well. The WAU is in the Klamath Mountains Geologic Province consisting of sedimentary, metamorphic, igneous, or volcanic rocks to river bottom alluvium. The majority of the WAU contains Jurassic volcanic and sedimentary rocks, with smaller areas of alluvium, Cretaceous sedimentary rocks, and Cretaceous and Jurassic intrusive rocks (Frank 1979). Yields from wells in the WAU range from less than one gallon per minute to 40 gallons per minute. Most of the wells yield less than ten gallons per minute.

J. Interpretation

Many drainages in the WAU have been impacted by human activities. Agricultural uses can have a negative impact on streams. Water withdrawn for irrigation and removing riparian vegetation can lead to decreased flows and increased stream temperatures in the summer. Fertilizers, which can add nutrients, and livestock in riparian areas, which can cause increased sediment, can negatively impact water quality.

Studies have documented road construction and timber harvesting affect stream channels and the hydrology of a watershed (Beschta 1978, Harr et al. 1979, Harr and McCorison 1979, Jones and Grant 1996, and Wemple et al. 1996). Roads can intercept water that would normally move through the ground as subsurface flow. When the water is routed to the stream channel faster it can cause increases in peak flows. This means less water would be stored as groundwater to be released in the summer for supporting fish and other aquatic organisms. Road density in the WAU is 4.56 miles per square mile. Thirty-two Drainages have road densities greater than four miles per square mile, which can affect the hydrology in the WAU. Drainages with road densities greater than four miles per square mile, numerous stream crossings, and intensive timber harvesting activities probably have experienced peak flows greater than what would have occurred in an undisturbed drainage.

The Riparian Reserve age class distribution indicates the stream channels are less complex, the substrate has been degraded, and fish habitat is poor in many areas of the WAU. Table C-1 in Appendix C shows the percentage of Riparian Reserves that contain stands at least 80 years old. Removing LWD from the stream channels in the past and harvesting vegetation along many streams has reduced the amount of LWD available for instream structures. Timber harvesting and road construction in and adjacent to riparian areas have lead to higher stream temperatures within the WAU. Riparian Reserves would help prevent increases in stream temperatures due to timber harvesting activities on BLM-administered land.

Many roads in the WAU have not been maintained on a regular schedule. The lack of routine road maintenance can lead to increased sedimentation from roads, landslides from road failures, and an increased risk of culvert problems.

Water quality of the South Umpqua River as it flows through the WAU is impacted during the summer low flows (Oregon Department of Environmental Quality 1998). Small tributaries of the South Umpqua River could be used as an indication of the influence a drainage has on the river. Many streams have been impacted from agriculture, timber harvesting, and urban settlement and development. The BLM administers a small percentage of land in some of the drainages. Improving water quality may require more than making improvements on BLM-administered land.

Generally, in transport or steeper stream reaches, the aquatic and riparian habitat are in fair to good condition. Downstream, in lower gradient stream reaches, aquatic and riparian habitat is in poor to fair condition. Generally, the low gradient reaches are not located on Federally-administered lands. Recovery of habitat conditions to full biological potential is estimated to take from 100 to 250 years along most of the South Umpqua River in the WAU (if active restoration activities were not conducted). The estimate accounts for some variability in recovery based on current aquatic and riparian conditions and natural foreseeable events (floods or fires).

Many interrelationships exist between riparian and floodplain vegetation, summer stream temperatures, sediment storage and routing, and the complexity of habitats in the WAU. Large mature conifers or hardwoods would continue to be limited on private lands, particularly agricultural lands, within the WAU unless major changes in land uses or land use regulations occur. The agricultural lands contain low gradient streams with high biological potential for salmon. Recovery of the large tree component on Federally-administered lands would not directly benefit these habitats on private lands but would have indirect impacts, such as decreased sediment delivery and cooler stream temperatures.

Stream shade recovery would occur quicker than habitat recovery. Habitat recovery and sediment storage and routing in the channel would recover to a more natural range of conditions with the maturation of riparian vegetation. A mature riparian forest provides shade, increases bank and channel stability, decreases channel width, and increases pool depths. Lower summer water temperatures and higher quality habitat conditions for trout and salmon would be created by the maturation of riparian forests, addressing road-related problems, and the limited amount of timber harvesting occurring on Federally-administered land.

VIII. Species and Habitats

A. Fisheries

1. Historic Fish Use in the South Umpqua River Basin

The South Umpqua River historically supported healthy populations of resident and anadromous salmonid fish. A survey conducted by the Umpqua National Forest in 1937 reported salmon, steelhead, and cutthroat trout were abundant throughout many reaches of the South Umpqua River and its tributaries (Roth 1937). Excellent fishing opportunities for resident trout and anadromous salmon and trout historically existed within the South Umpqua River (Roth 1937). The historical condition of the riparian zone along the upper South Umpqua River, upriver from Days Creek, favored conditions typical of old-growth forests found in the Pacific Northwest. Roth noted the shade component that existed along the surveyed stream reaches. The majority of the stream reaches surveyed were "arboreal" in nature, meaning "tall timber along the banks, shading most of the stream" (Roth 1937). The river and its tributaries were well shaded by the canopy closure associated with mature trees. Streambanks were provided protection by the massive root systems of these trees.

Since 1937, many changes have occurred within the South Umpqua River Basin and in the stream reaches surveyed by Roth. A comparative study conducted by the Umpqua National Forest during summer low flows between 1989 and 1993 surveyed the same stream reaches as in the 1937 report. The results of the study show that 22 of the 31 surveyed stream segments were significantly different than in 1937. Nineteen stream reaches were significantly wider while the remaining three stream segments were significantly narrower. Of the eight streams surveyed within designated wilderness areas, only one stream channel increased in width since 1937. Thirteen of the 14 stream reaches located in areas where timber harvesting occurred were significantly wider than in 1937.

The stream widening may have resulted from increased peak flows. Peak flows may occur after the removal of vegetation (tree canopy) and increases in compacted area within a watershed, especially within the Transient Snow Zone (Meehan 1991). Peak flows can introduce sediment into the stream channel from upslope and upstream, which can simplify the channel by rearranging instream structure. Excessive sediment delivery to streams usually changes stream channel characteristics and configuration. These stream channel changes normally result in decreasing the depth and the number of pool habitats and reducing the space available for rearing fish (Meehan 1991).

Results from the most recent Umpqua National Forest study document changes in low flow channel widths that have occurred within the South Umpqua River Basin since 1937 (Dose and Roper 1994). Land management activities (road construction and timber harvesting) may have contributed to the changes in stream channel characteristics. These changes in channel condition may have contributed to the observed decline in three of the four anadromous salmonid stocks occurring in the South Umpqua River Basin (Dose and Roper 1994).

Winter steelhead and resident rainbow trout (Oncorhynchus mykiss), fall and spring chinook salmon (Oncorhynchus tshawytscha), coho salmon (Oncorhynchus kisutch), and sea-run and resident cutthroat trout (Oncorhynchus clarki) have been documented using the South Umpqua WAU (see Table E-1 in Appendix E). Over the last 150 years, salmonids have had to survive dramatic changes in the environment. Streams and rivers in the Pacific Northwest have been altered by European settlement, urban and industrial development, and land management practices. Modifications in the landscape and waters of the South Umpqua River Basin, beginning with the first settlers, have made the South Umpqua River less habitable for salmonid species (Nehlsen 1994).

The South Umpqua River once supported abundant populations of chinook and coho salmon, steelhead, and cutthroat trout. These species survived in spite of the naturally low streamflows and warm water temperatures that occurred historically within the South Umpqua River Basin (Nehlsen 1994). Currently, salmonid populations throughout the Pacific Northwest are declining. A 1991 status report identified 214 native, naturally spawning fish stocks were vulnerable and at-risk of extinction (Nehlsen et al. 1991). According to this 1991 report, within the South Umpqua River, one salmonid stock is considered extinct, two salmonid stocks are at-risk of extinction, and two stocks were not considered at-risk.

a. Steelhead

Historically, steelhead runs in the South Umpqua River were strongest in the winter (Roth 1937). Currently, winter steelhead are considered to be the most abundant anadromous salmonid in the South Umpqua River (Nehlsen 1994). In 1937, Roth reported summer steelhead above the South Umpqua Falls. Summer steelhead are now considered to be extinct (Nehlsen et al. 1991).

b. Chinook Salmon

Historically, the principal chinook run was in the late spring and summer (Roth 1937). Currently, the Oregon Department of Fish and Wildlife (ODFW) considers spring chinook runs to be depressed. The spring chinook run is considered to be at high risk of extinction (Nehlsen et al. 1991). Fall chinook runs are considered to be healthy by ODFW (Nehlsen 1994).

c. Coho Salmon

Coho salmon were considered abundant in the South Umpqua River Basin in 1972 by the Oregon State Game Commission (Lauman et al. 1972). About 4,000 coho salmon spawned in the South Umpqua River Basin with 1,450 spawning in Cow Creek. Coho salmon in the South Umpqua River Basin are suffering the same declines as other coastal stocks. These declines may be due to the degradation of coho salmon habitat, the effects of extensive hatchery releases, and overfishing (Nehlsen 1994). No coho salmon were observed in the upper stream reaches of the South Umpqua River Basin during the 1937 survey (Roth 1937). Coho salmon were documented in Jackson Creek, a major tributary to the South Umpqua River, in the summer of 1989 (Roper et al. 1994). The documentation of coho salmon in Jackson Creek suggests this species exists in other tributaries in the upper reaches of the South Umpqua River Basin. Coho salmon have been observed in the South Umpqua WAU.

d. Cutthroat Trout

Sea-run cutthroat are assumed to be depressed from historic levels. Cutthroat trout were common or abundant throughout the stream segments surveyed in the South Umpqua River Basin in 1937 (Roth 1937). Historical information about cutthroat trout population size in the South Umpqua River is limited.

The assumption that sea-run cutthroat trout abundance is currently below historic levels throughout the Umpqua River Basin is based upon the information provided by the fish counting station at Winchester Dam on the North Umpqua River. Between 1947 and 1957, sea-run cutthroat trout runs in the North Umpqua River averaged about 900 fish per year. The highest number of sea-run cutthroat trout returning to the North Umpqua River between 1947 and 1957 was 1,800 fish in 1954. The lowest number was 450 sea-run cutthroat trout in 1949. In the late 1950s, the sea-run cutthroat trout returns declined drastically.

The stocking of Alsea River cutthroat trout into the Umpqua River Basin began in 1961 and continued until the late 1970s. Introducing this genetically distinct trout stock into the Umpqua River Basin has apparently compounded the problem for sea-run cutthroat trout native to the Umpqua River Basin. Sea-run cutthroat trout returns have been extremely low since discontinuing the hatchery releases in the late 1970s. The levels of returns resemble prehatchery release conditions of the late 1950s, with an average return of less than100 fish per year (ODFW 1994 - overhead packet). Table 44 shows the number of sea-run cutthroat trout that returned to the North Umpqua River from 1992 through 2000.

Table 44. Number of Returning Adult Sea-run Cutthroat Trout at Winchester Dam on the North Umpqua River from 1992 to 2000.

Year	Number of Fish
1992 - 1993	0
1993 - 1994	29
1994 - 1995	1
1995 - 1996	79
1996 - 1997	75
1997 - 1998	91
1998 - 1999	159
1999 - 2000	93
2000 - 2001 (as of August 15, 2000)	53

According to the data available, the South Umpqua River appears to have supported a larger run of sea-run cutthroat trout than the North Umpqua River. In 1972, 10,000 sea-run cutthroat trout were estimated to have returned to the South Umpqua River. Sea-run cutthroat trout populations have the highest occurrence in streams occupied by and accessible to coho salmon (Lauman et al. 1972). Sea-run cutthroat trout are constrained to the upper reaches of the South Umpqua River and Cow Creek, one of the major tributaries to the South Umpqua River. Warm water temperatures, lack of over-summering pool habitats, and low flows have limit sea-run cutthroat trout use in the lower stream reaches of the South Umpqua River Basin (Nehlsen 1994).

2. Current Fish Status

a. Threatened and Endangered Species

The Oregon Coast coho salmon was listed as a Threatened species by the National Marine Fisheries Service (NMFS) in 1998 under the Endangered Species Act (ESA) of 1973, as amended (Federal Register, Vol. 63, No. 153/August 10, 1998/Rules and Regulations). Critical habitat for the Oregon Coast coho salmon was designated by NMFS on February 16, 2000.

b. Other Special Status Fish Species

The West Coast steelhead had been proposed to be listed as a Threatened species. The National Marine Fisheries Service designated them as a Federal Candidate species in 1998 (Federal Register, Vol. 63, No. 53/March 19, 1998/Rules and Regulations).

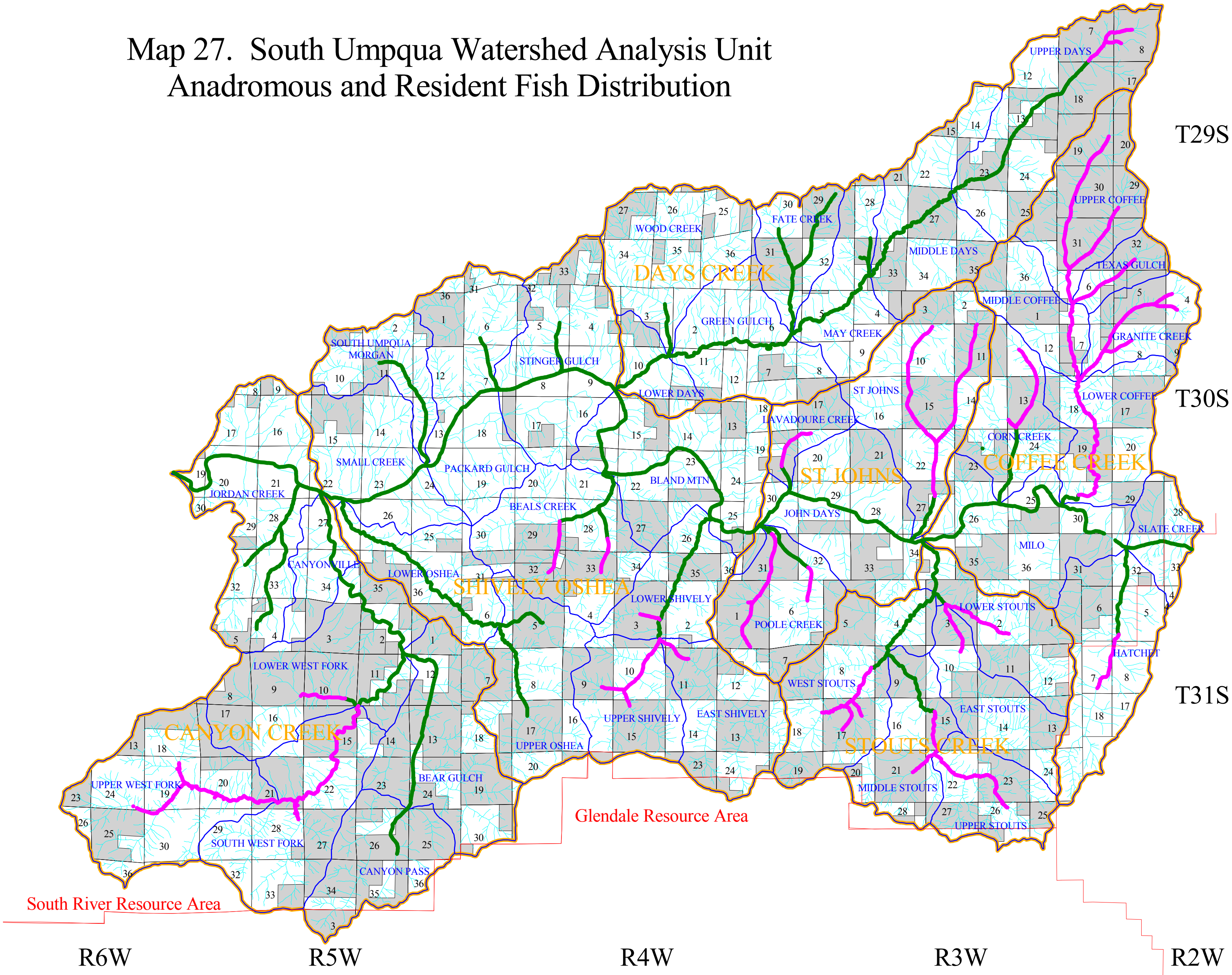
The Umpqua River cutthroat trout was listed in 1996 by NMFS as an Endangered species under the Endangered Species Act of 1973, as amended. The Umpqua River cutthroat trout were removed from the Federal List of Endangered and Threatened Wildlife on April 26, 2000. The Umpqua River cutthroat trout was determined to be part of a larger Oregon Coast population that previously had been determined not to be threatened or endangered as defined by the Endangered Species Act.

The Pacific lamprey (Lampetra tridentata) and the Umpqua chub (Oregonichthys kalawatseti) are on the United States Fish and Wildlife Service (USFWS) list as Species of Concern and are considered to be Bureau Sensitive Species by the BLM (Manual 6840). All of the Special Status fish species have been documented as occurring in the South Umpqua River.

3. Current Stream Habitat Conditions

The BLM administers about 37 percent (approximately 516 miles out of 1,407 miles) of the streams in the South Umpqua WAU. Fish distribution has been mapped using ODFW data (see Map 27). Approximately 145 miles of the streams in the WAU are considered to be fish-bearing. Approximately 93 miles are anadromous fish-bearing streams. All of the barriers to fish migration in the WAU have not been identified or mapped.

Map 27. South Umpqua Watershed Analysis Unit
Anadromous and Resident Fish Distribution



- Resource Area Boundaries
- Resident Fish Bearing Streams
- Anadromous Fish Bearing Streams
- Drainages
- Subwatersheds
- Streams
- Section Lines
- BLM Administered Land

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

N W E S

0 1 2 3 4 5 Miles

1:177435

The data collected through the ODFW Aquatic Habitat Inventory can be used to analyze the components that may limit the aquatic habitat and the fishery resource from reaching their optimal functioning condition. The Habitat Benchmark Rating System is a method developed by the Umpqua Basin Biological Assessment Team (BAT team) to rank aquatic habitat conditions. The BAT team consists of fisheries biologists from the Southwest Regional Office of the ODFW, Coos Bay BLM District, Roseburg BLM District, Umpqua National Forest, and Pacific Power Company. This group of local fisheries biologists address and resolve local questions and problems associated with the fisheries resource in the Umpqua River Basin. The matrix designed by the BAT team provides a framework to easily and meaningfully categorize habitat condition. This matrix is not intended to reflect equality of the habitat condition of each stream reach but to summarize the overall condition of the surveyed reaches. The matrix consists of four rating categories Excellent, Good, Fair, and Poor (see Table C-2 in Appendix C).

Data from the ODFW Aquatic Habitat Inventory conducted in the South Umpqua WAU were analyzed to determine an overall Aquatic Habitat Rating (AHR) for each stream reach. How the ratings correlate with the NMFS Matrix (see Table C-5 in Appendix C) is shown in Table 45.

Table 45. Comparison of the Aquatic Habitat Ratings (AHR) to the NMFS Matrix Ratings.

ODFW Aquatic Habitat Inventories	NMFS Matrix
Excellent or Good	Properly Functioning
Fair	At Risk
Poor	Not Properly Functioning

Twenty-seven streams in the South Umpqua WAU were inventoried by ODFW (see Table C-3 in Appendix C). Of the 82 stream reaches surveyed, three were rated as being in good condition, 57 were rated as being in fair condition, 22 were rated as being in poor condition, and no reaches were rated as being in excellent condition.

Each stream reach in the South Umpqua WAU may contain different limiting factors. Limiting factors for the fishery resource may include reduced instream habitat structure, increased sedimentation, the absence of a functional riparian area, decreased water quantity or quality, or the improper placement of drainage and erosion control devices associated with roads.

4. Interpretation

Historic vegetation data from the early 1900s indicates the lower elevations of the WAU consisted of agricultural and hardwood stands and the upper elevations were mainly merchantable conifer forests. Approximately 13 percent of the WAU was characterized as in open or nonforested conditions (see Table 6).

The riparian areas in the lower elevations of the WAU were probably like most interior valleys, dominated by hardwoods with a few, scattered, large conifers. Therefore, the riparian areas in the low gradient, valley portion of the WAU were probably not major sources for adding LWD to the streams. Large woody debris recruitment to streams may occur frequently (chronic) or infrequently (episodic) (Maser et al. 1988). The interval is dependant on numerous factors. Most LWD recruitment in the WAU probably occurred during episodic events. Large woody debris located in the high gradient stream reaches in the WAU were probably transported downstream to the low gradient, depositional stream reaches during large flood events. These large floods would have created favorable habitat conditions for anadromous salmonids in the valley bottom streams of the WAU.

Stream habitat is assumed to have consisted of a natural range of conditions before European settlement in the WAU. Fish populations would have been influenced by natural events, such as flooding, climate, and ocean productivity rather than by commercial and recreational fish harvesting, man-made barriers (such as irrigation dams), and livestock grazing. Beginning in the mid-1800s, rivers were cleared of debris to improve navigation and floodplain forests were cleared for agriculture, timber, and fuel wood (Meehan 1991). Recent stream habitat condition surveys suggest stream debris clearing and riparian area clearing had been conducted on the surveyed stream reaches.

Most of the anadromous fish-bearing stream reaches surveyed by ODFW in the WAU are deficient in large woody debris. The few pieces and low volume of instream large woody debris has resulted in fewer pool habitats for fish. The lack of instream large wood has, in most instances, negatively altered stream channel dynamics, such as bedload transport and stream substrate distribution. Other stream channel characteristics impacted by the lack of large woody debris include stream channel sinuosity, streambank stability, and floodplain interaction. Limiting a stream's ability to overflow onto the floodplain during high stream flow events can cause the channelization of streamflow and channel incision. Bureau of Land Management stream survey crews observed many of the streams on BLM-administered land in the South Umpqua WAU are incised and disconnected from their floodplain.

Approximately 38 percent (21,852 acres out of 58,027 acres) of the BLM-administered land is in Riparian Reserves. The desired future condition is to have at least 75 percent of the Riparian Reserves in age classes greater than 80 years old. The maturation stage, when large snags and down wood accumulate, typically occurs when a stand is between 80 and 140 years old (USDA and USDI 1994b). Approximately 55 percent of the Riparian Reserves on BLM-administered lands are at least 80 years old. In about 60 years, approximately 80 percent of the Riparian Reserves on BLM-administered land would be at least 80 years old (see Table 24). Riparian Reserves provide large wood, where it exists, to the adjacent stream. Riparian restoration could include thinning in Riparian Reserves to maintain or improve tree growth and provide large woody debris to streams. Riparian treatments could focus on anadromous fish-bearing streams or streams that historically supported anadromous fish but are not accessible now.

Average road density within Riparian Reserves on BLM-administered land is 3.15 miles per square mile (see Table 33). Approximately 55 percent of the roads in the Riparian Reserves on BLM-administered land are within 100 feet of a stream. Many of the roads are considered main access routes and unlikely to be considered for full decommissioning. However, these roads could be renovated or improved to minimize the impacts on water quality and the aquatic habitat.

A rating system was developed to evaluate where management and restoration activities should take place. The following criteria were evaluated from the fisheries resource perspective.

Aquatic habitat condition - Areas were rated based on cutthroat trout and coho salmon habitat. This rating relied heavily on professional judgement, current aquatic habitat data, and partly on personal observation by fish biologists.

Species diversity - Areas with a high degree of diversity (more fish species using an area) received the higher rating. Areas containing cutthroat, coho salmon, steelhead, and chinook salmon were rated the highest.

Access for anadromous fish - Areas containing natural blockages (i.e. waterfalls) would be rated low because anadromous fish, historically, would not have inhabited those areas.

Ownership pattern - This considers how much influence BLM actions would have on cumulative impacts. The consideration is whether the BLM administers enough land to affect aquatic conditions.

Restoration projects including culvert replacements, road decommissioning, road renovation, and instream large wood placement have been planned in the Days Creek, St. Johns, and Stouts Creek Subwatersheds. Fish populations are expected to be more abundant and distributed better in the future due to restoration activities. Restoration activities would increase bank and channel stability, decrease stream width/depth ratios, increase pool depths, decrease sediment, and lower summer water temperatures.

B. Wildlife

1. Historic and Current Wildlife Use of the South Umpqua WAU

Historically, wildlife species known to be present in Douglas County, and probably in the WAU, include the grizzly bear (Ursus arctos), grey wolf (Canis lupus), wolverine (Gulo gulo), and Pacific fisher (Martes pennanti pacifica). The grizzly bear and grey wolf are considered to be extinct in Oregon. The wolverine and Pacific fisher are considered to be very vulnerable to extinction in Oregon (Oregon Natural Heritage Program 1998).

Beaver populations have probably declined from historic levels due trapping and other human activities. The number of beavers harvested annually in Douglas County declined from 1,440 in 1979 to 264 in 1996 (Verts and Carraway 1998). Beavers had a major influence on stream hydrology with their dams. The decreased number of beavers may alter stream function and the number of aquatic animals.

The number of river otters (Lutra canadensis) harvested annually decreased from 70 animals in 1977 to 36 in 1999. Changes in harvest numbers may be a reflection of economic conditions rather than actual population numbers.

Many wildlife species live in the different vegetation types present in the WAU. The various vegetation types provide shelter, food, and habitat to over 200 terrestrial vertebrate species and thousands of invertebrate species. Sixty-seven species are of special concern by the Bureau of Land Management because they are considered to be Special Status Species, Special Attention Species in the Northwest Forest Plan, or are priority species to the Oregon Department of Fish and Wildlife. Thirty-two Special Status Species, which include Federally Threatened (FT), Federally Endangered (FE), Federally Proposed for Listing (P), Bureau Sensitive (BS), Bureau Assessment (BA), or Oregon state listed species, are expected to occur in the South Umpqua WAU (see Table E-1 in Appendix E). Bureau Tracking (BT) species are not considered to be Special Status Species but are listed in Table E-1 in Appendix E for reference. The BLM is tracking the occurrence of the Bureau Tracking species, which may be used to detect population trends of these species. Other species of interest are Special Attention Species (Survey and Manage or Protection Buffer species) included in the Northwest Forest Plan or ODFW priority species, which include animals of special interest to the public (such as game animals).

a. Federally Threatened, Endangered, and Proposed Species

Four terrestrial species known to occur in the Roseburg BLM District are legally listed as Federally Threatened (FT), Federally Endangered (FE), Federally Proposed for Listing (P), or Federally Proposed for Delisting (PD). These species include the American bald eagle (Haliaeetus leucocephalus) (FT, PD), the marbled murrelet (Brachyramphus marmoratus) (FT), the northern spotted owl (Strix occidentalis caurina) (FT), and the Columbian white-tailed Deer (Odecoilus virginianus leucurus) (FE, PD). Three other legally listed species may occur in the Roseburg BLM District. They are the Canada lynx (Felix lynx canadensis) (P), the Fender's blue butterfly (FE), and the vernal pool fairy shrimp (Branchinecta lynchi) (FT). The vernal pool fairy shrimp is listed in California and has been documented occurring in the Medford BLM District. It is unknown if the Canada lynx, Fender's blue butterfly, or vernal pool fairy shrimp are present in the Roseburg BLM District.

(1) The Northern Spotted Owl

The northern spotted owl is found in the Pacific Northwest, from northern California to lower British Columbia, Canada. The geographic range of the northern spotted owl has not changed much from its historical boundaries. Nesting habitat historically used by northern spotted owls has changed to the point owl population numbers have declined and distribution rearranged. These changes are considered to be a result of habitat alteration and removal by timber harvesting, fire, and land development (Thomas et al. 1990).

(a) Known Sites

Suitable forest stands where northern spotted owls have been located are known as spotted owl activity centers. There are 79 known spotted owl centers in the South Umpqua WAU representing nest locations for 50 northern spotted owl pairs. Twenty-one northern spotted owl pairs have alternate nesting locations in the WAU. The accepted method for determining a northern spotted owl pair home range is to use a 1.3 miles radius circle (for the Klamath Physiographic Province) around the site. The territory used by a pair of owls with alternate nesting sites would be the total area around all of the alternate nesting sites. Another method of describing a northern spotted owl pair home range is by using the drainage boundaries (ridgetops) as the territory boundaries. This description is consistent with the northern spotted owl's tendency to defend a territory by hooting. Multiple alternate nesting sites tends to be more common in areas where the suitable habitat is poor in quality or the distribution is scattered. Northern spotted owl pairs with multiple alternate sites may need a larger territory for survival. Factors influencing nest site selection include prey base abundance, distribution of habitat, and disturbance. Table 46 contains information about the status of use, habitat acres, occupation, and reproduction success of the northern spotted owls in the WAU.

There are eleven northern spotted owl activity centers outside of the WAU but within 1.3 miles of the WAU boundary. Management within the WAU may affect these northern spotted owl sites.

(b) Nesting, Roosting, and Foraging Habitat

Forest habitat important to the northern spotted owl was identified by Roseburg BLM District wildlife biologists. Using on-the-ground knowledge, inventory descriptions of forest stands, and known characteristics of the forest structure, suitable nesting, roosting and foraging habitat was identified in the WAU. There are approximately 32,663 acres of suitable northern spotted owl nesting, roosting, and foraging habitat in the WAU (see Map28). This is about 54 percent of the Federally-administered land and 23 percent of the WAU.

Table 46. Northern Spotted Owl Activity Center Ranking Data Within the South Umpqua WAU in the South River Resource Area (as of 1999).

MSNO	Year Site Was Located	Last Year of Known Active Pair (Pair Status + Number of Juveniles)	Last Year Occupied (Pair Status)	Number of Years of Reproduction/Pair Status Since 1985	Suitable Habitat Acres in Provincial Radius (1.3 Miles)	Suitable Habitat Acres in 0.7 Mile Radius	Potential Habitat Acres in Provincial Radius of All Alternate Sites	Land Use Allocation	Occupancy Rank	Acres Rank	History Rank
0283	1976	ND	ND	0/0	634	70		LSR			
0283A	1994	1999 (P+2J)	1999 (P)	1/2				LSR			
0283B	1997	1997 (P+1J)	1997 (P)	1/1				LSR			
0283C	1998	1998 (P+2J)	1998	1/1				LSR			
0283 (all)	1976	1999 (P+2J)	1999 (P)	3/4	1,094	412	5,099	LSR	1	D	1
0289	1976	1999 (P+2J)	1999 (P)	2/6	766	151		LSR			
0289A	1991	1995 (A)	1995 (A)	1/2				LSR			
0289 (all)	1976	1999 (P+2J)	1999 (P)	3/8	932	171	3,282	LSR	2	D	2
0295	1977	1999 (P)	1999 (P)	2/3	1,573 (1.2)	602	2,955 (1.2)	GFMA	1	A	2
0296	1977	1999 (P+2J)	1999 (P)	3/7	894	374	3,340	LSR	1	D	1
0297	1976	1997 (P)	1997 (P)	7/8	594	289		LSR			
0297A	1990	1999 (P)	1999 (P)	2/4				LSR			
0297 (all)	1976	1999 (P)	1999 (P)	9/12	565	286	3,430	LSR	1	D	1
0298	1985	1990 (P)	1991 (U)	2/5				LSR			
0298A	1992	1996 (P)	1996 (P)	2/4	1,095	398		LSR			
0298B	1997	1999 (P)	1999 (P)	1/3				LSR			
0298 (all)	1985	1999 (P)	1999 (P)	5/12	1,628	780	5,363	LSR	1	B	2
0361	1978	1994 (P)	1999 (M+F)	0/2	640 (1.3)	279	3,340	CONN	1	D	1
0363	1981	ND	ND	0/0	652	219		LSR			
0363A	1996	1999 (P)	1999 (P)	2/4				LSR			
0363 (all)	1978	1999 (P)	1999 (P)	2/4	822	431	4,658	LSR	1	D	2
0364	1981	1999 (P)	1999 (P)	0/4	695	235	3,340	LSR	1	D	2
0365	1979	1990 (P+1J)	1991 (S)	1/1	1,232	525		LSR			
0365A	1992	1996 (P+1J)	1999 (U)	4/6	1,198	556		LSR			
0365 (all)	1979	1996 (P+1J)	1999 (U)	5/7	1,368	658	3,832	LSR	2	A	2

Table 46. Northern Spotted Owl Activity Center Ranking Data Within the South Umpqua WAU in the South River Resource Area (as of 1999).

MSNO	Year Site Was Located	Last Year of Known Active Pair (Pair Status + Number of Juveniles)	Last Year Occupied (Pair Status)	Number of Years of Reproduction/Pair Status Since 1985	Suitable Habitat Acres in Provincial Radius (1.3 Miles)	Suitable Habitat Acres in 0.7 Mile Radius	Potential Habitat Acres in Provincial Radius of All Alternate Sites	Land Use Allocation	Occupancy Rank	Acres Rank	History Rank
0366	1983	1983 (P)	1983 (P)	0/0	1,178	487		LSR			
0366A	1986	1999 (P)	1999 (P)	2/6	1,043	312		LSR			
0366B	1989	1991 (P+1J)	1991 (P)	2/2	1,121	263		LSR			
0366C	1990	1996 (P)	1996 (P)	3/5	1,003	300		LSR			
0366 (all)	1983	1999 (P)	1999 (P)	7/13	1,607	776	5,035	LSR	1	B	1
1809	1986	1995 (P)	1999 (U)	1/6	913 (1.2)	455		CONN			
1809A*	1998	1998 (P+1J)	1998 (P)	1/1				CONN			
1809 (all)	1983	1999 (P)	1999 (P)	2/7	1,036	501	4,118	CONN	1	D	2
1810	1986	1996 (M+F)	1999 (S)	0/4	547 (1.2)	300	3,340	GFMA	1	D	3
1813	1986	1988 (P)	1988 (P)	0/2				LSR			
1813A	1989	1989 (P+2J)	1995 (M)	1/1	1,028	103		LSR			
1813 (all)	1986	1989 (P+2J)	1995 (M)	1/3	1,209	124	4,847	LSR	3	B	3
1930	1987	1995 (F)	1995 (F)	1/4	1,800 (1.2)	689		GFMA			
1930A	1997	1997 (P+1J)	1997 (P)	1/1				GFMA			
1930B	1999	1999 (P+2J)	1999 (P)	1/1				GFMA			
1930 (all)	1987	1999 (P+2J)	1999 (P)	3/6	2,537	1,126	3,968	GFMA	2	A	2
1932	1987	1999 (P)	1999 (P)	4/7	765	353	3,340	LSR	1	D	2
1933	1986	1999 (P)	1999 (P)	1/8	947	232		LSR			
1933A	1996	1996 (P+1J)	1997 (U)	1/1				LSR			
1933 (all)	1986	1999 (P)	1999 (P)	2/9	1,041	308	3,949	LSR	2	D	2
1934	1987	1990 (P)	1991 (U)	1/3				LSR			
1934A	1992	1992 (P+1J)	1993 (X)	1/1				LSR			
1934B	1994	1997 (P+1J)	1998 (M)	3/4	1,080	499		LSR			
1934C	1999	1999 (P+1J)	1999 (P)	1/1				LSR			
1934 (all)	1987	1999 (P+1J)	1999 (P)	6/9	1,172	627	4,339	LSR	1	B	2

Table 46. Northern Spotted Owl Activity Center Ranking Data Within the South Umpqua WAU in the South River Resource Area (as of 1999).

MSNO	Year Site Was Located	Last Year of Known Active Pair (Pair Status + Number of Juveniles)	Last Year Occupied (Pair Status)	Number of Years of Reproduction/Pair Status Since 1985	Suitable Habitat Acres in Provincial Radius (1.3 Miles)	Suitable Habitat Acres in 0.7 Mile Radius	Potential Habitat Acres in Provincial Radius of All Alternate Sites	Land Use Allocation	Occupancy Rank	Acres Rank	History Rank
1935	1987	1995 (P)	1995 (P)	1/5	1,293	361		LSR			
1935A	1996	1996 (P+1J)	1996 (P)	1/1				LSR			
1935B	1997	1998 (P)	1998 (P)	1/2				LSR			
1935C	1999	1999 (P+2J)	1999 (P)	1/1				LSR			
1935 (all)	1987	1999 (P+2J)	1999 (P)	4/9	1,295	721	4,691	LSR	1	B	2
1982*	1986	1999 (P+2J)	1999 (P)	4/6	1,064	450	3,340	LSR	1	B	2
1984	1987	1991 (P+0J)	1991 (P)	1/2	588 (1.3)	185	3,340	PRIVATE	3	D	3
1985	1988	1988 (P+1J)	1999 (S)	1/1				CONN			
1985A	1989	1994 (P+0J)	1996 (M)	1/7	369 (1.2)	218		CONN			
1985 (all)	1988	1994 (P)	1999 (S)	2/8	662	252	3,870	CONN	2	D	2
1994	1988	1997 (P)	1999 (S)	4/6	1,536 (1.2)	762		CONN			
1994A	1994	1998 (P+1J)	1998 (P)	3/4				CONN			
1994 (all)	1988	1998 (P+1J)	1999 (S)	7/10	2,086	789	4,047	CONN	1	A	1
1995	1988	1997 (P)	1999 (S)	3/9	876 (1.2)	354	3,340	GFMA	1	D	1
1996	1988	1992 (M)	1994 (M)	1/3	1,081 (1.2)	363		GFMA			
1996A	1995	1998 (P+1J)	1998 (P)	2/4				GFMA			
1996 (all)	1988	1998 (P+1J)	1998 (P)	3/7	1,487	696	4,670	GFMA	1	B	2
1997	1988	1994 (P)	1994 (P)	1/5	1,478	520		LSR			
1997A	1995	1999 (P)	1999 (P)	3/4				LSR			
1997 (all)	1988	1999 (P)	1999 (P)	4/9	1,779	740	4,127	LSR	2	A	2
1999	1988	1993 (P)	1999 (S)	0/3	1,957 (1.2)	791	3,340	GFMA	2	A	1
2087	1989	1995 (P)	1995 (P)	1/5	846	264		LSR			
2087A	1991	1991 (P)	1991 (P)	0/1				LSR			
2087 (all)	1989	1995 (P)	1995 (P)	1/6	918	373	4,110	LSR	3	D	2

Table 46. Northern Spotted Owl Activity Center Ranking Data Within the South Umpqua WAU in the South River Resource Area (as of 1999).

MSNO	Year Site Was Located	Last Year of Known Active Pair (Pair Status + Number of Juveniles)	Last Year Occupied (Pair Status)	Number of Years of Reproduction/Pair Status Since 1985	Suitable Habitat Acres in Provincial Radius (1.3 Miles)	Suitable Habitat Acres in 0.7 Mile Radius	Potential Habitat Acres in Provincial Radius of All Alternate Sites	Land Use Allocation	Occupancy Rank	Acres Rank	History Rank
2090	1989	1999 (P+1J)	1999 (P)	4/5				GFMA			
2090A	1992	1993 (M+F)	1993 (M+F)	0/2	607 (1.2)	177		GFMA			
2090B	1994	1997 (P)	1997 (P)	2/4	607 (1.2)	187		GFMA			
2090 (all)	1989	1999 (P+1J)	1999 (P)	6/11	873	288	3,844	GFMA	1	D	1
2091	1989	1996 (P+2J)	1996 (P)	4/7	710	246	3,340	CONN	2	D	1
2092	1989	1997 (P+0J)	1997 (P)	3/6	1,193	427	3,340	CONN	1	B	2
2093	1989	1999 (P)	1999 (P)	0/0	727 (1.3)	313	3,340	CONN	3	D	3
2197	1990	1991 (P+0J)	1991 (P)	2/4	543 (1.2)	389		GFMA			
2197A	1992	1999 (P)	1999 (P)	1/1				PRIVATE			
2197 (all)	1990	1999 (P)	1999 (P)	3/5	773	402	4,148	GFMA	1	D	2
2210	1990	1998 (P+1J)	1998 (P)	5/8	354	209	3,340	CONN	2	D	1
2292	1990	1997 (P+2J)	1997 (P)	3/5	1,036	373		CONN			
2292A	1995	1995 (P+1J)	1995 (P)	1/1	1,227	506		CONN			
2292B	1996	1999 (P+1J)	1999 (P)	1/1	1,273	439		CONN			
2292 (all)	1995	1999 (P+1J)	1999 (P)	5/7	1,239	549	4,077	CONN	1	B	1
2293	1990	1996 (P)	1998 (M+F)	1/2	1,862 (1.2)	769	3,340	GFMA	1	A	2
2382	1990	1990 (P)	1993 (M)	0/1	464	244	3,340	LSR	3	D	3
3104	1986	1998 (P+1J)	1999 (S)	4/8	1,285	348	3,340	LSR	1	B	2
3906	1994	1997 (P)	1997 (P)	2/4	1,036	458	3,340	LSR	2	B	2
3909	1992	1997 (P+2J)	1997 (P)	1/4	735	277	3,340	LSR	2	D	2
4052	1993	1994 (P+1J)	1997 (S)	1/1	621	225	3,340	LSR	2	D	3
4363	1991	1995 (P)	1999 (S)	0/1	1,053	836	3,340	CONN	2	A	3
4365	1990	1999 (P)	1999 (P)	2/4	1,183	475	3,340	CONN	1	B	3

MSNO	Year Site Was Located	Last Year of Known Active Pair (Pair Status + Number of Juveniles)	Last Year Occupied (Pair Status)	Number of Years of Reproduction/Pair Status Since 1985	Suitable Habitat Acres in Provincial Radius (1.3 Miles)	Suitable Habitat Acres in 0.7 Mile Radius	Potential Habitat Acres in Provincial Radius of All Alternate Sites	Land Use Allocation	Occupancy Rank	Acres Rank	History Rank
4366	1996	1999 (P)	1999 (P)	2/4	996	281	3,340	GFMA	1	D	1
4367	1994	1996 (P+2J)	1998 (S)	1/1	940	351	3,340	LSR	2	D	3
4368	1993	1996 (P+1J)	1996 (P)	1/1	257	14	3,340	LSR	3	D	3
4518	1998	1999 (P)	1999 (P)	1/2	1,073	461	3,340	CONN	1	A	1
4519	1998	1999 (P)	1999 (P)	0/2	1,141	235	3,340	LSR	1	B	2
4538	1999	1999 (P+2J)	1999 (P)	1/1	622	369	3,340	GFMA	2	D	1

Table 46. Northern Spotted Owl Activity Center Ranking Data Within the South Umpqua WAU in the South River Resource Area (as of 1999).

Table 45 Definitions

Last Year of Known Active Pair - Shows the year, pair status, and number of young produced. NP = Site has not had a pair. ND = No Data. **Pair Status -** M = Male; F = Female; J = Juvenile; P = Pair Status; (M+F) = Two Adult Birds, Pair Status Unknown; PU = Pair Status Undetermined; S = Single Owl; ND = Incomplete or No Data.

Number of Years of Reproduction/Pair Status Since 1985 - The first number represents the number of years with northern spotted owl reproduction at this site since 1985. The second number refers to the number of years for the entire history of the site since 1985 (including the original and alternate sites, i.e. 1090A). ND = No Data.

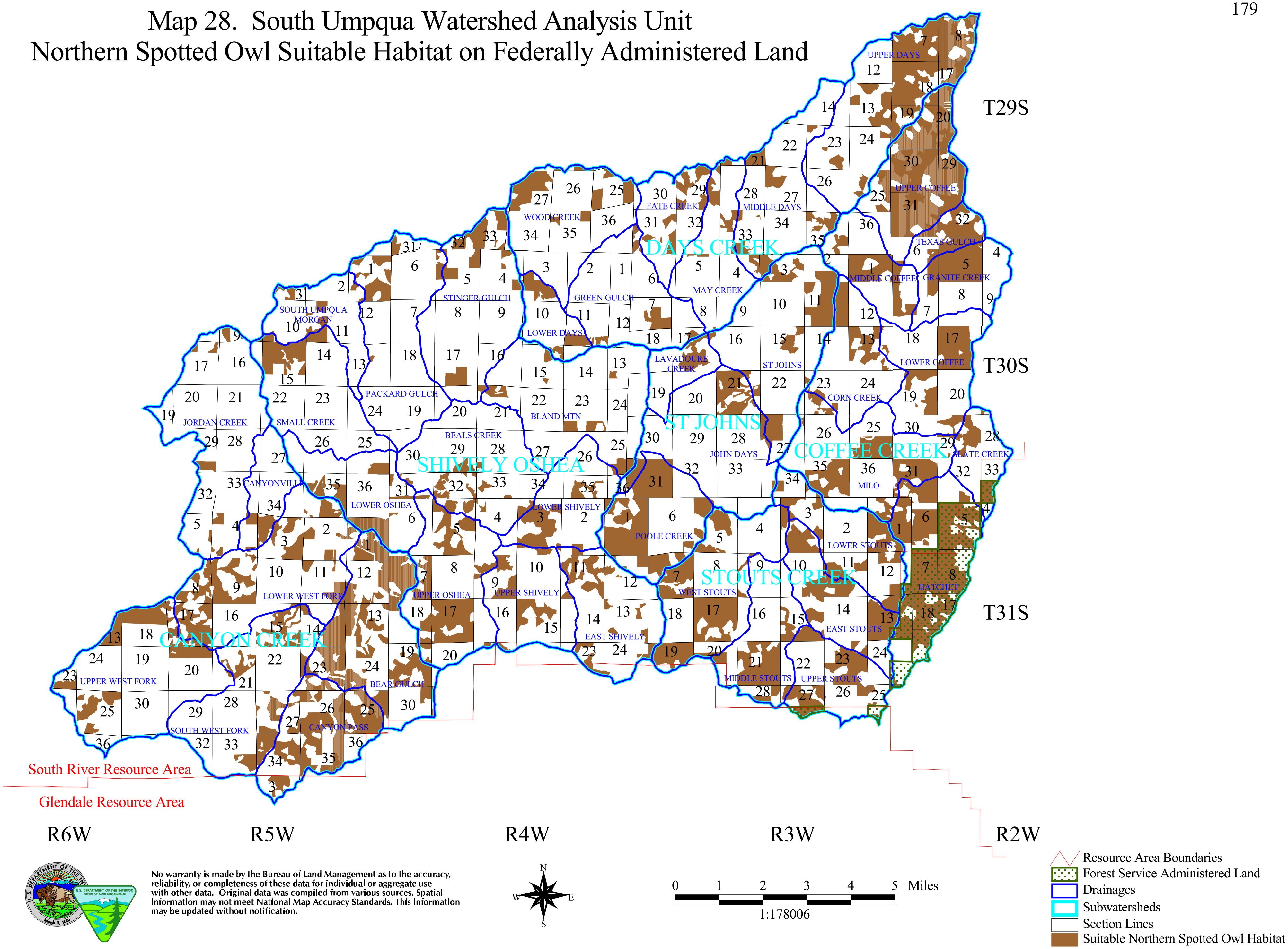
Occupancy Rank - 1: Sites with this ranking have current occupancy and have been occupied by a single northern spotted owl or pair of northern spotted owls for the last three years; 2: Sites with this ranking have been occupied in the past, show sporadic occupancy by a single northern spotted owl or a northern spotted owl pair, may be currently occupied; 3: Sites with this ranking have not been occupied during the last three years.

Acres Rank - These acres are in regards to suitable northern spotted owl habitat. A: These sites have more than 1,000 acres in the provincial radius and more than 500 acres within the 0.7 mile radius; B: These sites have more than 1,000 acres in the provincial radius but less than 500 acres within the 0.7 mile radius; C: These sites have less than 1,000 acres in the provincial radius and more than 500 acres in the 0.7 mile radius; D: These sites have less than 1,000 acres in the provincial radius and less than 500 acres in the 0.7 mile radius.

History Rank - This ranking includes occupancy ranking, reproduction data, acres ranking, habitat evaluation, and field experience about the site (location, quality, and forest structure). 1: A site considered stable due to consistent occupation by northern spotted owls, which have been producing young consistently; 2: Site is consistently used by northern spotted owls but reproduction is sporadic; 3: Northern spotted owls have reproduced some, occupation has been sporadic, or site has not been occupied. Private = Site is located on private land. State = Site is located on Oregon State Lands.

* These sites are occupied by a pair of barred owls or a pair composed of a female barred owl and a male northern spotted owl.

Map 28. South Umpqua Watershed Analysis Unit
Northern Spotted Owl Suitable Habitat on Federally Administered Land



(c) Dispersal Habitat

Other forested stands not identified as nesting, roosting, and foraging habitat and greater than 40 years old are considered to be dispersal habitat. Dispersal habitat refers to forest stands greater than 40 years old that provide cover, roosting, and foraging components northern spotted owls use while moving from one area to another (Thomas et al. 1990, USDI 1992b, and USDI 1994). Trees within these stands generally are an average of eleven inches in diameter at breast height (DBH) and with at least a 40 percent canopy closure. There are approximately 45,586 acres of dispersal habitat in the WAU (see Map 29).

A major factor contributing to the declining northern spotted owl population is the replacement rate of owls (specifically female) by new birds known as "floaters" (Burnham et al. 1994). Floaters are typically juvenile, unpaired adult, and subadult birds moving through and around established pair sites using the habitat outside of defended territories. Minimizing risks for dispersing northern spotted owls in the short term may help maintain viable, reproducing pair sites stabilizing the northern spotted owl population's decline.

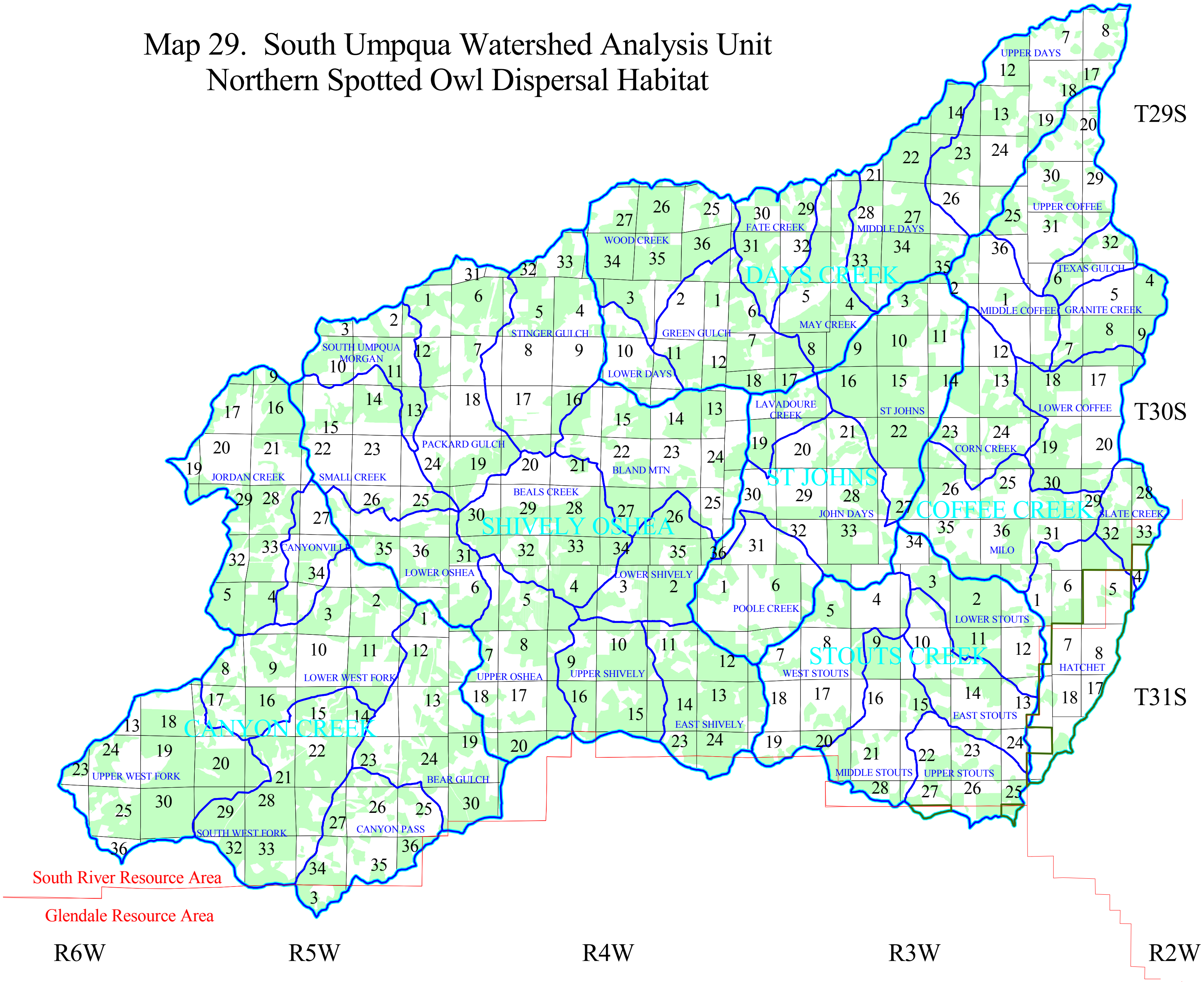
The lower elevations in the WAU have been developed for agricultural and residential uses expose dispersing northern spotted owls to predators, such as the great horned owl, which are more abundant and efficient in open habitats. Open areas may be barriers to dispersing northern spotted owls forcing them to avoid such areas.

One portion of the WAU considered important for dispersal between LSRs is located in the Canyon Creek Subwatershed. Approximately 74 percent of the BLM-administered land in the Canyon Creek Subwatershed is considered to be dispersal habitat. The 1987 Canyon Mountain Fire area is an exception, where approximately 5,247 acres burned.

(d) Critical Habitat for the Recovery of the Northern Spotted Owl

Portions of four designated Critical Habitat Units (CHU) for the recovery of the northern spotted owl are located in the WAU (see Map 30). The largest Critical Habitat Unit (CHU-OR-32) correlates with the South Umpqua River/Galesville LSR in the southern part of the WAU. Critical Habitat Unit OR-32 is mainly in the LSR, which would maintain northern spotted owl nesting habitat linking the Western Cascade, Coast Range and Klamath Mountain Physiographic Provinces. The function of CHU-OR-63, located in the western portion of the WAU, was to provide a stepping stone of northern spotted owl nesting habitat between the Western Cascade, Coast Range and Klamath Mountain Physiographic Provinces. Critical Habitat Unit OR-63 provides at best, a weak link between CHU-OR-62 in the Klamath Mountains Physiographic Province and CHU-OR-32 in the Western Cascades Physiographic Province. Most of the sections in CHU-OR-63 are Connectivity/Diversity Blocks. At least 25 percent of each Connectivity/Diversity Block would remain late-successional habitat.

Map 29. South Umpqua Watershed Analysis Unit Northern Spotted Owl Dispersal Habitat



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

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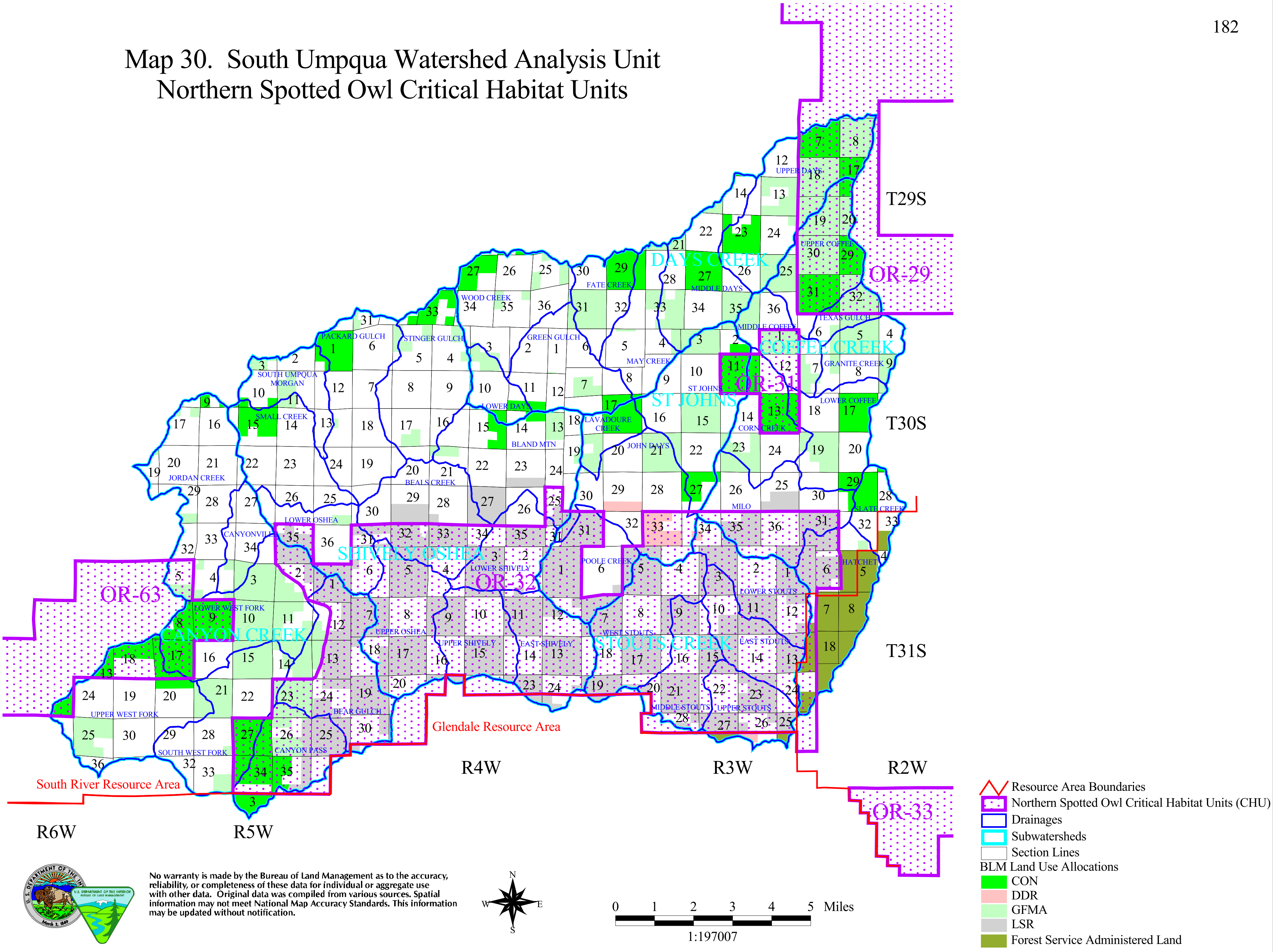
- Resource Area Boundaries
- Forest Service Administered Land
- Drainages
- Subwatersheds
- Section Lines
- Northern Spotted Owl Dispersal Habitat

Map 30. South Umpqua Watershed Analysis Unit
Northern Spotted Owl Critical Habitat Units



(2) The American Bald Eagle

Historic distribution of the bald eagle included the entire northwestern portion of the United States (California, Oregon, and Washington), Alaska, and western Canada. Bald eagle populations probably started declining in the 19th century but did not become noticeable until the 1940s (USDI 1986).

Throughout the North American range, drastic declines in bald eagle numbers and reproduction occurred between 1947 and the 1970s. In many places, the bald eagle disappeared from the known breeding range. The reason for this decline was the impact organochloride pesticide (DDT) use had on the quality of egg shells produced by bald eagles (USDI 1986). Bald eagle numbers probably declined on the Roseburg BLM District because DDT was used in western Oregon from 1945 to the 1970s (Henny 1991). Other causes of the bald eagle's decline included shooting, and habitat removal (Anthony et al. 1983). Historically, removal of old-growth forests near major water systems (e.g., South Umpqua River) contributed to habitat deterioration through the loss of bald eagle nesting, feeding, and roosting habitat.

Information collected during yearly inventories from 1971 to 1995 by Isaacs and Anthony of known bald eagle sites in Douglas County does not list any sites, nests, or territories within or near the South Umpqua WAU (Isaacs and Anthony 1995). On occasion, bald eagles are observed along the South Umpqua River during the winter but the eagles do not stay and do not appear to use the area as a long term wintering ground. To date there is no evidence of nesting by bald eagles along the South Umpqua River in the WAU. Some forest stands along the South Umpqua River have large conifers and black cottonwoods producing suitable bald eagle habitat.

(3) Marbled Murrelet

The marbled murrelet was listed as a threatened species in 1992 (USDI 1992c). Critical habitat for the recovery of the marbled murrelet was designated in 1996 (Federal Register 61(102):26256-26278). The marbled murrelet is found in the Roseburg BLM District but the South Umpqua WAU is outside the range of suitable marbled murrelet forest habitat. The South Umpqua WAU is located more than 50 miles from the Oregon Coast, which is considered to be the extent the marbled murrelet would be found.

(4) Columbian White-tailed Deer

The Columbian white-tailed deer is not expected to occur in the South Umpqua WAU. Although, the WAU is within the historic distribution range of the Columbian white-tailed deer it is outside the current distribution range from northeast of Oakland, Oregon to Cow Creek (USDI 1983 and USDA and USDI 1994a). Today, the known white-tailed deer population is restricted to an area northeast of Roseburg. The Columbian white-tailed deer was listed as Federally Endangered in 1978. The Roseburg population of Columbian white-tailed deer is proposed to be delisted as a Federal Endangered species.

(5) The Canada Lynx

The Canada lynx was proposed by the USFWS for listing as a Federal Threatened species on July 8, 1998. The listing would apply to lynx populations in Washington, Oregon, and 14 other states from Idaho to Vermont. Nine counties in Oregon had historical records of lynx populations (USDI 1998). A self-sustaining resident population is not occur in Oregon but individual animals are present (Verts and Carraway 1998). Historically, the Canada lynx was not present in the WAU. The lynx has not been reported as occurring in Douglas County, the Roseburg BLM District, or the South Umpqua WAU. Although, the lynx has been reported to be present in the Cascade and the Blue Mountains in Oregon (USDI 1998). The lynx occurs in areas receiving large amounts of snow during the winter and where the snowshoe hare lives.

(6) Fender's Blue Butterfly

The Fender's blue butterfly was listed as an Federal Endangered species on January 25, 2000. This butterfly is only known to occur in the Willamette Valley (Federal Register 2000 and ONHP 1998). The historical distribution is unknown. The Fender's blue butterfly may occur in the WAU where the habitat is similar to conditions in the Willamette Valley. Surveys for the butterfly have not been conducted in the South River Resource Area.

The life cycle of the Fender's blue butterfly is dependent on a few species of lupine, especially Kincaids lupine (Lupinus sulphurous ssp. kincaidii). The caterpillar feeds on the lupine during its growing period prior to changing into a butterfly. Kincaids lupine occurs in the South River Resource Area, in the Letitia Creek Drainage, and is suspected to occur in the South Umpqua WAU. The suspected presence of Kincaids lupine means the Fender's blue butterfly may be present in the WAU.

(7) The Vernal Pool Fairy Shrimp

The vernal pool fairy shrimp (Branchinecta lynchi) inhabits temporary pools of water found in grass or mud bottomed swales (Federal Register 1994). The primary distribution range is in the Central Valley in California. However, the vernal pool fairy shrimp has been located on the Medford BLM District, near Table Mountain. The vernal pool fairy shrimp is not expected to occur on BLM-administered land in the WAU due to the lack of suitable vernal pool habitat. Inventories have not been conducted for this species or its habitat in the Roseburg BLM District.

b. Bureau Sensitive Species

(1) The Peregrine Falcon

Peregrine falcons were a "common breeding resident" along the Pacific coastline and present in many other areas, including southwestern Oregon (Haight 1991). Peregrine falcon populations in the Pacific Northwest declined from historical numbers because of organochloride pesticide use, other chemicals (avicides, such as organophosphate) used to kill other bird species considered to be pests, shooting, and habitat disturbance (loss of wetlands and fresh water marsh environments in interior valleys and increased rural development) (Aulman 1991).

Several peregrine falcon nest locations occur in the South River Resource Area. One occupied peregrine falcon nest site is within one mile of the South Umpqua WAU. The pastures and hardwood stands along the South Umpqua River in the WAU provide open hunting areas for peregrine falcons. An evaluation using aerial photographs and on-the-ground review determined rock outcrops or cliff habitats occur in some parts of the WAU. Evaluation of higher elevations of the WAU is continuing.

The peregrine falcon has been delisted and is no longer considered a Federal Endangered species under the Endangered Species Act of 1973, as amended. The peregrine falcon is now considered to be a Bureau Sensitive Species. Its status will be reevaluated after five years of monitoring, in 2004.

(2) The Northern Goshawk

Information about the northern goshawk was collected east of the Cascade Mountains (Marshall 1991). Current geographic distribution suggests the northern goshawk would not be expected to occur in most of the Roseburg BLM District. Observations recorded since 1984 show the northern goshawk occurs north of its expected distribution range in Josephine County, Oregon. Several nest sites have been found on the Roseburg BLM District but are located outside of the South Umpqua WAU. Older forest stands are potential northern goshawk habitat but less than ten percent of the stands in the WAU have been surveyed.

(3) Bat Species

During the summer of 1994, a survey to identify the bat species present in the South River Resource Area was conducted by Dr. Steve Cross of Southern Oregon College in Ashland, Oregon. Bat species use unique habitats like caves, talus, cliffs, snags, and tree bark for roosting, hibernating, and maternity sites. Some of these components may be near or within vegetated areas. Bats also use other unique habitats (ponds, creeks, and streams) to find food and water. Many abandoned mine shafts and adits are present in the WAU, especially in the Canyon Creek Subwatershed. The abandoned mine inventory has not documented bats using any of the surveyed sites in the WAU.

Some bat species use coniferous forests for roosting habitat. Trees greater than 40 inches in diameter with defects and snags typically provide the best quality roosting habitat. A recent study using radio tracking technology found trees with defects, typically found in large, old, dominant trees, as well as snags, were the most commonly used roost sites within forest ecosystems (Bogan et. al. 1999).

(4) Amphibians and Reptiles

Amphibian inventories were conducted in the South River Resource Area in 1994 and 1997 (Bury 1995). These inventories document the amphibian species in the area. The spotted frog is not expected to occur in the WAU and was not found during the 1994 inventory. Species like the Southern Torrent salamander (Rhyacotriton variegatus), western red-backed salamander (Plethodon vehiculum), Dunn's salamander (Plethodon dunni), and other regional species have been documented as occurring in the WAU.

The northern red-legged frog, foothill yellow-legged frog, clouded salamander, Del Norte salamander, tailed frog, Cascades frog, southern seep salamander, and western pond turtle use unique habitats within the many different vegetation types in the WAU. The tailed frog, which prefers cooler water temperatures, has been documented occurring in O'Shea Creek. Features like large down woody material, talus slopes, creeks, seeps, ponds, and wetlands are often used by amphibian species in southwestern Oregon. Because these features are found in the South Umpqua WAU, amphibian species are expected to occur in the WAU. Generally, floodplain areas contained the best habitat for amphibians before development and grazing began in the early 1900s.

Western pond turtles occur in several ponds in the WAU, as well as along the South Umpqua River. Nesting turtles use warm, sandy riverbanks to incubate eggs. Although, nest sites have not been observed western pond turtle sites may occur in the WAU. Several riverside nest sites are located upriver from Tiller. The western pond turtle would be expected to occur mostly in ponds on Federally-administered land because of limited amount of Federally-administered land along the South Umpqua River.

c. Bureau Assessment Species

Five terrestrial animal species on the Roseburg BLM District are considered to be Bureau Assessment Species (BA). Bureau Assessment Species are not included as Federal or State species but are of concern in Oregon or Washington. The five species include the Brazilian free-tailed bat (Tadarida brasiliensis mexicana), common loon (Gavia immer), merlin (Falco columbarius), red-necked grebe (Podiceps grisegena), and snowy egret (Egretta thula).

(1) The Brazilian Free-tailed Bat

The distribution range of the Brazilian free-tailed bat extends from southwestern Oregon to the Carolinas and south to Central America (Verts and Carraway 1998 and Csuti et al. 1997). The Brazilian free-tailed bat uses caves, tree hollows, barns, houses, and other buildings. The warmer temperatures in the lower elevations may provide conditions this bat prefers.

(2) The Common Loon

The common loon species is occasionally observed on lakes and major rivers in Douglas County, Oregon. Although, the South Umpqua River flows through the South Umpqua WAU and there are some large constructed lakes a breeding population is not expected to occur in the WAU.

(3) The Merlin

The merlin is a bird of prey (a falcon) not commonly seen in Douglas County, Oregon. The lack of sightings may be due to its size and secretive habits. The merlin has been documented breeding in Douglas County, Oregon (Umpqua Valley Audubon Society 1997). Typical habitat for this species includes mixed conifer and hardwood stands interspersed with openings having low ground cover. Mixed conifer and hardwood stands occur in the lower elevations of the WAU. Avian prey species consist primarily of songbirds and small game birds.

(4) The Red-necked Grebe

The red-necked grebe has been seen but is not common in Douglas County, Oregon. This grebe uses shallow lakes, such as Klamath Lake or Howard Prairie, during its breeding season and spends the winter along the Oregon Coast. It is not expected to occur in the WAU because of the lack of suitable large lake habitat.

(5) Snowy Egret

The snowy egret is not expected to occur in Douglas County, Oregon. The snowy egret's breeding range is southeastern Oregon but some wandering individuals have been documented in Douglas County, Oregon. Wetlands, marshes and shallow lakes are the preferred habitats for this species.

d. State of Oregon Listed Species

There are 25 animals listed as threatened or endangered by the State of Oregon. The marbled murrelet, northern spotted owl, and bald eagle are also Federally listed. The peregrine falcon is no longer listed as Federally Endangered but is listed as endangered by the State of Oregon.

e. Special Attention Species

Survey and Manage species were identified in the Northwest Forest Plan (USDA and USDI 1995). Management of known sites, surveys prior to ground disturbing activities, and extensive or general regional surveys are the components of Survey and Manage Standards and Guidelines. Protection Buffer species were identified to be protected by buffers from ground or habitat disturbing activities.

(1) Mollusks

In western Oregon and Washington, over 150 species of land snails and slugs have been identified. Generally, snails and slugs avoid disturbed areas where habitat modification leads to loss of moisture and increased exposure to solar radiation (Frest and Johannes 1993).

Over 200 species of aquatic mollusks have been documented in western North America. These species inhabit permanent or seasonal water bodies. Most freshwater mollusks prefer cold, clear streams with dissolved oxygen (DO) near saturation levels (Frest and Johannes 1993). In 1993, Frest and Johannes stated that 108 mollusk species (57 freshwater aquatic and 51 land) were known to occur within the range of the northern spotted owl. Of these, 102 species are known or are likely to occur on Federally-administered lands.

In 1997, Frest and Johannes reported 46 mollusk species (17 land and 29 aquatic) were known to occur in Douglas County, Oregon. An additional 75 species may be present. Thirty-one of these species were analyzed in the SEIS ROD as sensitive taxons. Only five species of land snails and slugs present in Douglas County, Oregon require surveys prior to ground disturbing activities.

Several species are considered to be common in the WAU, including Ancotrema sportella, Haplotrema vancouverense, Vespericola columbianus, Ariolimax columbianus, and Monadenia fidelis. The four Survey and Manage terrestrial mollusk species documented as occurring in the WAU include the blue-grey taildropper slug (Prophysaon coeruluem), papillose tail-dropper slug (Prophysaon dubium), Oregon megomphix (Megomphix hemphilli), and the Oregon shoulderband (Helminthoglypta hertleini). The preferred habitat elements for these species are canopy closure greater than 70 percent, hardwoods, deep leaf litter, down logs, rock outcrops, talus, and ground vegetation, such as sword fern and salal. The nonforested areas probably do not provide habitat for these mollusk species. No Survey and Manage aquatic mollusk species are known to be present in the WAU.

(2) Del Norte Salamander

The Del Norte salamander (Plethodon elongatus), a Survey and Manage species, was documented occurring in the Lower Cow Creek Watershed, which is adjacent to the South Umpqua WAU. No known Del Norte salamander sites occur in the South Umpqua WAU. The Del Norte salamander uses forested talus habitat, rocky substrates in hardwood stands, and riparian areas. Other habitat features include cool, moist conditions with moss and fern ground cover, lichen downfall, deep litter, and cobble dominated rocky substrates (IB-OR-96-161 Protocols for Survey and Manage Amphibians and BLM-IM-OR-2000-004, Survey and Manage Survey Protocols- Amphibians v. 3.0).

The South Umpqua WAU is less than 25 miles from a known the Del Norte salamander site. Projects in the WAU need to be evaluated to determine if surveys are required prior to ground disturbing activities (BLM-IM-OR-2000-004). If suitable rocky habitat is present, the site needs to be surveyed before implementing ground disturbing activities. Evaluation of soil data indicates the WAU may have about 42,000 acres of potential Del Norte salamander habitat.

(3) The Red Tree Vole

The red tree vole (Phenacomys longicaudus) is an arboreal rodent, which lives inside the canopy of Douglas-fir forests in Oregon and northern California. Its primary food is Douglas-fir needles. However, Sitka spruce, western hemlock, and grand fir needles are also eaten by red tree voles (Huff et al. 1992). The red tree vole's geographic range includes the Roseburg BLM District. The red tree vole is present in the South Umpqua WAU. There are approximately 38,013 acres of Douglas-fir forest stands greater than 50 years old. Seventy-nine percent of the stands are on Federally-administered land.

(4) The Great Gray Owl

The great gray owl (Strix nebulosa) was designated a Protection Buffer Species in the Northwest Forest Plan (USDA and USDI 1994b). This owl species uses forest stands for nesting while foraging in meadows or other openings. The great gray owl usually lives in areas above 2,500 feet in elevation.

The great gray owl has been documented occurring in the Stouts Creek Subwatershed of the WAU. Repeated observations in the same general vicinity suggests great gray owls may be nesting in the area. Although, a nesting site has not been located.

f. Special Interest Species

These species are of special interest to the general public or another agency, such as the Oregon Department of Fish and Wildlife.

(1) Osprey

The South Umpqua WAU supports bird of prey species common to the region but estimates of local populations are not available. These raptor species occur where suitable habitat is present.

Osprey (Pandion haliaetus) nesting habitat is present along the South Umpqua River, which flows through the middle of the WAU. Several nest sites have been monitored.

(2) Turkey

Historic distribution of the wild turkey (Meleagris gallopavo) extended from Arizona north and east to New England and southern Canada. Their range also extended to Veracruz, Mexico. The turkey has disappeared from its historic range. It has been introduced into California, Nevada, Oregon, Utah, Washington, and Wyoming (Csuti et al. 1997).

Wild turkeys inhabit savannah woodlands, young forest stands less than 10 years old, meadows, and riparian areas (Csuti et al. 1997 and Crawford and Keegan 1990). Oak savannahs present in the lower elevations of the WAU are mostly on private land.

(3) Roosevelt Elk

Historically, the range of Roosevelt elk (Cervus elaphus) extended from the summit of the Cascade Mountains to the Oregon Coast. In 1938, the elk population was estimated to be 7,000 animals (Graf 1943). Elk numbers and distribution changed as people settled in the region. Over time, elk habitat areas shifted from the historical distribution to "concentrated population centers which occur as islands across forested lands of varying seral stages" (South Umpqua Planning Unit 1979). Information about the historical distribution of elk within the South Umpqua WAU and the Melrose and Tioga management units designated by ODFW, is not available. Due to the increased number of people, road construction, home construction, and timber harvesting, it is suspected the elk population has decreased as reported in other parts of the region (Brown 1985).

The number of Roosevelt elk in the South Umpqua WAU are not available (Personal communication from ODFW). Elk forage for food in open areas where the vegetation includes grass-forb, shrub, and open sapling communities. Elk use a range of vegetation age classes for hiding. Hiding components include large shrub, open sapling, closed sapling, and mature or old-growth forest habitat (Brown 1985).

The South Umpqua WAU includes part of two elk management areas Roseburg District Proposed Resource Management Plan (USDI 1994). However, management direction for these elk management areas were not discussed in the Roseburg District ROD/RMP (USDI 1995).

The quality of elk habitat in these management areas was evaluated in the Roseburg District Proposed Resource Management Plan (USDI 1994). Cover quality, forage quality and road density indices were calculated using the Wisdom model (Wisdom et al. 1986). All three indices were below the minimum levels considered optimum for use by elk. The habitat indices are general guides for elk management.

(4) Neotropical Bird Species

Bird species that migrate and spend winter south of the North American Continent are considered to be neotropical bird species. Bird species that live on the North American Continent year round are called resident birds. Widespread concern for neotropical bird species, related habitat alterations, impacts due to pesticide use, and other threats began in the 1970s and 1980s (Peterjohn et al. 1995).

Oregon has over 169 bird species considered to be neotropical migrants. Population trends of neotropical migrants in Oregon show declines and increases. Over 25 species have been documented to be declining in numbers (Sharp 1990). Oregon populations of 19 bird species show statistically significant declining trends while nine species show significant increasing trends (Sharp 1990). Including all species showing declines, increases, or almost statistically significant trends, there are 33 species decreasing and twelve species increasing in number in Oregon (Sharp 1990).

From 1993 through 1999, neotropical birds were captured and banded and habitat evaluations were conducted in the South River Resource Area. One of the banding stations is located in the Canyon Creek Subwatershed. Surveys from 1996 through 1998 found 62 bird species were present at the banding station. Over half (62 percent) of the bird species banded were neotropical migrants. Six neotropical bird species declining in numbers in the State of Oregon were banded. Two species, the purple martin and Lewis' woodpecker, are listed as State of Oregon Critical species.

Approximately 800 acres of private land within the WAU were donated to the Roseburg BLM District in 1996. The Canyon Mountain Fire and subsequent salvage operations changed the age class of stands in the fire area. The resulting younger stands, in conjunction with the elevation zones and special habitats (i.e. meadows), provide diverse habitats used by a number of neotropical bird species.

Other areas in the South Umpqua WAU also support populations of neotropical species. The hardwood, shrub, and conifer species in the WAU function as breeding, feeding, and resting habitat for many neotropical birds. The conversion of native grasslands and oak savannahs to agricultural lands may have changed the number and types of bird species inhabiting the WAU.

2. Interpretation

The plant associations are present due to the elevation and geologic history of the South Umpqua WAU. The combination of age classes, stand structures, and plant communities produces a variety of wildlife habitat types. Habitat quality and distribution affects habitat use by wildlife. The arrangement of the various wildlife habitats in the WAU is a result of natural and human caused events. Natural disturbances like fire, wind, and flood change the landscape by altering plant community distribution and structure. Human impacts include fire, used to clear land of vegetation and debris, timber harvesting, road construction, home construction, and ownership patterns. Approximately 57 percent of the WAU is privately owned. The checkerboard pattern of vegetation differences is a dominant feature of the WAU, affecting wildlife habitat management.

Nonforested areas, such as agricultural and urban areas, have increased slightly during the past sixty years. The number of acres in early and mid seral age class stands has increased since 1936. Consequently, wildlife species, which use early and mid seral age class habitat, probably have experienced an increase in habitat availability. Wildlife habitat quality may depend upon how a stand is managed.

The amount of late seral habitat in the WAU has decreased since 1936. Late seral stands comprise about 26 percent of the WAU (using the FOI and POI GIS data). Using 1993 satellite imagery, the late seral habitat comprised about 36 percent of the WAU. Both methods of analysis show the late seral stands remaining in the WAU have become fragmented (separated from each other). The Stouts Creek, St. Johns Creek, and Days Creek Subwatersheds have been affected the most. About 95 percent of the late seral habitat in the WAU is on Federally-administered land.

Most late seral stands are a mixture of age classes, with gaps containing early seral vegetation nested in a block of late seral vegetation. In the Klamath Province especially, late seral stands contain a mixture of uneven aged hardwoods and conifers and not a uniform stand of large, old conifers, generally visualized as old-growth forests. The differences between historic vegetation conditions (small patches of early and mid seral vegetation nested in larger blocks of mature vegetation) and current conditions (large blocks of early and mid seral vegetation with scattered patches of late seral vegetation between them) has affected wildlife populations in the WAU.

Forest management practices may increase habitat for some wildlife species, such as early and mid seral stands providing forage for elk. However, some early and mid seral stands may not provide habitat used by other wildlife species. Silvicultural manipulation of some early seral stands may have removed some wildlife habitat components, changing wildlife habitat quality. Timber harvesting on short rotations do not allow stands to develop old-growth characteristics and provide habitat for wildlife species dependent on late seral habitat.

Wildlife habitat distribution in 2025 could be estimated from age classes based on a long range timber harvesting plan (see Map 16). There would be less early seral habitat in 2025 and it would be located mainly in the Matrix Land Use Allocation. The early seral habitat would contain residual habitat elements from the previous stand, making it more useful for many wildlife species. The early seral habitat would have grown into mid-seral stands.

The amount of late seral habitat on BLM-administered land in the WAU would be about the same in 2025 as current conditions. However, the arrangement and quality of the habitat would change. There would be less late seral habitat in the Matrix Land Use Allocation and more in the reserves. The quality of the late seral habitat would be somewhat different since some of the stands would be 80 years old and the harvested stands would generally be greater than 120 years old with old-growth characteristics. The maturation of forest stands in the reserves would provide more continuity between late seral forest stands and create larger blocks of interior forest conditions and useable habitat.

In 2025, many of the early seral stands (less than 30 years old) would have matured into closed canopy, mid seral aged stands (31 to 60 years old). The mid seral stands provide dispersal habitat for some old-growth associated wildlife species. Dispersal habitat provides food, shelter, shade, and moisture conditions for many late-successional associated wildlife species. Mid seral stands adjacent to late seral stands may provide connectivity between late seral habitat across the landscape allowing late-successional associated wildlife species to move between late-successional habitat. The change would effectively increase the use of late-successional habitat and the abundance of late-successional associated wildlife species.

Fire can cause the loss of wildlife habitat in the WAU. The Klamath Mountain Physiographic Province has an ecology developed with wildfire. However, the WAU is in the northern part of the Klamath Mountain Physiographic Province, which has a cooler, wetter climate than other portions of physiographic province. Wildfires have burned a large amount of wildlife habitat in the southern portion of the WAU. The two largest fires on the Roseburg BLM District during the last two decades burned in this WAU. Limiting wildfires is important for maintaining wildlife habitat.

Riparian Reserves were designated to help provide habitat and dispersal opportunities for late seral species. Riparian Reserves on BLM-administered land in the WAU are composed of 55 percent late seral habitat. Connectivity of riparian late seral habitat is of concern in the Days Creek Subwatershed and the St. Johns Creek Drainage. These areas are used for dispersal by late seral associated wildlife species, such as the northern spotted owl, which avoid the agricultural lands in the valleys of the WAU. Most of the documented dispersing northern spotted owls in the WAU travel east and west through the South Umpqua River/Galesville LSR or north and south between Township 31 South, Range 3 West and Township 30 South, Range 3 West. Two sections (T30S, R3W, Sections 15 and 23) contain a limited amount of late seral habitat in reserved areas of BLM-administered land, representing the least connectivity of late seral habitat for dispersal.

Many wildlife species are known to use riparian areas as primary or secondary habitat. At least thirteen species of land mollusks use riparian areas including Ancotrema sportella, Haplotrema vancouverense, Prophysaon dubium, Prophysaon coeruleum, Prophysaon andersoni, three new species of the genus Vespericola, Vertigo columbiana, Monadenia fidelis, Pristiloma arcticum crateris, Ariolimax columbianus, and one new species of the genus Trilobopsis (Frest and Johannes 1999). Four salamander species (the Dunn’s, Pacific giant, clouded, and rough-skinned newt) may be present in the WAU. At least one species of aquatic snail (Juga juga) is present in the WAU. Other species of snails and clams have been located in the South Umpqua River.

Several ponds are located in the WAU. Most of these are manmade structures, constructed as pump chances for fire suppression activities. They also provide water for terrestrial wildlife and habitat for aquatic wildlife species. A pond’s usefulness for wildlife is dependent on the shape, the type of vegetation present, or if non-native species are present.

C. Plants

1. Special Status Plants

Surveys have been conducted for Special Status Plants on portions of the South Umpqua WAU. However, many Survey and Manage and Protection Buffer species do not have survey protocols developed. Appendix J2 of the Final Supplemental Environmental Impact Statement (FSEIS) was the source for information on fungi, lichens and bryophytes and their habitats. At the watershed analysis level, identifying locations of species suspected to occur in the WAU would be based on habitat. Five Special Status Plant species have been documented to occur in the WAU.

a. Vascular Plants

Astragalus umbraticus (Woodland Milk Vetch), Bureau Assessment Species
Woodland milk vetch grows in open woods at low to mid elevations from southwest Oregon to northwest California. Woodland milk vetch has been observed to grow in areas impacted by fire and logging. It is likely this species has become rarer because of fire suppression activities.

Dichelostemma ida-maia (Firecracker Plant), Bureau Tracking Species
The firecracker plant grows in open woods, grassy hillsides, and roadsides at elevations between 1,000 and 4,000 feet from Douglas County, Oregon south through the Siskiyou Mountains into California, where it is more common. It has been found in clearcuts, road cuts, and areas impacted by fire.

Mimulus douglasii (Kellogg's monkeyflower), Bureau Assessment Species
Mimulus douglasii grows in open woods and meadows. It grows in gravelly soil that is moist in the spring. The plant often grows on serpentine soils. It occurs below 4,000 feet in elevation. Avoid ground disturbance at known sites.

Pellaea andromedaefolia (Coffee Fern), Bureau Assessment Species
Pellaea andromedaefolia is a fern that occurs on dry rock outcrops, mostly in the open, but at times along shaded stream banks. It grows below 4,000 feet in elevation. Distribution ranges from Lane County, Oregon south to Baja, California.

Phacelia verna (Spring Phacelia), Bureau Tracking Species
Phacelia verna is an annual forb in the waterleaf family that blooms from April to June. Its distribution range is southwest Oregon. It grows on mossy sparsely vegetated rock outcrops and balds between 500 and 6,600 feet in elevation.

Three other Special Status Plants that have been documented in South River Resource Area are suspected to occur in the South Umpqua WAU.

Aster vialis (Wayside aster), Bureau Sensitive and Survey and Manage Species
Aster vialis is a rare locally endemic plant known only from Lane, Linn, and Douglas Counties in Oregon. It occurs primarily along ridges between Eugene and Roseburg. Plant succession resulting in canopy closure of the forest over these plants could be a significant management concern. Long term survival of this species may depend on controlled disturbance of the habitat to allow more light to penetrate the canopy and improve conditions for Aster vialis reproduction. The role of fire is probably important in maintaining viability. It thrives most vigorously in openings within old-growth stands or associated with edge habitat (Alverson and Kuykendall 1989).

Cypripedium montanum (Mountain Lady's Slipper), Bureau Tracking and Survey and Manage Species
Cypripedium montanum populations are small and scattered. Less than 20 exist west of the Cascade Mountains. Small populations may reflect the slow establishment and growth rate of this species. Cypripedium montanum persists in areas that have been burned. The species ranges from southern Alaska and British Columbia to Montana, Idaho, Wyoming, Oregon, and California. Survival of the species may depend on protecting known populations and developing a conservation plan (USDA and USDI 1994a).

Lupinus sulphureus var. kincaidii (Kincaids Lupine), Federal Threatened Species
This is one of the three varieties of Lupinus sulphureus found in Oregon. It grows in the Willamette Valley and south into Douglas County, with a disjunct population reported in Lewis County, Washington (Eastman 1990). Lupinus sulphureus has been observed growing in road cuts and jeep trails. Long term survival of this species may depend on controlled disturbance of the habitat to allow more light to penetrate the canopy and improve conditions for lupine reproduction (Kaye et al. 1991).

Other Survey and Manage Species have been documented as occurring in the WAU. They include the Fungi Hydnum umbilicatum, Otidea onotica, Pithya vulgaris, and Sarcosoma mexicana, and the Lichens Lobaria hallii and Pseudocyphellaria crocata. Survey and Manage plant species suspected to occur in the South Umpqua WAU are listed in Table F-1 in Appendix F.

b. Fungi

Hydnum umbilicatum, Survey and Manage Species
Hydnum umbilicatum is a mycorrhizal tooth fungus associated with both conifers and hard woods. It fruits during the winter from October to April. The geographic range extends from northern California to Washington.

Otidea onotica, Protection Buffer and Survey and Manage Species
Otidea onotica is a cup fungus. The geographic range extends from northern California to Washington.

Pithya vulgaris, Survey and Manage Species
Pithya vulgaris is restricted to fruiting from detached twigs and down foliage of true firs and redwoods. It typically fruits near or under melting snowbanks.

Sarcosoma mexicana, Protection Buffer and Survey and Manage Species
Sarcosoma mexicana is a cup fungi. It occurs in the Cascade and Coast Range Mountains from California to Washington.

c. Lichens

Lobaria hallii, Survey and Manage Species
Lobaria hallii is found on the bark and wood of hardwoods and conifers. It ranges from Alaska to northern California and east to near the Continental Divide in western Montana.

Pseudocyphellaria crocata, Survey and Manage Species
Pseudocyphellaria crocata is found on the bark and wood of hardwoods and conifers. It ranges from Alaska to California.

Other plants to consider include Protection Buffer Species suspected to occur in the WAU. Protection Buffer Species suspected to occur in the WAU include the Bryophytes Buxbaumia viridis, Rhizomnium nudum, and Ulota megalospora, and the Fungi Aleuria rhenana, Otidea leporina, Otidea smithii, and Polyozellus multiplex.

2. Noxious Weeds

Noxious weed encroachment has reduced natural resource values in the South Umpqua WAU. The introduction and establishment of noxious weeds can affect native plant communities by reducing the diversity, abundance, and distribution of native plants (Bedunah 1992).

Yellow Starthistle (Centaurea solstitialis) and Rush Skeletonweed (Chondrilla juncea) have been documented as occurring in the WAU. Both of these noxious weed species have been designated as Target noxious weeds by the Oregon Department of Agriculture (ODA). There is a high potential Yellow Starthistle may spread within the WAU.

The intent of the integrated weed management program is to maintain and restore desirable plant communities and healthy ecosystems. Preventing the establishment and spread of new noxious weed populations is the best protection method. The management strategy concerning new noxious weed invasions would be to eradicate infestations before they spread to the point where eradication is not possible. Treatments in following years may be needed to eradicate invading noxious weeds. Established invasions may not allow practical or economical eradication treatments. Treatments to contain existing large populations and eradicate small, outlying populations would be used to control established invasions.

The BLM has an agreement with the Oregon Department of Agriculture (ODA) where locations of noxious weed invasions are identified and monitored by the BLM and control measures are administered by ODA. Biological controls have been approved and are used to slow or reduce the spread of established populations of widespread noxious weeds, such as non-native thistles, Saint John's wort, and Scotch broom. Mechanical and chemical treatments have been used to prevent the spread of Scotch broom and decrease visibility hazards on forest roads.

The following goals are important to minimize or avoid the spread of nonnative species.

-Inventory by species
-Identification of potential invaders
-Monitoring
-Prioritization of noxious weed species
-Habitat management and restoration
-Revegetate bare soil following disturbance
-Develop rock source management plans
-Keep records of rock surfaced roads that may have noxious weed seed.
-Equipment cleaning

VIII. Synthesis

The Bureau of Land Management administers approximately 41 percent of the South Umpqua WAU. About 57 percent of the WAU is privately owned. The U.S. Forest Service administers the remaining two percent of the South Umpqua WAU. Timber harvesting activities on BLM-administered lands through the year 2024 are estimated to affect about four percent of the WAU.

About 13 percent of the WAU is nonforested (mostly agricultural land). The WAU has about the same amount of agricultural land as in 1936. The amount of nonforested land affects the vegetation patterns in the WAU. The nonforested land may also be a barrier to the movement of some wildlife species and affect the distribution of those species.

Historically, between 50 and 87 percent of the WAU consisted of mid and late seral stands. Assuming all private lands would be less than 80 years old, the WAU would be estimated to consist of about 32 percent in late seral stands in 80 years.

Land management practices, roads, and timber harvesting can affect stream channels and the hydrology of the WAU. When precipitation is routed to stream channels faster, it may cause increased peak flows and less water to be stored as groundwater. Reducing road densities, replacing culverts, improving roads, conducting stream restoration projects, and thinning in Riparian Reserves would address water quality and stream channel conditions in the WAU. Stream temperatures, dissolved oxygen, sediment, fish passage, and peak flows are water quality and fisheries conditions that could be improved by reducing road densities, replacing culverts, improving roads, and constructing stream restoration projects. Thinning in Riparian Reserves would allow trees adjacent to stream channels to grow and provide recruitment of LWD faster than without management.

Timing and spacing of timber harvesting activities could help minimize impacts on wildlife, peak flows, and streams. Timber harvesting may be used to help with the cost of conducting watershed restoration opportunities.

Seven types of restoration opportunities were identified. The seven types were vegetation treatments in Riparian Reserves, road treatments, instream structures, culvert treatments, vegetation treatments in the LSR uplands, risk reduction treatments, and pond treatments. Criteria where restoration activities should occur were identified for five of the restoration opportunity types. Criteria for risk reduction treatments could not be developed, at this time. The pond treatments (specific locations and actual restoration treatments) have already been identified. The ideal situation would be to use all of the criteria to decide where to go first for restoration opportunities. However, if areas do not overlap, restoration opportunities have been completed where all of the criteria overlap, or funding becomes available, such as associated with another management activity, then treatments may occur in what may be considered a lower priority area. The criteria for determining the priority areas are included in the following lists.

A. Vegetation Treatments in Riparian Reserves

- Go to owl circle ranking of 3 for the Matrix Land Use Allocation and 1 for the LSR in Table E-2 in Appendix E of the watershed analysis,
- Locate treatments in streams on the state water quality limited list for temperature (the information is in Table 41 and in this watershed includes Fate Creek, Stouts Creek, the East Fork of Stouts Creek, and the South Umpqua River, although the BLM administers only a small amount of land along the South Umpqua River),
- Areas with concerns about connectivity of late seral habitat (would include T30S, R3W, Sections 15 and 23 and the Lower West Fork Drainage in the Canyon Creek Subwatershed),
- the South Umpqua River/Galesville LSR Assessment identified the Bland Mountain Fire area.

B. Road Treatments

- TMO data listed in Appendix G of the watershed analysis,
- location of road (valley bottom, mid-slope, or ridgetop), the higher priority roads to treat would be those causing problems within 100 feet of a stream,
- soil type (information about slope stability, which could come from the TPCC),
- macroinvertebrate sampling results (results indicated moderate impairment from sediment in Coffee, Stouts, and St. John Creeks),
- road density (areas with higher road densities would be higher priority),
- number of stream crossings (areas with more stream crossings would be higher priority).

C. Instream Structures

- fish distribution (priorities streams would be in descending order of where anadromous, resident, or no fish occur)
- fish density (species richness, which means the number of species)
- streams on the state water quality list for habitat modification (the information is in Table 41 and in this watershed includes Beals, Days, and Shively Creeks),
- stream morphology (Rosgen Classification map is in Appendix D of the watershed analysis, C type streams would be the best places for instream structures),
- size class or age class (stands with trees at least 16 inches DBH would allow trees to be pulled over or cut and placed in streams, the least to most suitable would be trees from 0 to 16 inches DBH, 16 inch DBH in stands less than 80 years old, and stands at least 80 years old).

D. Culverts

- fish distribution (same categories as instream structure),
- fish density/species richness (same categories as instream structure),
- type of passage (ranges from complete barrier to allows fish passage),
- problems being caused by culvert (such as sediment or would not accommodate a 100 year flood),
- life expectancy of culvert.

E. Vegetation Treatments in Uplands of LSR

- Bland Mountain Fire area in the LSR,
- owl territories (go to rating 1 for the LSR in Table E-2 in Appendix E of the watershed analysis),
- age class (LSR Assessment identifies priority age classes),
- high risk areas (if they have been identified).

IX. Recommendations

A. Vegetation

Conduct silviculture activities, such as thinnings/density management, regeneration harvests, pruning, and stand fertilization in conformance with the Northwest Forest Plan and the Roseburg and Medford BLM District RMPs.

Plan timber harvesting activities considering the impacts to other resources.

Plant genetically selected seedlings when they are available.

White pine blister rust resistant seedlings should be used when planting sugar pine in the WAU.

B. Fire and Fuels Management

Broadcast and pile burning should continue to be used for site preparation to reduce vegetative competition and hazardous fuel accumulations. Site preparation may include broadcast burning regeneration harvest units and burning hand or machine piled logging slash and landing decks. Burning activity fuels may also reduce wildfire hazards. When other resource concerns eliminate using prescribed fire, mechanical or manual fuels treatments may be necessary to achieve fuels management objectives. Fuels treatments can rarely be justified as the primary reason for reducing the risk of wildfire. Consider reducing wildfire risks when forest management activities create high fire risk conditions. Site preparation prescriptions should be written to achieve the silviculture objectives and reduce the fuel hazards as a secondary objective.

Consider the timing and size of forest management activities to avoid increasing the risk of unplanned wildland fire. Consider leaving some areas untreated or manipulating fuels in precommercial thinning stands. Providing fuel breaks and creating a variety of fuel types, such as by not thinning some stands, could allow wildfires to be suppressed at a smaller size.

C. Soils

Best Management Practices (BMPs) should be applied during all ground and vegetation disturbing activities. See Appendix D, Roseburg District Record of Decision and Resource Management Plan (USDI 1995) for a list and explanation of BMPs. Along with the BMPs, the Standards and Guidelines in the SEIS Record of Decision (USDA and USDI 1994b) should be implemented in order to achieve proper soil management. Best Management Practices should be monitored for implementation and effectiveness to document that soil goals are being achieved.

Consider using methods other than prescribed fire for reducing vegetative competition on Category 1 Soils unless considered essential for resource management, such as habitat improvement, tree seedling establishment, or reducing fire risks.

D. Hydrology

Limited water quality, stream temperature, and summer base flow data are available for this WAU. Water quality data could be collected using multi-parameter instruments, which collect diurnal data. Temperature, DO, and pH data would be useful to quantify changes occurring in streams in the WAU.

Rosgen Level II surveys would be useful to classify stream channel morphology and identify potential stream restoration sites.

Improved regional curves could be used to predict streamflow, depth, width, and cross-sectional area of ungaged streams. The information would be useful to determine potential changes in stream morphology that may occur due to management activities and help with designing stream restoration projects.

Consider planting conifers in riparian areas, where they occurred naturally, but are not growing there now.

Consider adding LWD to increase habitat complexity and help restore streams impacted by timber harvesting and road construction. Thinning in Riparian Reserves would also allow trees adjacent to stream channels to grow and provide LWD in a shorter amount of time than without any management.

Use bioengineering techniques with stream restoration opportunities. Avoid using rip rap, gabion baskets, or check dams in the stream channel.

Monitor stream restoration projects for temperature, turbidity, sediment, and channel morphology changes.

Conduct stream surveys to help design stream restoration projects, such as removing culverts when decommissioning roads or replacing culverts on fish bearing streams.

Refer to the TMO file for a list of roads observed to be causing water quality problems. Some roads to consider fully decommissioning or improving are listed in Appendix G. Roads in Tier 1 Key Watersheds, Late-Successional Reserves, Riparian Reserves, identified as causing water quality problems, and Drainages with the highest road densities would be consider first for full decommissioning.

Determine where culverts block fish passage, need to be repaired or replaced, are inadequate to accommodate a 100-year flood, and where additional culverts, waterbars, or waterdips would reduce stream network extension from ditchlines and roads.

When fertilizing in the WAU, provide adequate buffers on streams and monitor activities. Where streams or other water bodies have a pH greater than 8.0 or in municipal watersheds, apply the fertilizer so the stream pH or primary productivity would not increase.

Verify the 303(d) water quality listings and determine if management activities on BLM-administered land are causing or contributing to the water quality problems.

Consider the amount of forested land less than 30 years old, road density, amount of land in the TSZ when analyzing the potential impact of management activities.

Consider planning regeneration harvests and commercial thinnings where existing roads can be used to minimize the amount of new road construction.

Reduce road densities, improve roads, fully decommission roads, and identify stream restoration projects. Thinning in the Riparian Reserves should be considered where opportunities exist.

Consider opportunities to adjust Riparian Reserve widths within the WAU. The Riparian Reserve Evaluation Techniques and Synthesis module should be used as a guide when considering adjusting Riparian Reserve widths.

E. Fisheries

Watershed restoration opportunities may be closely linked to land management activities (i.e. road construction or timber harvesting). Streams with fair or good habitat condition ratings, high species diversity, low gradient, and easily accessible habitat should be priority areas for watershed restoration.

Follow the Terms and Conditions of the National Marine Fisheries Service (NMFS) March 18, 1997 Biological Opinion for road construction, maintenance, and decommissioning; livestock grazing; mining; and riparian rock quarry operation (USDC 1997).

Describe how projects within Riparian Reserves meets Aquatic Conservation Strategy objectives.

Analyze the amount of soil disturbance, timber falling, and yarding within late-successional timber stands in Riparian Reserves. Salvage activities in late-successional stands within Riparian Reserves should not retard or prevent attainment of Aquatic Conservation Strategy objectives.

Follow NMFS guidance on timber salvage activities in riparian areas. Salvage only the portion of tree in the road prism, leaving the portion of the tree that reached the stream.

Follow the Long Range Timber Sale Plan. Include new information from the Long Range Timber Sale Plan in the watershed analysis.

Consider reducing road densities where peak flows have negatively altered stream channel condition and impacted the fisheries resource. Prioritize the road restoration needs based on information in the Transportation Management Objectives (TMOs). Consider decommissioning roads in Drainages containing the most acres in the Transient Snow Zone and anadromous fish-bearing stream reaches. Priorities for road decommissioning would be valley bottom, midslope, and ridgetop roads.

Use existing roads, as much as possible, when planning land management activities in the WAU. Construct new stream crossings and roads within Riparian Reserves only when necessary.

F. Wildlife

1. Federally Threatened, Endangered, and Proposed Species

a. The Northern Spotted Owl

Density management activities should be conducted to accelerate development of late-successional habitat to benefit northern spotted owl productivity and survival.

b. The American Bald Eagle

Consider conducting bald eagle winter surveys along the South Umpqua River. Bald eagles have not been observed using the WAU for nesting during several years of osprey surveys in the WAU. However, osprey surveys are not conducted during the best times for detecting bald eagles. The limited amount of Federally-administered land along the South Umpqua River limits opportunities to conduct bald eagle nesting surveys from the ground. Surveys from the ground may help in determining if bald eagles are nesting in the WAU.

c. Fender's Blue Butterfly

The caterpillar of the Fender's blue butterfly is closely association with Kincaids lupine and other lupine species. The Federally-administered land in the WAU may contain Kincaids lupine habitat.

Consider conducting general surveys to locate Kincaids lupine. Any Kincaids lupine populations discovered in the WAU should be surveyed for the presence of Fender's blue butterfly caterpillars.

2. Bureau Sensitive Species

a. The Peregrine Falcon

Prepare a management plan for any high potential peregrine falcon habitat identified in the WAU considering the following management guidelines. Management guides locating a no activity buffer around an active peregrine falcon site, seasonal restrictions during the peregrine falcon breeding season from

January 1 to July 31, or maintaining the integrity of medium to high potential sites (USDI 1995 and IM-OR-2000-022). The buffer should include a no activity area of 0.25 miles to 0.75 miles (400 meters to 1,207 meters) radius around known occupied sites. A secondary zone of 0.75 miles to 1.5 miles (1,200 meters to 2400 meters) radius reflecting the shape of primary zone should be considered where no management activities, such as timber harvesting, road construction, or helicopters would be allowed during the breeding season. Activities may resume 14 days after fledgling or nest failure is confirmed. To maintain site integrity of a medium to high potential peregrine falcon nesting site, it should be managed as if it was occupied. Projects that require a disturbance, such as blasting, within one mile of any high potential habitat discovered in the future should be surveyed before project initiation. A resource area biologist should determine if seasonal restrictions may be waived.

b. The Northern Goshawk

Consider evaluating habitat and conducting surveys to determine if northern goshawks are present in the WAU. Maintain 30 acre buffers around active and alternate nest sites.

c. Bat Species

Coordinate and support research to determine what habitat elements are used by bat species in the WAU, in accordance with the National Memorandum of Understanding (MOU) with Bat Conservation International (USDI 1993).

d. Amphibians and Reptiles

Consider surveying for western pond turtles on open, south aspects within 500 feet of the South Umpqua River to prevent damaging nests by management activities.

Consider renovating ponds or wetlands lacking habitat elements. Consider removing non-native species from ponds or wetlands. Activities, such as recontouring the bottoms, planting native vegetation, removing bullfrogs and non-native fish, could be conducted with routine maintenance activities or culvert repairs.

Tailed frog habitat may be limited in stream reaches with high stream temperatures. Protect stream temperatures from increasing in streams occupied by the tailed frog by maintaining shade. Reduce stream temperatures by planting, fertilizing, or thinning trees in Riparian Reserves to grow larger trees and provide shade in a shorter amount of time.

3. Special Attention Species

a. Mollusks

Consider conducting general surveys in the WAU. Surveys for Survey and Manage mollusk species should be conducted according to established protocol guides before ground disturbing activities, including commercial thinning and herbicide use, are implemented. Survey would be conducted in the following order 1) clearance surveys of management activities, 2) survey Riparian Reserves to document species presence or absence, and 3) survey managed habitats and adjacent Riparian Reserves to evaluate impacts of habitat disturbance on specific mollusk sites.

Dispersal of smaller organisms may be maximized by retaining small patches of habitat in timber harvesting units. If these patches are close enough together, species may move between them after five to ten years when the regenerating seedlings would provide shade, and recolonize disturbed habitat. In general, management for late seral characteristics retain the moisture. In a late seral stand, increasing tree species diversity (especially hardwood species), down woody debris amounts, and organic soil depth increases the moisture regime and abundance and diversity of mollusks. Mollusk abundance may increase the available nutrients, vegetation growth rate, and moisture retention at a site.

Organic material does not accumulate on steep, rocky sites to suitable depths for use by mollusks. Primary decomposing organisms, including mollusks, prefer sites with suitable soil depths, litter, large woody debris, and moisture. Accumulations of organic debris hold water. Mollusk abundance and site productivity may be improved by capturing more organic material. Consider retaining down woody debris on steep, shallow soils. Maintain down woody debris at right angles to the slope to catch and hold organic material on the site.

b. Del Norte Salamander

Consider evaluating potential rocky habitat to determine if it is suitable Del Norte salamander habitat. Evaluate Del Norte salamander survey data to determine if this species might occur in the South Umpqua WAU.

c. The Red Tree Vole

Consider conducting general surveys for red tree voles in the WAU. Conduct clearance surveys for red tree voles prior to implementing ground disturbing activities. Follow the most recent protocol survey guides. Currently the most recent protocol guides are include in IM-OR-2000-037.

d. Neotropical Bird Species

Activities that modify habitat impact neotropical birds. This usually changes the bird species composition using a particular area. Broadcast burning, brushing, regeneration harvesting, and precommercial and commercial thinning activities impact neotropical birds by removing habitat and physically displacing birds. Displacement includes removing occupied habitat during the breeding season.

Ways to benefit neotropical birds would be to reduce the impacts from management activities that manipulate habitat. Scheduling management activities to avoid disturbing birds during nesting and breeding periods should be considered. Local populations of neotropical birds start breeding in April and May and continue through August. However, most species have young capable of flying by the beginning of July or August. Consider implementing projects impacting nesting habitat before April 1 or after July 30 of any given year.

Another way to reduce impacts is to consider the goals of Riparian Reserves when brushing, precommercial thinning, or broadcast burning areas. Consider including different prescriptions when brushing or thinning in Riparian Reserves. The different prescriptions could exclude Riparian Reserves from the activity or increase the number of shrubs and non commercial tree species that are retained.

Matrix lands outside of Riparian Reserves also contain brush and non commercial tree species used by neotropical birds. Consider retaining brush and non commercial tree species that are not competing with the desired tree species. Some projects using these recommendations have been completed. The results should be reviewed and evaluated.

Management opportunities on the recently donated land in the Canyon Creek Subwatershed to provide neotropical bird habitat could include maintaining early seral vegetation by using prescribed fire or cutting or girdling brush; maintaining vegetation patterns, diverse vegetation types, and age classes; maintaining snags.

Communication and powerline towers may be a hazard to neotropical birds. Several towers are located in the WAU. Coordinate research to determine migratory pathways and monitor the effects of towers on neotropical birds in the WAU, in accordance with the State Office MOU OR 930-9510. Utilize cooperating agency personnel to accomplish field work and analyze results.

Cavity nesting bird species use large green trees and snags as roost structures. Population trends of cavity nesting birds are unknown. Consider surveying for cavity nesting birds to determine population trends in the WAU.

X. Summary of Recommendations

Table 47 summarizes the recommendations, based on the main concerns of current conditions in the Lower South Umpqua WAU and identifies the planning objectives to be met by implementing the management strategies and potential activities. The intent of Table 47 was to show the connection between resource management concern and the management strategies and recommended activities. The planning objectives are based on the management direction and policy addressed in the RMP (USDI 1995) and SEIS ROD (USDA and USDI 1994b). The management strategy is intended to describe general methods for meeting the objectives. The management activities are more specific opportunities that may be implemented in order to achieve the management strategy. The information presented in Table 47 is discussed in more detail throughout the watershed analysis.

Table 47. Summary Table of Resource Management Concerns in the South Umpqua WAU.
Vegetation/Silviculture

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
What opportunities exist to manage overstocked stands, which have slower growth rates, are more susceptible to insects and diseases, and have an increased risk of loss due to wind and fire? How can stand density and species composition be influenced to achieve desired late-successional characteristics in the Riparian Reserves?	Approximately 9,825 acres of well stocked or overstocked stands on BLM-administered land could be treated during the next ten years to maintain growth and healthy stands.	RMP (Appendix E pp.145-154) - Riparian Reserves - Apply silvicultural practices for Riparian Reserves to control stocking and acquire desired vegetation characteristics needed to attain ACS objectives. Matrix - Precommercial and commercial thinning and fertilization would be designed to control stand density, influence species dominance, maintain stand vigor, and place stands on developmental paths.	Manage young stands to maintain or improve growth and vigor, and to improve stand structure and composition to meet ACS objectives.	Precommercial thinning and density management in the Riparian Reserves. Precommercial and commercial thinning, and density management in Matrix. Consider precommercially thinning approximately 4,325 acres in Matrix within the next ten years. Consider commercial thinning approximately 4,500 acres in Matrix within the next ten years. Consider density management of approximately 1,000 acres in the LSR within the next ten years. Consider fertilizing precommercially or commercially thinned or slow growing, overstocked stands in the Matrix. Consider manipulating precommercial thinning slash in all Land Use Allocations. Provide breaks in continuous stand types.

Table 47. Summary Table of Resource Management Concerns in the South Umpqua WAU.
Vegetation/Silviculture

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
Are there opportunities for Matrix lands within this WAU to provide a sustainable supply of timber and other forest commodities?	Approximately 10,871 acres of late seral stands on BLM-administered land in Matrix are available to help provide a sustainable supply of timber and other forest commodities.	RMP (p. 33) - Objectives for Matrix lands are to produce a sustainable supply of timber and other forest commodities and provide early-successional habitat.	Harvest timber and other forest products on Matrix lands.	Conduct regeneration harvest on Matrix lands in conformance with the RMP. Retain six to eight green trees on GFMA lands and 12 to 18 green trees in Connectivity/Diversity Blocks.

Table 47. Summary Table of Resource Management Concerns in the South Umpqua WAU.
Roads

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
Are BLM managed roads eroding and delivering excess sediment to stream channels and adversely affecting water quality and fish? Are BLM-managed roads changing peak flows, impacting stream morphology, or adding to the drainage network in the WAU?	Some BLM roads are eroding or have slope stability concerns. Average road density of 4.56 miles per square mile and stream crossing density of 2.12 crossings per stream mile in the WAU may increase sediment in streams that is outside the range of natural variability. Data Gap - No information if BLM managed roads are causing increased sediment in streams, peak flows, or the drainage network. The intermingled ownership pattern makes it difficult to reduce road densities.	RMP (pp. 72-74) - Develop and maintain a transportation system to meet the needs of users in an environmentally sound manner. RMP (p. 72) - Correct problems associated with high road density by emphasizing the reduction of minor collector and local road densities where those problems exist. RMP (pp. 19-20, ACS) - Maintain and restore the sediment regime. . . - The timing, magnitude, duration and spatial distribution of peak, high and low flows must be protected.	Minimize new road construction in areas with high surface erosion rates or slope stability problems. This would help reduce impacts to soils, water quality, and fisheries. Stabilize existing roads where they contribute to significant adverse affects on these resources. Locate, design, construct and maintain roads to standards meeting management objectives in the district road management plan. Prioritize and address erosion or slope stability concerns caused by roads, based on current and potential impacts to riparian resources and the ecological value of the affected riparian resources. Minimize sediment delivery to streams.	Consider conducting road and stream surveys, which would include looking at downcutting of stream channels, road encroachment, and culvert surveys. Possible restoration activities could include road treatments mentioned in the Fisheries section of this table. Prioritize and schedule maintenance on roads identified to be eroding or having slope stability problems. Consider closing, stabilizing, or decommissioning roads identified to be eroding or having slope stability problems, while considering short-term and long-term transportation and resource management needs.

Table 47. Summary Table of Resource Management Concerns in the South Umpqua WAU.
Soils

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
What management activities have the potential for reducing site productivity on highly sensitive (Category 1) soils?	Category 1 Soils are highly sensitive to the effects of prescribed slash burning. There are approximately 21,041 acres of Category 1 Soils on BLM-administered land in the WAU.	RMP (p. 35) - Improve and/or maintain soil productivity.	RMP (p. 140) - Evaluate the need for burning based on soils, plant community, and site preparation criteria. Burn under conditions when a light or moderate burn can be achieved on all units to protect soil productivity. The following standards should be followed: Avoid burning on Category 1 Soils (highly sensitive). RMP (pp. 36-37) - The use of prescribed fire on highly sensitive soils (those soils recognized as unusually erodible, nutrient deficient, or with low organic matter) will be avoided. Any burning on such soils, if considered essential for resource management, will be accomplished under site specific prescriptions to accomplish the resource objectives and minimize adverse impacts on soil properties. On other soils, prescribed fire prescriptions will be designed to protect beneficial soil properties. Minimize disturbance of identified fragile sites. Appendix D (pp.129-143) contains a summary of management guidance for fragile sites.	Use appropriate methods for reducing vegetative competition on Category 1 Soils. Avoid prescribed burning on Category 1 Soils unless considered essential for resource management.

Table 47. Summary Table of Resource Management Concerns in the South Umpqua WAU.
Soils

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
What management activities have the potential to reduce soil productivity due to compaction or the removal or disturbance of organic matter.	About ten percent of the South Umpqua WAU contains BLM-administered land that could be harvested with ground based equipment. About 19 percent of the South Umpqua WAU contains TPCC fragile soil sites.	RMP (p. 35) - Improve and/or maintain soil productivity.	RMP (pp. 36-37) - Apply BMPs during all ground and vegetation disturbing activities. Use silvicultural systems that are capable of maintaining or improving long-term site productivity of soils. Minimize disturbance of identified fragile sites. Design logging systems to avoid or minimize adverse impacts to soils. In forest management activities involving ground based systems, tractor skid trails, including existing skid trails, will be planned to have insignificant growth loss effect. RMP (pp.61-62) - Select logging systems based on the suitability and economic efficiency of each system for the successful implementation of the silvicultural prescription, for protection of soil and water quality, and for meeting other land use objectives. Plan timber sales involving ground yarding systems with skid trails to have insignificant (less than one percent) growth loss effect. SEIS ROD (p. C-44) - Modify site treatment practices, particularly the use of fire and pesticides, and modify harvest methods to minimize soil and litter disturbance.	Minimize soil compaction and the amount of bare soil when using ground based timber harvesting methods. Follow BMPs in Appendix D of the RMP. Follow mechanical site preparation guidelines for track type equipment. Locate new roads on existing trails or disturbance when possible. Construct roads to the minimum standards necessary to meet objectives.

Table 47. Summary Table of Resource Management Concerns in the South Umpqua WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning Objectives	Management Strategy	Management Activity
How can suitable habitat around northern spotted owl sites be managed following the Standards and Guidelines to minimize effects on the northern spotted owl?	Forty-nine northern spotted owl pairs are located in the WAU. Many of the sites are below threshold levels of 40 percent suitable habitat within a 1.3 mile radius around the owl activity center.	RMP (p. 41) - Protect, manage, and conserve Federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and Bureau special status species.	RMP (p.48) - Retain 100 acres of the best northern spotted owl habitat as close to the nest site or owl activity center as possible for all known (as of January 1, 1994) spotted owl activity centers. Human activity within 1/4 mile of nest sites which could disturb owl nesting activities will be restricted, especially the use of large power equipment and falling of trees. Restrictions will apply from March 1 to September 30 or until non-nesting status is confirmed using protocol procedures. The retention of adequate habitat conditions for dispersal of the northern spotted owl will be taken into account during watershed analysis that addresses the issue of adjusting Riparian Reserve widths.	Consider using timing and location of habitat removal or modification on the landscape to reduce effects within known territories. Plan timber harvesting activities that consider owl site condition, connection to other habitat, and the ranking of the owl sites in this analysis. Consider conducting near future timber harvesting activities outside of known 1.3 mile territories or in the periphery of the territory and outside of the 0.7 mile radius of known activity centers, when possible.
Is there potential great gray owl habitat within the WAU? The great gray owl is a Protection Buffer Species.	Great gray owls may occur in coniferous forests adjacent to meadows. There is potential suitable habitat above 2,500 feet in elevation on BLM-administered land in the WAU.	RMP (p. 41) - Protect SEIS Special Attention Species so as not to elevate their status to any higher level of concern.	RMP (p. 44) - The RMP/NFP established Late-Successional Reserves for the Protection Buffers of the great gray owl. Specific mitigation measures for the great gray owl, within the range of the northern spotted owl, include the following: provide a no harvest buffer of 300 feet around meadows and natural openings and establish 1/4 mile protection zones around known nest sites. Survey for nest location using the established protocols. Protect all future discovered nest sites.	Conduct surveys using established protocols to clear potential project areas. A two year survey protocol is required if the habitat meets all of the protocol criteria.

Table 47. Summary Table of Resource Management Concerns in the South Umpqua WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning Objectives	Management Strategy	Management Activity
Are there survey and manage species present in the WAU?	Four survey and manage mollusk species and the red tree vole have been documented occurring in the WAU.	RMP (p. 41) - Protect SEIS Special Attention Species so as not to elevate their status to any higher level of concern.	Collect information on distribution and abundance of survey and manage species present in the WAU. Identify what type of or how much habitat is necessary for species to survive.	Conduct clearance surveys prior to implementing ground disturbing activities. Consider conducting general surveys in all LUAs using established protocols to identify distribution across the landscape. Consider retaining suitable habitat features in regeneration harvest units to maintain habitat connectivity. Consider conducting pre- and post-harvest surveys to monitor effects on mollusks.
Is there potential Del Norte salamander habitat within the WAU? Is the WAU within 25 miles of a known site? Is the Del Norte salamander present in the WAU?	There are approximately 42,093 acres of talus habitat associated with stands that are at least 80 years old on BLM-administered land in the WAU. The entire WAU is within 25 miles of a known site. This salamander may be in the WAU but has not been documented to occur in the WAU.	RMP (p.41) - Protect SEIS Special Attention Species so as not to elevate their status to any higher level of concern.	RMP (p.45) - Survey prior to activities and manage sites within the known or suspected ranges and within the habitat types of vegetation communities associated with the Del Norte salamander.	Consider conducting surveys using protocol methods to determine if suitable habitat occurs in the WAU.

Table 47. Summary Table of Resource Management Concerns in the South Umpqua WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning Objectives	Management Strategy	Management Activity
The northern goshawk is a Bureau Sensitive species. Is there northern goshawk habitat within the WAU?	The northern goshawk is not common in the Roseburg BLM District but the district is within the geographic range. There are approximately 30,400 acres of potential habitat on Federally-administered land in the WAU, based on GIS.	RMP (p. 41) - Manage for the conservation of Federal Candidate and Bureau Sensitive species and their habitats so as not to contribute to the need to list and to recover the species.	RMP (p. 49) - Retain 30 acre buffers of undisturbed habitat around active and alternative nest sites. Restrict human activity and disturbance within 1/4 mile of active sites between March and August or until such time as young have dispersed. Consider this species when planning or implementing ground disturbing projects.	Consider conducting field reviews to verify and evaluate potential habitat using standard protocol survey methods. Consider identifying and managing a post fledgling area around an activity center.
Do Special Status amphibian and reptile species occur in the WAU?	The western pond turtle and tailed frog are Special Status Species found in the WAU.	RMP (p. 41) - Manage for the conservation of Federal Candidate and Bureau Sensitive species and their habitats so as not to contribute to the need to list and to recover the species.	RMP (p. 41) - Conduct field surveys according to protocols and established procedures. Review all proposed actions to determine whether or not Special Status Species occupy or use the affected area or if the habitat for such species is affected.	Consider conducting field reviews to verify and evaluate potential habitat. Protect stream temperatures from increasing where tailed frogs occur.
Fender's blue butterfly is listed as a Federal Endangered Species. Is there Fender's blue butterfly habitat present in the WAU?	Potential Fender's blue butterfly habitat may occur in the WAU. Surveys have not been conducted to determine if this butterfly occurs in the WAU.	RMP (p. 41) - Protect, manage, and conserve Federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and Bureau special status species.	RMP (p. 41) - Conduct field surveys according to protocols and established procedures. Review all proposed actions to determine whether or not Special Status Species occupy or use the affected area or if the habitat for such species is affected.	Consider conducting surveys for Fender's blue butterfly and Kincaids lupine in the WAU.

Table 47. Summary Table of Resource Management Concerns in the South Umpqua WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning Objectives	Management Strategy	Management Activity
The peregrine falcon is a Bureau Sensitive Species. Do peregrine falcons occur in or near the WAU?	The peregrine falcon was delisted as a Federal Endangered Species. One known peregrine falcon nest site is located within in one mile of the WAU boundary. Actions within the WAU may affect this site.	RMP (p. 37) - Enhance and maintain biological diversity and ecosystem health to contribute to healthy wildlife populations. RMP (p. 41) - Manage for the conservation of Federal Candidate and Bureau Sensitive species and their habitats so as not to contribute to the need to list and to recover the species.	Develop a Habitat Management Plan for peregrine falcon nest sites on BLM-administered land.	Manage known and potential nesting sites to maintain site integrity. Comply with site specific habitat management plans.
Do special habitat features used by bats occur in the WAU?	Bats are expected to occur in the WAU since caves, mine adits, and other special habitats occur in the WAU.	RMP (p. 39) - Identify special habitat areas and determine relevance for management. RMP (p. 47) - Conduct surveys of crevices in caves, mines, and abandoned bridges and buildings for the presence of roosting bats. Develop mitigation measures in project or activity plans to protect sites.	Survey for the presence of roosting bats in special habitat features, such as crevices in caves, mines, and abandoned bridges and buildings in the WAU. Prohibit timber harvesting within 250 feet of an occupied bat site and develop other management direction as necessary.	Coordinate with and support research on habitat use by bats. Conduct non-intrusive surveys of special habitat features, such as crevices in caves, mines, and abandoned bridges and buildings and occupied sites. Develop management direction to protect bat roosting sites.

XI. Monitoring

General objectives of monitoring are:
1) To determine if the plan is being implemented correctly,
2) Determine the effectiveness of management practices at multiple scales, ranging from individual sites to watersheds,
3) Validate whether ecosystem functions and processes have been maintained as predicted.

The Roseburg RMP, Appendix I provides monitoring guidelines for various Land Use Allocations and resources. Some implementation, effectiveness, and validation monitoring questions are addressed. Management actions on the Roseburg BLM District may be monitored prior to project initiation and following project completion, depending on the resource or activity being monitored.

Some key resource elements that may be monitored in the Lower South Umpqua WAU are as follows:

A. All Land Use Allocations

Are surveys for the species listed in the Roseburg District RMP, Appendix H conducted before ground disturbing activities occur?
Are protection buffers being provided for specific rare and locally endemic species and other species in the upland forest matrix?
Are the sites of amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropod species listed in Appendix H of the Roseburg District RMP being surveyed?
Are the sites of amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropod species listed in Appendix H of the Roseburg District RMP being protected?
Are high priority sites for species management being identified?

B. Riparian Reserves

Is the width and integrity of the Riparian Reserves maintained?
Are management activities within Riparian Reserves consistent with SEIS ROD Standards and Guidelines, RMP management direction, and Aquatic Conservation Strategy objectives?
Has Watershed Analysis been completed prior to on-the-ground actions being initiated in Riparian Reserves?

C. Matrix

Are suitable numbers of snags, coarse woody debris, and green trees being left following timber harvesting as called for in the SEIS ROD Standard and Guidelines and Roseburg RMP management direction?
Are timber sales being designed to meet ecosystem objectives for the Matrix?
Are forests growing at a rate that will produce the predicted yields?
Are forests in the Matrix providing for connectivity between Late-Successional Reserves?

D. Late-Successional Reserves

What activities were conducted or authorized within the LSR and how were they compatible with objectives of the LSR Assessment?
Were activities consistent with the SEIS ROD Standards and Guidelines, Roseburg and Medford RMP management direction, the LSR Assessment, and REO review requirements?
What is the status of development and implementation plans to eliminate or control non-native species which adversely impact late-successional objectives?
Are projects conducted in the LSR designed to maintain, improve, or attain LSR objectives?

E. Key Watersheds

Was watershed analysis completed prior to implementation of management activities?
Has the number of miles of roads been reduced or at least no net increase in roads been achieved?
Are at-risk fish species and stocks being identified?
Are fish habitat restoration and enhancement activities being designed and implemented which contribute to attainment of Aquatic Conservation Strategy objectives?
Are potential adverse impacts to fish habitat and fish stocks being identified?

XII. Revisions to the Watershed Analysis and Data Gaps

Watershed analysis is an ongoing, iterative process designed to help define important resource information needed for making sound management decisions. This watershed analysis would, generally, be updated as existing information is refined, new data becomes available, new issues develop, when significant changes occur in the WAU, or as management needs dictate.

Some data gaps identified in the watershed analysis include the condition of roads and culverts at stream crossings, water quality data of streams on BLM-administered land, stream type classifications, and if some Special Status Species occur in the WAU.

Appendix A

Glossary

Appendix A

Glossary

Age Class - One of the intervals into which the age range of trees is divided for classification or use.

Anadromous Fish - Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Salmon, steelhead, and shad are examples.

Aquatic Conservation Strategy - Plan developed in Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl, designed to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats.

Beneficial Use - The reasonable use of water for a purpose consistent with the laws and best interest of the peoples of the state. Such uses include, but are not limited to, the following: instream, out of stream and groundwater uses, domestic, municipal, industrial water supply, mining, irrigation, livestock watering, fish and aquatic life, wildlife, fishing, water contact recreation, aesthetics and scenic attraction, hydropower, and commercial navigation.

Best Management Practices (BMPs) - Methods, measures, or practices designed to prevent or reduce water pollution. Not limited to structural and nonstructural controls, and procedures for operations and maintenance. Usually, Best Management Practices are applied as a system of practices rather than a single practice.

Bureau Assessment Species - Plant and animal species on List 2 of the Oregon Natural Heritage Data Base, or those species on the Oregon List of Sensitive Wildlife Species (OAR 635-100-040), which are identified in BLM Instruction Memo No. OR-91-57, and are not included as federal candidate, state listed or Bureau sensitive species.

Bureau Sensitive Species - Plant or animal species eligible for federal listed, federal candidate, state listed, or state candidate (plant) status, or on List 1 in the Oregon Natural Heritage Data Base, or approved for this category by the State Director.

Candidate Species - Those plants and animals included in Federal Register "Notices of Review" that are being considered by the United States Fish and Wildlife Service (FWS) for listing as threatened or endangered.

> Category 1. Taxa for which the Fish and Wildlife Service has substantial information on hand to support proposing the species for listing as threatened or endangered. Listing proposals are either being prepared or have been delayed by higher priority listing work.

Commercial Thinning - The removal of merchantable trees from an even-aged stand to encourage growth of the remaining trees.

Connectivity - A measure of the extent to which conditions between late-successional/old-growth forest areas provide habitat for breeding, feeding, dispersal, and movement of late-successional/old-growth-associated wildlife and fish species.

Connectivity/Diversity Block - A land use classification under Matrix lands managed on 150 year area control rotations. Periodic timber sales will leave 12 to 18 green trees per acre.

Core Area - That area of habitat essential in the breeding, nesting and rearing of young, up to the point of dispersal of the young.

Critical Habitat - Under the Endangered Species Act, (1) the specific areas within the geographic area occupied by a federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a listed species when it is determined that such areas are essential for the conservation of the species.

Density Management - Cutting of trees for the primary purpose of widening their spacing so that growth of remaining trees can be accelerated. Density management harvest can also be used to improve forest health, to open the forest canopy, or to accelerate the attainment of old growth characteristics if maintenance or restoration of biological diversity is the objective.

District Defined Reserves (DDR) - Areas designated for the protection of specific resources, flora and fauna, and other values. These areas are not included in other land use allocations nor in the calculation of the Probable Sale Quantity.

Endangered Species - Any species defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range and published in the Federal Register.

Endemic - Native or confined to a certain locality.

Environmental Assessment (EA) - A systematic analysis of site-specific BLM activities used to determine whether such activities have a significant effect on the quality of the human environment and whether a formal environmental impact statement is required; and to aid an agency's compliance with National Environmental Protection Agency when no Environmental Impact Statement is necessary.

Ephemeral Stream - Streams that contain running water only sporadically, such as during and following storm events.

Fluvial - Migratory behavior of fish moving away from the natal stream to feed, grow, and mature then returning to the natal stream to spawn.

General Forest Management Area (GFMA) - Forest land managed on a regeneration harvest cycle of 70-110 years. A biological legacy of six to eight green trees per acre would be retained to assure forest health. Commercial thinning would be applied where practicable and where research indicates there would be gains in timber production.

Geographic Information System (GIS) - A computer based mapping system used in planning and analysis.

Intermittent Stream - Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two criteria.

Issue - A matter of controversy or dispute over resource management activities that is well defined or topically discrete. Addressed in the design of planning alternatives.

Land Use Allocations - Allocations which define allowable uses/activities, restricted uses/activities, and prohibited uses/activities. They may be expressed in terms of area such as acres or miles etc. Each allocation is associated with a specific management objective.

Late-Successional Forests - Forest seral stages which include mature and old-growth age classes.

Late-Successional Reserve (LSR) - A forest in its mature and/or old-growth stages that has been reserved.

Matrix Lands - Federal land outside of reserves and special management areas that will be available for timber harvest at varying levels.

Mitigating Measures - Modifications of actions which (a) avoid impacts by not taking a certain action or parts of an action; (b) minimize impacts by limiting the degree or magnitude of the action and its implementation; (c) rectify impacts by repairing, rehabilitating or restoring the affected environment; (d) reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or (e) compensate for impacts by replacing or providing substitute resources or environments.

Monitoring - The process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

Nonpoint Source Pollution - Water pollution that does not result from a discharge at a specific, single location (such as a single pipe) but generally results from land runoff, precipitation, atmospheric deposition or percolation, and normally is associated with agricultural, silvicultural and urban runoff, runoff from construction activities, etc. Such pollution results in the human-made or human-induced alteration of the chemical, physical, biological, radiological integrity of water.

Orographic - Of or pertaining to the physical geography of mountains and mountain ranges.

Peak Flow - The highest amount of stream or river flow occurring in a year or from a single storm event.

Perennial Stream - A stream that has running water on a year round basis.

Phenotypic - Of or pertaining to the environmentally and genetically determined observable appearance of an organism.

Precommercial Thinning (PCT) - The practice of removing some of the trees less than merchantable size from a stand so that remaining trees will grow faster.

Probable Sale Quantity (PSQ) - Probable sale quantity estimates the allowable harvest levels for the various alternatives that could be maintained without decline over the long term if the schedule of harvests and regeneration were followed. "Allowable" was changed to "probable" to reflect uncertainty in the calculations for some alternatives. Probable sale quantity is otherwise comparable to allowable sale quantity (ASQ). However, probable sale quantity does not reflect a commitment to a specific cut level. Probable sale quantity includes only scheduled or regulated yields and does not include "other wood" or volume of cull and other products that are not normally part of allowable sale quantity calculations.

Proposed Threatened or Endangered Species - Plant or animal species proposed by the U.S. Fish & Wildlife Service or National Marine Fisheries Service to be biologically appropriate for listing as threatened or endangered, and published in the Federal Register. It is not a final designation.

Resident Fish - Fish that are born, reared, and reproduce in freshwater.

Resource Management Plan (RMP) - A land use plan prepared by the BLM under current regulations in accordance with the Federal Land Policy and Management Act.

Riparian Reserves - Designated riparian areas found outside Late-Successional Reserves.

Riparian Zone - Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables and soils which exhibit some wetness characteristics. Normally used to refer to the zone within which plants grow rooted in the water table of these rivers, streams, lakes, ponds, reservoirs, springs, marshes, seeps, bogs and wet meadows.

Stream Order - A hydrologic system of stream classification. Each small unbranched tributary is a first order stream. Two first order streams join to form a second order stream. A third order stream has only first and second order tributaries, and so on.

Stream Reach - An individual first order stream or a segment of another stream that has beginning and ending points at a stream confluence. Reach end points are normally designated where a tributary confluence changes the channel character or order. Although reaches identified by BLM are variable in length, they normally have a range of ½ to 1-1/2 miles in length unless channel character, confluence distribution, or management considerations require variance.

Survey and Manage - Those species that are listed in Table C-3 of the Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl for which four survey strategies are defined.

Tillage - Breaking up the compacted soil mass to promote the free movement of water and air using a self drafting individual tripping winged subsoiler.

Transportation Management Objectives (TMO) - An evaluation of the current BLM transportation system to assess future need for roads, and identify road problem areas which need attention, and address future maintenance needs.

Watershed - The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake.

Watershed Analysis - A systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives. Watershed analysis is a stratum of ecosystem management planning applied to watersheds of approximately 20 to 200 square miles.

Appendix B
References

Appendix B - References

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Appendix C

Fisheries

Table C-1. Summary Table of Current Conditions in the South Umpqua WAU.

Drainage Name Subwatershed Name	Road Density	Stream Density	Percent BLM Administered Land	Stream Crossing Density	Percent Less Than 30 Years Old (BLM)	Percent HRP	Percent of Riparian Reserves at Least 80 Years Old
Bear Gulch	4.31	6.49	71	2.03	19	95	62
Canyon Pass	3.28	5.63	77	1.56	17	91	62
Canyonville	9.76	4.60	14	6.42	4	97	100
Jordan Creek	5.70	5.34	8	2.49	27	99	63
Lower West Fork	3.63	5.20	76	2.04	36	86	43
South West Fork	4.60	7.34	42	2.24	24	93	47
Upper West Fork	4.94	6.41	32	2.44	11	95	48
Canyon Creek Subwatershed	4.74	5.99	47	2.34	23	93	53
Corn Creek	5.73	7.01	43	2.88	35	98	49
Granite Creek	3.35	5.91	44	1.20	10	97	87
Hatchet	2.12	6.14	22	0.83	15	96	73
Lower Coffee	3.74	6.43	43	2.16	9	91	52
Middle Coffee	5.08	5.96	43	2.00	20	90	61
Milo	4.74	5.86	36	1.95	25	93	64
Slate Creek	4.76	7.34	28	1.90	43	92	47
Texas Gulch	1.92	5.49	72	0.26	26	83	65
Upper Coffee	1.89	5.23	89	0.47	15	91	83
Coffee Creek Subwatershed	3.66	6.10	45	1.60	19	93	68

Drainage Name Subwatershed Name	Road Density	Stream Density	Percent BLM Administered Land	Stream Crossing Density	Percent Less Than 30 Years Old (BLM)	Percent HRP	Percent of Riparian Reserves at Least 80 Years Old
Fate Creek	4.80	6.30	52	2.01	45	100	52
Green Gulch	4.48	6.60	15	2.28	14	99	59
Lower Days	3.96	6.82	30	1.65	3	100	90
May Creek	2.88	5.75	16	1.72	48	99	50
Middle Days	4.46	5.74	43	1.81	21	97	30
Upper Days	4.40	4.93	64	1.94	25	91	55
Wood Creek	4.16	8.31	19	2.22	21	100	73
Days Creek Subwatershed	4.21	6.25	36	2.01	26	97	54
Beals Creek	5.06	7.03	38	2.46	39	98	20
Bland Mountain	4.59	6.09	25	1.96	11	99	25
East Shively	5.33	7.50	56	3.12	30	89	25
Lower O'Shea	4.45	6.03	23	2.24	0	98	80
Lower Shively	5.14	6.50	44	2.96	44	97	43
Packard Gulch	6.45	6.58	14	2.76	29	100	55
South Umpqua Morgan	5.86	7.61	20	3.19	11	100	28
Small Creek	4.24	5.96	15	1.82	0	100	79
Stinger Gulch	5.45	6.50	16	2.72	12	100	78
Upper O'Shea	4.45	6.98	52	1.53	27	93	56
Upper Shively	4.59	6.58	50	1.79	37	89	34
Shively-O'Shea Subwatershed	5.07	6.63	31	2.39	26	97	41

Drainage Name Subwatershed Name	Road Density	Stream Density	Percent BLM Administered Land	Stream Crossing Density	Percent Less Than 30 Years Old (BLM)	Percent HRP	Percent of Riparian Reserves at Least 80 Years Old
John Days	5.94	5.66	33	2.19	52	95	44
Lavadoure Creek	3.73	6.50	62	1.92	52	96	36
Poole Creek	2.84	6.02	59	0.83	20	90	85
St Johns	4.66	6.86	42	2.30	37	95	42
St Johns Subwatershed	4.59	6.24	44	1.91	37	94	54
East Stouts	4.78	7.60	53	2.11	24	78	65
Lower Stouts	5.05	7.76	52	2.83	22	96	45
Middle Stouts	4.34	5.64	57	1.03	46	80	57
Upper Stouts	4.77	7.83	51	1.98	15	90	68
West Stouts	4.98	7.11	53	2.25	35	77	73
Stouts Creek Subwatershed	4.81	7.16	53	2.12	30	83	62
South Umpqua WAU	4.56	6.37	41	2.12	26	94	54

Table C-2. Habitat Bench Marks Related to Category Types

Pools	Bench Mark Weighing Scale 1-5	4-Excellent	3-Good	2-Fair	1-Poor	Row Totals
a) Pool Area %	2	≥ 45	30-44	16-29	≤ 15	
b) Residual Pool						
Small (1-3 ordered)	4	≥ 0.55	0.35 - 0.54	0.15 - 0.34	0 - 0.14	
Large (4th order and greater)	4	≥ 0.95	0.76 - 0.94	0.46 - 0.75	≤ 0.45	
Riffles						
a) Width/Depth (wetted) (ODFW)	3	≤ 10.4	10.5 - 20.4	20.5 - 29.4	≥ 29.5	
b) Width/Depth (bank full) (USFS)	3	≤ 10	11 - 15	16 - 19	≥ 20	
c) Silt/Sand/Organics (% area) (ODFW)	2	≤ 1	2 - 7	8 - 14	≥ 15	
d) Embeddedness (% by unit) (USFS)	2	0	1 - 25	26 - 49	≥ 50	
e) Gravel % (Riffles)	3	≥ 80	30 - 79	16 - 29	≤ 15	
f) Substrate dominant	3	Gravel	Cobble	Cobble	Bedrock	
subdominant (USFS)	2	Cobble	Large Boulder	Small Boulder	Anything	
Reach Average						
a) Riparian condition Species dom/subdom. (> 15 cm)	2	conifer/hdwd* Klam - hdwd*	conifer/hdwd* Klam - hdwd*	hdwd*/conifer	alder/anything	
Size (Conifers)	3	≥ 36" Klam - ≥ 24"	24 - 35" Klam - 12 - 23"	7 - 23"	≤ 6"	
b) Shade (%) (ODFW)						
Stream Width < 12 M	1	≥ 80	71 - 79	61 - 70	≤ 60	
Stream Width > 12 M	1	≥ 70	61 - 69	51 - 60	≤ 50	
LWD						
a) Pieces (lg/sm) 100 M Stream	3	≥ 29.5	19.5 - 29.4	10.5 - 19.4	≤ 10.4	
b) Vol/100 M Stream	2	≥ 39.5	29.5 - 39.4	20.5 - 29.4	≤ 10.4	
USFS - Pieces 50' or more long and 24" DBH per mile	5	≥ 70	45 - 69	31 - 44	≤ 30	
Temperatures	1	≤ 55	56 - 60	61 - 69	≥ 70	
Macroinvertebrates						
Totals for Category						

* Hardwood category does not include alder.

*Where USFS designations appear, either USFS or ODFW measurements may be used but not both.

HABITAT BENCHMARK RATING SYSTEM

100 - 82 EXCELLENT
81 - 63 GOOD
62 - 44 FAIR
43 - 25 POOR

Table C-3. ODFW Aquatic Habitat Inventory Data Table

Stream	**Reach**	**% Pool Area**	**Residual Pool Depth**	**Riffle W/D Ratio**	**% Fines in Riffles**	**% Gravel in Riffles**	**Riparian Vegetation (dom/subdom)**	**Riparian Conifer Size**	**% Shade**	**LWD pieces per 100m**	**LWD vol per 100m**	**AHR**
Days Creek	1	41	0.6	27.2	11	67	hdwd/con	small	57	0.8	0.4	fair
	2	8	0.4	37.6	9	69	hdwd/con	small	65	0.9	0.9	poor
	3	6	0.3	133.0	12	51	hdwd/con	small	63	2.7	2.5	poor
	4	13	0.3	--	20	50	con/hdwd	small	94	3.0	2.9	poor
	5	8	0.2	--	13	52	con/hdwd	medium	100	3.4	1.7	poor
	6	5	0.2	10.7	20	60	con/hdwd	medium	99	7.3	18.3	fair
Fate Creek	1	45	0.5	--	43	48	hdwd/con	small	81	0.6	0.3	poor
	2	60	0.4	--	28	61	hdwd/con	small	68	1.9	3.0	poor
Wood Creek	1	55	0.5	16.0	10	80	hdwd/con	small	87	1.3	0.8	fair
	2	39	0.6	25.1	17	72	hdwd/con	small	67	0.7	0.1	fair
	3	55	0.5	--	34	58	hdwd/con	small	74	1.3	0.9	fair
	4	85	0.4	2.0	80	20	hdwd/con	small	56	1.7	1.2	fair
St John Creek	1	50.2	0.3	25.9	8	51	hdwd/con	small	67	1.6	0.3	fair
	2	38.6	0.3	25.6	7	76	hdwd/con	small	81	21.5	29.2	fair
	3	53.3	0.3	13.1	12	76	hdwd/con	small	84	19.1	31.1	fair
	4	42.6	0.3	12.7	5	56	con/hdwd	small	90	11.1	15.0	fair
	5	28.8	0.2	10.9	1	57	con/hdwd	medium	91	28.1	50.7	fair
	6	--	0.0	--	--	--	con/hdwd	medium	76	27.1	47.6	fair

Table C-3. ODFW Aquatic Habitat Inventory Data Table

Stream	Reach	% Pool Area	Residual Pool Depth	Riffle W/D Ratio	% Fines in Riffles	% Gravel in Riffles	Riparian Vegetation (dom/subdom)	Riparian Conifer Size	% Shade	LWD pieces per 100m	LWD vol per 100m	AHR
Coffee Creek	1	27.0	0.6	33.2	11	35	hdwd/con	small	68	2.1	2.2	poor
	2	34.0	0.6	28.4	7	26	hdwd/con	small	81	5.3	15.1	fair
	3	39.0	0.4	33.1	6	21	hdwd/con	small	78	2.0	11.8	poor
	4	40.0	0.6	37.1	7	16	hdwd/con	small	77	8.5	26.0	fair
	5	85.0	0.7	53.4	8	27	hdwd/con	medium	57	0.4	1.5	poor
	6	unsurveyed reach										--
	7	25.0	0.6	24.9	7	42	con/hdwd	medium	93	24.6	94.8	good
	8	1.0	0.4	--	16	36	con/hdwd	medium	97	18.2	49.6	fair
Stouts Creek	1	30.7	0.3	24.0	12	29	--	--	86	5.7	6.7	poor
	2	28.5	0.4	27.1	19	30	--	--	62	18.3	39.0	fair
	3	7.3	0.2	18.4	41	29	--	--	97	4.9	9.3	poor
Stouts Creek (trib#14)	1	7.6	0.3	20.0	50	20	--	--	99	0.0	0.0	poor
Stouts Creek (trib#16)	1	17.5	0.3	16.5	33	24	--	--	89	10.7	15.5	fair
Stouts Creek (U5863)	1	6.1	0.3	6.9	10	29	--	--	78	8.4	14.2	fair
East Fork of Stouts Creek	1	14.9	0.3	15.8	27	43	--	--	95	8.3	6.8	fair
	2	10.2	0.2	63.6	9	32	--	--	86	7.9	2.7	poor
	3	16.3	0.3	0.0	33	21	--	--	98	9.2	13.1	poor

Table C-3. ODFW Aquatic Habitat Inventory Data Table

Stream	Reach	% Pool Area	Residual Pool Depth	Riffle W/D Ratio	% Fines in Riffles	% Gravel in Riffles	Riparian Vegetation (dom/subdom)	Riparian Conifer Size	% Shade	LWD pieces per 100m	LWD vol per 100m	AHR
East Fork of Stouts Creek (trib#15)	1	4.1	0.2	10.0	0	0	--	--	99	7.5	17.8	fair
Northeast Fork of Stouts Creek	1	7.4	0.2	--	18	39	--	--	95	14.6	24.9	poor
	2	3.9	0.3	--	10	30	--	--	99	17.1	22.6	fair
Southwest Fork of Stouts Creek	1	12.1	0.5	14.8	26	27	--	--	42	47.8	44.4	fair
	2	7.4	0.4	22.6	24	29	--	--	88	11.5	17.4	fair
O'Shea Creek	1	27.5	0.6	29.6	2	47	hdwd/con	small	77	0.5	14.0	fair
	2	14.9	0.5	23.2	1	45	hdwd/con	medium	93	3.1	6.8	fair
	3	9.5	0.5	32.9	4	68	hdwd/con	small	96	5.6	12.1	fair
	4	3.8	0.5	30.8	3	59	con/hdwd	medium	95	5.4	34.5	fair
Corn Creek	1	46.0	0.4	22.7	22	39	hdwd/con	small	95	7.9	11.7	fair
	2	35.0	0.3	20.3	26	38	con/hdwd	small	100	15.6	37.0	fair
	3	14.0	0.3	16.6	41	26	con/hdwd	small	95	11.2	27.1	fair
Lavadoure Creek	1	10.4	0.5	11.8	11	65	hdwd/con	small	41	2.8	10.1	fair
Shively Creek	1	17.9	0.5	20.2	0	29	con/hdwd	small	93	2.6	5.1	fair
	2	18.6	0.5	27.0	1	42	hdwd/con	small	91	3.1	8.6	fair
	3	2.5	0.4	23.4	5	65	hdwd/con	small	95	7.7	19.9	fair

Table C-3. ODFW Aquatic Habitat Inventory Data Table

Stream	Reach	% Pool Area	Residual Pool Depth	Riffle W/D Ratio	% Fines in Riffles	% Gravel in Riffles	Riparian Vegetation (dom/subdom)	Riparian Conifer Size	% Shade	LWD pieces per 100m	LWD vol per 100m	AHR
East Fork of Shively Creek	1	1.7	0.3	12.7	0	30	hdwd/con	small	93	5.9	20.0	fair
	2	10.7	0.5	21.0	4	49	hdwd/con	medium	96	4.6	12.8	fair
	3	1.1	0.4	26.1	14	63	con/hdwd	small	98	6.6	14.5	fair
Poole Creek	1	15.5	0.2	13.4	3	61	hdwd/con	small	93	11.5	17.3	fair
	2	19.6	0.2	--	--	--	hdwd/con	small	91	16.5	23.8	poor
East Fork of Poole Creek	1	15.4	0.3	11.8	2	62	hdwd/con	medium	93	8.0	8.8	fair
Beals Creek	1	19.5	0.3	15.5	23	73	hdwd/con	small	54	3.0	2.1	poor
	2	45.1	0.2	12.0	16	62	hdwd/con	small	65	2.0	2.2	fair
	3	19.6	0.3	29.3	14	48	hdwd/con	medium	65	3.3	2.4	poor
	4	--	--	23.0	14	43	hdwd/con	medium	71	3.8	1.2	poor
Beals Creek (trib#1)	1	5.1	0.4	15.1	16	43	con/hdwd	small	95	8.9	6.4	fair
Sweat Creek	1	7.6	0.2	16.9	41	42	hdwd/con	medium	90	4.0	4.4	fair
Canyon Creek	1	56.1	0.5	26.9	0	34	hdwd/con	small	75	1.1	0.8	fair
	2	55.6	0.4	21.5	2	27	hdwd/con	small	86	0.8	0.6	fair
	3	43.4	0.3	17.6	1	33	hdwd/con	small	92	0.5	0.1	fair
	4	37.3	0.3	14.5	0	44	con/hdwd	small	83	0.8	0.1	fair
	5	32.6	0.3	10.8	0	71	con/hdwd	small	80	0.6	0.4	fair
	6	--	0.0	--	--	--	hdwd/con	medium	89	0.6	0.4	poor

Table C-3. ODFW Aquatic Habitat Inventory Data Table

Stream	Reach	% Pool Area	Residual Pool Depth	Riffle W/D Ratio	% Fines in Riffles	% Gravel in Riffles	Riparian Vegetation (dom/subdom)	Riparian Conifer Size	% Shade	LWD pieces per 100m	LWD vol per 100m	AHR
West Fork of Canyon Creek	1	44.5	0.4	34.2	0	37	hdwd/con	medium	75	8.0	5.6	poor
	2	44.1	0.5	33	0	49	hdwd/con	medium	73	8.6	7.8	fair
	3	36.3	0.5	26.1	0	32	hdwd/con	medium	76	2.0	3.2	fair
	4	21.9	0.5	17.6	0	15	hdwd/con	small	70	5.6	7.9	fair
	5	unsurveyed reach (Win Walker Reservoir)										
	6	30.5	0.4	19.2	2	45	hdwd/con	small	81	4.8	7.2	fair
	7	20.3	0.3	15.4	2	67	hdwd/con	small	93	10.6	5.7	fair
	8	27.5	0.3	10.5	5	93	hdwd/con	small	93	19.0	28.2	fair
	9	0	0.0	--	0	0	hdwd/con	small	98	27.4	43.7	fair
Tributary to the West Fork of Canyon Creek	1	32.4	0.4	14.1	6	39	hdwd/con	small	57	25.3	8.5	fair
	2	30.0	0.5	14.1	5	57	hdwd/con	medium	77	48.5	53.3	good
	3	28.2	0.3	11.3	10	64	hdwd/con	medium	81	17.8	25.3	fair
	4	1.7	0.3	4.3	15	75	con/hdwd	small	93	14.0	18.1	fair
St John Creek (tributary to the West Fork of Canyon Creek)	1	25.7	0.4	11.9	4	48	hdwd/con	small	84	13.5	17.5	fair
	2	4.4	0.3	5	5	90	hdwd/con	small	94	28.3	43.5	good
	3	--	0.0	--	--	--	hdwd/con	small	88	27.7	66.4	poor

AHR = Aquatic Habitat Rating

-- = no data available/no data collected

Table C-4. List of Fish Species Occurring in the Umpqua River Basin.

TYPE	COMMON NAME	SCIENTIFIC NAME
NATIVE ANADROMOUS	Sea-run Cutthroat trout	Oncorhynchus clarki
	Coho salmon	Oncorhynchus kisutch
	Summer/Winter Steelhead trout	Oncorhynchus mykiss
	Spring/Fall Chinook salmon	Oncorhynchus tshawytscha
	Green Sturgeon	Acipenser medirostris
	White Sturgeon	Acipenser transmontanus
	Pacific lamprey	Lampetra tridentata
NATIVE RESIDENT	Cutthroat trout	Oncorhynchus clarki
	Rainbow trout	Oncorhynchus mykiss
	Oregon (Umpqua) chub	Oregonichthys kalawatseti
	Umpqua dace	Rhinichthys evermanni
	Longnose dace	Rhinichthys cataractae
	Umpqua squawfish	Ptychocheilus umpquae
	Largescale sucker	Catostomus macrocheilus
	Redside shiner	Richardsonius balteatus
	Speckled dace	Rhinichthys osculus
	Brook lamprey	Lampetra richardsoni
	Sculpin species	Cottus spp.
NON-NATIVE	Brown trout	Salmo trutta
	Brook trout	Salvelinus fontinalis
	Lake trout	Salvelinus namaycush
	Kokanee	Oncorhynchus nerka
	Largemouth bass	Micropterus salmoides
	Smallmouth bass	Micropterus dolomieu
	Sunfishes	Lepomis spp.
	Yellow perch	Perca flavescens
	White Crappie	Pomoxis annularis
	Black Crappie	Pomoxis nigromaculatus
	Black Bullhead	Ameiurus melas
	Brown Bullhead	Ameiurus nebulosus
	Yellow Bullhead	Ameiurus natalis
	Peamouth	Mylocheilus caurinus
	Striped Bass	Morone saxatilis
	Shad	Alosa sapidissima
	Mosquito fish	Gambusia affinis
	Threespine stickleback	Gasterosteus aculeatus
	Olympic mudminnow	Novumbra hubbsi

Sources: BLM Roseburg District PRMP/EIS, Vol. II.
Dave Harris, personal communication, ODFW-Roseburg

Table C-5. Example of Biological Assessment Matrix of Factors and Indicators
Western Cascades Geology

FACTORS	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
Water Quality	Maximum Temperature	2nd through 4th order basins: < 66 degrees Fahrenheit. 5th order or larger basins: < 69 degrees Fahrenheit.	2nd through 4th order basins: 66 - 69 degrees Fahrenheit. 5th order or larger basins: 66 - 74 degrees Fahrenheit.	2nd through 4th order basins: $\geq$ 70 degrees Fahrenheit. 5th order or larger basins: > 74 degrees Fahrenheit.
	Sediment and Turbidity	< 12% fines (< 0.85 mm) in gravel, relatively low turbidity.	12 - 17% fines (< 0.85 mm) in gravel, moderate turbidity.	> 17% fines (< 0.85 mm) in gravels, high turbidity.
Habitat Access	Physical Barriers	No man-made barriers in watershed that prevent upstream and downstream passage of age 1+ salmonids.	Some man-made barriers in watershed prevent upstream or downstream passage of age 1+ salmonids.	Most or all man-made barriers in watershed prevent upstream or downstream passage of age 1+ salmonids.
Habitat Elements	Large Woody Debris **	> 60 pieces/mile, > 24" in diameter, > 50' length. Little or no evidence of stream clean-out or management related debris flows.	30 - 60 pieces/mile, > 24" in diameter, > 50' length. Some evidence of stream clean-out and/or management related debris flows.	< 30 pieces/mile, > 24" in diameter. > 50' length. Evidence of stream clean-out and/or management related debris flows is widespread.
	Substrate	Dominant substrate is gravel or cobble, with very little embeddedness.	Gravel and cobble are subdominant substrates, with moderate amounts of embeddedness.	Bedrock, sand, silt, or small gravel substrates are dominant. Or gravel/cobble substrate with large amounts of embeddedness.
	Pool Characteristics $\geq$ 3rd order	> 30% pool habitat by area. Little or no reduction of pool volume by fine sediment or unsorted substrates (as per District roadless area stream surveys).	< 30% pool habitat by area. Moderate reduction of pool volumes by fine sediment or unsorted substrates.	< 30% pool habitat by area. Large reduction of pool volumes by fine sediment or unsorted substrates.
	Off-Channel Habitat	Active side channels relatively frequent and a result of structural influence (large wood, nick point, etc.).	Relatively few active side channels or evidence of abandoned side channels related to management activities.	Few or no active side channels and evidence of numerous abandoned side channels related to past management activities. Or side channels being formed due to aggraded channel.
	Refugia	Habitat refugia exist and are adequately buffered. Existing refugia are sufficient in size, number, and connectivity to maintain viable populations or sub-populations.	Habitat refugia exist but are not adequately buffered. Existing refugia are insufficient in size, number, and connectivity to maintain viable populations or sub-populations.	Adequate habitat refugia do not exist.

FACTORS	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
Channel Condition and Dynamics	Width/Depth Ratio and Channel Type	W/D ratios and channel types are well within historic ranges and site potential in watershed. Rosgen Type — W/D Ratio A, E, G — <12 B, C, F — 12-30 D — >40	W/D ratios and/or channel types in portions of watershed are outside historic ranges and/or site potentials.	W/D ratios and channel types throughout the watershed are well outside of historic ranges and/or site potentials.
	Streambank Condition	Relatively stable banks. Few or no areas of active erosion.	Moderately stable banks. Some active erosion occurring on outcurves and constrictions.	Highly unstable stream banks. Numerous areas of exposed soil and stream bank cutting.
	Floodplain Connectivity	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation, and succession.	Reduced linkage of wetland, floodplains, and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland and riparian vegetation function.	Severe reduction in hydrologic connectivity between off-channel, wetland, floodplain, and riparian areas; wetland extent drastically reduced and riparian vegetation function altered significantly.
Flow/Hydrology	Change in Peak/Base Flows	Timber harvest and roading history is such that little or no change to the natural flow regime has occurred.	Moderate amounts of timber harvest and roading have likely altered the flow regime to some extent.	Relatively high levels of timber harvest and roading have likely had a large effect on the flow regime.
	Drainage Network	Zero or minimum increase in drainage network density due to roads.	Moderate increases in drainage network due to roads.	Significant increases in drainage network density due to roads.
Watershed Conditions	Road Density and Location **	Road density < 2 miles/square mile, with no valley bottom roads.	Road density at 2 - 3 miles/square mile, with some valley bottom roads.	Road density > 3 miles/square mile, with many valley bottom roads.
	Disturbance History	< 5% ECA/decade (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or Riparian Reserves; and for NWFP area (except AMAs), ≥15% retention of LSOG in watershed.	<5% ECA/decade (entire watershed) but disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or Riparian Reserves; and for NWFP area (except for AMAs), ≥15% retention of LSOG in watershed.	>5% ECA/decade (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or Riparian Reserves; does not meet NWFP standard for LSOG retention.
	Riparian Reserves **	Riparian Reserves are relatively intact, with >80% of these areas being in a late seral condition.	Riparian Reserves have been altered somewhat, with between 60-80% of these areas being found in a late seral condition.	Riparian Reserves have been substantially altered, with <60% of these areas being found in a late seral condition.
	Landslide Rates	Within 10-20% of historic, natural rates. Stream conditions not evidently altered due to management caused landslides.	Some subdrainages with >20% of landslides related to land management activities. Some stream conditions evidently altered by management related landslides.	Many subdrainages with >25% of landslides related to land management activities. Stream conditions obviously and/or dramatically altered by management related landslides.

** These values were obtained local investigations using roadless area stream surveys, historical aerial photographs, and studies of fire disturbance history.

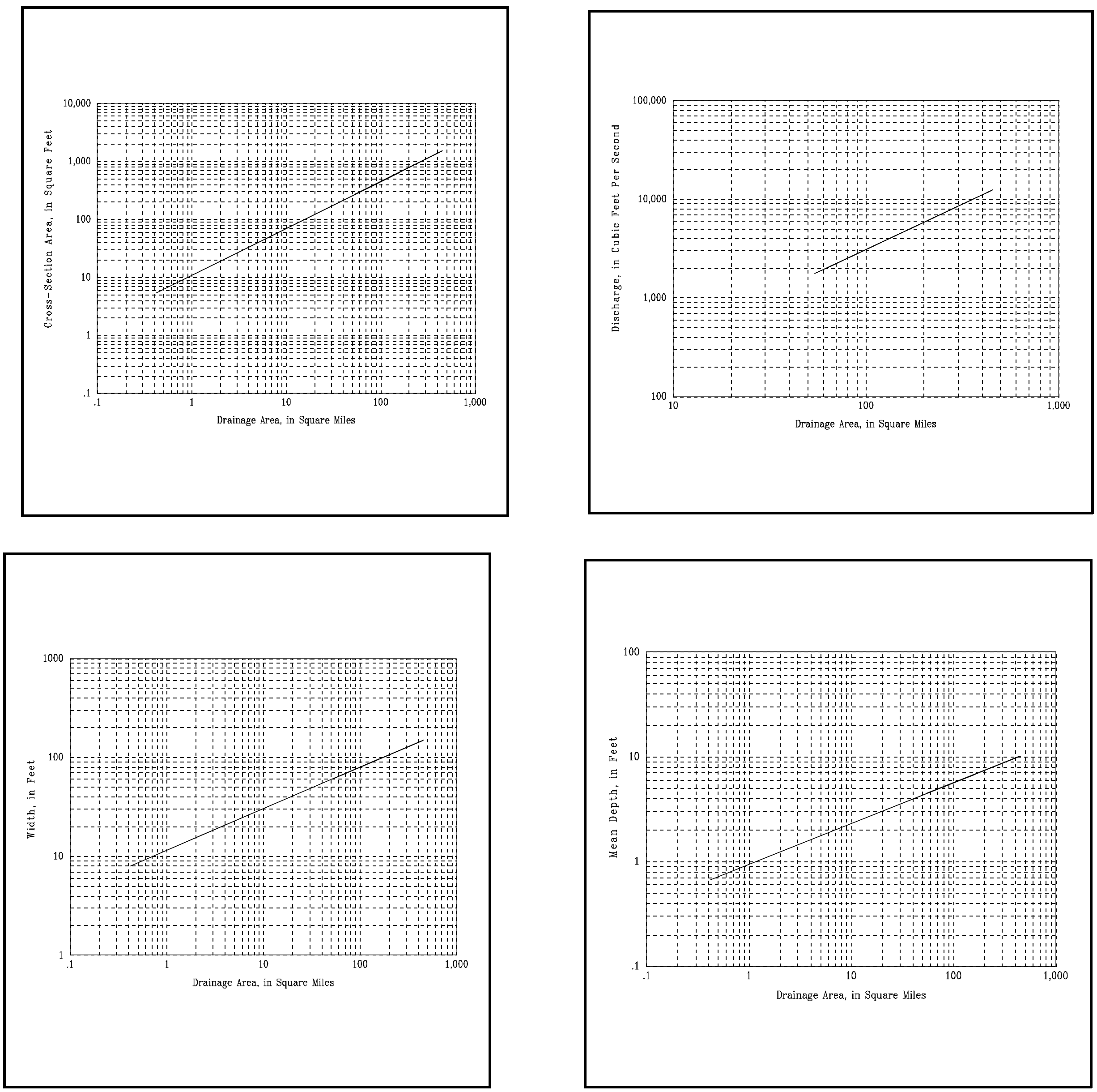
Assumptions: The matrix would be filled out as the factors and indicators pertain to fish bearing portions of a stream system. In general, these streams would be 3rd order or larger in size. There are three levels of information that are used when determining health or function of each of the indicators: 1) Facts, 2) likelihoods based upon scientific literature and theory, and 3) professional judgements (which include local, site-specific knowledge).

Appendix D

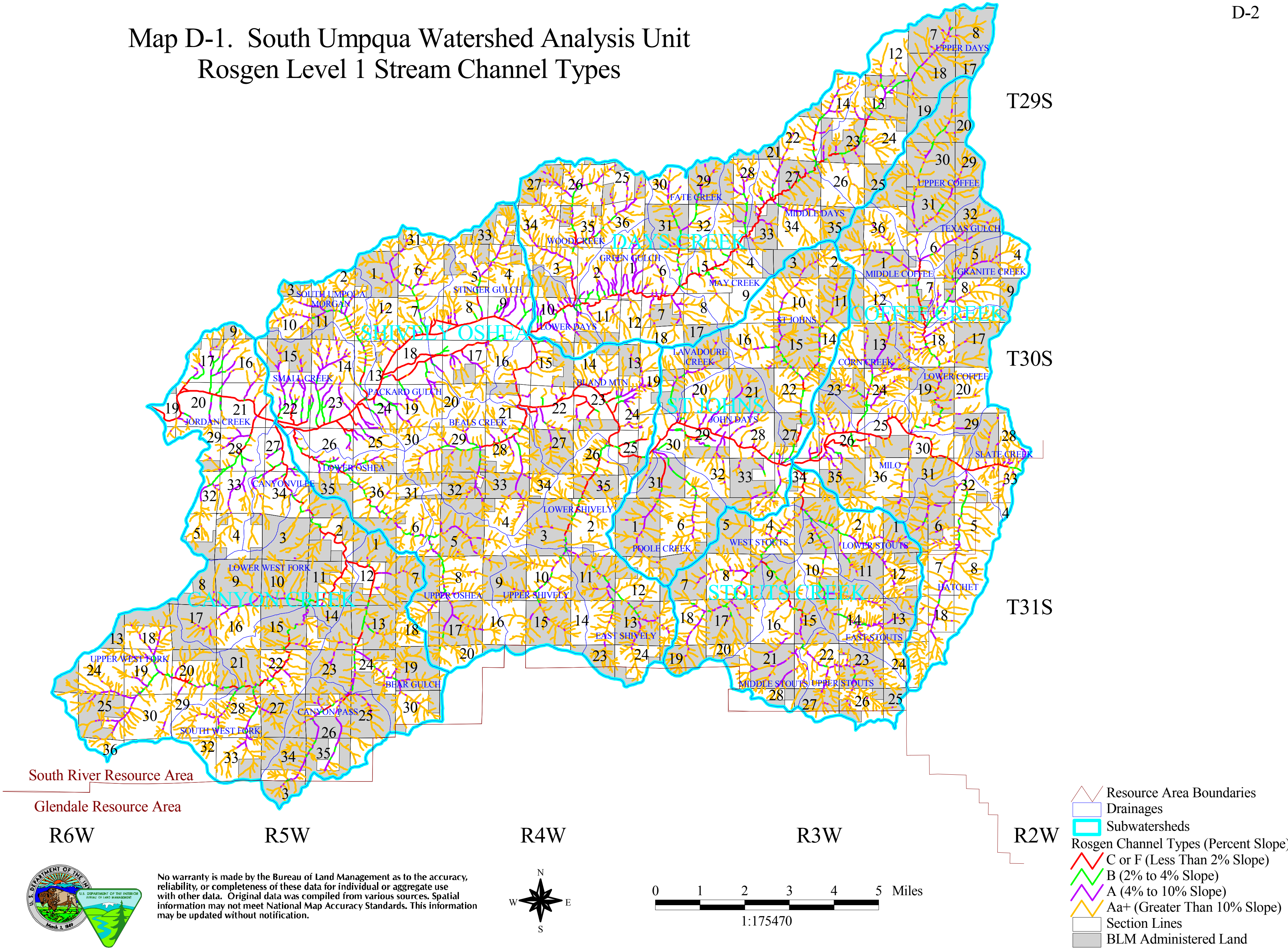
Hydrology

Development of regional curves using Rosgen's Level II classification can be used to predict bankfull streamflow, mean depth, width, and cross-sectional area of ungaged streams (Rosgen 1996). Graph D-1 shows regional curves developed by hydrologists in the Roseburg BLM District using the Level II classification (Kuck 2000). The classification system can be used to evaluate the processes of river mechanics and develop dimensionless ratios. The classification system can also be used to determine the feasibility of restoration projects, what structures needed to enhance and promote channel stability, and the size of culverts or bridges to install.

Graph D-1. Regional Curves for the South Umpqua River Basin Using Drainage Area to Estimate Bankfull Cross-sectional Area, Discharge, Mean Depth, and Width.



Map D-1. South Umpqua Watershed Analysis Unit
Rosgen Level 1 Stream Channel Types



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

Appendix E

Wildlife

Appendix E

Table E-1. Terrestrial and Aquatic Animal Species Present in the Roseburg BLM District and Expected Presence in the South Umpqua WAU.

Species	Status	Presence in District	District Monitoring Level	Expected in the WAU	Expected in Project Area**
VERTEBRATES					
FISH					
Coastal Steelhead Trout (Oncorhynchus mykiss ssp.)	FCO, V	D	3	Y	
Coho Salmon (Oncorhynchus kisutch)	FT, C	D	3	Y	
Fall Chinook (Oncorhynchus tshawytscha)	FPTO, C	D	3	Y	
Green Sturgeon (Acipenser medirostris)	BSP, XC	N	1	N	
Pacific Lamprey (Lampetra ayresi)	XC, BSP, V	D	3	Y	
Umpqua Chub (Oregonichthys kalawatseti)	XC, SV, BSPO	D	1	Y	
Umpqua River Cutthroat Trout (Oncorhynchus clarki)	V	D	3	Y	
AMPHIBIANS					
Cascades Frog (Rana cascadae)	XC, BSP, V	D	3	N	
Cascade Torrent Salamander (Rhyacotriton cascadae)	BT, V	N	3	N	
Clouded Salamander (Aneides ferrous)	U, BT	D	3	Y	
Del Norte Salamander (Plethodon elongatus)	FPB, S&M, XC, V, BSPO	U	3	U	
Foothill Yellow-legged Frog (Rana boylii)	XCO, V, BSPO	D	3	Y	
Northern Red-legged Frog (Rana aurora aurora)	XC, U, BSPO	D	3	Y	
Oregon Slender Salamander (Batrachoseps wrighti)	BTO, V	N	1	N	
Southern Torrent salamander (Rhyacotriton variegatus)	XCO, V, BSPO	D	3	Y	
Tailed Frog (Ascaphus truei)	XC, V, BSP	D	3	N	
Western Toad (Bufo boreas)	V, BTO	D	1	Y	
REPTILES					
California Mountain Kingsnake (Lampropeltis zonata)	V, BT	S	1	Y	
Common Kingsnake (Lampropeltis getulus)	V, BTO	S	1	Y	
Northwestern Pond Turtle (Clemmys marmorata marmorata)	XC, C, BSO	D	3	Y	
Sharptail Snake (Contia tenuis)	V, BT	D	3	Y	
BIRDS					
Acorn Woodpecker (Melanerpes formicivorous)	BT	D	1	Y	
Allen's Hummingbird (Selasphorus sasin)	BTO	U	1	Y	
Bald Eagle (Haliaeetus leucocephalus)	FT, ST	D	3	Y	
Bank Swallow (Riparia riparia)	BTO, U	D	1	Y	
Burrowing owl (Speotyto cunicularia)	BSO, XC, C	N	1	N	
Common Loon (Gavia immer)	BAO	D	1	N	
Downy Woodpecker (Picoides pubescens)	HI	D	3	Y	
Flammulated Owl (Otus flammeolus)	C, BSO	N	1	N	
Grasshopper Sparrow (Ammodramus savannarum)	BT	N	1	N	
Golden Eagle (Aquila chrysaetos)	HI	D	3	Y	

Table E-1. Terrestrial and Aquatic Animal Species Present in the Roseburg BLM District and Expected Presence in the South Umpqua WAU.					
Species	**Status**	**Presence in District**	**District Monitoring Level**	**Expected in the WAU**	**Expected in Project Area****
Great Gray Owl (Strix nebulosa)	FPB, V	D	3	N	
Great Egret (Casmerodius albus)	BT	D	1	Y	
Greater Yellowlegs (Tringa melanoleuca)	BTO	D	1	N	
Harlequin Duck (Histrionicus histrionicus)	XC, BSPO, U	S	2	N	
Hairy Woodpecker (Picoides villosus)	HI	D	3	Y	
Horned Grebe (Podiceps auritus)	BT	D	1	N	
Lewis' Woodpecker (Melanerpes lewis)	C, BSO	D	1	N	
Loggerhead Shrike (Lanius ludovicianus)	BT	N	1	N	
Long-billed Curlew (Numenius americanus)	BT	N	1	N	
Marbled Murrelet (Brachyramphus marmoratus marmoratus)	FT, ST, CH	D	4	Y	
Merlin (Falco columbarius)	BAO	D	1	N	
Mountain Quail (Oreortyx pictus)	BTO, U	D	1	Y	
Northern Goshawk (Accipiter gentilis)	XC, C, BSP	S	3	Y	
Northern Pygmy Owl (Glaucidium gnoma)	C	D	3	Y	
Northern Spotted Owl (Strix occidentalis caurina)	FT, ST, CH	D	4	Y	
Northern Waterthrush (Seiurus noveboracensis)	BT	N	1	N	
Olive-sided Flycatcher (Contopus cooperi)	BSPO, XC, V	D	3	Y	
Oregon Vesper Sparrow (Pooecetes gramineus)	C, BSO	U	1	Y	
Osprey (Pandion haliaetus)	HI	D	3	Y	
Peregrine Falcon (Falco peregrinus anatum)	BS, SE	D	4	N	
Pileated Woodpecker (Dryocopus pileatus)	BT, V	D	3	Y	
Purple Martin (Progne subis)	C, BSO	D	3	Y	
Pygmy Nuthatch (Sitta pygmae)	BT, V	U	1	N	
Red-breasted Sapsucker (Sphyrapicus ruber)	HI	D	3	Y	
Red-necked Grebe (Podiceps grisegena)	BAO	D	1	N	
Snowy Egret (Egretta thula)	BAO	D	1	N	
Western Bluebird (Sialia mexicana)	V, BT	D	3	Y	
Western Burrowing Owl (Speotyto cunicularia hypugea)	BSPO	N	1	N	
Western Least Bittern (Ixobrychus exiles hesperis)	BSP, XC, P	N	1	N	
Willow Flycatcher (Empidonax traillii brewsteri)	XC, BSPO, V	D	3	Y	
White-tailed Kite (Elanus leucurus)	BTO	D	1	Y	
Williamson’s Sapsucker (Sphyrapicus thyroideus)	BTO, U	N	1	N	
Yellow-bellied Sapsucker (Sphyrapicus varius)	HI	N	1	N	
MAMMALS					
American Marten (Martes americana)	V, BT	S	1	N	
Black Bear (Ursus americanus)	Game	D	1	Y	
Black-tailed Deer (Odocoileus hemionus columbianus)	Game	D	1	Y	
Brazilian free-tailed Bat (Tadarida brasiliensis)	BAO	D	1	Y	

Table E-1. Terrestrial and Aquatic Animal Species Present in the Roseburg BLM District and Expected Presence in the South Umpqua WAU.

Species	Status	Presence in District	District Monitoring Level	Expected in the WAU	Expected in Project Area**
Canada Lynx (Lynx canadensis)	FT	N	1	N	
California Wolverine (Gulo gulo luteus)	XC, BSPO, ST	U	1	N	
Columbian White-tailed Deer (Odocoileus virginianus leucurus)	FE, ST	D	3	Y	
Fringed Myotis (Myotis thysanodes)	XC, V, BSP, FPB	D	3	Y	
Long-eared Myotis (Myotis evotis)	XC, BSP, U, FPB	D	3	Y	
Long-legged Myotis (Myotis volans)	XC, BSP, U, FPB	D	3	Y	
Mountain Lion (Felis concolor)	Game	D	1	Y	
Pacific Fisher (Martes pennanti pacifica)	XC, C, BSO	U	1	N	
Pacific Pallid Bat (Antrozous pallidus)	V, BT	D	3	Y	
Pacific Townsend's Big-eared Bat (Corynorhinus townsendii)	XC, C, BSO	D	3	Y	
Red Tree Vole (Arborimus longicaudus)	S&M	D	3	Y	
Ringtail (Bassariscus astutus)	BTO, U	D	1	Y	
Roosevelt Elk (Cervus canadensis)	Game	D	1	Y	
Silver Haired Bat (Lasionycteris noctivagans)	BTO, U	D	3	Y	
Yuma Myotis (Myotis yumanensis)	XC, BSP	D	3	Y	
White-footed vole (Arborimus albipes)	XCO, BSPO, U	S	1	U	
INVERTEBRATES					
Alsea Ochrotichian Micro Caddisfly (Ochrotrichia alsea)	XCO, BS	S	1	U	
American Boreostolus Bug (Boreostolis americanus)	BTO	U	1	U	
Ashlock-Obrien's Seed Bug (Malezonotus obrieni)	BTO	U	1	U	
Blue-gray Taildropper (Prophysaon coeruleum)	S&M, BTO	D	3	Y	
Boreal Carduastethus Pirate Bug (Cardiastethus borealis)	BTO	U	1	U	
Brown Juga (Juga sp. nov.)	BTO	U	1	U	
California Clubtail Dragonfly (Gomphus kurilis)	BTO	U	1	U	
California Floater (Anodonta californiensis)	BSP, XC	S	1	U	
California Giant Damselfly (Archilestes californica)	BTO	U	1	U	
California Stellarid Bug (Vanduzeeina borealis californicus)	BTO	U	1	U	
Cascades Apatanian Caddisfly (Apatania tavala)	BSPO, XCO	S	1	U	
Cooley's Acalypta Lace Bug (Acalypta cooleyi)	BTO	U	1	U	
Coronis Fritillary Butterfly (Speyeria coronis coronis)	BTO	U	1	U	
Crater Lake Tightcoil (Pristiloma arcticum crateris)	S&M, BSO	S	1	U	
Dendrocoris Stink Bug (Dendrocoris arizonensis)	BTO	U	1	U	
Denning's Agapetus Caddisfly (Agapetus denningi)	XCO, BS	U	1	U	
Deschutes Sideband (Monadenia fidelis ssp. nov.)	BSO	U	3	U	
Disc Oregonian (Cryptomastix sp. nov.)	BSO	U	1	U	
Douglas-fir Platylyngus Bug (Platylyngus pseudotsugae)	BTO	U	1	U	
Essig's Macrotylus Plant Bug (Macrotylus essigi)	BTO	U	1	U	
Fender's Blue Butterfly (Icaricia icaroides fenderi)	FE	S	1	U	

Table E-1. Terrestrial and Aquatic Animal Species Present in the Roseburg BLM District and Expected Presence in the South Umpqua WAU.

Species	Status	Presence in District	District Monitoring Level	Expected in the WAU	Expected in Project Area**
Fender's Rhyacophilan Caddisfly (Rhyocophila fenderi)	BTO	U	1	U	
Foliaceous Lace Bug (Derephysia foliacea)	BTO	U	1	U	
Franklin's Bumblebee (Bombus franklini)	XCO, BSO	S	1	U	
Garita Skipper Butterfly (Oarisma garita)	BTO	U	1	U	
Gold-hunter's Hairstreak Butterfly (Satyrium auretorium)	BTO	U	1	U	
Gray-Blue Butterfly (Agriades glandon podarce)	BTO	U	1	U	
Green Sideband (Monadenia fidelis beryllica)	BSO	D	3	Y	
Hatch's Snail-eating Carabid Beetle (Scaphinotus hatchi)	BTO	S	1	U	
Hotspring Physa (Physella sp. nov.)	BSO	U	1	U	
Indian Ford Juga (Juga hemphilli ssp. nov.)	BSO	U	3	U	
Indian Paintbrush Bug (Polymerus castilleja)	BTO	S	1	U	
Insular Blue Butterfly (Plebejus saepiolus insulanus)	BSO	S	1	U	
Lillianis Moss Bug (Acalypta lillianis)	BTO	U	1	U	
Marsh Ground Beetle (Acupalpus punctulatus)	BTO	U	1	U	
Marsh Nabid Bug (Navicula propinqua)	BTO	U	1	U	
Montane Bog Dragonfly (Tanypteryx hageni)	BTO	U	1	U	
Mt. Hood Brachycentrid Caddisfly (Eobrachycentrus gelidae)	BSPO, XCO	D	1	U	
Oregon Acetropis Bug (Ceratpcapsus oregana)	BTO	U	1	U	
Oregon Cave Amphipod (Stygobromus oregonensis)	BTO	U	1	U	
Oregon Giant Earthworm (Driloleirus macelfreshi)	BSO, XCO	S	1	U	
Oregon Halticotoma Plant Bug (Halticotoma sp. nov.)	BTO	U	1	U	
Oregon Megomphix (Megomphix hemphilli)	S&M, BSO	D	3	Y	
Oregon Shoulderband (Helminthoglypta hertleini)	S&M, BSO	D	3	Y	
Oregon Trunk-inhabiting Plant Bug (Eurychilopterella sp. nov.)	BTO	U	1	U	
Pale Teratocoris Sedge Bug (Teratocoris paludum)	BTO	U	1	U	
Papillose Taildropper (Prophysaon dubium)	S&M, BTO	D	3	U	
Piper's Carabid Beetle (Nebria piperi)	BTO	U	1	U	
Pristine Spring Snail (Pristiloma hemphilli)	BTO	D	1	U	
Puget Oregonian Snail (Cryptomastix devia)	BT	S	1	U	
Rotund Lanx (Lanx subrotundata)	BSO	D	1	U	
Sagehen Creek Goeracean Caddisfly (Goeracea oregona)	BSPO, XCO	S	1	U	
Salien Plant Bug (Criocoris saliens)	BTO	U	1	U	
Schuh's Micranthia Shore Bug (Micracanthia schuhi)	BTO	U	1	U	
Shiny Tightcoil (Pristiloma wascoense)	BTO	S	1	U	
Siuslaw Sand Tiger Beetle (Cicindela hirticollis siuslawensis)	BTO	U	1	U	
Siskiyou Copper Butterfly (Lycaena mariposa)	BTO	U	1	U	
Siskiyou Hesperian (Vespericola sierranus)	BTO	U	1	U	
Small Blue Butterfly (Philotiella speciosa)	BTO	U	1	U	

Table E-1. Terrestrial and Aquatic Animal Species Present in the Roseburg BLM District and Expected Presence in the South Umpqua WAU.

Species	Status	Presence in District	District Monitoring Level	Expected in the WAU	Expected in Project Area**
Tombstone Prairie Farulan Caddisfly (Farula reapiri)	BSPO, XCO	S	1	U	
Travelling Sideband (Monadenia fidelis celethuia)	BSO	S	3	U	
True Fir Pinalitus Bug (Pinalitus solivagus)	BTO	U	1	U	
Umbrose Seed Bug (Atrazonotus umbrous)	BTO	U	1	U	
Vernal Pool Fairy Shrimp (Branchinecta lynchi)	FT	U	1	U	
Vertrees' Ceraclean Caddisfly (Ceraclea vertreesi)	BSPO, XCO	D	1	U	
Vertrees' Ochrotichian Micro Caddisfly (Ochrotrichia vertreesi)	BSPO, XCO	U	1	U	
Western Chrosoma Bug (Chrosoma sp. nov.)	BTO	U	1	U	
Western Ridge Mussel (Gonidea angulata)	BTO	D	1	U	
Western Pearlshell (Margaritifera falcata)	BTO	D	1	U	

** The Expected in Project Area column may be used to create a list of species that may be found in a project area.

STATUS ABBREVIATIONS:	DISTRICT PRESENCE ABBREVIATIONS:
FE -- Federal Endangered	D -- Documented by surveys or identified in the field
FT -- Federal Threatened	S -- Suspected, habitat present
FP -- Federal Proposed	U -- Uncertain
FC -- Federal Candidate	
XCO – Former Federal Candidate in Oregon	
XC -- Former Federal Candidate in Oregon and Washington	**MONITORING LEVELS USED TO DOCUMENT SPECIES PRESENCE:**
CH -- Critical habitat designated	N -- No surveys done or planned
SE -- State Endangered	1 -- Literature search only
ST -- State Threatened	2 -- One field search done
C -- ODFW Critical	3 -- Some surveys completed
V -- ODFW Vulnerable	4 -- Protocol completed
P -- ODFW Peripheral/Naturally Rare	
U -- ODFW Undetermined	
HI -- Species of high interest in the District	
BSP – Provisionally Bureau Sensitive in Oregon and Washington	**EXPECTED IN WATERSHED OR PROJECT AREA ABBREVIATIONS:**
BSPO – Provisionally Bureau Sensitive in Oregon	U -- Unknown
BA -- Bureau Assessment Species in Oregon and Washington	Y -- Expected
BAO -- Bureau Assessment Species in Oregon	N -- Not expected
BTO -- Bureau Tracking species in Oregon	
BT -- Bureau Tracking species Oregon and Washington	
FPB – Northwest Forest Plan Protection Buffer Species	
S&M -- Survey and Manage (SEIS ROD)	
The species status reflects interim guidelines from the Oregon State BLM Office IB-OR-2000-02 (January 25, 2000). March 9, 2000 R. H. Espinosa	

Spotted owl site ranking and general suitable habitat evaluation are the two topics to consider when planning management activities affecting northern spotted owl suitable habitat. Habitat evaluation would include the timing of habitat disturbance and spatial distribution of seral age classes. The following steps would be used to evaluate how a management activity affects northern spotted owl suitable habitat.

A. Spotted Owl Site Ranking

1. Use the information in Table 46. Values given in Table 46 were from owl survey data and suitable habitat inventory data.

2. Table 46 contains information on historic and current owl sites. The owl sites best representing the territory locations were selected. Usually the number of potential sites is lower than the total number of historic and current sites. The reason is that any one activity center can have more than one alternate location. Usually the area of these different alternate numbers overlap. Some have alternate numbers that are physically in a differed drainage, subwatershed, ownership, or section.

3. Criteria steps **a** through **m**, listed below, were used to group the selected owl sites to determine the rankings.

Criteria list:

a. Areas where owl sites are **not** present would be considered first.

b. If sites cannot be avoided, then sites that have more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with occupancy and history rankings of "3" would be **second**.

c. Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with occupancy and history rankings of "3" would be considered **third**.

d. Sites with an occupancy ranking of "2" and history ranking of "3" would be considered **fourth**.

e. Sites with an occupancy ranking of "3" and history ranking of "2" would be considered **fifth**.

f. Sites with more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with occupancy and history rankings of "2" would be considered **sixth**.

g. Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with occupancy and history rankings of "2" would be considered **seventh**.

h. Sites with more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with an occupancy ranking of "1" and a history value of "2" would be considered **eighth**.

I. Sites with more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with an occupancy ranking of "2" and a history ranking of "1" would be considered **ninth**.

j. Sites with more than 1,000 acres suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with an occupancy ranking of "1" and a history ranking of "2" would be considered **tenth**.

k. Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with an occupancy ranking of "1" and a history ranking of "2" would be considered **eleventh**.

l. Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with an occupancy ranking of "2" and a history ranking of "1" would be considered **twelfth**.

m. Sites with occupancy and history rankings of "1" would be considered **last**.

4. Projects meeting criteria **a**, which is removing or modifying suitable spotted owl habitat outside of known provincial territories would be considered first.

5. Owl territories meeting criteria **b** through **g** were grouped and given a ranking of **one**.

6. Owl territories meeting criteria **h** through **j** were grouped and given a ranking of **two**.

7. Owl territories meeting criteria **k** through **m** were grouped and given a ranking of **three**.

8. The following conditions apply to the individual rankings.

When it is not possible to avoid modifying or removing suitable habitat within a known territory, then sites with "go to" rank of "one" would be first, "two" would be second, and "three" would be last. The ranking in Table E-2 for any given owl site number has a different purpose based on Land Use Allocation (LSR or Matrix). For example, a site with a final rank of "1" in Matrix would be considered as a potential area where timber harvesting may occur first. Details of timing, location, and distance from core area would be determined by an ID Team and other staff evaluations. Sites with a rank of "1" in the LSR portion of the WAU would be considered first for habitat evaluation. Details of timing, location, distance from core area, objectives, and treatment would be determined by an ID Team or other staff evaluations.

Table E-2. Go to Ranking of Spotted Owl Master Sites in the South Umpqua WAU.

MATRIX			LSR	
MSNO[1]	LUA	Go To Rank For Timber Harvest	MSNO[1]	Go To Rank For Habitat Evaluation[2]
0295	GFMA	2	0283	1
0361	CONN	2	0289	2
1809	CONN	3	0296	1
1810	GFMA	3	0297	1
1930	GFMA	1	0298	1
1984	PRIVATE	1	0363	1
1985	CONN	1	0364	1
1994	CONN	3	0365	3
1995	GFMA	3	0366	1
1996	GFMA	3	1813	3
1999	GFMA	2	1932	1
2090	GFMA	3	1933	3
2091	CONN	3	1934	2
2092	CONN	2	1935	2
2093	CONN	1	1977	3
2197	GFMA	2	1982	3
2210	CONN	3	2087	3
2292	CONN	3	2382	1
2293	GFMA	2	3104	2
4363	CONN	1	3906	3
4365	CONN	3	3909	3
4366	GFMA	3	4052	3
4518	CONN	3	4367	3
4538	GFMA	3	4368	3
			4519	3

1. MSNO group includes original (i.e 0300) and alternate sites (0300A). 2. Follow the habitat evaluation steps.

B. Habitat Evaluation

The concept of habitat evaluation would be applied to the landscape while maintaining objectives for the various Land Use Allocations. Habitat evaluation would describe the timing, location, and spatial distribution of habitat removal or modification on Matrix lands in the WAU. Habitat evaluation may include topics like connectivity of mature and late-successional blocks to other similar blocks and their relationship to topography, the amount of suitable habitat present around spotted owl sites, where the suitable habitat is located, the connectivity of suitable habitat, and the status of dispersal habitat. The function and objectives of critical habitat would be considered in areas where Critical Habitat Units overlap Matrix lands.

In the LSR portion of the WAU, the habitat evaluation would consider current and future forest age classes, location, and connection to similar habitat within or between spotted owl territories across the landscape. This evaluation could locate LSR project areas and actions where manipulation of forest stands could aid reaching old-growth characteristics sooner than if left in the current condition.

Evaluation of the connectivity of suitable habitat would be conducted using aerial photographs of the WAU, seral age class maps, and ground inspections. This way the connection of late-successional blocks and the relationship to topography could be examined. Topography is important because knowing where connectivity is present or lacking and the relationship to riparian systems or uplands may make a difference on its success. Because of the checkerboard ownership, connectivity of the remaining older forest stands is very important. Even avian species capable of flight require connectivity of habitat for moving from one place to another. The ability to move within the forest from one place to another becomes more important to species that require or have dependency on the older age classes, have small territories, or move by crawling or walking across the ground.

The following is an example of steps to evaluate forest connectivity on the landscape. This example deals with owls but the process can be used for other species. This process would involve wildlife biologists, planning, and silviculture specialists.

1. Consider the ranking system. Keep in mind habitat acre thresholds of maintaining 500 acres within 0.7 miles, 1,335 acres within 1.3 miles, or 1,286 acres within 1.2 miles of a spotted owl site and LSR objectives. This data was presented in Table 46 in this watershed analysis.

2. Owl sites would be evaluated using the spatial arrangement of seral age classes within the provincial radii (1.2 or 1.3 miles) around an owl site. In the LSR, the purpose would be to locate areas where manipulation could increase the rate of stand development toward late-successional characteristics. On Matrix lands, the purpose may be to locate areas where manipulation may provide a functional forest corridor and coordinate the timing and spacing of timber harvesting units.

3. Within the WAU, the connectivity of suitable spotted owl habitat within an owl site to other late-successional habitat in the vicinity would be evaluated. Blocks of older age class stands (80 years old and

older) and how they are connected to other similar blocks would be analyzed. The following questions and comments would be reviewed and answered.

a. Does the provincial radii of owl sites contain forest stands suitable for harvest (Matrix) or manipulation (LSR/Matrix)? If the ranking table has been completed this information is already available.

b. Will manipulation of forest stands (LSR/Matrix) speed up attaining older age class characteristics to provide connectivity between owl sites and suitable spotted owl habitat?

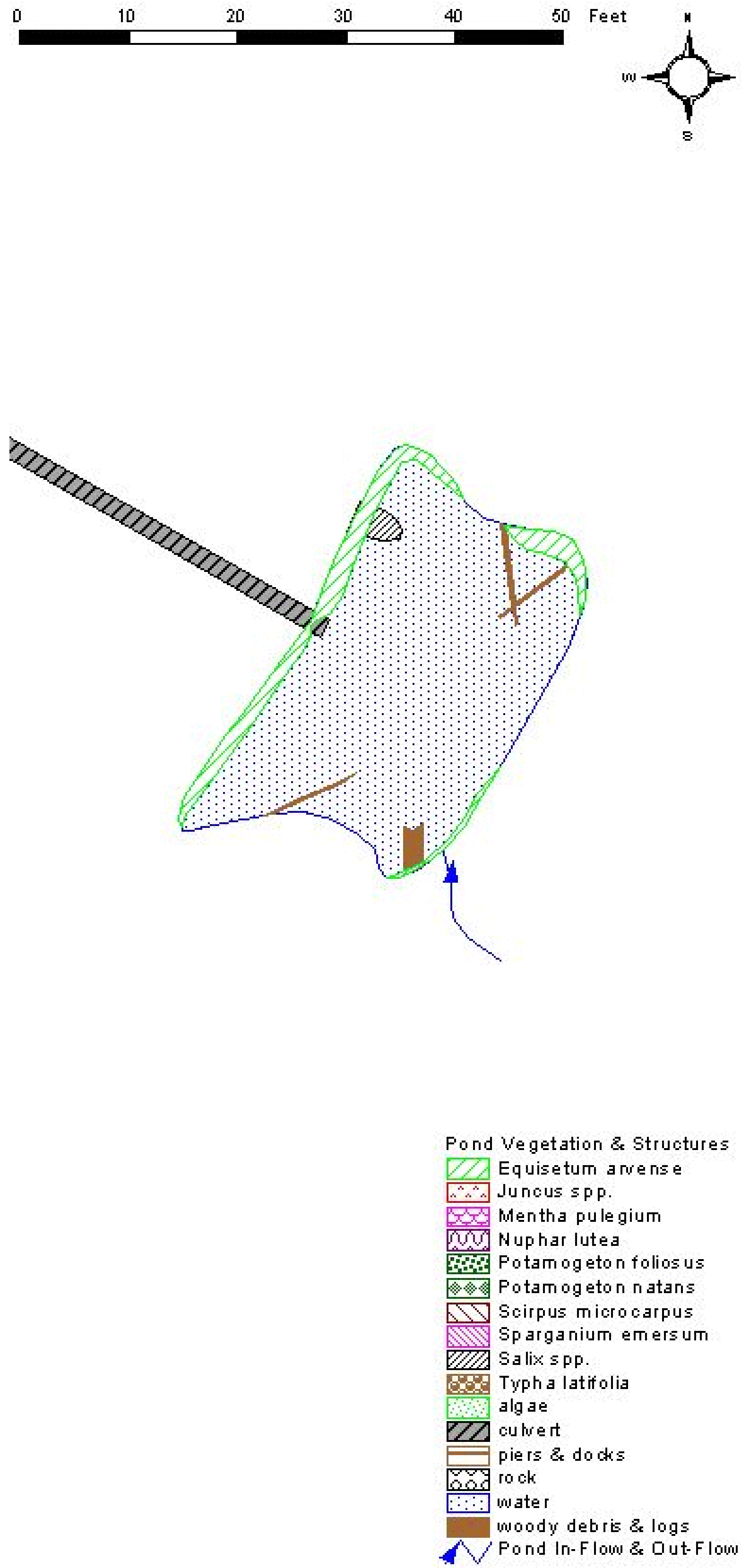
c. Will timber harvesting of stands reduce connectivity between suitable owl habitat and adjacent habitat?

d. Will manipulation of the stand increase or decrease connectivity between suitable owl habitat and adjacent habitat, between the LSRs and Matrix, or between Connectivity/Diversity Blocks?

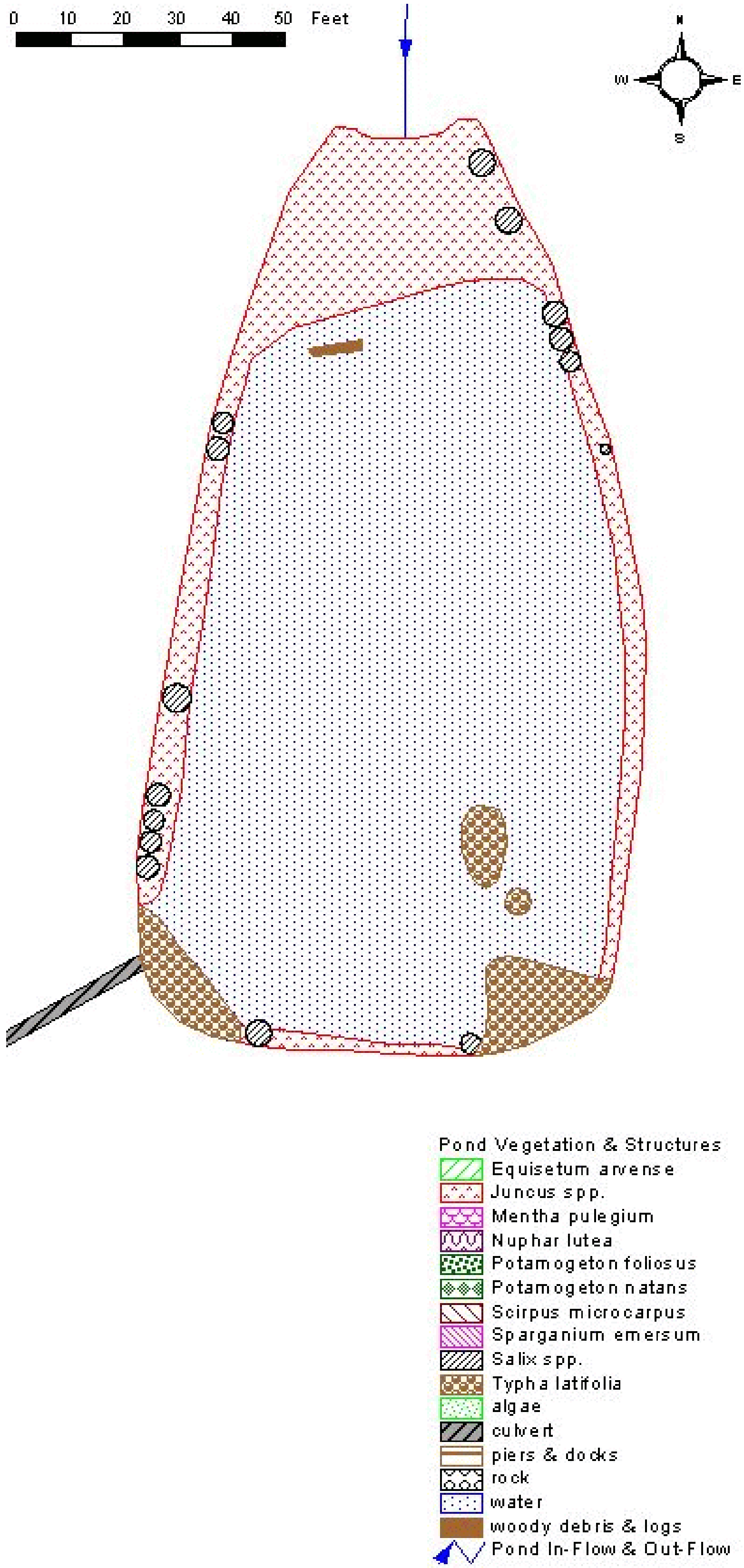
e. Where is connectivity needed? In the upland or in the riparian area of the drainage? Both? Is the Riparian Reserve connection adequate to meet objectives?

f. Evaluate and select forest stands to leave without manipulation and the advantages or disadvantages of such a choice (in Matrix or LSR). This could lead to long-term connection of older forest stands across the landscape.

Pond Name: "Big Sallar" T30S-R04W-S36 **Survey Date:** September 2, 1999 **Surveyor:** Rex McGraw	
Pond Variable	0 *(n=3)*
Pond Morphology	
Surface Area	72m^2 (772ft^2)
Perimeter	37m (120ft)
SLD	1.23
Littoral Zone Depth	40cm (16in)
Water Chemistry	
Temperature	14ºC (58ºF)
pH	7.65
Conductivity	0.116mS/cm
Macro-Invertebrate Indices	
Total No. Families	14
No. Families	8.0
Abundance	81.67
Shannon Diversity Index	1.428
Equitability	0.705
Hilsenhoff Biotic Index	5.53
Vertebrate Species Detected	
Pacific Giant Salamander (*Dicamptodon tenebrosus*) Pacific Treefrog (*Hyla regilla*) Roughskin Newt (*Taricha granulosa*)	

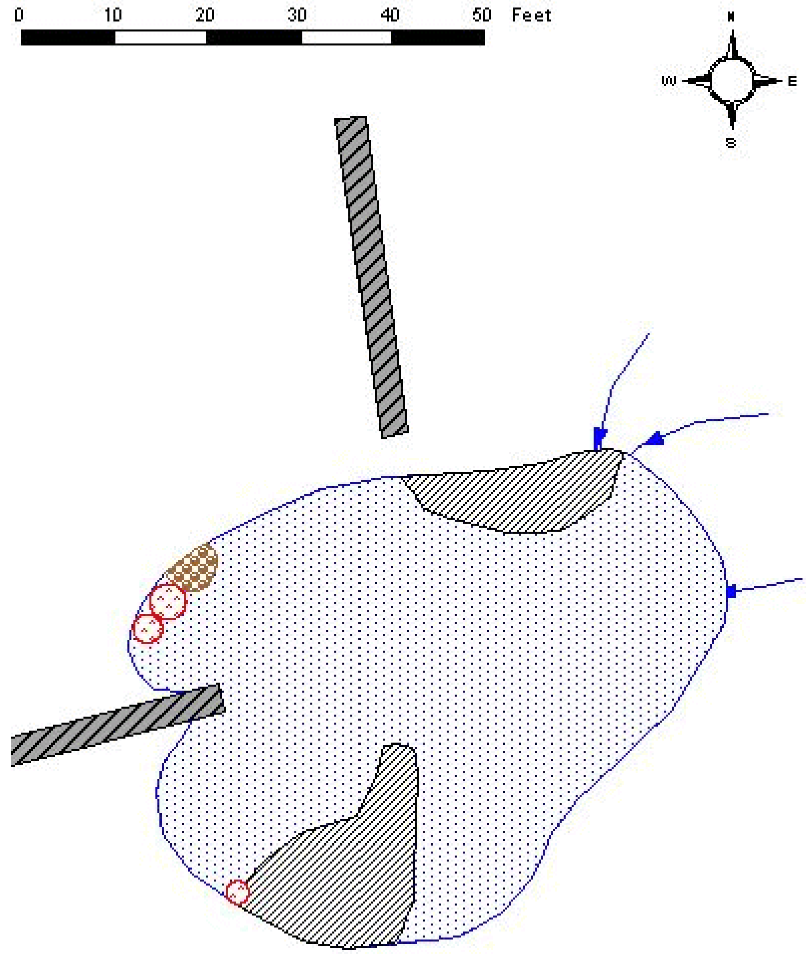


Pond Name: Magic Mountain T31S-R05W-S17 **Survey Date:** September 2, 1999 **Surveyor:** Rex McGraw	
Pond Variable	0 *(n=5)*
Pond Morphology	
Surface Area	$1181m^2$ ($12{,}707ft^2$)
Perimeter	138m (453ft)
SLD	1.13
Littoral Zone Depth	22cm (9in)
Water Chemistry	
Temperature	21ºC (71ºF)
pH	8.19
Conductivity	0.050mS/cm
Macro-Invertebrate Indices	
Total No. Families	11
No. Families	6.2
Abundance	64.6
Shannon Diversity Index	0.622
Equitability	0.344
Hilsenhoff Biotic Index	8.72
Vertebrate Species Detected	
Pacific Treefrog (*Hyla regilla*) Roughskin Newt (*Taricha granulosa*)	



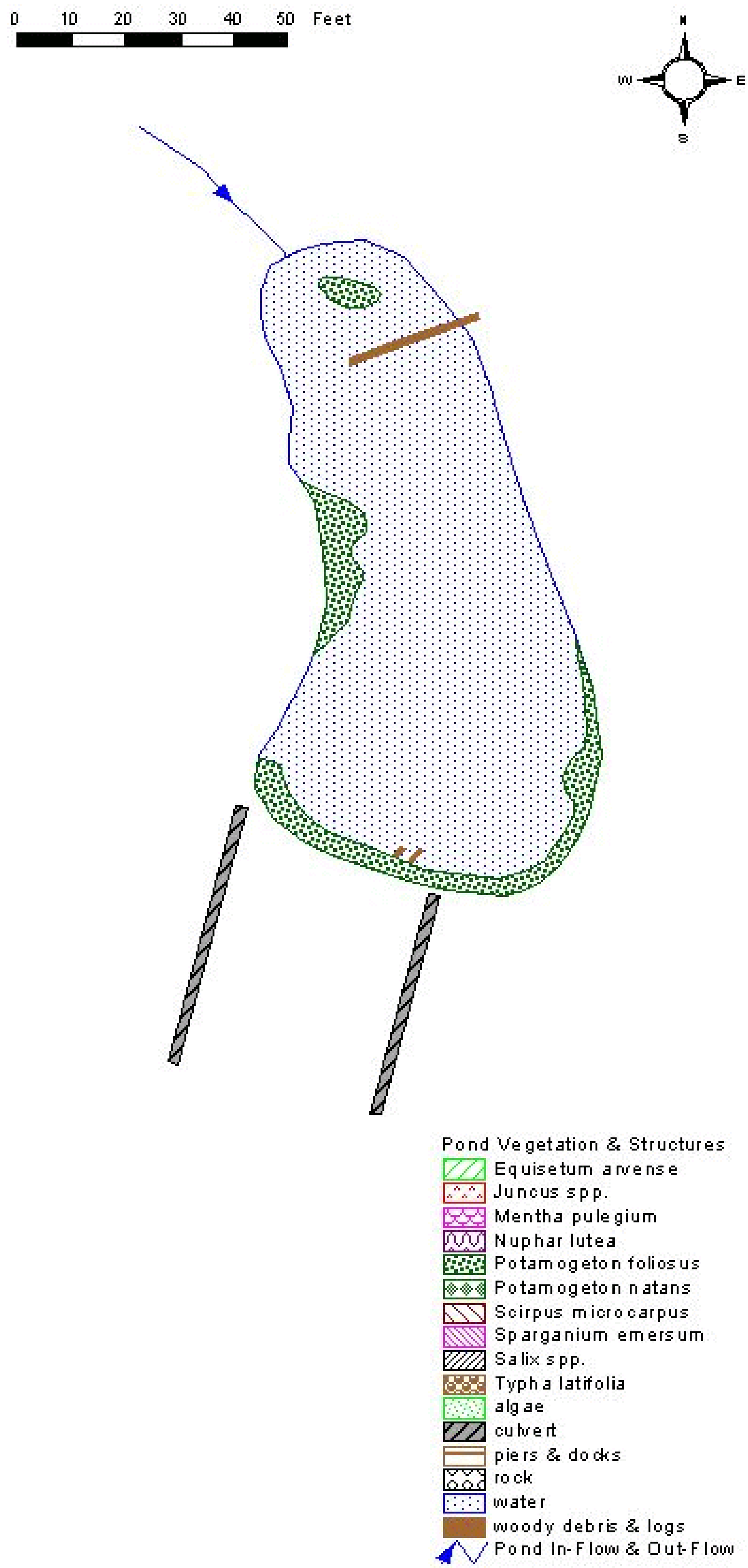
Pond Name: Turkey Creek
T31S-R05W-S13
Survey Date: September 2, 1999
Surveyor: Rex McGraw

Pond Variable	0 *(n=3)*
Pond Morphology	
Surface Area	228m² (2449ft²)
Perimeter	58m (191ft)
SLD	1.08
Littoral Zone Depth	49cm (19in)
Water Chemistry	
Temperature	15ºC (58ºF)
pH	7.30
Conductivity	0.140mS/cm
Macro-Invertebrate Indices	
Total No. Families	12
No. Families	6.3
Abundance	36.33
Shannon Diversity Index	1.445
Equitability	0.783
Hilsenhoff Biotic Index	6.91
Vertebrate Species Detected	
Roughskin Newt (*Taricha granulosa*)	



Pond Vegetation & Structures
- Equisetum arvense
- Juncus spp.
- Mentha pulegium
- Nuphar lutea
- Potamogeton foliosus
- Potamogeton natans
- Scirpus microcarpus
- Sparganium emersum
- Salix spp.
- Typha latifolia
- algae
- culvert
- piers & docks
- rock
- water
- woody debris & logs
- Pond In-Flow & Out-Flow

Pond Name: "Un-Named Pond" T31S-R05W-S09 **Survey Date:** September 2, 1999 **Surveyor:** Rex McGraw	
Pond Variable	0 *(n=3)*
Pond Morphology	
Surface Area	485m² (5215ft²)
Perimeter	96m (315ft)
SLD	1.23
Littoral Zone Depth	44cm (18in)
Water Chemistry	
Temperature	20ºC (68ºF)
pH	7.82
Conductivity	0.191mS/cm
Macro-Invertebrate Indices	
Total No. Families	6
No. Families	4.0
Abundance	110.0
Shannon Diversity Index	0.850
Equitability	0.640
Hilsenhoff Biotic Index	7.80
Vertebrate Species Detected	
Garter Snake (*Thamnophis spp.*) Roughskin Newt (*Taricha granulosa*)	



Appendix F

Plants

Appendix F

Table F-1. Survey and Manage Plant Species Suspected to Occur in the South Umpqua WAU.

Species	Survey Strategy			
	1	2	3	4
Vascular plants				
Allotropa virgata[d]	X	X		
Aster vialis[d]	X	X		
Cypripedium fasciculata	X	X		
Cypripedium montanum[d]	X	X		
Fungi				
Rare False Truffles				
Gautieria otthii	X		X	
False Truffles				
Rhizopogon truncatus			X	
Chanterelles				
Cantharellus cibarius[d]			X	X
Cantharellus subalbidus			X	X
Cantharellus tubaeformis[d]			X	X
Chanterelles - Gomphus				
Gomphus clavatus			X	
Gomphus floccosus[d]			X	
Gomphus kauffmannii			X	
Tooth Fungi				
Hydnum repandum[d]			X	
Hydnum umbilicatum[d]			X	

Appendix F

Table F-1. Survey and Manage Plant Species Suspected to Occur in the South Umpqua WAU.

Species	Survey Strategy			
	1	2	3	4
Rare Resupinates and Polypores				
Gyromitra esculenta[d]			X	X
Gyromitra infula			X	X
Otidea leporina[d]			X	
Otidea onotica[d]			X	
Otidea smithii	X		X	
Sarcosoma mexicana[d]			X	
Sarcosoma eximia			X	
Rare Cup Fungi				
Aleuria rhenana	X		X	
Helvella compressa[d]	X		X	
Helvella maculata	X		X	
Coral Fungi				
Clavicorona avellanea[d]			X	
Jelly Mushroom				
Phlogoitis helvelloides[d]			X	X
Lichens				
Rare Leafy (arboreal) Lichens				
Hypogymnia duplicata	X	X	X	
Rare Nitrogen-Fixing Lichens				
Lobaria hallii[d]	X		X	

Appendix F

Table F-1. Survey and Manage Plant Species Suspected to Occur in the South Umpqua WAU.

Species	Survey Strategy			
	1	2	3	4
Nitrogen-fixing Lichens				
Lobaria oregana[d]				X
Lobaria pulmonaria[d]				X
Lobaria scrobiculata[d]				X
Pseudocyphellaria anomala[d]				X
Pseudocyphellaria anthraspis[d]				X
Pseudocyphellaria crocata[d]				X
Sticta limbata[d]				X
Sticta fuliginosa[d]				X
Peltigera collina[d]				X
Nephroma resupinatum[d]				X
Bryophytes				
Antitrichia curtipendula				X
Diplophyllum plicatum	X	X		
Tetraphis geniculata	X		X	

d = Species documented as occurring in the South River Resource Area.

Survey Strategies:
1= Manage Known Sites
2= Survey Prior to Activities and Manage Sites
3= Conducts Extensive Surveys and Manage Sites
4= Conduct General Regional Surveys

Appendix G

Roads

Table G-1. Roads in the South Umpqua WAU to Consider Decommissioning.

Road Number	Miles	Surface Type	Subwatershed
31-5-2.01C	0.10	Natural	Canyon Creek
31-5-12.01A	0.19	Rock	Canyon Creek
31-5-15.01A	0.20	Rock	Canyon Creek
31-5-18.00A	0.31	Natural	Canyon Creek
31-5-19.00B	0.16	Natural	Canyon Creek
31-5-21.02A	0.13	Natural	Canyon Creek
31-5-24.00B	0.39	Natural	Canyon Creek
31-5-24.01B	0.35	Natural	Canyon Creek
31-5-28.00A	0.50	Natural	Canyon Creek
31-5-28.01B	0.08	Natural	Canyon Creek
29-2-19.01A	0.29	Rock	Coffee Creek
29-3-25.00A	0.42	Rock	Coffee Creek
29-3-35.00B	0.21	Rock	Coffee Creek
29-3-35.04A	0.38	Rock	Coffee Creek
30-2-9.01A2	0.21	Natural	Coffee Creek
30-2-16.00B	0.10	Natural	Coffee Creek
30-3-13.05A	0.26	Rock	Coffee Creek
30-3-23.01A2	0.30	Natural	Coffee Creek
30-3-23.01C	0.21	Natural	Coffee Creek
30-3-23.02B	0.38	Natural	Coffee Creek
30-3-23.03B	0.10	Natural	Coffee Creek
30-3-23.05B	0.25	Rock	Coffee Creek
30-3-24.01B	0.27	Natural	Coffee Creek
29-2-9.04A	0.31	Rock	Days Creek
29-3-23.04A	0.31	Natural	Days Creek
29-3-24.00B	0.33	Natural	Days Creek

Road Number	Miles	Surface Type	Subwatershed
29-3-24.01A	0.18	Natural	Days Creek
29-3-26.02A	0.17	Rock	Days Creek
29-3-27.01B	0.07	Natural	Days Creek
29-3-29.00A	0.37	Natural	Days Creek
29-3-29.01A	0.21	Natural	Days Creek
29-3-33.07A	0.10	Natural	Days Creek
29-3-33.09A	0.38	Rock	Days Creek
29-4-27.01A	0.13	Rock	Days Creek
29-4-27.03A	0.06	Rock	Days Creek
30-3-7.00A	0.22	Rock	Days Creek
30-3-18.02A	0.22	Rock	Days Creek
30-4-22.00M	0.10	Natural	Shively-O’Shea
30-4-26.02A	0.27	Rock	Shively-O’Shea
30-4-26.03A	0.33	Rock	Shively-O’Shea
30-4-27.01A	0.40	Natural	Shively-O’Shea
30-4-28.03B	0.63	Rock	Shively-O’Shea
30-4-35.00A	0.10	Natural	Shively-O’Shea
30-5-10.00A	0.49	Natural	Shively-O’Shea
30-5-10.01A	0.31	Natural	Shively-O’Shea
31-3-8.02B	0.16	Rock	Shively-O’Shea
31-4-2.00A	0.28	Rock	Shively-O’Shea
31-4-3.02A	0.48	Rock	Shively-O’Shea
31-4-3.03A	0.17	Rock	Shively-O’Shea
31-4-4.04B	0.13	Rock	Shively-O’Shea
31-4-5.01A	0.51	Rock	Shively-O’Shea
31-4-5.01B	0.04	Rock	Shively-O’Shea
31-4-9.01A	0.52	Natural	Shively-O’Shea

Road Number	Miles	Surface Type	Subwatershed
31-4-9.05A	0.35	Natural	Shively-O’Shea
31-4-9.06A	0.16	Rock	Shively-O’Shea
31-4-13.01A	0.18	Natural	Shively-O’Shea
31-4-13.03A	0.28	Rock	Shively-O’Shea
31-4-13.04A	0.11	Natural	Shively-O’Shea
31-4-20.00B	0.13	Rock	Shively-O’Shea
31-4-24.00B	0.16	Natural	Shively-O’Shea
29-3-33.04D	0.61	Rock	St Johns Creek
29-3-35.00B	0.21	Rock	St Johns Creek
30-3-3.01A	0.37	Rock	St Johns Creek
30-3-17.01A	0.55	Rock	St Johns Creek
30-3-23.05B	0.25	Rock	St Johns Creek
30-3-29.01A	0.23	Natural	St Johns Creek
30-3-30.03C	0.19	Natural	St Johns Creek
30-4-23.00B	0.56	Natural	St Johns Creek
31-3-7.01C	0.58	Natural	St Johns Creek
31-3-3.02D	0.12	Rock	Stouts Creek
31-3-5.00A	0.50	Rock	Stouts Creek
31-3-8.02B	0.16	Rock	Stouts Creek
31-3-10.00A	0.44	Rock	Stouts Creek
31-3-16.03C	0.50	Natural	Stouts Creek
31-3-16.04B	0.31	Natural	Stouts Creek
31-3-25.00A	0.38	Natural	Stouts Creek
31-3-27.01C	0.31	Rock	Stouts Creek
31-3-33.00E	0.26	Rock	Stouts Creek
Total	21.67		

Table G-2. Roads in the South Umpqua WAU to Consider Either Decommissioning or Improving.

Road Number	Miles	Surface Type	Subwatershed
31-5-10.01B	0.50	Natural	Canyon Creek
29-3-13.00B	0.27	Natural	Days Creek
29-3-26.01B	0.87	Natural	Days Creek
29-3-27.02A	0.16	Natural	Days Creek
30-3-17.00A	1.38	Rock	Days Creek
30-4-21.01E	0.10	Natural	Shively-O'Shea
30-4-28.02B	0.70	Natural	Shively-O'Shea
30-3-16.00E	0.42	Natural	St Johns Creek
30-3-16.00G	0.16	Natural	St Johns Creek
31-3-1.02A	0.14	Natural	Stouts Creek
31-3-10.04A	0.86	Rock	Stouts Creek
31-3-15.02A	1.14	Rock	Stouts Creek
31-3-16.00C	0.56	Rock	Stouts Creek
Total	7.26		

Table G-3. Roads in the South Umpqua WAU to Consider Improving.

Road Number	Miles	Surface Type	Subwatershed
30-5-31.00D3	0.15	Natural	Canyon Creek
30-5-31.00F	0.56	Natural	Canyon Creek
31-4-19.01A	0.87	Rock	Canyon Creek
31-4-19.02A	0.48	Natural	Canyon Creek
31-5-10.00A	1.20	Natural	Canyon Creek
31-5-12.00B	0.45	Rock	Canyon Creek
31-5-12.00D	0.42	Rock	Canyon Creek
31-5-13.00D	1.87	Rock	Canyon Creek
31-5-13.01A	4.47	Rock	Canyon Creek
31-5-14.00A	0.51	Rock	Canyon Creek
31-5-14.03A	0.25	Rock	Canyon Creek
31-5-16.00C	0.57	Natural	Canyon Creek
31-5-19.03A	0.40	Natural	Canyon Creek
31-5-21.03A	1.69	Rock	Canyon Creek
31-5-21.04A	0.43	Rock	Canyon Creek
31-5-22.02A	1.24	Rock	Canyon Creek
31-5-22.03A	3.35	Rock	Canyon Creek
31-5-24.00E2	0.36	Rock	Canyon Creek
31-5-24.00G	0.53	Rock	Canyon Creek
31-5-27.00A	0.93	Rock	Canyon Creek
31-5-34.00A	1.92	Rock	Canyon Creek
31-5-35.00H	0.15	Rock	Canyon Creek
31-5-35.00J	0.66	Rock	Canyon Creek
31-6-24.00A	2.49	Rock	Canyon Creek
31-6-26.01B	0.30	Natural	Canyon Creek

Road Number	Miles	Surface Type	Subwatershed
32-5-3.00A	1.76	Rock	Canyon Creek
29-2-19.00A	1.03	Rock	Coffee Creek
29-3-36.00A	1.42	Rock	Coffee Creek
30-2-7.00B	1.20	Natural	Coffee Creek
30-2-9.00A	0.04	Natural	Coffee Creek
30-2-9.02A	0.39	Rock	Coffee Creek
30-2-9.03A	0.80	Rock	Coffee Creek
30-2-13.01L	0.42	Natural	Coffee Creek
30-2-28.02A	0.85	Rock	Coffee Creek
30-2-29.00A	1.28	Rock	Coffee Creek
30-3-1.00A	0.81	Rock	Coffee Creek
30-3-13.01F	1.08	Rock	Coffee Creek
30-3-13.03A1	0.96	Rock	Coffee Creek
30-3-13.03A2	0.64	Rock	Coffee Creek
30-3-23.05A	0.63	Rock	Coffee Creek
30-3-24.00B	0.26	Natural	Coffee Creek
29-2-4.00A	3.11	Rock	Days Creek
29-2-19.02A	0.70	Rock	Days Creek
29-2-19.02B	0.21	Rock	Days Creek
29-3-11.04A	0.42	Natural	Days Creek
29-3-13.01B	0.35	Natural	Days Creek
29-3-13.02A	0.82	Rock	Days Creek
29-3-15.01C	0.93	Natural	Days Creek
29-3-27.01A	0.18	Natural	Days Creek
29-3-29.02A	0.78	Rock	Days Creek

Road Number	Miles	Surface Type	Subwatershed
29-3-29.02B	0.27	Rock	Days Creek
29-3-29.03A	1.25	Rock	Days Creek
29-3-33.00I	4.44	Rock	Days Creek
29-3-33.02A	0.19	Natural	Days Creek
29-3-33.04A	1.10	Rock	Days Creek
29-3-33.04B1	1.40	Rock	Days Creek
29-3-33.04B2	0.42	Rock	Days Creek
29-4-25.00B	0.14	Natural	Days Creek
29-4-27.00A	1.35	Rock	Days Creek
29-4-35.00B	0.25	Rock	Days Creek
29-4-35.00D	0.63	Rock	Days Creek
30-3-6.00D	3.31	Rock	Days Creek
30-3-18.01A	0.95	Rock	Days Creek
30-4-1.00A	0.62	Rock	Days Creek
30-4-3.00A	0.09	Natural	Days Creek
30-4-3.00C	0.15	Natural	Days Creek
30-4-3.00F	0.25	Natural	Days Creek
29-4-32.00C	0.47	Natural	Shively-O’Shea
29-4-32.00D	0.25	Natural	Shively-O’Shea
29-4-32.00F	0.30	Natural	Shively-O’Shea
30-4-6.00A	0.63	Rock	Shively-O’Shea
30-4-6.00C	0.95	Rock	Shively-O’Shea
30-4-26.00A	1.55	Rock	Shively-O’Shea
30-4-26.00B	2.00	Rock	Shively-O’Shea
30-4-27.00A	1.52	Natural	Shively-O’Shea

Road Number	Miles	Surface Type	Subwatershed
30-4-28.00G2	0.59	Natural	Shively-O'Shea
30-4-28.00I	0.10	Natural	Shively-O'Shea
30-4-28.01H	0.64	Rock	Shively-O'Shea
30-4-28.04B	1.39	Rock	Shively-O'Shea
30-5-1.00A	0.95	Rock	Shively-O'Shea
30-5-1.01A	0.44	Rock	Shively-O'Shea
30-5-1.02A	0.26	Natural	Shively-O'Shea
30-5-14.00A	2.48	Rock	Shively-O'Shea
30-5-14.00B	1.43	Rock	Shively-O'Shea
30-5-15.00A	0.39	Natural	Shively-O'Shea
30-5-24.00H	0.10	Natural	Shively-O'Shea
30-5-24.00I	0.20	Natural	Shively-O'Shea
30-5-31.00D3	0.15	Natural	Shively-O'Shea
30-5-31.00F	0.56	Natural	Shively-O'Shea
30-5-33.00E	0.65	Natural	Shively-O'Shea
31-4-2.02A	2.40	Rock	Shively-O'Shea
31-4-3.00C	0.85	Rock	Shively-O'Shea
31-4-4.01B	0.62	Rock	Shively-O'Shea
31-4-4.01E	0.25	Natural	Shively-O'Shea
31-4-4.03B	0.28	Natural	Shively-O'Shea
31-4-5.00B	0.43	Rock	Shively-O'Shea
31-4-5.03A	0.52	Rock	Shively-O'Shea
31-4-9.00A	0.78	Rock	Shively-O'Shea
31-4-9.02A	0.17	Natural	Shively-O'Shea
31-4-9.03A	0.10	Natural	Shively-O'Shea

Road Number	Miles	Surface Type	Subwatershed
31-4-9.04A	0.10	Natural	Shively-O’Shea
31-4-11.00B	0.79	Rock	Shively-O’Shea
31-4-11.01C	0.35	Natural	Shively-O’Shea
31-4-11.01E	0.18	Natural	Shively-O’Shea
31-4-13.00B	0.21	Natural	Shively-O’Shea
31-4-13.00C	0.15	Natural	Shively-O’Shea
31-4-13.00D	0.61	Natural	Shively-O’Shea
31-4-15.00A	1.07	Rock	Shively-O’Shea
31-4-19.02A	0.48	Natural	Shively-O’Shea
31-4-20.00A	0.23	Rock	Shively-O’Shea
31-5-12.00D	0.42	Rock	Shively-O’Shea
31-5-13.01A	4.47	Rock	Shively-O’Shea
31-5-24.00H	1.16	Rock	Shively-O’Shea
31-5-35.00L1	0.64	Natural	Shively-O’Shea
31-5-35.00L2	0.56	Natural	Shively-O’Shea
30-3-15.02A	0.55	Rock	St Johns Creek
30-3-16.00B	0.33	Natural	St Johns Creek
30-3-16.00C	0.12	Natural	St Johns Creek
30-3-16.01A	0.47	Natural	St Johns Creek
30-3-22.00A	0.29	Rock	St Johns Creek
30-3-22.01B	0.17	Natural	St Johns Creek
30-3-30.03A	0.87	Rock	St Johns Creek
30-3-34.01H	0.62	Rock	St Johns Creek
30-4-1.00K	0.39	Rock	St Johns Creek
30-3-29.00B	0.29	Rock	St Johns Creek

Road Number	Miles	Surface Type	Subwatershed
30-3-29.00D	0.14	Rock	St Johns Creek
30-3-30.00D	0.45	Natural	St Johns Creek
30-3-30.01B	0.68	Rock	St Johns Creek
30-3-33.00A	1.66	Rock	St Johns Creek
30-4-36.00A	0.84	Rock	St Johns Creek
31-3-4.00C	2.57	Rock	St Johns Creek
31-4-1.01A	0.82	Rock	St Johns Creek
31-4-11.01C	0.35	Natural	St Johns Creek
31-4-11.01E	0.18	Natural	St Johns Creek
30-3-34.00N	0.18	Natural	Stouts Creek
31-3-1.00B	1.76	Rock	Stouts Creek
31-3-1.04A	1.12	Rock	Stouts Creek
31-3-1.05A	0.84	Rock	Stouts Creek
31-3-2.02C	1.03	Rock	Stouts Creek
31-3-2.03B	0.41	Rock	Stouts Creek
31-3-8.01B	0.42	Rock	Stouts Creek
31-3-8.01C	1.12	Rock	Stouts Creek
31-3-10.01A	1.22	Rock	Stouts Creek
31-3-10.03A1	0.38	Rock	Stouts Creek
31-3-10.03A2	1.45	Rock	Stouts Creek
31-3-10.05A	0.55	Rock	Stouts Creek
31-3-11.00A	2.23	Rock	Stouts Creek
31-3-11.02A	0.58	Rock	Stouts Creek
31-3-29.00C	0.30	Natural	Stouts Creek
Total	125.33		

Table G-4. Roads in the South Umpqua WAU Not Needing Treatment at This Time.

Road Number	Miles	Surface Type	Subwatershed
30-5-31.00D2	0.20	Rock	Canyon Creek
31-4-7.00A	0.64	Rock	Canyon Creek
31-4-19.00A	0.42	Rock	Canyon Creek
31-4-32.00A	1.33	Rock	Canyon Creek
31-5-2.00E	0.19	Rock	Canyon Creek
31-5-2.00F	0.28	Rock	Canyon Creek
31-5-2.00M	0.07	Rock	Canyon Creek
31-5-4.00A	0.87	Rock	Canyon Creek
31-5-10.01A	0.68	Rock	Canyon Creek
31-5-10.02A	1.51	Rock	Canyon Creek
31-5-10.02B	0.77	Rock	Canyon Creek
31-5-13.00A	0.76	Rock	Canyon Creek
31-5-13.00B	1.79	Rock	Canyon Creek
31-5-13.00C	2.45	Rock	Canyon Creek
31-5-13.02A	1.21	Rock	Canyon Creek
31-5-14.01A	0.43	Rock	Canyon Creek
31-5-15.00B	3.43	Rock	Canyon Creek
31-5-15.00C	1.09	Rock	Canyon Creek
31-5-15.00D	1.99	Rock	Canyon Creek
31-5-16.00A	2.63	Rock	Canyon Creek
31-5-16.00B	0.45	Rock	Canyon Creek
31-5-17.00A	0.43	Rock	Canyon Creek
31-5-17.01A	0.25	Rock	Canyon Creek
31-6-17.02A	0.11	Rock	Canyon Creek
31-6-17.03A	0.40	Rock	Canyon Creek

Road Number	Miles	Surface Type	Subwatershed
31-5-21.00A	0.14	Rock	Canyon Creek
31-5-21.01P	0.25	Rock	Canyon Creek
31-5-24.00E1	0.25	Rock	Canyon Creek
31-5-27.01A	0.53	Rock	Canyon Creek
31-5-35.01A	1.29	Rock	Canyon Creek
31-6-12.03B	1.18	Rock	Canyon Creek
31-6-12.03C	0.80	Natural	Canyon Creek
31-6-25.01A	0.82	Rock	Canyon Creek
28-2-32.00D	4.21	Rock	Coffee Creek
29-2-4.00C	0.83	Rock	Coffee Creek
29-2-8.00A	1.75	Rock	Coffee Creek
29-2-20.00A	1.71	Rock	Coffee Creek
29-2-31.00A	0.81	Rock	Coffee Creek
29-2-32.00A	0.59	Rock	Coffee Creek
29-2-32.02A	1.24	Rock	Coffee Creek
29-2-32.03A	0.86	Rock	Coffee Creek
29-3-27.00C	0.30	Rock	Coffee Creek
29-3-27.00D	0.30	Rock	Coffee Creek
29-3-27.00E	0.10	Rock	Coffee Creek
29-3-27.00F1	1.25	Rock	Coffee Creek
29-3-27.00F2	0.45	Rock	Coffee Creek
29-3-35.00A	0.99	Rock	Coffee Creek
29-3-35.02A	1.08	Rock	Coffee Creek
30-2-9.01A1	0.34	Rock	Coffee Creek
30-2-13.01K1	0.13	Rock	Coffee Creek

Road Number	Miles	Surface Type	Subwatershed
30-2-13.01K2	0.10	Rock	Coffee Creek
30-2-30.00B	0.72	Rock	Coffee Creek
30-3-13.04A	0.63	Rock	Coffee Creek
30-3-23.01A1	0.95	Rock	Coffee Creek
30-3-23.04A	0.49	Rock	Coffee Creek
30-3-26.00A	0.66	Rock	Coffee Creek
30-3-26.00B	0.39	Rock	Coffee Creek
30-3-26.00C	1.06	Rock	Coffee Creek
30-3-26.00D	0.65	Rock	Coffee Creek
30-3-26.00E	0.52	Rock	Coffee Creek
29-2-4.00B	1.62	Rock	Days Creek
29-2-6.00A	1.63	Rock	Days Creek
29-2-7.00A	0.18	Rock	Days Creek
29-3-11.00B	1.73	Rock	Days Creek
29-3-11.00C	0.76	Rock	Days Creek
29-3-13.03A	0.44	Rock	Days Creek
29-3-15.02C	1.00	Rock	Days Creek
29-3-23.00A	0.18	Rock	Days Creek
29-3-23.01A	0.60	Rock	Days Creek
29-3-23.02A	0.61	Rock	Days Creek
29-3-23.03A	0.30	Rock	Days Creek
29-3-23.03B	0.26	Rock	Days Creek
29-3-25.01A	0.65	Rock	Days Creek
29-3-26.00A	0.63	Rock	Days Creek
29-3-26.00B	1.20	Rock	Days Creek

Road Number	Miles	Surface Type	Subwatershed
29-3-27.00A	0.41	Rock	Days Creek
29-3-27.00B	2.39	Rock	Days Creek
29-3-29.02C	0.30	Rock	Days Creek
29-3-29.02D	0.31	Rock	Days Creek
29-3-31.02A2	0.55	Rock	Days Creek
29-3-33.00A	0.20	Rock	Days Creek
29-3-33.00B	0.16	Rock	Days Creek
29-3-33.00C	0.22	Rock	Days Creek
29-3-33.00D	0.09	Rock	Days Creek
29-3-33.00E	0.87	Rock	Days Creek
29-3-33.00F	1.46	Rock	Days Creek
29-3-33.00G	1.33	Rock	Days Creek
29-3-33.00H	0.57	Rock	Days Creek
29-3-33.03A	0.58	Rock	Days Creek
29-3-33.06A	0.37	Rock	Days Creek
29-4-27.02A	0.75	Rock	Days Creek
29-4-35.00A	0.28	Rock	Days Creek
29-4-35.00G	1.09	Rock	Days Creek
30-3-6.00A	1.26	Rock	Days Creek
30-3-6.00B	0.25	Rock	Days Creek
30-3-6.00C	2.10	Rock	Days Creek
30-3-6.01B	0.93	Rock	Days Creek
30-4-1.00C	0.62	Rock	Days Creek
30-4-3.02A	0.49	Rock	Days Creek
29-4-33.00A	0.85	Rock	Shively-O’Shea

Road Number	Miles	Surface Type	Subwatershed
29-4-34.00B	0.23	Rock	Shively-O'Shea
30-4-3.01A	2.78	Rock	Shively-O'Shea
30-4-3.01C	1.53	Rock	Shively-O'Shea
30-4-6.00B	1.92	Rock	Shively-O'Shea
30-4-21.00A	0.46	Bituminous	Shively-O'Shea
30-4-21.00B1	1.45	Rock	Shively-O'Shea
30-4-21.00B2	1.07	Natural	Shively-O'Shea
30-4-22.00A	0.88	Rock	Shively-O'Shea
30-4-22.00B	0.22	Rock	Shively-O'Shea
30-4-22.00C	0.06	Rock	Shively-O'Shea
30-4-22.00D	0.06	Rock	Shively-O'Shea
30-4-22.00E	3.11	Rock	Shively-O'Shea
30-4-22.00F	0.69	Rock	Shively-O'Shea
30-4-22.00G	0.20	Rock	Shively-O'Shea
30-4-22.00H	0.28	Rock	Shively-O'Shea
30-4-22.00I	1.41	Rock	Shively-O'Shea
30-4-22.00J	1.07	Rock	Shively-O'Shea
30-4-22.00K1	0.67	Rock	Shively-O'Shea
30-4-26.00C	0.13	Rock	Shively-O'Shea
30-4-26.01A	0.78	Rock	Shively-O'Shea
30-4-28.00B	0.79	Rock	Shively-O'Shea
30-4-28.00D1	0.11	Rock	Shively-O'Shea
30-4-28.00D2	0.07	Rock	Shively-O'Shea
30-4-28.00G1	0.56	Rock	Shively-O'Shea
30-4-28.01C	0.78	Rock	Shively-O'Shea

Road Number	Miles	Surface Type	Subwatershed
30-4-28.01D	0.20	Rock	Shively-O’Shea
30-4-28.01F	0.10	Rock	Shively-O’Shea
30-4-29.00A	0.41	Rock	Shively-O’Shea
30-4-29.00B	1.44	Rock	Shively-O’Shea
30-4-29.00C	1.52	Rock	Shively-O’Shea
30-5-11.00A	0.24	Natural	Shively-O’Shea
30-5-31.00C	0.51	Rock	Shively-O’Shea
30-5-31.00D1	0.39	Rock	Shively-O’Shea
30-5-31.00D2	0.20	Rock	Shively-O’Shea
31-3-8.02A	2.65	Rock	Shively-O’Shea
31-4-1.02A	0.15	Rock	Shively-O’Shea
31-4-1.02B	0.21	Rock	Shively-O’Shea
31-4-2.01A	0.26	Rock	Shively-O’Shea
31-4-3.00A	0.11	Rock	Shively-O’Shea
31-4-4.02A	0.51	Rock	Shively-O’Shea
31-4-4.02B	1.27	Rock	Shively-O’Shea
31-4-4.02C	0.57	Rock	Shively-O’Shea
31-4-5.00A	0.56	Rock	Shively-O’Shea
31-4-5.02A	0.48	Rock	Shively-O’Shea
31-4-5.04A	0.40	Rock	Shively-O’Shea
31-4-5.05A	0.50	Rock	Shively-O’Shea
31-4-7.00A	0.64	Rock	Shively-O’Shea
31-4-8.00A	1.14	Rock	Shively-O’Shea
31-4-11.00A	1.34	Rock	Shively-O’Shea
31-4-11.00C	1.83	Rock	Shively-O’Shea

Road Number	Miles	Surface Type	Subwatershed
31-4-11.00D	2.15	Rock	Shively-O'Shea
31-4-11.01A	0.60	Rock	Shively-O'Shea
31-4-13.00A	0.32	Rock	Shively-O'Shea
31-4-13.02B	1.63	Rock	Shively-O'Shea
31-4-14.00A	1.90	Rock	Shively-O'Shea
31-4-14.02A	1.52	Rock	Shively-O'Shea
31-4-19.00A	0.42	Rock	Shively-O'Shea
31-4-19.00C	0.97	Rock	Shively-O'Shea
31-4-23.00A	0.51	Rock	Shively-O'Shea
31-4-23.02A	0.56	Rock	Shively-O'Shea
31-4-24.01A	0.92	Rock	Shively-O'Shea
31-5-35.00N	0.87	Rock	Shively-O'Shea
29-3-34.00B	0.35	Rock	St Johns Creek
29-3-34.01B	0.23	Rock	St Johns Creek
29-3-34.01D	0.38	Rock	St Johns Creek
30-3-15.00A	0.13	Rock	St Johns Creek
30-3-15.01A	0.78	Rock	St Johns Creek
30-3-17.02A	0.22	Rock	St Johns Creek
30-3-22.00B	1.34	Rock	St Johns Creek
30-3-22.00C	0.57	Rock	St Johns Creek
30-3-22.00D	1.22	Rock	St Johns Creek
30-3-23.01A1	0.95	Rock	St Johns Creek
30-4-1.00F1	0.96	Rock	St Johns Creek
30-4-1.00F2	0.32	Rock	St Johns Creek
30-4-23.00A	1.08	Natural	St Johns Creek

Road Number	Miles	Surface Type	Subwatershed
31-3-4.00B	1.47	Rock	St Johns Creek
30-3-7.01A	0.35	Rock	St Johns Creek
31-3-7.01B	0.93	Rock	St Johns Creek
31-3-7.01C	0.58	Rock	St Johns Creek
31-4-1.02B	0.21	Rock	St Johns Creek
30-2-31.00A	0.79	Rock	Stouts Creek
31-3-1.00A	0.31	Rock	Stouts Creek
31-3-1.01A	0.35	Rock	Stouts Creek
31-3-1.03A	1.23	Rock	Stouts Creek
31-3-2.02A	0.11	Rock	Stouts Creek
31-3-2.02B	0.38	Rock	Stouts Creek
31-3-2.03C	0.75	Rock	Stouts Creek
31-3-2.04B	0.70	Rock	Stouts Creek
31-3-3.02A	1.60	Rock	Stouts Creek
31-3-3.02B	0.45	Rock	Stouts Creek
31-3-3.02C	0.30	Rock	Stouts Creek
31-3-4.00B	1.47	Rock	Stouts Creek
31-3-7.01A	0.35	Rock	Stouts Creek
31-3-7.01B	0.93	Rock	Stouts Creek
31-3-8.01A	0.58	Rock	Stouts Creek
31-3-8.02A	2.65	Rock	Stouts Creek
31-3-10.01B	2.57	Rock	Stouts Creek
31-3-10.03C	0.53	Rock	Stouts Creek
31-3-11.00B	1.06	Rock	Stouts Creek
31-3-11.01A	0.47	Rock	Stouts Creek

Road Number	Miles	Surface Type	Subwatershed
31-3-15.00A	0.41	Rock	Stouts Creek
31-3-16.01F	1.41	Rock	Stouts Creek
31-3-16.02B	0.16	Rock	Stouts Creek
31-3-16.02D	0.03	Rock	Stouts Creek
31-3-19.01B	0.85	Rock	Stouts Creek
31-3-21.00A	0.60	Rock	Stouts Creek
31-3-25.01A	0.93	Rock	Stouts Creek
31-3-27.00B	0.42	Rock	Stouts Creek
31-3-27.01A	0.27	Rock	Stouts Creek
Total	169.01		

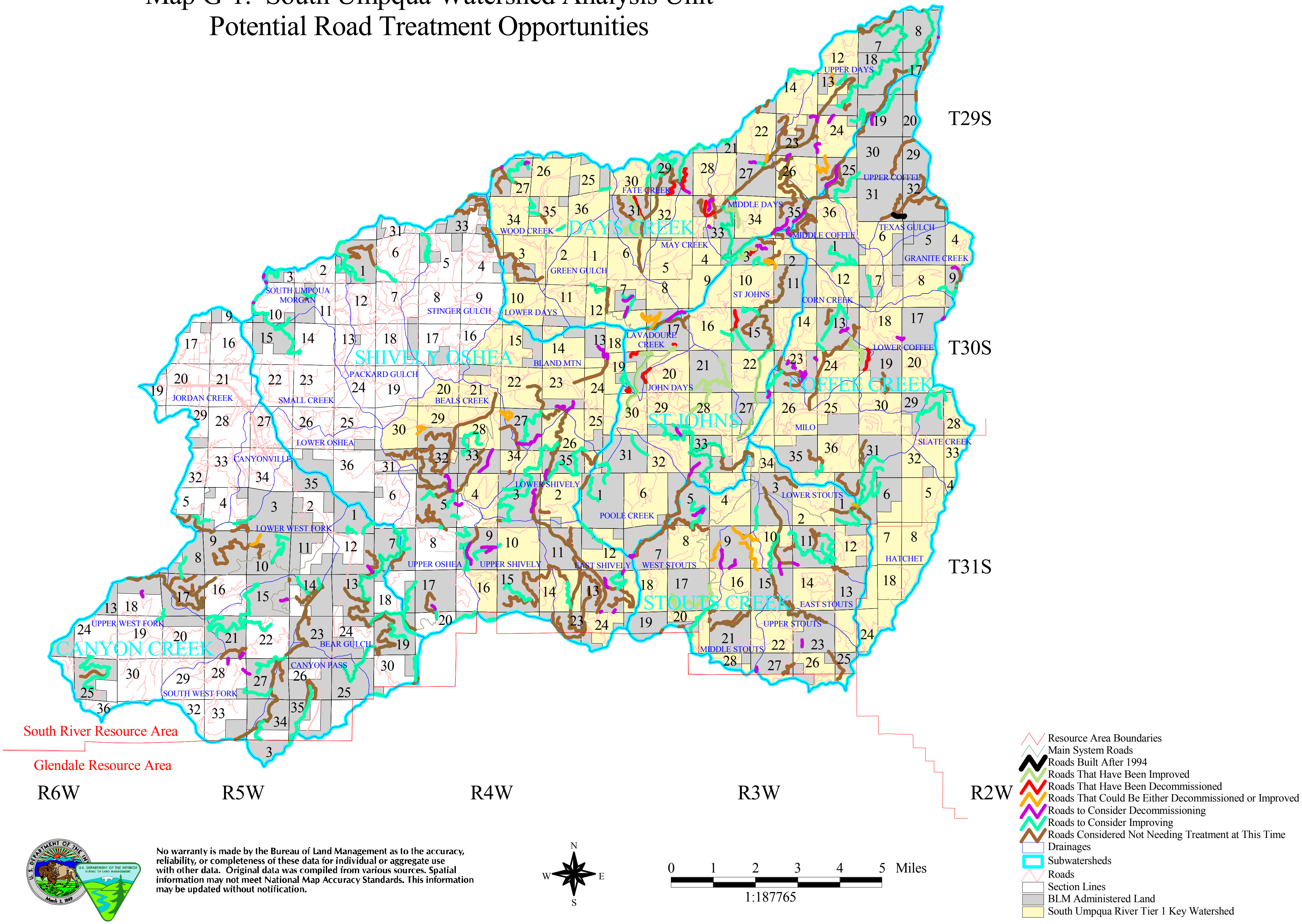
Table G-5. Roads in the South Umpqua WAU That Have Been Improved.

Road Number	Miles	Year of Treatment	Surface Type	TMO Recommendation	Subwatershed
30-2-19.00A	0.27	1997	Natural	Decommission	Coffee Creek
30-3-13.00A	0.62	1997	Natural	Improve	Coffee Creek
30-3-13.00C	0.09	1997	Natural	Improve	Coffee Creek
29-3-31.00A	0.67	1998	Natural	Improve	Days Creek
29-3-31.02A1	0.15	1997	Rock	Maintain	Days Creek
29-3-33.01A	0.23	1997	Rock	Improve	Days Creek
29-3-33.08A	0.28	1998	Rock	Maintain	Days Creek
30-3-6.01A	0.67	1997	Rock	Improve	Days Creek
30-3-3.00A	0.65	1999	Rock	Maintain	St Johns Creek
30-3-20.00A	0.52	1997	Rock	Decommission	St Johns Creek
30-3-20.01A	0.25	1997	Natural	Decommission	St Johns Creek
30-3-21.00A	0.54	1998	Rock	Maintain	St Johns Creek
30-3-28.00A	0.91	1998	Rock	Improve	St Johns Creek
30-3-28.00B	1.91	1998	Rock	Improve	St Johns Creek
30-3-30.02A	1.71	1997	Rock	Improve	St Johns Creek
30-3-34.01A	0.68	1999	Rock	Maintain	St Johns Creek
30-3-34.01D	1.05	1999	Rock	Improve	St Johns Creek
31-3-17.01A	2.43	1997	Rock	Improve	Stouts Creek
Total	13.63				

Table G-6. Roads in the South Umpqua WAU That Have Been Decommissioned.

Road Number	Miles	Year of Treatment	Surface Type	TMO Recommendation	Subwatershed	In Tier 1 Key Watershed
30-3-13.00E	0.48	1997	Natural	Decommission	Coffee Creek	Yes
29-3-29.00A1	0.62	1999	Natural	Decommission	Days Creek	Yes
29-3-29.04A	0.58	1998	Natural	Decommission	Days Creek	Yes
29-3-31.01A	0.60	1998	Natural	Decommission	Days Creek	Yes
29-3-33.05A1	0.32	1998	Natural	Decommission	Days Creek	Yes
30-3-3.00A1	0.25	1999	Natural	Decommission	St Johns Creek	Yes
30-3-20.00A1	0.31	1997	Rock	Decommission	St Johns Creek	Yes
30-3-20.01A1	0.11	1997	Rock	Decommission	St Johns Creek	Yes
30-3-30.02D1	0.19	1997	Rock	Decommission	St Johns Creek	Yes
30-3-30.02E	0.18	1997	Natural	Decommission	St Johns Creek	Yes
30-3-30.03C	0.18	1998	Natural	Decommission	St Johns Creek	Yes
30-3-34.01I	0.46	1997	Rock	Decommission	St Johns Creek	Yes
Total	4.28					

Map G-1. South Umpqua Watershed Analysis Unit
Potential Road Treatment Opportunities



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

Appendix H

Aquatic Conservation Strategy and Riparian Reserves

Appendix H
Aquatic Conservation Strategy and Riparian Reserves

The four components of the Aquatic Conservation Strategy are Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems on public lands. The Aquatic Conservation Strategy seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds.

Aquatic Conservation Strategy objectives can be associated or linked with the National Marine Fisheries Service (NMFS) Matrix of Pathways and Indicators. The factors and indicators may relate to one or more of the nine ACS objectives. Including the NMFS factors and indicators in an ACS objective consistency discussion may provide a common link and logic track between the ACS objectives and the effects determination of a proposed project on Federally-listed fish species (i.e. Oregon Coast coho salmon).

When determining whether activities retard or prevent attainment of Aquatic Conservation Strategy objectives, the scale of analysis typically would be BLM analytical watersheds (Fifth Field Watershed) or similar units (USDI 1995). The time period would be defined as decades to possibly more than a century (USDA and USDI 1994b and USDI 1995).

ACS Objective 1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Pathways/Indicators Used in BA Effects Matrix:

Habitat Elements/Off-Channel Habitat
Habitat Elements/Refugia
Channel Condition/Dynamics/Floodplain Connectivity
Watershed Conditions/Road Density and Location
Watershed Conditions/Disturbance History
Watershed Conditions/Riparian Reserves

ACS Objective 2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Temperature
Water Quality/Chemical Contamination/Nutrients
Habitat Access/Physical Barriers
Habitat Elements/Off-channel Habitat
Habitat Elements/Refugia
Channel Condition/Dynamics/Floodplain Connectivity
Flow/Hydrology/Increase in Drainage Network
Watershed Conditions/Riparian Reserves

ACS Objective 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Pathways/Indicators Used in BA Effects Matrix:

Habitat Elements/Substrate
Habitat Elements/Large Woody Debris
Habitat Elements/Pool Frequency
Habitat Elements/Pool Quality
Habitat Elements/Off-channel Habitat
Channel Condition/Dynamics/Width/Depth Ratio
Channel Condition/Streambank Condition
Channel Condition/Dynamics/Floodplain Connectivity
Watershed Conditions/Road Density and Location
Watershed Conditions/Riparian Reserves

ACS Objective 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Temperature
Water Quality/Sediment/Turbidity
Water Quality/Chemical Contamination/Nutrients
Watershed Conditions/Riparian Reserves

ACS Objective 5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Sediment/Turbidity
Habitat Elements/Substrate
Habitat Elements/Pool Quality
Flow/Hydrology/Change in Peak/Base Flow
Flow/Hydrology/Increase in Drainage Network
Watershed Conditions/Road Density and Location
Watershed Conditions/Disturbance History
Watershed Conditions/Riparian Reserves

ACS Objective 6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Sediment/Turbidity
Habitat Access/Physical Barriers
Habitat Elements/Large Woody Debris
Habitat Elements/Pool Quality
Habitat Elements/Off-channel Habitat
Channel Condition/Dynamics/Floodplain Connectivity
Flow/Hydrology/Change in Peak/Base Flow
Flow/Hydrology/Increase in Drainage Network

ACS Objective 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Pathways/Indicators Used in BA Effects Matrix:

Channel Condition/Dynamics/Floodplain Connectivity
Flow/Hydrology/Change in Peak/Base Flow
Flow/Hydrology/Increase in Drainage Network

ACS Objective 8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Temperature
Water Quality/Sediment/Turbidity
Water Quality/Chemical Contamination/Nutrients
Habitat Elements/Substrate
Habitat Elements/Large Woody Debris
Habitat Elements/Pool Frequency
Habitat Elements/Off-Channel Habitat
Channel Condition/Dynamics/Width/Depth Ratio
Channel Condition/Streambank Condition
Channel Condition/Dynamics/Floodplain Connectivity
Watershed Conditions/Riparian Reserves

ACS Objective 9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Temperature
Water Quality/Sediment/Turbidity
Water Quality/Chemical Contamination/Nutrients
Habitat Access/Physical Barriers
Habitat Elements/Substrate
Habitat Elements/Large Woody Debris
Habitat Elements/Pool Frequency
Habitat Elements/Pool Quality
Habitat Elements/Off-channel Habitat
Habitat Elements/Refugia
Channel Condition/Dynamics/Width/Depth Ratio
Channel Condition/Streambank Condition
Channel Condition/Dynamics/Floodplain Connectivity
Watershed Conditions/Riparian Reserves

Riparian Reserves are associated in the NMFS Matrix of Pathways and Indicators with seven of the nine Aquatic Conservation Strategy objectives. Riparian Reserves generally parallel the stream network, but include other areas necessary for maintaining hydrologic, geomorphic and ecological processes that directly affect streams, stream processes and fish habitats. Riparian Reserves are expected to provide benefits including:

- maintaining streambank integrity (ACS objectives 3, 8 and 9)
- maintaining and recruiting large woody debris and other vegetative debris to provide aquatic habitat and filter suspended sediments. The trapped sediments would absorb and store water. This water would be available during summer months to supplement low summer flows. (ACS objectives 3, 5, 6 and 8)
- the large woody debris would help regulate streamflows by dissipating energy, thus moderating peak streamflows and protecting the morphology of stream channels (ACS objectives 3, 8 and 9)
- providing a nutrient source and water for aquatic and terrestrial species (ACS objectives 2, 4, 8 and 9)
- maintaining shade and riparian climate (ACS objectives 2, 4, 8 and 9)
- providing sediment filtration from upslope activities (ACS objectives 5, 6, 8 and 9)
- enhancing habitat for species dependent on the transition zone between upslope and riparian areas (ACS objectives 1, 2, 4, 8 and 9)
- improving travel and dispersal corridors for terrestrial animals and plants and providing greater connectivity within the watershed (ACS objectives 1, 2, 3, 6 and 8)
- maintaining surface and ground water systems as exchange areas for water, sediment, and nutrients (ACS objectives 2, 4, 6 and 8)
- providing for the creation of and maintenance of pool habitat, both for frequency and quality (ACS objectives 3, 6, 8 and 9)
- providing lateral, longitudinal, and drainage network connections, which include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia (ACS objectives 1, 2, 6, 7, 8 and 9).

Appendix I
Timber Harvesting

Appendix I
Timber Harvesting

A long range timber harvesting plan has been initiated for the South River Resource Area. The timber harvesting planning went through a rigorous process to determine suitable timber harvesting locations. This process continues to be refined.

The first step in the selection process of potential harvest areas was to identify all available and suitable stands. Information from GIS was used to identify Matrix lands greater than 80 years old and not located in reserved areas, such as Riparian Reserves, LSRs, TPCC Nonsuitable Woodland areas, owl core areas, or other administratively withdrawn areas. The remaining available stands were identified as being potential harvest areas. Birthdates (Dk) in the Forest Operation Inventory (FOI) were used to determine which stands were greater than 80 years old.

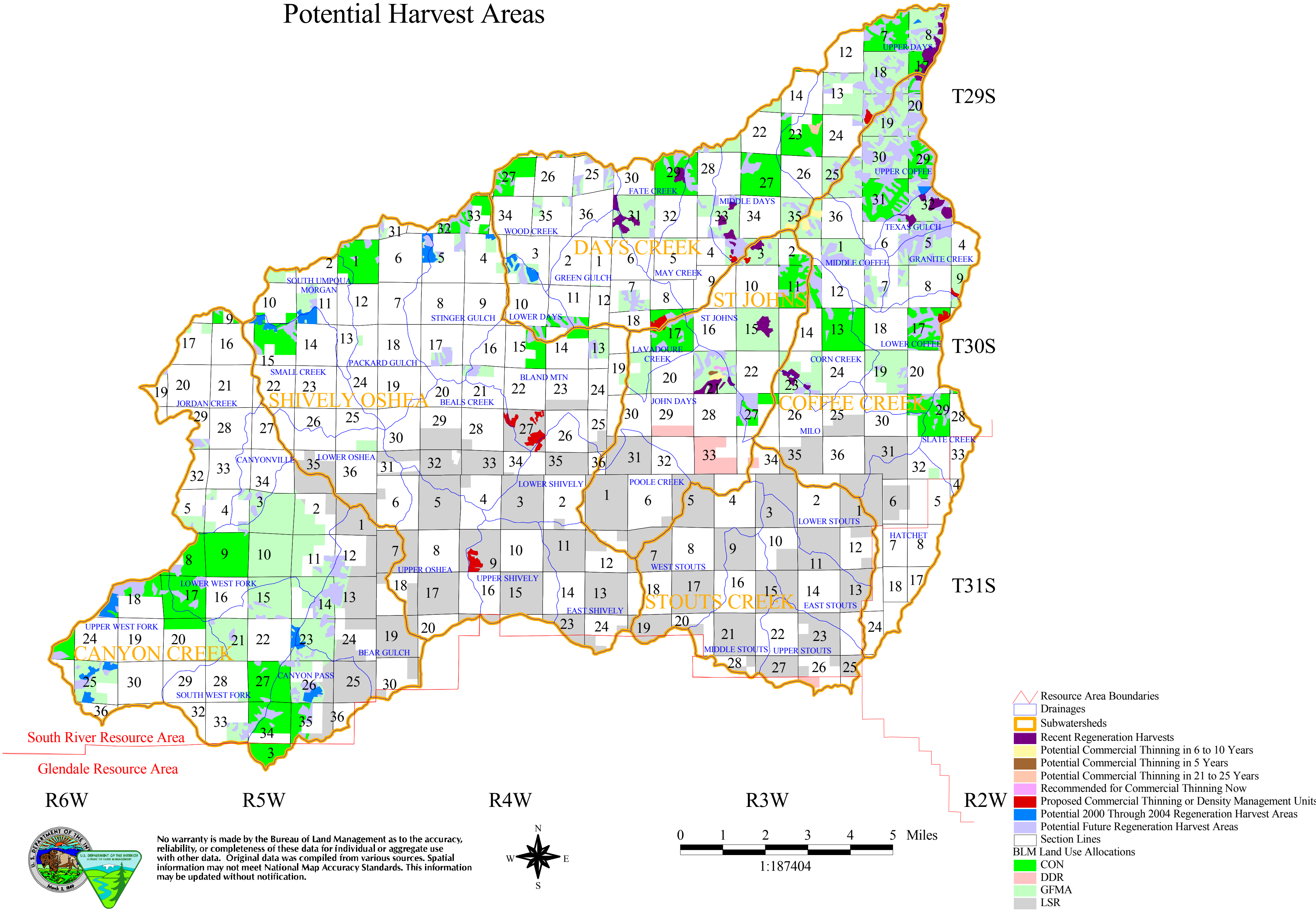
Interpretation of aerial photographs and GIS themes were used to identify suitable harvest areas and define logical unit boundaries. Unit boundaries were established within subwatershed (sixth field watershed) boundaries. Small areas (generally less than two acres) were not mapped as harvestable unless they could be harvested from an existing road. Some stands greater than 80 years old did not appear (as determined by aerial photograph interpretation) to have enough merchantable trees to make a viable unit after retention tree requirements were met. Those areas were not identified for harvesting at this time.

The identified harvest units were digitized into a GIS theme. The digitized harvest units were used to develop a timber sale plan through the year 2024 by attempting to balance timber harvesting equally across all watersheds in the South River Resource Area over time. The timber sale plan assumed timber harvesting would occur in each subwatershed at a level proportional to the number of acres currently available for timber harvesting, with one-third of the available acres in GFMA planned to be harvested in each of the first three decades. Timber harvesting of approximately 1,200 acres per decade was planned within Connectivity/Diversity Blocks in the resource area while maintaining 25 to 30 percent of each Connectivity/Diversity Block in late-successional forests.

Another step was to rank each subwatershed's relative importance to the terrestrial wildlife, hydrology, and fisheries resources. The goals were to identify subwatersheds or areas within a subwatershed where delaying timber harvesting would benefit a resource and what subwatersheds would be impacted the least by timber harvests. In general, subwatersheds with the least amount of BLM-administered land and the fewest available acres for timber harvesting were identified as the places to plan timber harvests first.

The latest step was to evaluate all available timber harvesting units previously identified where harvesting could occur with acceptable impacts to the wildlife, hydrology, and fisheries resources. Potential priority timber harvesting units were areas that did not have obvious conflicts with wildlife, fisheries, or hydrology and were considered to be physically harvestable (see Map I-1). Changes to unit size and shape would be anticipated after extensive field review. Other areas having some concern from wildlife, fisheries, or hydrology, generally, would be considered for timber harvesting after the priority areas. Although, occasions may occur where a lower priority area for timber harvesting may be harvested before a higher priority area, such as if including a lower priority unit in a sale would allow decommissioning of a road facilitating recovery of a larger area.

Map I-1. South Umpqua Watershed Analysis Unit
Potential Harvest Areas



Appendix J

Soils

Characteristics of Soil Parent Material in the South Umpqua WAU.

Soil characteristics are divided into two groups, surface and subsoil layers. The surface soil layer includes the soil from the surface to a depth of 12 inches. The subsoil soil layer includes the soil from a depth of 12 inches to bedrock or to a depth of 60 inches. The layers are non-disturbed soil weighted averages by layer depth and percent of soil type component. Soil depth and drainage are averaged using both soil layers.

Table J-1. Weighted Average Soil Characteristics by Parent Material.

Geologic Parent Material	% of WAU	Acres	Depth (Inches)	Drainage (Code)	% Clay Surface Layer	% Clay Subsoil Layer	K Factor Surface Layer	K Factor Subsoil Layer	Available Water Capacity Surface Layer (Inches per Inch)	Available Water Capacity Subsoil Layer (Inches per Inch)
Water	0.38	527								
Clayey alluvium	0.18	248	62.63	5.83	45.70	51.37	0.31	0.32	0.16	0.14
Mixed alluvium	5.39	7,435	60.73	3.09	21.58	24.50	0.23	0.21	0.14	0.13
Conglomerate	0.17	231	28.54	3.02	14.87	18.17	0.11	0.11	0.10	0.10
Granodiorite	23.18	31,981	54.23	3.11	19.92	31.54	0.33	0.36	0.14	0.15
Metamorphic rock	43.96	60,648	39.69	2.90	24.53	27.76	0.17	0.16	0.11	0.10
Mica schist	12.56	17,326	46.59	3.12	18.50	26.12	0.33	0.26	0.16	0.14
Pits	0.05	65								
Sandstone and metamorphic rock	0.80	1,107	20.26	2.23	21.68	22.79	0.12	0.10	0.08	0.07
Sandstone and siltstone	1.91	2,636	52.99	4.20	27.12	48.74	0.33	0.30	0.19	0.15
Sandstone siltstone and metamorphic rock	7.22	9,950	47.06	3.04	27.84	32.64	0.26	0.27	0.14	0.14
Serpentinite and peridotite	0.23	317	29.47	3.27	40.16	45.12	0.17	0.16	0.10	0.09
Volcanic rock	3.97	5,481	57.00	3.19	31.84	37.09	0.21	0.22	0.14	0.14

Table J-1 (continued). Weighted Average Soil Characteristics by Parent Material.

Geologic Parent Material	% of WAU	Acres	Bulk Density Surface Layer (g/cm^3)	Bulk Density Subsoil Layer (g/cm^3)	% Organic Matter Surface Layer	% Organic Matter Subsoil Layer	pH Surface Layer	pH Subsoil Layer	CEC Surface Layer (meq/100g)	CEC Subsoil Layer (meq/100g)	Permeability Surface Layer (Inches per Hour)	Permeability Subsoil Layer (Inches per Hour)
Water	0.38	527										
Clayey alluvium	0.18	248	1.29	1.31	3.57	2.04	6.12	6.14	30.80	30.86	2.54	1.59
Mixed alluvium	5.39	7,435	1.37	1.39	2.57	0.92	6.13	6.20	16.10	15.36	13.03	28.02
Conglomerate	0.17	231	1.42	1.43	1.05	0.40	6.07	5.68	8.22	8.20	26.23	25.98
Granodiorite	23.18	31,981	1.27	1.39	3.64	1.07	5.89	5.81	15.05	15.97	12.19	6.06
Metamorphic rock	43.96	60,648	1.33	1.36	2.13	1.07	6.05	5.93	11.88	10.17	17.95	16.84
Mica schist	12.56	17,326	1.21	1.31	1.74	0.63	5.56	5.42	10.56	2.38	10.04	9.76
Pits	0.05	65										
Sandstone and metamorphic rock	0.80	1,107	1.35	1.35	1.46	1.23	6.30	5.70	11.41	12.50	26.76	28.23
Sandstone and siltstone	1.91	2,636	1.39	1.40	2.79	0.90	5.66	5.51	13.99	20.27	5.88	2.65
Sandstone siltstone and metamorphic rock	7.22	9,950	1.39	1.37	2.31	1.35	5.66	6.78	14.04	10.08	5.87	3.08
Serpentinite and peridotite	0.23	317	1.35	1.36	2.21	1.11	6.72	6.11	10.91	10.36	2.24	1.38
Volcanic rock	3.97	5,481	1.29	1.34	4.17	1.44	5.47	5.22	11.83	4.17	9.20	8.12

The Natural Resources Conservation Service - National Soil Survey Handbook Part 618 - Soil Properties and Qualities section 430-VI-NSSH (1996) was the source for most of the following information.

Depth: Depths are from the soil surface to weathered (soft) or unweathered (hard) bedrock in inches.

Table J-2. Depth Codes and Description of What the Codes Mean.

Code	Description	Depth to Bedrock (inches)
RO	Rock Outcrop	0 - 4
SHV	Very Shallow	4 - 10
SH	Shallow	10 - 20
MD	Moderately Deep	20 - 40
DP	Deep	40 - 60
DPV	Very Deep	> 60

Drainage: An estimate of the natural drainage class or the prevailing wetness conditions of a soil.

Table J-3. Drainage Class Codes and Description of What the Codes Mean.

Code	Drainage Class	Depth to Water Table (inches)	Permeability	Description
1	Excessively Drained	> 60	Rapid	Water moves through the soil very rapidly. Internal free water is very rare or very deep. Soils are commonly coarse-textured, have very high saturated hydraulic conductivity, and lack redoximorphic features.
2	Some What Excessively Drained	> 60	Moderately Rapid	Water moves through the soil rapidly. Internal free water is very rare or very deep. Soils are commonly coarse-textured, have high saturated hydraulic conductivity, and lack redoximorphic features.
3	Well Drained	40 - 60	Moderate to Slow	Water moves through the soil readily but not rapidly. Internal free water is deep or very deep. Annual duration is not specified. Water is available, in humid regions, to plants during much of the growing season. Wetness does not inhibit root growth for significant periods during most growing seasons. Soils are deep and lack redoximorphic features.
4	Moderately Well Drained	30 - 40	Moderate to Slow	Water moves through the soil slowly during some periods of the year. Internal free water is 20 to 40 inches and may be transitory or permanent. Soil is wet within the rooting depth for only a short time during the growing season. The soil has a moderately low, or lower, saturated hydraulic conductivity class within one meter of the surface or periodically receives high rainfall, or both.
5	Somewhat Poorly Drained	10 - 20	Moderate to Slow	The soil is wet 10 to 20 inches deep for significant periods during the growing season. Internal free water is 10 to 40 inches and transitory to permanent. Mesophytic plant growth is restricted, unless the soil is artificially drained. The soil has a low or very low saturated hydraulic conductivity class, a high water table, receives water from lateral flow, receives persistent rainfall, or some combination.
6	Poorly Drained	4 - 10	Moderate to Slow	The soil is wet 4 to 20 inches deep periodically during the growing season or remains wet for long periods. Internal free water is 4 to 20 inches and common or persistent. Most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously wet beyond eight inches in depth. The soil has a low or very low saturated hydraulic conductivity class or persistent rainfall, or both.
7	Very Poorly Drained	above surface 4 - 10	Rapid to Slow	Water is at or near the soil surface during much of the growing season. Internal free water is 0 to 10 inches and is persistent or permanent. Most mesophytic crops cannot be grown unless the soil is artificially drained. The soil commonly occurs in a depression or level area.

Clay: Measured as soil grain size < than .002 mm in diameter percent by weight.

Table J-4. Percent of Clay by General Soil Type.

Clay Percent	General Soil Type
0 - 10	Sandy
10 - 35	Loamy
> 35	Clayey

K Factor: The soil erodibility factor quantifies the susceptibility of a soil to detachment by water from the whole soil layer including coarse fragments (gravels, cobbles and stones). It is a quantitative value experimentally determined by applying a series of simulated rainstorms on freshly tilled plots. Soil erodibility factors can be estimated using a nomograph, which incorporates the relationships between five soil properties (1) percent silt plus very fine sand, (2) percent sand greater than 0.10 mm, (3) organic matter content, (4) structure, and (5) permeability. Rock fragment content is adjusted separately from the nomograph. The greater the rock fragment content the lower the K factor value. The K factor values obtained experimentally range from 0.02 to 0.69.

Table J-5. The K Factor Groups and Erodibility.

K Factor Groups	Erodibility
0.02 - 0.20	Low
0.21 - 0.40	Moderate
0.41 - 0.69	High

Available Water Capacity: Available Water Capacity is the volume of water available to plants if the soil, including fragments, was at field capacity. It is commonly considered to be the amount of water held in the soil between field capacity and the wilting point, with corrections for salinity, fragments, and rooting depth. Available water capacity classes are used as adjective ratings reflecting the sum of available water capacity in inches to some arbitrary depth. Class limits vary according to climate zone and the crops commonly grown in an area. Available Water Capacity is an important soil property used for developing water budgets, predicting droughtiness, designing drainage systems, protecting water resources, and predicting yields.

Bulk Density: Bulk Density is the oven-dried weight of soil material less than 2 mm in diameter per unit volume of soil at a water tension of 1/10 bar or 1/3 bar. Bulk density influences plant growth and engineering applications. It is used to convert measurements from a weight basis to a volume basis. Bulk density is an indicator of how well plant roots are able to extend into the soil. Bulk density is used to calculate porosity.

Table J-6. Particle Size Classes in Relation to Bulk Density and Root Growth.

Family Particle Size Class	Restriction - Initiation (grams per cm^3)	Root Limiting (grams per cm^3)
Sandy (Sandy)	1.69	> 1.85
Coarse Loamy (Loamy)	1.63	> 1.80
Fine Loamy (Loamy)	1.60	> 1.78
Coarse Silty (Loamy)	1.60	> 1.79
Fine Silty (Loamy)	1.54	> 1.65
Clayey (35 - 45% Clay)	1.49	> 1.58
Clayey (> 45 % Clay)	1.39	> 1.47

Organic Matter: Organic matter is the percent by weight of decomposed plant and animal residue, expressed as a weight percentage of soil material less than 2 mm in diameter. Organic matter influences the physical and chemical properties of soils in a greater proportion than the quantity of organic matter is present (Brady 1974). It encourages granulation and good tilth, increases porosity, lowers bulk density, promotes water infiltration, reduces plasticity and cohesion, and increases the available water capacity. It has a high cation adsorption capacity and is important for pesticide binding. It furnishes energy to soil microorganisms. Organic matter releases nitrogen, phosphorous, and sulfur as it decomposes.

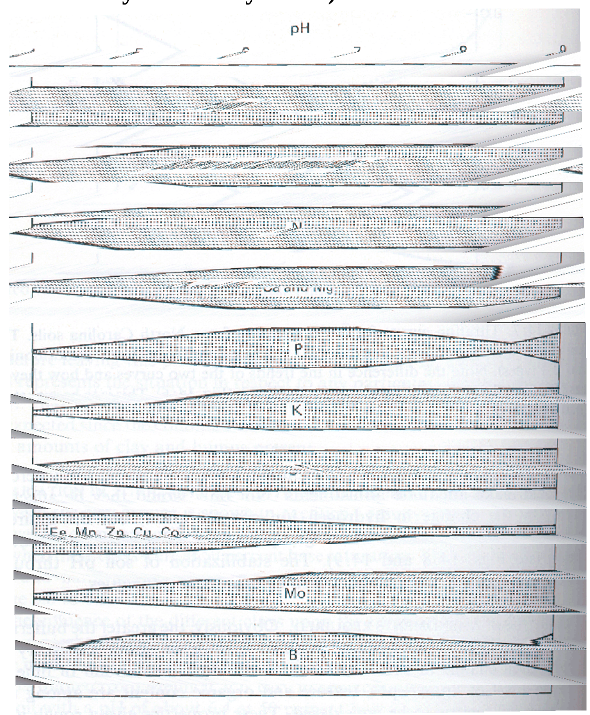
pH: Soil pH is a numerical expression of the relative acidity or alkalinity of a soil.

Figure J-1 shows the relationship in mineral soils between pH, microorganism activity, and the availability of plant nutrients. The wide portions of the bands indicate the pH when microbial activity and nutrient availability are the highest. Generally, pH ranging from six to seven promote plant nutrient availability. If soil pH is optimum for phosphorus, other plant nutrients, if present in adequate amounts, would be available. Acidic soils (with a low pH) have less calcium, magnesium, and molybdenum and more aluminum, iron, and boron available. Acidic soils also have less nitrogen and phosphorus available and possibly more organic toxins. are at the other extreme. Calcium, magnesium, nitrogen and molybdenum are more abundant and aluminum is not toxic with alkaline soils (soils with a high pH). Soils with a pH above 7.9 may have an inadequate availability of iron, manganese, copper, zinc, phosphorus, and boron. Highly alkaline or acidic soils can be very corrosive to steel. Acidic soils, with a pH less than 5.5, are likely to be highly corrosive to concrete. Alkaline soils, with a pH greater than 8.5, are susceptible to dispersion and piping may be a problem. Piping is when water flows along root channels or through animal burrows.

Table J-7. Descriptions of pH Range of Values.

pH Values	Class Descriptor
1.8 - 3.4	Ultra acid
3.5 - 4.4	Extremely acid
4.5 - 5.0	Very strongly acid
5.1 - 5.5	Strongly acid
5.6 - 6.0	Moderately acid
6.1 - 6.5	Slightly acid
6.6 - 7.3	Neutral
7.4 - 7.8	Slightly alkaline
7.9 - 8.4	Moderately alkaline
8.5 - 9.0	Strongly alkaline
9.1 - 11.0	Very strongly alkaline

Figure J-1. Relationship in Mineral Soils Between pH, Microorganism Activity, and Plant Nutrient Availability (From Nature and Properties of Soils. 8th edition. Nyle C. Brady. 1974).



Cation Exchange Capacity: Cation Exchange Capacity (CEC) is expressed as meq/100 g of soil. Cation Exchange Capacity is a measure of the ability of a soil to retain cations, which may be plant nutrients. Soil particles are composed of silicate and aluminosilicate clay. These particles are negatively charged colloids. A cation is a positively charged ion, for example H+, Ca++, Mg++, K+, NH4+, Na+ are all cations. Cations are bound ionically to the surface of the negatively charged colloid particles. Cation Exchange Capacity increases as the clay and organic matter contents increase. Soils with a low Cation Exchange Capacity hold fewer cations and may require more frequent applications of fertilizer and amendments than soils having a high CEC.

Table J-8. Cation Exchange Capacity Values Associated with Soil Types.

Soil Type	Typical CEC Values (meq/100g of soil)
Sand	2 - 4
Loam	7 - 16
Clay	4 - 60
Organic	50 - 300

Permeability: Permeability enables water or air to move through the soil. Values are measured in inches per hour. Historically, the soil survey has used permeability coefficient or permeability as a term for saturated hydraulic conductivity.

Permeability is used in soil interpretations to determine irrigation, drainage system, septic tank absorption fields, terraces and other conservation practices suitability. Permeability is affected by pore size and shape distribution. Texture, organic matter content, mineralogy, structure, matted or absence of roots, pore size, and density are used to estimate permeability.

Table J-9. Relationship of Class Values to Permeability Classes.

Permeability Class	Class Values (inches per hour)	Class Values (um per second)
Very rapid	20 - 100	141 - 705
Rapid	6 - 20	42 - 141
Moderately rapid	2 - 6	14 - 42
Moderate	0.6 - 2	4 - 14
Moderately slow	0.2 - 0.6	1.4 - 4
Slow	0.06 - 0.2	0.42 - 1.4
Very slow	0.0015 - 0.06	0.01 - 0.42
Impermeable	0.00 - 0.0015	0.00 - 0.01

Appendix K

Water Quality Restoration Plan

Water Quality Restoration Plan
Appendix to the South Umpqua Watershed Analysis
South Umpqua River Watershed

Bureau of Land Management
Roseburg District Office

December 2003

Watershed at a Glance	
Watershed	South Umpqua River: 141,455 acres Federally-Administered Land: 60,829 acres (43 percent)
Stream Miles*	Total: 1,407 Perennial: 309 Federally-Administered Land: 502 total 103 perennial Private Ownership: 865 total 206 perennial
Watershed Identifier	1710030205 (Hydrologic Unit Code)
303(d) Listed Parameters	Temperature, Flow and Habitat Modification, pH, Dissolved Oxygen, Sedimentation, Toxics, Aquatic Weeds or Algae, Bacteria, and Biological Criteria
Key Resources and Uses	Salmonids, Domestic, Agricultural, Industrial, and Recreation
Known Impacts	Wastewater Discharge Agriculture, Timber Harvesting, Roads, and Water Withdrawals

*Data are from BLM GIS. Perennial streams are estimated to be at least third order streams.

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Statement of Purpose

This water quality restoration plan is being prepared to meet the requirements of Section 303(d) of the 1972 Federal Clean Water Act.

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Water Quality Restoration Plan Element Location

A Table of Contents for location of the Oregon Department of Environmental Quality elements within the South Umpqua River Watershed Water Quality Restoration Plan is provided below:

Chapter 1 - Project Overview

Introduction

The area covered by this plan includes Federally-administered land (see Table 1) managed primarily by the Bureau of Land Management (BLM) following the Standards and Guidelines in the Northwest Forest Plan (NWFP) (USDA and USDI 1994). Private land within the area of this Water Quality Restoration Plan (WQRP) includes urban, agricultural, and forested lands. The private forested land is managed following the Oregon Forest Practices Act (OFPA). A subsequent Water Quality Management Plan (WQMP) will be written by the Oregon Department of Environmental Quality (ODEQ) to cover the private lands in the South Umpqua River Watershed. The South Umpqua River WQRP is intended to be adaptive in management implementation and includes the protocols described in Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters (USDA et al. 1999). It allows for future changes in response to new information. Information generated during development of the WQMP may indicate this WQRP for Federally-administered land needs to be revised.

Table 1. Watershed Ownership.

Ownership	Acres
Total	141,455
Federal	60,829
Private	80,626

The South Umpqua River is a high value salmonid fish watershed in the Southern Oregon Coastal Basin. Despite habitat modification, spawning coho salmon, fall chinook salmon, and winter steelhead return to the South Umpqua River every year. Anadromous and resident fish distributions are shown on Map 26 in the South Umpqua Watershed Analysis (USDI 2001).

The South Umpqua River Watershed covers approximately 141,455 acres (221 square miles) in southwestern Oregon. Much of the land along the South Umpqua River is flat and used for agricultural purposes. In the agricultural areas many tributaries of the South Umpqua River have been straightened or had their flow patterns altered. Most of the old growth conifers and hardwoods have been replaced with low growing vegetation, which generally are grasses. Riparian areas may have some deciduous trees along the stream banks. The higher elevations of the watershed are a combination of Federally-administered and private forested land. Timber harvesting and road construction have probably affected channel complexity, water quality, and hydraulic processes in the watershed.

Location

The management area for this WQRP is the South Umpqua River Watershed (see Figure 1), one of thirteen Fifth Field watersheds comprising the South Umpqua Subbasin. The South Umpqua River Watershed covers about twelve percent of the South Umpqua Subbasin. Most of the Federally-administered land is managed by the Roseburg BLM District. However, small areas are managed by the Medford BLM District in the southern portion and by the Umpqua National Forest in the southeastern portion of the watershed. For analytical purposes, the area was divided into six subwatersheds and 43 drainages (see Map 2 in USDI 2001). The South Umpqua Subbasin drains about 1,800 square miles. The South Umpqua River flows out of the Cascade Mountains until it meets the North Umpqua River near Roseburg, Oregon where they join to form the Umpqua River.

Ownership and Land Use Allocations

Lands administered by the BLM are managed according to the Land Use Allocations established by the Records of Decision for the Roseburg and Medford District Resource Management Plans (RMP) (USDI 1995) and the Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (NWFP) (USDA and USDI 1994). Mapped allocations for BLM land within the WQRP area include a Late-Successional Reserve, District Defined Reserves, Connectivity/Diversity Blocks, and General Forest Management Areas. The analysis area contains a Tier 1 Key Watershed (as defined in the NWFP), which includes the portion of the watershed upriver from the confluence of Days Creek with the South Umpqua River. Riparian Reserves are superimposed upon the Land Use Allocations. Acreage by Land Use Allocation are presented in Table 2 and shown on Map 3 in the South Umpqua Watershed Analysis (USDI 2001).

Late-Successional Reserve (LSR)

This Land Use Allocation is defined on page 7 of the NWFP. Known spotted owl activity centers are included in Table 2 and shown on Map 3 in the South Umpqua Watershed Analysis (USDI 2001). Protection buffers are unmapped.

Matrix

The Matrix Land Use Allocation includes Federally-administered land outside of designated reserves. The Roseburg and Medford BLM District RMPs divided Matrix into General Forest Management Areas (GFMA) and Connectivity/Diversity Blocks (CONN).

General Forest Management Areas (GFMA)

General Forest Management Areas would be managed on a regeneration harvest cycle of 80 to 110 years. A biological legacy of six to eight green trees per acre would be retained to assure forest health.

Connectivity/Diversity Blocks (CONN)

Connectivity/Diversity Blocks would be managed on a 150 year area control rotation. Twelve to 18 green trees per acre would be retained within harvest units. Twenty-five to 30 percent of each Connectivity/Diversity Block would be maintained in late-successional forests at any point in time.

District Defined Reserves (DDR)

This Land Use Allocation was designated in the RMP for the protection of specific resources, flora and fauna, and other values. These areas are not included in other Land Use Allocations nor in the calculation of Probable Sale Quantity (PSQ).

Current Conditions

The drainage density in the South Umpqua River Watershed is 6.4 miles per square mile. First and second order streams consist of approximately 1,097 miles, which is about 78 percent of the stream miles in the watershed (see Table 2). These are generally steep headwater channels draining small areas. Many first and second order streams are intermittent in the late summer. The remaining 22 percent of stream miles are third order or greater streams, which usually flow all year.

The South Umpqua River and the lower section of Days Creek have average gradients less than one percent. These are low-energy depositional streams. In contrast, tributary streams have narrow canyons and steeper channel gradients. Tributary streams usually start below steeply sloped headwalls. Longitudinal profiles of streams are useful to compare morphology between stream reaches and from one stream to another. Coffee Creek and Stouts Creek have the highest average gradients. These high-energy, erosional streams can transport large amounts of water and sediment. However, all streams contain low gradient reaches, which provide high habitat value.

Figure 1. South Umpqua River Watershed Vicinity Map

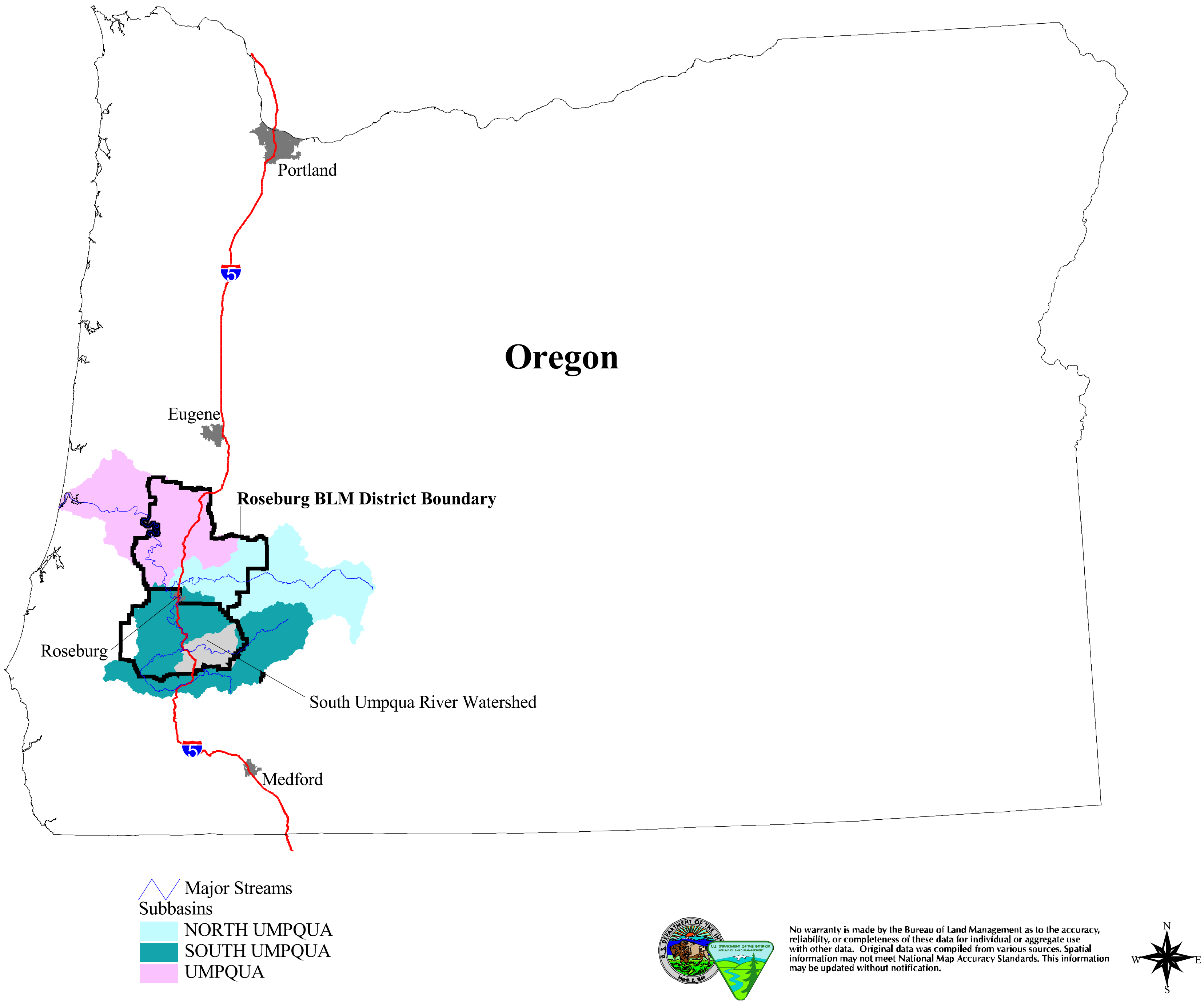


Table 2. Miles of Streams by Stream Order and Drainage.

Drainage **Subwatershed**	Miles of Stream by Stream Order							
	1	2	3	4	5	6	7	Total
Bear Gulch	27.5	9.2	5.4	3.0	3.2	0	0	48.3
Canyon Pass	15.1	4.6	3.9	2.7	0	0	0	26.3
Canyonville	4.7	2.0	1.6	0	0	1.8	0	10.1
Jordan Creek	19.8	11.0	5.8	2.1	0	0	4.7	43.4
Lower West Fork	24.3	8.9	3.2	2.5	1.6	2.5	0	43.2
South West Fork	32.3	9.9	4.3	2.1	3.3	0	0	51.8
Upper West Fork	32.5	8.7	6.0	2.1	2.0	0	0	51.2
Canyon Creek Subwatershed	156.2	54.3	30.2	14.5	10.1	4.3	4.7	274.3
Corn Creek	16.0	6.4	3.7	1.1	1.3	0	0	28.5
Granite Creek	9.3	3.9	2.2	2.2	0	0	0	17.6
Hatchet	22.9	7.7	3.2	4.6	0.3	0	0	38.7
Lower Coffee	18.2	7.5	2.2	0	3.6	0	0	31.5
Middle Coffee	11.2	3.4	1.6	1.2	1.6	0	0	19.0
Milo	21.8	6.9	2.6	1.0	0	5.6	0	37.9
Slate Creek	8.6	3.5	1.3	0	0	1.3	0	14.7
Texas Gulch	4.9	0.9	0.5	1.5	0	0	0	7.8
Upper Coffee	16.7	4.1	4.7	2.0	0	0	0	27.5
Coffee Creek Subwatershed	129.6	44.3	22.0	13.6	6.8	6.9	0	223.2
Fate Creek	12.3	3.1	2.2	1.2	0	0	0	18.9
Green Gulch	21.2	8.4	2.5	0	3.0	0	0	35.1
Lower Days	6.9	3.8	0.8	0	0	1.3	0	12.8
May Creek	12.7	5.2	2.1	1.3	2.2	0	0	23.4
Middle Days	20.3	5.9	3.7	1.5	2.8	0	0	34.1
Upper Days	24.1	8.2	3.7	1.7	2.5	0	0	40.2
Wood Creek	29.2	11.3	5.5	1.9	2.5	0	0	50.5
Days Creek Subwatershed	126.7	45.9	20.5	7.6	13.0	1.3	0	215.0

Table 2. Miles of Streams by Stream Order and Drainage.

Drainage **Subwatershed**	Miles of Stream by Stream Order							
	1	2	3	4	5	6	7	Total
Beals Creek	28.4	9.8	4.7	2.5	1.8	0	0	47.2
Bland Mountain	24.3	12.1	5.0	0.4	0	0	7.2	49.0
East Shively	21.8	7.6	5.1	1.4	1.4	0	0	37.3
Lower O'Shea	15.0	4.3	1.9	0	4.7	0	0	25.9
Lower Shively	14.0	4.9	3.6	0	0	2.8	0	25.3
Packard Gulch	23.4	13.0	5.5	2.6	1.1	0	2.3	47.9
Small Creek	15.7	8.5	4.9	1.5	0.1	0	2.4	33.1
South Umpqua Morgan	13.8	4.7	2.4	0.5	2.6	0	0	24.0
Stinger Gulch	23.7	13.0	3.7	2.6	0	0	2.6	45.6
Upper O'Shea	24.2	8.5	4.7	2.4	2.0	0	0	41.8
Upper Shively	16.2	5.1	3.6	1.5	0.9	0	0	27.3
Shively-O'Shea Subwatershed	220.5	91.5	45.1	15.4	14.6	2.8	14.5	404.4
John Days	21.8	8.2	4.5	0.7	0	0.1	3.9	39.3
Lavadoure Creek	6.4	2.2	1.3	1.0	0	0	0	10.9
Poole Creek	17.1	6.0	4.1	1.7	0	0	0	28.9
St Johns	32.5	8.8	4.0	3.4	2.1	0	0	50.7
St Johns Subwatershed	77.8	25.2	13.9	6.8	2.1	0.1	3.9	129.8
East Stouts	18.5	5.6	3.3	3.0	0	0	0	30.4
Lower Stouts	19.1	6.3	3.4	2.7	0.3	1.1	0	32.9
Middle Stouts	11.9	5.5	1.9	1.2	2.6	0	0	23.1
Upper Stouts	15.7	7.1	2.8	1.3	0.8	0	0	27.7
West Stouts	26.9	9.1	6.0	2.0	0.5	1.8	0	46.3
Stouts Creek Subwatershed	92.1	33.6	17.4	10.2	4.2	2.9	0	160.4
South Umpqua River Watershed	802.9	294.8	149.1	68.1	50.8	18.3	23.1	1,407.1
Drainage Density	3.6	1.3	0.7	0.3	0.2	0.1	0.1	6.4

Listing Status

Beneficial water use within the watershed includes domestic water supply, irrigation, livestock watering, water contact recreation, and cold water biota (salmonids). Table 3 shows the parameters the ODEQ (1998) used to place streams on the 1998 303(d) list.

Table 3. Water Quality Limited 1998 303(d) Listings in the South Umpqua River Watershed.

Name and Description	Parameter	Listing Criteria	Miles	Season	Beneficial Uses Affected
Beals Creek Mouth to Headwaters	Habitat Modification	--	3.87	--	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Days Creek Mouth to Headwaters	Habitat Modification	--	13.85	--	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Fate Creek Mouth to Headwaters	Temperature	Rearing 17.8°C (64° F)	2.46	Summer	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Shively Creek Mouth to Headwaters	Habitat Modification	--	5.21	--	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Stouts Creek Mouth to Headwaters	Temperature	Rearing 17.8°C (64° F)	7.92	Summer	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Stouts Creek, East Fork Mouth to Headwaters	Temperature	Rearing 17.8°C (64° F)	4.88	Summer	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Umpqua River, South Cow Creek to Elk Creek	Flow Modification	--	27.97	--	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Umpqua River, South Days Creek to Castle Rock/Black Rock Forks	pH	pH Greater Than 8.5	17.06	Summer	Resident Fish and Aquatic Life, Water Contact Recreation
Umpqua River, South Days Creek to Castle Rock/Black Rock Forks	Sedimentation	--	17.06	--	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing

Table 3. Water Quality Limited 1998 303(d) Listings in the South Umpqua River Watershed.

Name and Description	Parameter	Listing Criteria	Miles	Season	Beneficial Uses Affected
Umpqua River, South Days Creek to Castle Rock/Black Rock Forks	Temperature	Rearing 17.8°C (64° F)	17.06	Summer	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Umpqua River, South Mouth to Canyonville	Toxics	Chlorine	4.02	Year Around	Resident Fish and Aquatic Life, Drinking Water
Umpqua River, South Roberts Creek to Days Creek	Aquatic Weeds or Algae	Periphyton	10.91	Summer	Water Contact Recreation, Aesthetics, Fishing
Umpqua River, South Roberts Creek to Days Creek	Bacteria	Fecal Coliform 1996 Standard	10.91	Summer	Water Contact Recreation
Umpqua River, South Roberts Creek to Days Creek	Bacteria	Fecal Coliform 1996 Standard	10.91	Fall, Winter, Spring	Water Contact Recreation
Umpqua River, South Roberts Creek to Days Creek	Biological Criteria	--	10.91	--	Resident Fish and Aquatic Life
Umpqua River, South Roberts Creek to Days Creek	Dissolved Oxygen (DO)	Cool-water Aquatic Life: DO < 8 mg/l or 90% sat.	10.91	April 1 to September 31	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing
Umpqua River, South Roberts Creek to Days Creek	pH	pH Greater Than 8.5	10.91	Summer	Resident Fish and Aquatic Life, Water Contact Recreation
Umpqua River, South Roberts Creek to Days Creek	Temperature	Rearing 17.8°C (64° F)	10.91	Summer	Resident Fish and Aquatic Life, Salmonid Spawning and Rearing

-- = No Data.

South Umpqua River water temperatures exceeded the ODEQ standard between June and September. The water quality limited status for temperature on the South Umpqua River is located mainly along privately owned land, since there is very little Federally-administered land along the South Umpqua River in this watershed. Water temperature standards were also exceeded on Fate Creek, Stouts Creek, the East Fork of Stouts Creek, the West Fork of Canyon Creek, Lavadoure Creek, the lower part of Days Creek, and the lower part of Coffee Creek (see Tables 42 and 43 in USDI 2001). The purpose of this WQRP is to present information if Federally-administered lands are providing the coolest water possible downstream and how the BLM will address problems on that land. The intention is to show to what extent water is being warmed and what factors are contributing to the warming on Federally-administered land.

Seasonal Variation in Temperature and Flow

Both stream temperature and flow vary seasonally and annually. Water temperatures are cool during the winter months but can exceed the state standard during the summer when stream flows are lowest and solar radiation and air temperatures are the highest. Normally, stream temperatures increase in July and August when flows are receding but are not at their lowest flow level. However, maximum temperatures may occur earlier in the summer on streams with little shade (Johnson and Jones 2000). Water temperature data collected by BLM personnel on Lavadoure Creek and at the gaging station on Days Creek showed results similar to those reported by Johnson and Jones (see Tables 42 and 43 in USDI 2001).

Minimum Flows

Low flows along the South Umpqua River have been measured only periodically by the Watermaster Office for flow regulation. Streamflows normally recede until September or October. The two-year recurrence interval, seven-day low flow for the South Umpqua River at Days Creek is 50 cfs (0.078 cfs per square mile), 0.5 cfs (0.009 cfs per square mile) for Days Creek at Days Creek and 47 cfs (0.105 cfs per square mile) for the South Umpqua River at Tiller (Wellman et al. 1993). The minimum discharge recorded between 1975 and 1987 on the South Umpqua River at Days Creek was 31 cfs on September 15, 1977. Days Creek at Days Creek had no flow for many days in July and August 1961. The minimum discharge recorded on the South Umpqua River at Tiller was 20 cfs on September third and fourth in 1911. Low flows generally reflect annual precipitation levels with higher low flows in wetter years and lower summer flows in drier years. During these periods, there was pooled water, but little live flow. Some variation in low flow from year to year is typical of streams in the South Umpqua River Watershed.

Summer streamflows result from the release of subsurface water. This is primarily dependent upon soil type, soil depth, and porosity. Generally, the soils and geology in the watershed do not allow subsurface water retention during the summer.

Timeline for Implementation

The problems leading to water quality limitations and 303(d) listing have accumulated over many decades. Natural recovery and restorative management actions to address these problems will occur over an extended period of time. The first priority is to correct the causes of the problems to avoid additional degradation. This has largely been accomplished through the use of Best Management Practices (BMPs). The second priority is to address the symptoms of the problems. This is accomplished through restorative management actions. Implementation will be continued until the restoration goals, objectives, and management actions described in this WQRP are achieved. The Aquatic Conservation Strategy contained in the NWFP describes restoration timeframes. The ACS seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds. Because it is based on natural disturbance processes, it may take decades, possibly more than a century to achieve objectives.

The South River Resource Area has completed an aquatic restoration assessment. This assessment discusses the restoration needs and ways to address those needs. In addition, the resource area has initiated a programmatic environmental assessment for implementing restoration projects within the next five to ten years.

Responsible Parties

Participants in this plan for Federally-administered lands include the BLM and ODEQ. The BLM is the lead agency in this plan, since the BLM manages a large percentage of land in this watershed. Federal land managers agreed that the Federal agency managing the most land within a watershed would be the lead agency for completing a WQRP.

A summary Water Quality Management Plan (including information from this WQRP) for the watershed will be developed by ODEQ with assistance from the Oregon Department of Forestry (ODF) and the Oregon Department of Agriculture. The Oregon Water Resources Department (OWRD) may be a participant in the implementation and monitoring components of the Water Quality Management Plan (WQMP). The WQMP will address private forest, agricultural, and non-resource lands.

The ODF is the Designated Management Agency (DMA) for regulation of water quality on non-Federal forest lands. The Oregon Board of Forestry in consultation and with the participation and support of ODEQ has adopted water protection rules in the form of Best Management Practices (BMP) for forest operations. These rules are implemented and enforced by ODF and monitored to assure their effectiveness. The ODF and ODEQ will jointly demonstrate how the Oregon Forest Practices Act (OFPA), forest protection rules (including the rule amendment process), and BMP's adequately protect water quality.

Reasonable Assurance of Implementation

The BLM is responsible for creating and implementing public land management plans for lands under their jurisdiction. The plans are required to comply with the Clean Water Act and state environmental protection programs. These plans fully address water quality and provide the foundation for long term restorative processes that are passive in nature. These plans also protect overall water quality through Best Management Practices (BMPs) that guide land management activities including restoration and rehabilitation.

The BLM works cooperatively with other interested parties in the watershed. This includes watershed councils, other government agencies, and private entities. The problems affecting water quality are widespread. Activities need to be coordinated with other parties to accomplish watershed restoration.

Public Involvement

The NWFP (USDA and USDI 1994) was signed in April 1994, following extensive public review. Watershed analysis is a required component (in certain situations, such as in Key Watersheds) of the Aquatic Conservation Strategy (ACS) under the NWFP. This WQRP is a procedural step that focuses on water quality using elements of the NWFP. It tiers to and appends the South Umpqua Watershed Analysis (USDI 2001). The watershed analysis describes the current conditions in the watershed in order to develop the appropriate context upon which this WQRP can base conclusions regarding BLM's ability to meet water quality requirements for Federally-administered lands.

The ODEQ procedure for public input offers a 30-day public comment period prior to submission of a WQMP to the Environmental Protection Agency (EPA). The ODEQ will provide appropriate public notice requesting comments on the information contained in the WQMP and state the document is pending submission to EPA. The public notice would provide an opportunity for public hearings for people to submit written or oral comments if submitted comments indicate significant public interest, written requests from ten or more people are received, or an organization representing at least ten people requests a public hearing.

Chapter 2 - Condition Assessment/Problem Description

Parameter 1. Stream Temperature

Introduction/Listing Validation

For stream temperature, the affected beneficial uses are resident fish and aquatic life and salmonid fish spawning and rearing. Salmonid fish species require specific water temperatures at various stages of their fresh water life.

The Oregon water quality standard [OAR 340-41 – (basin) (2) (b)] that applies to the Umpqua Basin is:

> Standards applicable to all basins (adopted as of 1/11/96, effective 7/1/96):
> Seven (7) day moving average of daily maximum shall not exceed the following values unless specifically allowed under a Department-approved basin surface water temperature management plan:
>
> 17.8° C (64° F) Rearing (June 1 to September 14)
> 12.8° C (55° F) during times and in waters that support salmon spawning, egg incubation, and fry emergence from the egg and from the gravels (September 15 to May 31).

A stream is listed as water quality limited if there is documentation that the moving seven-day average daily maximum temperature exceeds the appropriate standard. This represents the warmest seven-day period (usually occurring from late July to early September) and is calculated by a moving average of the daily maximum temperatures. The time period of interest for rearing is June 1 through September 14. Streams on the water quality limited list for temperature in the South Umpqua River Watershed include Fate Creek, Stouts Creek, the East Fork of Stouts Creek, and the portion of the South Umpqua River in the South Umpqua River Watershed (see Figure 2).

The BLM collected summertime stream temperature data in the South Umpqua River Watershed from 1992 to 2000 (see Tables 42 and 43 in USDI 2001). The stream temperature data are shown in Figure 3. Ten out of the 17 monitored sites in the watershed exceeded the water quality standards for rearing temperature regardless of yearly climate differences. Water temperatures in lower Coffee Creek, lower Days Creek, Lavadoure Creek, the East Fork of Stouts Creek, Stouts Creek, and the West Fork of Canyon Creek exceeded water quality standards most of the summers.

Stream temperature is driven by the interaction of many variables, such as stream channel characteristics. Streams with narrow channels tend to have cooler stream temperatures. A stream with a gentle gradient is typically wide, shallow, and has a slow velocity, which contributes to increased stream temperatures. Energy exchange may involve solar radiation, longwave radiation, evaporative heat transfer, convective heat transfer, conduction, and advection (Lee 1980 and Beschta and Weatherred 1984). For a stream with a given surface area and stream flow, an increase in the amount of heat entering a stream from solar radiation will produce a proportional increase in stream temperature (Brown 1972). Solar radiation is the most important radiant energy source heating streams during the day (Brown 1983).

Figure 2. South Umpqua River Watershed Stream Segments on the 1998 303(d) List of Water Quality Limited Streams for Exceeding the Water Temperature Standard

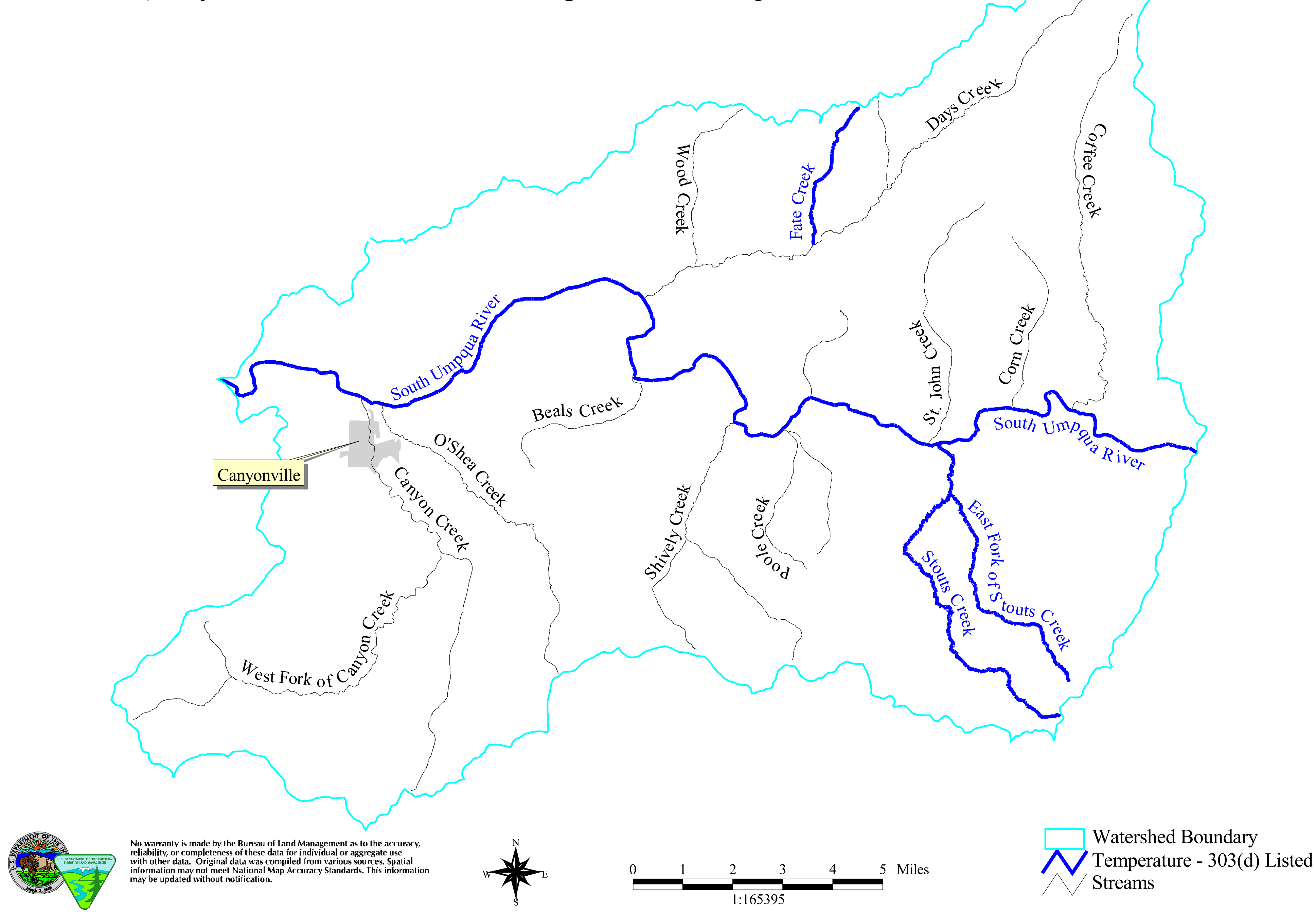
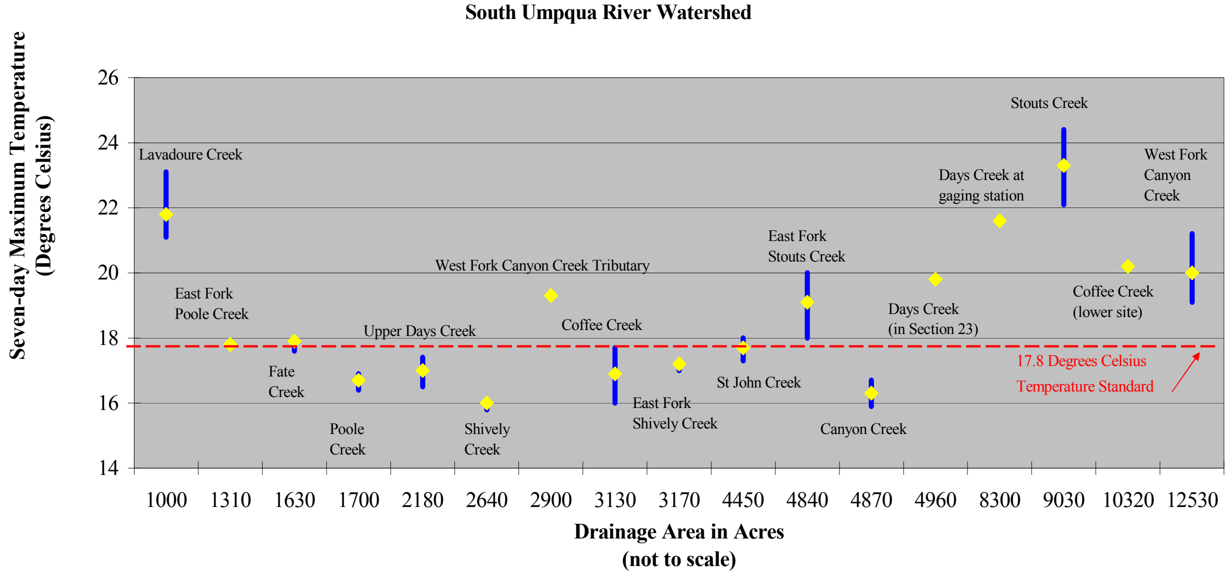


Figure 3. Correlation Between the Seven-day Maximum Stream Temperature and Drainage Area for Sites in the South Umpqua River Watershed



Management activities that decrease riparian shade and contribute to the introduction of bedload sediment and result in increases in width to depth ratios and stream surface area can increase the amount of solar radiation intercepted by a stream. Water withdrawals during the summer may also increase the effect solar radiation has on water temperatures as demonstrated by Brown's equation (Brown 1972). This WQRP was developed to address stream shade, flow, and stream channel morphology as factors affected by land management activities that may contribute to elevated water temperature in the South Umpqua River Watershed.

Disturbance of the riparian area and stream channel from landslides and floods can also increase the amount of solar radiation intercepted by a stream. However, these are considered natural processes and are "expected" change agents considered by the ACS (USDA and USDI 1994). The changes in riparian vegetation caused by landslides and floods will fluctuate within the range of natural variability for this watershed, that analysis is considered to be outside the scope of this assessment. This WQRP focuses on areas where Federal land management activities have influenced natural disturbance and affected water quality.

Temperature Factor 1. Stream Shade

Riparian vegetation can effectively reduce the total daily solar heat load. Without riparian vegetation, most incoming solar energy would be available to heat the stream. The shadow model (Park 1993) was used to estimate the amount of existing shade in riparian areas along perennial streams in the South Umpqua River Watershed. Modeling parameters included active channel width, vegetative overhang, riparian tree height, shade density, and stream orientation. Active channel width, vegetative overhang, and the distance from the tree to the stream channel were calculated based on stream order or derived from field observations. Only data on BLM-administered lands were verified in the field. Data were not collected on private lands. Target shade was determined by using reference stream reaches. These reference stream reaches had trees in the riparian areas that were at the site potential tree height (which is considered to be the average maximum height and average maximum shade possible given site conditions). The number of years required for riparian vegetation to provide target shade was calculated based on the estimated number of years it would take trees to reach the site potential tree height.

Stream channel shade changes as forest stands grow. The target shade value is calculated based on site characteristics and site potential tree height. Target shade values represent the maximum potential stream shade. Tables 4 and 5 display the existing and target shade values for Federally-administered and all lands in the South Umpqua River Watershed. The type of disturbance listed was commonly “harvest”, which means timber harvesting. Fire disturbance has reduced shade in some areas of the watershed. Other natural processes that may reduce shade in riparian areas include drought, insect damage, disease, and blow down. Shade along the South Umpqua River has been impacted by agriculture and human settlement.

Table 4. Current Shade Conditions and Potential Recovery on Federally-Administered Lands in the South Umpqua River Watershed.

Subwatershed Drainage	Percent of Stream Miles in the Watershed[1]	Percent Existing Shade	Percent Probable Target Shade	Percent Difference Between Target and Existing Shade	Type of Disturbance	Years to Shade Recovery[2]
Canyon Creek Subwatershed	7.1	74	91	-17	Harvest/Fire	40
Bear Gulch	2.9	85	92	-7	Harvest	24
Canyon Pass	1.1	78	90	-12	Harvest	40
Canyonville	0	N/A	N/A	N/A	N/A	N/A
Jordan Creek	0	N/A	N/A	N/A	N/A	N/A
Lower West Fork	1.7	53	89	-36	Harvest/Fire	56
South West Fork	0.9	73	92	-19	Harvest/Fire	56
Upper West Fork	0.3	66	94	-28	Harvest	56
Coffee Creek Subwatershed	5.7	85	89	-4	Harvest	14
Corn Creek	0.6	89	92	-3	Harvest	24
Granite Creek	0.7	90	90	0	Harvest	0
Hatchet	0.7	82	91	-9	Harvest	24
Lower Coffee	0.7	74	83	-9	Harvest	24
Middle Coffee	0.6	80	91	-11	Harvest	24
Milo	0.5	78	81	-3	Harvest	8
Slate Creek	0	N/A	N/A	N/A	N/A	N/A
Texas Gulch	0.3	91	91	0	Harvest	0
Upper Coffee	1.7	89	91	-2	Harvest	8
Days Creek Subwatershed	3.6	83	91	-8	Harvest	20
Fate Creek	0.5	72	93	-21	Harvest	72
Green Gulch	0	N/A	N/A	N/A	N/A	N/A
Lower Days	0	N/A	N/A	N/A	N/A	N/A
May Creek	0.3	87	92	-5	Harvest	24
Middle Days	0.7	85	91	-6	Harvest	8
Upper Days	1.8	87	90	-3	Harvest	8
Wood Creek	0.2	64	94	-30	Harvest	56

Table 4. Current Shade Conditions and Potential Recovery on Federally-Administered Lands in the South Umpqua River Watershed.

Subwatershed Drainage	Percent of Stream Miles in the Watershed[1]	Percent Existing Shade	Percent Probable Target Shade	Percent Difference Between Target and Existing Shade	Type of Disturbance	Years to Shade Recovery[2]
Shively-O'Shea Subwatershed	7.6	85	91	-6	Harvest	29
Beals Creek	1.0	90	92	-2	Harvest	24
Bland Mountain	0.4	66	80	-14	Harvest	40
East Shively	1.6	87	92	-5	Harvest	40
Lower O'Shea	0.1	78	82	-4	Harvest	8
Lower Shively	1.1	78	89	-11	Harvest	40
Packard Gulch	0.5	75	89	-14	Harvest	40
Small Creek	0	N/A	N/A	N/A	N/A	N/A
South Umpqua Morgan	0.2	79	96	-17	Harvest	40
Stinger Gulch	0.1	86	93	-7	Harvest	40
Upper O'Shea	1.5	90	91	-1	Harvest	8
Upper Shively	1.0	91	93	-2	Harvest	24
St. Johns Subwatershed	3.5	80	91	-11	Harvest/Fire	26
John Days	0.5	61	92	-31	Harvest/Fire	56
Lavadoure Creek	0.6	50	89	-39	Harvest/Fire	72
Poole Creek	1.2	92	92	0	Harvest	0
St Johns	1.2	90	92	-2	Harvest	8
Stouts Creek Subwatershed	6.0	78	89	-11	Harvest/Fire	27
East Stouts	1.0	85	93	-8	Harvest/Fire	40
Lower Stouts	1.0	82	91	-9	Harvest	40
Middle Stouts	1.5	60	83	-23	Harvest/Fire	40
Upper Stouts	0.9	84	91	-7	Harvest	24
West Stouts	1.6	85	91	-6	Harvest/Fire	24

1. Percent of Steam Miles in the Watershed refers to the percent of stream miles in a Subwatershed or Drainage out of the total stream miles in the South Umpqua River Watershed.
2. Years to Recovery uses the weighted average tree height with DEQ's site index scale for trees in the riparian area to determine the number of years needed to reach the target height.
N/A The drainage does not contain Federally-administered land along the perennial stream channels.

Table 5. Current Shade Conditions and Potential Recovery for All Lands in the South Umpqua River Watershed.

Subwatershed Drainage	Percent of Stream Miles in the Watershed[1]	Percent Existing Shade	Percent Probable Target Shade	Percent Difference Between Target and Existing Shade	Type of Disturbance	Years to Shade Recovery[2]
Canyon Creek Subwatershed	20.1	69	88	-17	Harvest/Agriculture /Fire	48
Bear Gulch	3.6	86	92	-6	Harvest	24
Canyon Pass	1.8	81	91	-10	Harvest	40
Canyonville	1.1	44	82	-38	Harvest	72
Jordan Creek	4.1	47	75	-28	Agriculture	72
Lower West Fork	3.3	57	87	-30	Harvest/Fire	56
South West Fork	2.9	79	93	-14	Harvest/Fire	40
Upper West Fork	3.3	84	94	-10	Harvest	40
Coffee Creek Subwatershed	16.6	79	87	-8	Harvest/Agriculture	30
Corn Creek	2.4	85	92	-7	Harvest	40
Granite Creek	1.6	88	92	-4	Harvest	24
Hatchet	2.6	86	89	-3	Harvest	8
Lower Coffee	2.4	78	86	-8	Harvest	40
Middle Coffee	1.4	82	91	-9	Harvest	24
Milo	2.9	58	75	-17	Agriculture	56
Slate Creek	0.7	71	78	-7	Agriculture	40
Texas Gulch	0.6	92	92	0	Harvest	0
Upper Coffee	2.0	87	91	-4	Harvest	8
Days Creek Subwatershed	12.6	70	90	-20	Harvest	41
Fate Creek	1.0	56	91	-35	Harvest	72
Green Gulch	1.8	52	90	-38	Harvest	72
Lower Days	0.4	28	70	-42	Harvest	80
May Creek	1.7	66	90	-24	Harvest	56
Middle Days	2.8	80	91	-11	Harvest	24
Upper Days	2.3	88	90	-2	Harvest	8
Wood Creek	2.6	73	92	-19	Harvest	40

Table 5. Current Shade Conditions and Potential Recovery for All Lands in the South Umpqua River Watershed.

Subwatershed Drainage	Percent of Stream Miles in the Watershed[1]	Percent Existing Shade	Percent Probable Target Shade	Percent Difference Between Target and Existing Shade	Type of Disturbance	Years to Shade Recovery[2]
Shively-O'Shea Subwatershed	27.9	60	86	-26	Harvest/Agriculture	49
Beals Creek	3.3	79	92	-13	Harvest	40
Bland Mountain	3.3	43	73	-30	Agriculture	72
East Shively	2.5	88	92	-4	Harvest	24
Lower O'Shea	2.1	64	90	-26	Harvest	56
Lower Shively	2.1	82	90	-8	Harvest	24
Packard Gulch	3.9	53	83	-30	Agriculture	72
Small Creek	1.6	39	79	-40	Agriculture	72
South Umpqua Morgan	1.4	69	92	-23	Harvest	56
Stinger Gulch	2.5	53	76	-23	Agriculture	72
Upper O'Shea	3.1	88	92	-4	Harvest	24
Upper Shively	2.0	90	93	-3	Harvest	24
St. Johns Subwatershed	9.8	71	86	-15	Harvest/Agriculture/Fire	42
John Days	3.6	48	79	-31	Agriculture/Fire	72
Lavadoure Creek	0.9	47	88	-41	Harvest/Fire	72
Poole Creek	2.2	91	92	-1	Harvest	8
St Johns	3.2	88	91	-3	Harvest	24
Stouts Creek Subwatershed	13.0	75	90	-15	Harvest/Fire	34
East Stouts	2.3	76	92	-16	Harvest/Fire	40
Lower Stouts	2.6	84	91	-7	Harvest	24
Middle Stouts	2.3	62	84	-22	Harvest/Fire	40
Upper Stouts	2.0	87	91	-4	Harvest	24
West Stouts	3.7	69	90	-21	Harvest/Fire	40

1. Percent of Stream Miles in the Watershed refers to the percent of stream miles in a Subwatershed or Drainage out of the total stream miles in the South Umpqua River Watershed.
2. Years to Recovery uses the weighted average tree height with DEQ's site index scale for trees in the riparian area to determine the number of years needed to reach the target height.

In the South Umpqua River Watershed, the greatest loss of shade on Federally-administered lands is due to the harvest of trees or fire disturbance in the riparian area. Based on the percent of stream miles and amount of shade loss, the Middle Stouts and Lower West Fork Drainages would be the highest priority areas to conduct shade restoration activities on Federally-administered lands in the watershed. The decreased amount of shade on Federally-administered lands in these two Drainages probably had a small-to-moderate effect on increasing stream temperature within the South Umpqua River Watershed.

Summary and WQRP Targets

The NWFP limits the removal of trees in riparian buffers on Federally-administered lands (USDA and USDI 1994). Therefore, current management activities are not increasing the average solar exposure to stream channels. The data in Table 6 are an average of all the streams on Federally-administered lands in the watershed with some streams having more and others less than the target amount of shade. Shade recovery on Federally-administered land in the watershed is expected to occur in about 27 years. However, some areas will take longer. Infrequent natural disturbances, such as floods and landslides, may affect shade recovery.

Table 6. Summary of Riparian Shade Conditions and Potential Recovery on Federally-Administered Lands in the South Umpqua River Watershed.

Percent Existing Shade	Percent Probable Target Shade	Percent Difference Between Target and Existing Shade	Type of Disturbance	Years to Shade Recovery[1]	Proposed Treatments
81	90	-9	Harvest	27	Follow the Aquatic Conservation Strategy for Management Activities in Riparian Reserves Adjacent to Perennial Streams.

1. Years to Recovery uses the weighted average tree height with DEQ's site index scale for trees in the riparian area to determine the number of years needed to reach the target height.

Temperature Factor 2. Flow

The temperature change produced by a given amount of heat is inversely proportional to the volume of water heated, such as the water in a stream (Brown 1983). A stream with less flow will heat up faster than a stream with more flow, given all other channel and riparian characteristics are the same.

Stream temperatures in the South Umpqua River Watershed can be affected by groundwater flows. Groundwater input has the tendency to cool streamflow. The groundwater may come from fractured bedrock or deep soils that produce sustained summer flows. Shallow soils have low water storage capacities and contribute less to summer flows. Melting snow may also contribute to summer flows and cool stream temperatures. Groundwater inflow tends to cool summer stream temperatures and augment summertime flows. Reducing or eliminating groundwater inflow allows streams to become warmer. Water withdrawals are addressed in the flow modification parameter. No federal water withdrawals are affecting stream temperatures in the South Umpqua River Watershed.

Temperature Factor 3. Stream Channel Morphology

While solar radiation and flow play a large role in determining stream temperature, stream channel morphology can also affect stream temperature. Streams that are narrow and have a high percentage of their streambed dominated by cobble and gravel are less prone to thermal loading than wide channels that are dominated by bedrock. Large wood plays an important role in creating stream channel morphology. Obstructions created by large wood help to deposit gravel. Gravel helps decrease thermal loading by reducing the amount of water exposed to direct solar input, since some of the water will travel under the gravel. The removal of large wood has affected stream channel morphology. The large wood held the alluvial material in place, preventing the stream channels from down cutting and widening, which allowed increased thermal loading and stream heating. A more extensive discussion of stream morphology is included in the habitat modification parameter.

Management Actions

The Standards and Guidelines contained in the NWFP require Riparian Reserves along streams. Riparian Reserve widths are described in the ACS portion of the Standards and Guidelines. They are based on the site potential tree height (160 feet in the South Umpqua River Watershed) or a minimum slope distance, whichever is greatest, unless described otherwise in a watershed analysis. Timber harvesting in Riparian Reserves is allowed under certain conditions, such as when catastrophic events result in degraded riparian conditions or when thinning, salvaging, or fuelwood cutting would help attain ACS objectives. In addition, silvicultural practices to control stocking, re-establish and manage stands, and acquire desired vegetation characteristics are to be applied when needed to achieve ACS objectives.

Management activities that influence the amount of shade include allowing riparian vegetation to grow to target shade values and using silvicultural practices to meet ACS objectives. The watershed analysis recommends the following in Riparian Reserves:

Thinning in Riparian Reserves to maintain or enhance the growth of conifers,
Thinning in Riparian Reserves that are overstocked (due to fire suppression) to reduce fire hazard and loss of ecological function,
Planting understocked Riparian Reserves to restore hardwood and conifer species.

Areas to focus on might include:

Dense stands,
Dense stands with an elevated risk of catastrophic fires and loss of ecological function,
Understocked stands that would provide the greatest benefit to streams on the water quality limited list for exceeding the water temperature standard.

Parameter 2. Habitat Modification

Introduction/Listing Validation

The beneficial uses affected by habitat modification include resident fish and aquatic life and salmonid fish spawning and rearing. The Oregon water quality standards that apply are:

> The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life, or affect the potability of drinking water, or the palatability of fish or shellfish shall not be allowed [OAR 340-41 – (basin)(2)(i)],

or:

> Waters of the State shall be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities [OAR 340-41-027].

A stream is listed as water quality limited if there is documentation that habitat conditions are a limitation to fish or other aquatic life. Streams listed for habitat modification in the South Umpqua River Watershed include Days Creek, Shively Creek, and Beals Creek (see Figure 4). These streams were listed because Oregon Department of Fish and Wildlife (ODFW) surveys indicated habitat conditions were a limitation to fish or other aquatic life.

The ODFW Aquatic Habitat Inventory (AHI) data and macroinvertebrate data collected by the BLM were used to document overall channel conditions and the biological potential of fish-bearing stream reaches in the watershed. The ODFW AHI surveys indicated many of the second through fifth order streams in the watershed do not meet the Large Woody Debris (LWD) Frequency (four or more functional key pieces of wood per 100 meters for 50 percent of the stream length) or Pool Frequency (no more than five to eight channel widths between pools for 60 percent of the stream length) used by ODEQ to list a stream as water quality limited for habitat modification. Large Woody Debris is defined as a functional key piece of woody debris with an adequate length and diameter to be stable within a channel. All of the surveyed reaches on streams listed as water quality limited for habitat modification do not meet the Oregon Coast Salmon Restoration Initiative (CSRI) key LWD frequencies criteria used by ODEQ. Ten out of twelve stream reaches do not meet the CSRI pool frequency criteria used by ODEQ (see Table 7). Therefore, the listing of Days Creek, Shively Creek, and Beals Creek appears to be valid for habitat modification based on key LWD frequency and pool frequency.

Aquatic Habitat Inventory

The analysis of stream survey data for this WQRP concentrated on five attributes at the stream reach scale: 1) pool frequency, 2) riffle width/depth ratio, 3) riparian conifer size, 4) pieces of large wood, and 5) key pieces of large wood. All of these attributes, except for riparian conifer size, have been accepted by Federal and State teams in Oregon as core attributes needed to assess stream conditions. In addition, they are included in the Interagency Aquatic Database and GIS, which is a compilation of stream surveys from various agencies in Oregon. These attributes are inventoried by the Forest Service, BLM, and ODFW following similar protocols. Riparian conifer size is discussed in this WQRP because of important relationships between aquatic and riparian functions.

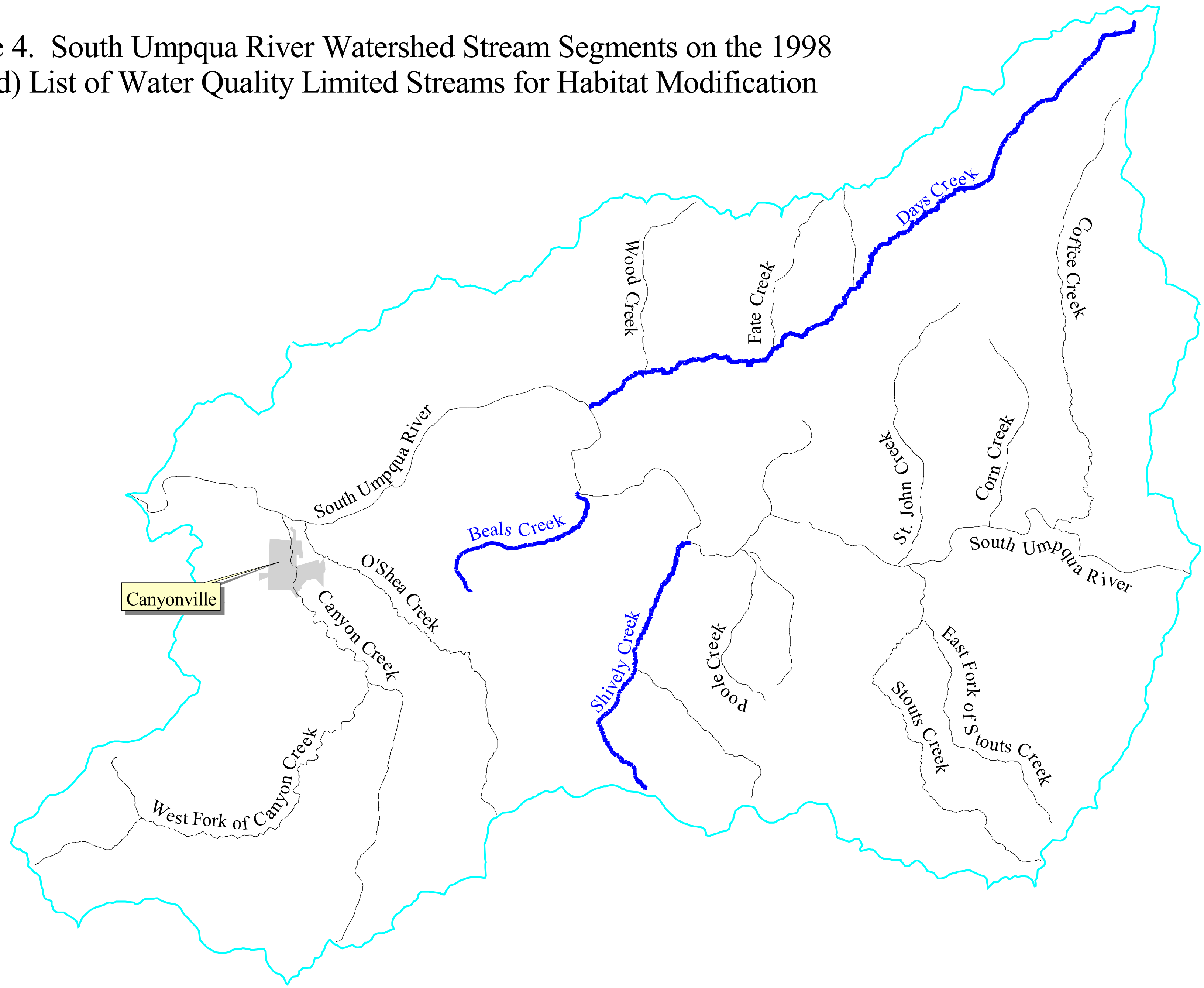
Data collected in the ODFW AHI can be used to identify the components that may limit the aquatic habitat and fishery resource from reaching their optimal functioning condition. The Habitat Benchmark Rating System is a method developed by the Umpqua Basin Biological Assessment Team (BAT) to rank aquatic habitat conditions. The BAT consists of fisheries biologists from the Southwest Regional Office of the ODFW, Coos Bay BLM District, Roseburg BLM District, Umpqua National Forest, and Pacific Power and Light Company. This group of local fisheries biologists addresses and resolves local questions and problems associated with the fisheries resource in the Umpqua Basin. The matrix designed by the BAT provides a framework to easily and meaningfully categorize habitat condition (see Table C-2 in USDI 2001). This matrix is not intended to reflect quality of the habitat condition of each stream reach but to summarize the overall condition of the surveyed reaches. The matrix consists of four rating categories: Excellent, Good, Fair, and Poor. How the ratings correlate with the National Marine Fisheries Service (NMFS) Matrix are shown in Table 8.

Table 7. Summary of ODFW Habitat Data Specific to the Categories Identified by ODEQ to List Days, Shively, and Beals Creeks for Habitat Modification.

Stream Name	Reach Number	Large Woody Debris Frequency per 100 meters (CSRI standard: ≥ 4/100m)	Pool Frequency, channel widths between pools (CSRI standard: ≤ 8)
Days Creek	1	0	7.5
	2	0	18.5
	3	0	33.5
	4	0	20.5
	5	0	22.7
	6	0.6	68.3
Shively Creek	1	0.2	13.8
	2	0.3	14.6
	3	0.9	92.9
Beals Creek	1	0	12.4
	2	0	8.0
	3	0	16.9
	4	0	ND

ND = No Data

Figure 4. South Umpqua River Watershed Stream Segments on the 1998 303(d) List of Water Quality Limited Streams for Habitat Modification



N W E S

0 1 2 3 4 5 Miles

1:165395

Watershed Boundary
Habitat Modification - 303(d) Listed
Streams

Table 8. Comparison of the Aquatic Habitat Ratings (AHR) to the NMFS Matrix Ratings.

ODFW Aquatic Habitat Inventories	NMFS Matrix
Excellent or Good	Properly Functioning
Fair	At Risk
Poor	Not Properly Functioning

Twenty-seven streams in the South Umpqua River Watershed were inventoried by ODFW (see Table C-3 in Appendix C of USDI 2001). Eighty-five stream reaches were identified during the inventories. Of these reaches, three would be rated as Properly Functioning, 58 would be rated as At Risk, and 22 would be rated as Not Properly Functioning according to the NMFS Matrix. Two reaches were not surveyed. About 96 percent of the surveyed stream reaches would be rated as At Risk or Not Properly Functioning (70 and 26 percent, respectively) and affecting aquatic life.

Each surveyed stream reach in the South Umpqua River Watershed may contain different limiting factors. Limiting factors for the fisheries resource include reduced instream habitat structure, increased sedimentation, the absence of a functional riparian area, decreased water quantity or quality, or the improper placement of drainage and erosion control devices associated with roads.

Individual Attribute Discussion

Large Wood

Large woody debris is an important part of stream morphology. Large woody debris traps and stores sediment and organic material (which are important to aquatic species) and dissipates stream channel energy. Energy dissipation in a stream with adequate amounts of large wood varies greatly along the channel length and results in a channel form that is diverse. This channel form diversity is displayed by the frequent occurrence of pools, with scour occurring at stable LWD sites, rather than along the entire reach. Scouring can lead to channel incision, unstable banks, bank erosion, channel widening, and loss of channel complexity and habitat diversity (Montgomery and Buffington 1993). The presence of LWD in a system may also attenuate streamflow by “smoothing” out the storm hydrograph, lowering the magnitude of the peak flow and lengthening the time when the peak flow occurs (decreases the flashiness).

Past management practices, such as stream cleaning, road construction, and salvaging activities in riparian areas, left many streams lacking in LWD. The early seral vegetation along many of the streams does not allow the recruitment of LWD. The removal of large wood from the stream and potential woody debris from the riparian area had the greatest direct impact on stream channel morphology in the South Umpqua River Watershed.

Most of the anadromous fish-bearing stream reaches surveyed by ODFW in the watershed are deficient in LWD. The low frequency and volume of instream wood has resulted in fewer pool habitats for fish. The lack of instream large wood has, in most instances, negatively altered stream channel dynamics, such as bedload transport and stream substrate distribution. Other stream channel characteristics impacted by the lack of LWD include stream channel sinuosity, streambank stability, and floodplain interaction. Limiting a stream's ability to overflow onto the floodplain during high stream flow events inhibits stream channel hydraulics and channel dynamics. Normally, these conditions cause the channelization of stream flow and channel incision. Bureau of Land Management survey crews observed many of the streams on BLM-administered land in the South Umpqua River Watershed are incised and disconnected from their floodplain.

Channel Complexity (Pools)

Research has demonstrated that channel complexity, especially slow water habitat, is a major limiting factor of fresh water habitat for coho salmon (Dolloff 1986). Pool habitat is an essential habitat element for rearing salmonids. Pools are most productive when large wood is present. Large woody debris provides cover both in the summer and winter and velocity refuges during floods. Fish population surveys found the most coho salmon in slow water areas, pools behind beaver dams, and channel spanning pools (State of Oregon 1997).

Complex channels have higher proportions of slow water habitat created by LWD, meanders, and beaver activity (Meehan 1991). Although no direct links between pools and sedimentation have been found, studies indicate excessive sedimentation may play a role in reducing pool depth and frequency (Lisle and Hilton 1992). Channel simplification has increased channel width, decreased channel depth, and reduced pool size and frequency in the upper South Umpqua River (Dose and Roper 1994).

Bureau of Land Management personnel and Dose and Roper (1994) observed pool frequencies in the South Umpqua River and its tributaries have been impacted by channel simplification, loss of LWD, sedimentation, and increased width/depth ratios. Since only a selected number of stream reaches were surveyed by the BLM, total pool area in the South Umpqua River Watershed can not be determined. However, the number of channel widths separating pools (pool frequency) has been quantified.

Width to Depth Ratio

Stream habitat surveys were conducted on the South Umpqua River and its tributaries in 1937 (Roth 1937). Since that time many changes have occurred within the South Umpqua Subbasin and in the stream reaches surveyed. A comparative study conducted by the Umpqua National Forest during the summer low flows between 1989 and 1993 surveyed the same stream reaches as in the 1937 report. The results of the study showed that 22 of the 31 surveyed stream segments were significantly different than in 1937. Nineteen stream reaches were significantly wider while the remaining three stream segments were significantly narrower. Of the eight streams surveyed within designated wilderness areas, only one stream channel increased in width since 1937. Thirteen of the 14 stream segments located in areas where timber harvesting occurred were significantly wider than in 1937.

The increased channel widths were attributed to changes in the stream flow regime due to timber harvesting and road building and simplification of the stream channel by the removal of LWD from the channel and the riparian area (Dose and Roper 1994). Peak flows can introduce sediment into the channel from upslope and upstream and can simplify the channel by rearranging instream structures. Excess sediment delivery to streams usually changes stream channel characteristics and channel configuration. These changes in the stream channel decrease the depth, number of pool habitats, and space available for rearing fish (Meehan 1991). The results from the most recent Umpqua National Forest study document changes in low flow channel widths that have occurred within the South Umpqua Subbasin since 1937 (Dose and Roper 1994). These changes in channel condition may have contributed to the decline of three of the four anadromous salmonid stocks occurring in the South Umpqua Subbasin (Dose and Roper 1994).

The ODFW habitat survey data (summarized in Table 9) shows that most stream reaches surveyed in the South Umpqua River Watershed had riffle width to depth ratios ranging from excellent to poor, with an average rating of fair. Forty-six percent of all reaches were rated as fair or poor. The criteria for the Aquatic Habitat Rating are shown in Table 10. The data indicates channel widening may have occurred in some stream reaches in the South Umpqua River Watershed.

Table 9. Summary of ODFW Survey Data in the South Umpqua River Watershed.

Stream Name	Reach Number	% Pool Area	Pool Frequency (Riffle Widths Between Pools*)	Riffle W/D Ratio	% Fines in Riffles	Riparian Conifer Size (≥ 50 cm DBH/305m)	LWD Pieces per 100m	Key LWD Pieces per 100m ≥ 60 cm Diameter*	Aquatic Habitat Rating
Days Creek	1	41	7.5	27.2	11	0	0.8	0	fair
	2	8	18.5	37.6	9	0	0.9	0	poor
	3	6	33.5	--	12	30	2.7	0	poor
	4	13	20.5	--	20	0	3	0	poor
	5	8	22.7	--	13	0	3.4	0	poor
	6	5	68.3	10.7	20	183	7.3	0.6	fair
Fate Creek	1	45	41.8	--	43	0	0.6	0	poor
	2	60	24.6	--	28	0	1.9	0.1	poor
Wood Creek	1	55	12.5	16	10	0	1.3	0	fair
	2	39	17.3	25.1	17	0	0.7	0	fair
	3	55	19.2	--	34	0	1.3	0	fair
	4	85	40.8	2	80	0	1.7	0	fair
St. John Creek	1	50.2	4.6	25.9	8	0	1.6	0	fair
	2	38.6	6.6	25.6	7	0	21.5	0.5	fair
	3	53.3	4.3	13.1	12	0	19.1	0.7	fair
	4	42.6	5.4	12.7	5	0	11.1	0.3	fair
	5	28.8	13.8	10.9	1	12	28.1	1.8	fair
	6	--	--	--	--	0	27.1	0.9	fair
Coffee Creek	1	27	8.1	33.2	11	0	2.1	0	poor
	2	34	7.1	28.4	7	15	5.3	0.7	fair
	3	39	7	33.1	6	0	2	0.7	poor
	4	40	5.6	37.1	7	152	8.5	0.9	fair
	5	85	15.1	53.4	8	122	0.4	0	poor
	6	--	--	--	--	--	--	--	--
	7	25	11	24.9	7	122	24.6	4.5	good
	8	1	436.9	--	16	183	18.2	2.6	fair
Stouts Creek	1	30.7	--	24	12	--	5.7	--	poor
	2	28.5	--	27.1	19	--	18.3	--	fair
	3	7.3	--	18.4	41	--	4.9	--	poor
Stouts Creek (trib. #14)	1	7.6	--	20	50	--	0	--	poor
Stouts Creek (trib. #16)	1	17.5	--	16.5	33	--	10.7	--	fair
Stouts Creek (U5863)	1	6.1	--	6.9	10	--	8.4	--	fair

Table 9. Summary of ODFW Survey Data in the South Umpqua River Watershed.

Stream Name	Reach Number	% Pool Area	Pool Frequency (Riffle Widths Between Pools*)	Riffle W/D Ratio	% Fines in Riffles	Riparian Conifer Size (≥ 50 cm DBH/305m)	LWD Pieces per 100m	Key LWD Pieces per 100m ≥ 60 cm Diameter*	Aquatic Habitat Rating
East Fork of Stouts Creek	1	14.9	--	15.8	27	--	8.3	--	fair
	2	0.2	--	63.6	9	--	7.9	--	poor
	3	16.3	--	--	33	--	9.2	--	poor
East Fork of Stouts Creek (trib. #15)	1	4.1	--	10	0	--	7.5	--	fair
Northeast Fork of Stouts Creek	1	7.4	--	--	18	--	14.6	--	poor
	2	3.9	--	--	10	--	17.1	--	fair
Southwest Fork of Stouts Creek	1	12.1	--	14.8	26	--	47.8	--	fair
	2	7.4	--	22.6	24	--	11.5	--	fair
O'Shea Creek	1	27.5	11.2	29.6	2	0	0.5	0	fair
	2	14.9	15.7	23.2	1	20	3.1	0.2	fair
	3	9.5	21.9	32.9	4	0	5.6	0.5	fair
	4	3.8	83.4	30.8	3	61	5.4	1.8	fair
Corn Creek	1	46	7.9	22.7	22	91	7.9	0.3	fair
	2	35	5.8	20.3	26	15	15.6	1.6	fair
	3	14	48.5	16.6	41	46	11.2	0.9	fair
Lavadoure Creek	1	10.4	187.2	11.8	11	76	2.8	0.3	fair
Shively Creek	1	17.9	13.8	20.2	0	0	2.6	0.2	fair
	2	18.6	14.6	27	1	15	3.1	0.3	fair
	3	2.5	92.9	23.4	5	37	7.7	0.9	fair
East Fork of Shively Creek	1	1.7	168.8	12.7	0	0	5.9	0.9	fair
	2	10.7	51.6	21	4	20	4.6	0.5	fair
	3	1.1	116.1	26.1	14	30	6.6	0.5	fair
Poole Creek	1	15.5	17.8	13.4	3	20	11.5	0.4	fair
	2	19.6	38.7	--	--	183	16.5	0.3	poor
East Fork of Poole Creek	1	15.4	21.7	11.8	2	15	8	0.1	fair
Beals Creek	1	19.5	12.4	15.5	23	0	3	0	poor
	2	45.1	8	12	16	0	2	0	fair
	3	19.6	16.9	29.3	14	0	3.3	0	poor
	4	--	--	23	14	0	3.8	0	poor

Table 9. Summary of ODFW Survey Data in the South Umpqua River Watershed.

Stream Name	Reach Number	% Pool Area	Pool Frequency (Riffle Widths Between Pools*)	Riffle W/D Ratio	% Fines in Riffles	Riparian Conifer Size (≥ 50 cm DBH/305m)	LWD Pieces per 100m	Key LWD Pieces per 100m ≥ 60 cm Diameter*	Aquatic Habitat Rating
Beals Creek (trib. #1)	1	5.1	70.1	15.1	16	0	8.9	0	fair
Sweat Creek	1	7.6	48.8	16.9	41	0	4	0.2	fair
Canyon Creek	1	56.1	3.2	26.9	0	0	1.1	0	fair
	2	55.6	4.8	21.5	2	0	0.8	0	fair
	3	43.4	4.9	17.6	1	0	0.5	0	fair
	4	37.3	8.1	14.5	0	0	0.8	0	fair
	5	32.6	13.8	10.8	0	0	0.6	0	fair
	6	--	--	--	--	0	0.6	0	poor
West Fork of Canyon Creek	1	44.5	4.2	34.2	0	0	8	0.1	poor
	2	44.1	3.3	33	0	49	8.6	0.2	fair
	3	36.3	6.8	26.1	0	0	2	0.1	fair
	4	21.9	4.6	17.6	0	0	5.6	0.3	fair
	5	--	--	--	--	--	--	--	--
	6	30.5	6.5	19.2	2	0	4.8	0.2	fair
	7	20.3	10.9	15.4	2	20	10.6	0	fair
	8	27.5	15	10.5	5	0	19	0.5	fair
	9	0	--	--	0	30	27.4	2	fair
Tributary to the West Fork of Canyon Creek	1	32.4	7.8	14.1	6	0	25.3	0	fair
	2	30	5.7	14.1	5	30	48.5	1.2	good
	3	28.2	11.3	11.3	10	12	17.8	0.4	fair
	4	1.7	490.7	4.3	15	20	14	0.1	fair
St John Creek (Tributary to the West Fork of Canyon Creek)	1	25.7	9.2	11.9	4	0	13.5	0.3	fair
	2	4.4	148.1	5	5	0	28.3	0.8	good
	3	--	--	--	--	0	27.7	0.6	poor
Mean Values		25.2	41.3	20.9	13	23.3	9.4	0.4	
Standard Deviation		19.2	85.3	10.6	14.2	46.4	9.9	0.7	
Range of Values		0-85	3.2-490.7	2-63.6	0-80	0-183	0-48.5	0-4.5	good to poor

-- = No Data.

Table 10. Aquatic Habitat Rating System.

Rating Category	% Pool Area	Pool Frequency (Riffle Widths Between Pools*)	Riffle W/D Ratio	% Fines in Riffles	Riparian Conifer Size (≥ 50 cm DBH/305m)	LWD Pieces per 100m	Key LWD Pieces per 100m ≥ 60 cm Diameter*
Excellent	$45	--	#10	#1	--	$30	--
Good	31-44	# 8	11 to 20	2 to 7	--	20-29	$ 4
Fair	16-30	--	21-29	8 to 14	--	11 to 19	--
Poor	#15	--	$30	$15	--	#10	--

-- = No Data.

Riparian Conifer Size

The historical condition of the riparian zone along the South Umpqua River above Days Creek favored conditions typical of old-growth forests found in the Pacific Northwest. Many of the stream reaches surveyed by Roth in1937 were "arboreal" in nature, meaning "tall timber along the banks, shading most of the stream" (Roth 1937). The river and its tributaries were well shaded by the canopy closure associated with mature trees. Streambanks were provided protection by the massive root systems of these trees.

Management activities in the watershed have been extensive since 1937. Timber harvesting practices often removed standing trees, instream wood, and downed wood lying within flood plains. The ODFW habitat survey data shows 61 percent of the stream reaches surveyed had no trees of mature sizes (≥ 20 inches or 50 cm DBH) within 100 feet (30 meters) of either side of the stream channel.

Aquatic Insects

Aquatic insects sensitive to changes in aquatic habitat can be used to assess the quality of habitat conditions. Aquatic insects are the primary food source for fish and perform an important role in stream ecosystems. Macroinvertebrate and stream substrate embeddedness surveys were conducted during the summer of 2000 by BLM personnel in order to validate the water quality limited listing of the South Umpqua River for sediment. Documentation of macroinvertebrate community status is one accepted criteria for determining stream impairment by sedimentation.

Results of the macroinvertebrate surveys in the South Umpqua River Watershed are presented in Table 11. The ODEQ Biotic Index scores and decreased macroinvertebrate abundance, as compared to reference sites on the North Umpqua River, indicate there have been adverse impacts from sedimentation in the South Umpqua River between Days Creek and Tiller. The Biotic Index scores were not low enough to list the South Umpqua River from Days Creek to Tiller for sediment or habitat modification. However, this section of the South Umpqua River could be designated under ODEQ guidance as a stream of concern and prioritized for further investigation.

Table 11. Summary of BLM Macroinvertebrate Monitoring in 2000 in the South Umpqua River From Jackson Creek to Days Creek and Tributaries of the South Umpqua River within the South Umpqua River Watershed.

Vicinity	Sample Site	Overall Impairment of Macroinvertebrate Community
South Umpqua River Tiller to Milo	Two miles west of Tiller	**Impairment Uncertain, Stream Segment of Concern.** Relative to reference stations - increased stream substrate embeddedness, decline in ODEQ Biotic Index Scores, and decreased overall abundance suggests adverse impacts due to sedimentation. Additional data collection suggested.
South Umpqua River Milo to Days Creek	0.25 miles west of Milo 0.25 miles above the confluence with Poole Creek 1.3 miles above the confluence with Days Creek	**Impairment Uncertain, Stream Segment of Concern.** Relative to reference stations - increased stream substrate embeddedness, decline in ODEQ Biotic Index Scores, and decreased overall abundance suggests adverse impacts due to sedimentation. Additional data collection suggested.
Coffee Creek	One mile above the confluence with the South Umpqua River	**Moderate Impairment.** Relative to reference stations - high stream substrate embeddedness, moderate impairment ODEQ Biotic Index Scores, and decreased overall abundance indicates adverse impacts due to sedimentation.
Days Creek Poole Creek	Eight miles above the confluence with the South Umpqua River 1.5 miles above the confluence with the South Umpqua River	**Unimpaired.** ODEQ unimpaired Biotic Index Score, good overall taxonomic richness, and abundance of sensitive mayflies, stoneflies, and caddisflies indicate unimpaired water quality and habitat conditions. **Unimpaired.** ODEQ unimpaired Biotic Index Score, good overall taxonomic richness, and abundance of sensitive mayflies, stoneflies, and caddisflies indicate unimpaired water quality and habitat conditions.
East Fork of Poole Creek	1.5 miles above the confluence with the South Umpqua River	**Unimpaired.** ODEQ unimpaired Biotic Index Score, good overall taxonomic richness, and abundance of sensitive mayflies, stoneflies, and caddisflies indicate unimpaired water quality and habitat conditions.
Shively Creek	2.5 miles above the confluence with the South Umpqua River	**Slight Impairment.** ODEQ slight impairment Biotic Index Score. Fair overall taxonomic richness and abundance of sensitive mayflies, stoneflies, and caddisflies. Moderate embeddedness suggests impacts due to sedimentation.

Table 11. Summary of BLM Macroinvertebrate Monitoring in 2000 in the South Umpqua River From Jackson Creek to Days Creek and Tributaries of the South Umpqua River within the South Umpqua River Watershed.

Vicinity	Sample Site	Overall Impairment of Macroinvertebrate Community
St. John Creek	0.5 miles above the confluence with the South Umpqua River	**Moderate Impairment.** Relative to reference stations - high stream substrate embeddedness, moderate impairment ODEQ Biotic Index Scores, and decreased overall abundance indicates adverse impacts due to sedimentation.
Stouts Creek	1.5 miles above the confluence with the South Umpqua River	**Moderate Impairment.** Relative to reference stations - high stream substrate embeddedness, moderate impairment ODEQ Biotic Index Scores, and decreased overall abundance indicates adverse impacts due to sedimentation.
East Fork of Stouts Creek	1.5 miles above the confluence with the South Umpqua River	**Slight Impairment.** ODEQ slight impairment Biotic Index Score. Fair overall taxonomic richness and abundance of sensitive mayflies, stoneflies, and caddisflies. Moderate embeddedness suggests impacts due to sedimentation.

The BLM macroinvertebrate and stream substrate embeddedness surveys also assessed sedimentation and aquatic life use in major tributaries draining BLM-administered lands in the watershed. Three of the ten sites sampled indicated the streams were moderately impaired from sedimentation. Sites in Stouts Creek, Coffee Creek, and St. John Creek had both high levels of embeddedness, as well as lower populations and diversities of macroinvertebrates as compared to reference sites in the watershed. Although Days Creek and Shively Creek are on the water quality limited listed for habitat modification, the data indicates Days Creek is unimpaired and Shively Creek is slightly impaired because of sedimentation. The slightly impaired condition of Shively Creek suggests impacts to the biologic community are due to sediment embedding larger substrate. Further evaluation and investigation may be necessary to determine the effect of sedimentation on habitat condition.

Management Actions

Protective and restorative management actions would be used to achieve water quality and fish habitat goals. Protective actions are the cessation of human activities that cause habitat modification or prevent recovery. They include maintaining LWD in stream channels and allowing riparian vegetation to grow. These protective actions would improve large wood recruitment and bank stabilization. Restorative actions recover aquatic processes and functions.

Placing large wood in streams would actively restore the aquatic habitat. Reducing the amount of sediment entering streams would focus on the source and placing structures in streams would address the symptoms. Placing large wood in streams will be done as opportunities occur and based on an assessment of local conditions (where it historically accumulated, where downed wood is readily available, where habitat is needed, and in depositional stream reaches).

Restorative measures to address the temperature and sediment listings will also improve aquatic habitat. Table 12 provides a summary of habitat elements, affected processes, and management actions. The table shows a particular management action can affect numerous processes and that it is important actions occur in both the upland and riparian areas.

Table 12. Habitat Elements, Affected Processes, and Potential Management Activities to Restore Aquatic Habitat.

Habitat Element	Affected Process	Management Actions	
		Upland	Riparian
Water Temperature	Riparian canopy closure		Maintain effective stream buffers. Apply silviculture treatments to maintain or enhance tree growth or diversity in riparian areas
	Sedimentation	Locate and avoid unstable areas Decommission or improve roads	Decommission or improve roads
	Increased peak flows and channel scour	Maintain canopy closures Decommission or improve roads	Maintain effective stream buffers
	Instream wood		Add large wood to streams
Sediment	Landslides	Decommission or improve roads Locate and avoid unstable land	Maintain effective stream buffers
	Road surface erosion	Decommission or improve roads	Decommission or improve roads
	Stream crossing failures	Decommission or improve roads	Decommission or improve roads
	Stream bank erosion	Maintain canopy closures	Add large wood to streams
Flow	Bank erosion and channel scour	Maintain canopy closures	Add wood to streams
	Stream extension and road ditch lines	Decommission or improve roads	Decommission or improve roads
Stream Structure	Stream cleaning		Add large wood to streams
	Bank erosion and increased peak flows	Maintain canopy closures Decommission or improve roads	Apply silviculture treatments to maintain or enhance tree growth or diversity in riparian areas
	Riparian harvest		Apply silviculture treatments to maintain or enhance tree growth or diversity in riparian areas

Parameter 3. Flow Modification

Introduction/Listing Validation

Flow modification is not considered a water quality pollutant but may cause water quality listing criteria to be exceeded. The primary beneficial uses affected by flow modification are resident fish and aquatic life and salmonid spawning and rearing. Flow modification refers to human-caused instream flow reductions that create significant limitations for fish or other aquatic life. According to ODEQ listing criteria, the human-caused reductions are the evidence of water rights or diversions above or in the stream segment (ODEQ 1998b). The applicable water quality standard is:

> Waters of the state shall be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

Water withdrawn during summer low flows may decrease available habitat for aquatic life, increase summer water temperatures and pH, and decrease dissolved oxygen. Conversely, additional flow should benefit these listed parameters and improve habitat quality for aquatic life (see Temperature Factor 2: Flow). Effective water quality restoration is directly related to the ability to keep water in stream channels and will be unattainable without sufficient flows (USDA et al. 1999).

The South Umpqua River is listed for flow modification along its entire length in the South Umpqua River Watershed (see Figure 5). United States Geological Survey (USGS) flow data was used to place this segment on the 303(d) list (ODEQ 1998). These data show that instream water rights are not met during part of the year. Supporting data for the listing includes a 1992 ODFW report, which states sea-run cutthroat trout and coho salmon have severely depressed populations due to low flows and flow alteration from water withdrawals. The listing appears valid since the data shows minimum instream flows designed to protect beneficial uses are not met in some years.

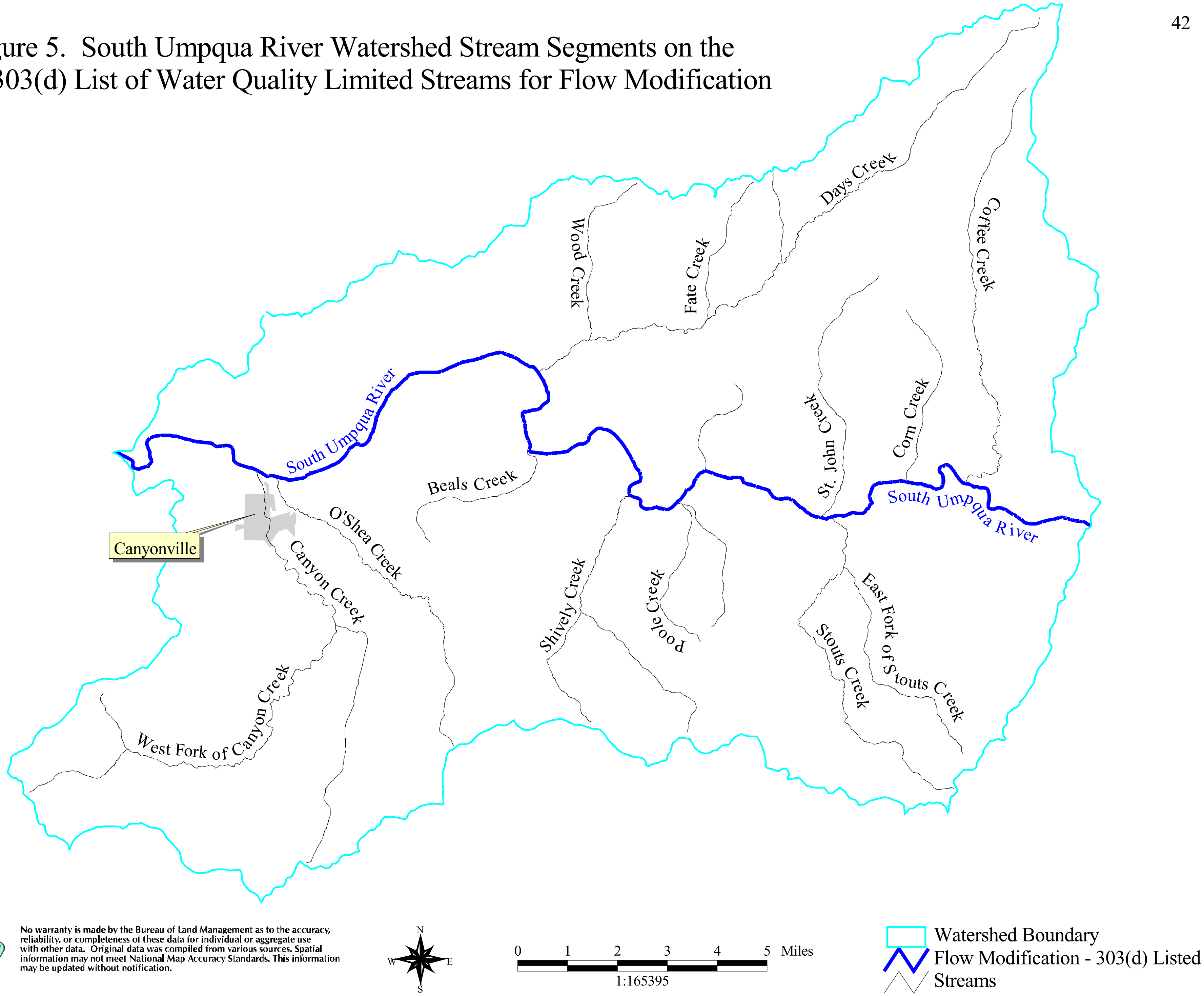
Summer flows may be decreased by irrigation withdrawals. This assumption could be verified by collecting summer flow data. Consumptive use may be lowering summer river levels and is one important element in explaining summer temperature increases in the South Umpqua River.

Changes in channel morphology (F channel types) and channel complexity decrease summer flows because these changes decrease water storage. Summer flows have also decreased because of water withdrawals. These factors contribute to higher summer stream temperatures.

Runoff during rain-on-snow events has been associated with mass wasting, riparian zone damage, and downstream flooding. Studies indicate runoff during rain-on-snow events is greater in open areas than under a forest canopy. Peak flows may increase in areas where timber harvesting and road construction are extensive, increasing channel scour and aggradation (Christner 1982).

Changes in channel morphology and riparian vegetation have affected low flows. Removal of forest vegetation has been shown to increase low flows by reducing evapotranspiration (Harr et al. 1979). However, this has not been shown to occur in the South Umpqua River Watershed because summer stream flows are very low. Species conversion from conifers to red alder can decrease summer low flows because red alder transpires more water during the summer than conifers.

Figure 5. South Umpqua River Watershed Stream Segments on the 1998 303(d) List of Water Quality Limited Streams for Flow Modification



Existing Water Rights

There are 413 appropriated water right permits totaling approximately 68 cubic feet per second (cfs) of streamflow in the watershed. Twenty-five permits for water diversion or storage total 1,120 acre feet. Points of diversion and use are shown on Map 23 in the South Umpqua Watershed Analysis (USDI 2001). Water withdrawal is significant when compared to instream summer low flows of the South Umpqua River. The withdrawn water is used for domestic, irrigation, livestock, industrial, municipal, fish, mining, and forest management purposes. The largest use of appropriated water rights in the watershed, about 83 percent of the water rights, is for irrigation. The City of Canyonville stores water in Win Walker Reservoir on the West Fork of Canyon Creek. This reservoir has a 58 foot high dam and a storage capacity of 300 acre feet of water. Water from the reservoir and Canyon Creek provide drinking water for the city of Canyonville. Canyonville also obtains water from O'Shea Creek.

Instream Water Rights and Low Flows

The OWRD established two instream water rights on the South Umpqua River because summer low flows may be further reduced by human water withdrawals. In order to provide adequate flows that support beneficial uses, minimum instream flows were designated for reaches of the South Umpqua River (Williams 2000). Two types of instream water rights exist on the South Umpqua River. The first is a point water right established on October 24, 1953 for 60 cfs at the mouth of the South Umpqua River, which is at the confluence of the North Umpqua River. When flows fall below this volume, at this point in the river, consumptive water uses with rights after that date are restricted, except for domestic water use or irrigation of one-half acre gardens.

The second instream water right was established by OWRD on March 26, 1974 from the confluence of the South Umpqua River and Cow Creek to Tiller. Table 13 lists minimum instream flows that must be maintained for this reach of the river. When flows fall below these levels consumptive water uses with water rights after March 26, 1974 are restricted. Mean low flows of 93 cfs in August and 121 cfs in September and minimum flows of 54 cfs in August and 38 cfs in September were measured at the gaging station near Days Creek on the South Umpqua River from 1975 to 1987 (Moffatt et al. 1990). Flows on the South Umpqua River at Days Creek had a 50 percent chance of falling below 60 cfs for 30 days in any water year between 1975 and 1987 (Wellman et al. 1993). Mean low flows of 77 cfs in August and 78 cfs in September and minimum flows of 29 cfs in August and 39 cfs in September were measured at Tiller from 1911 to 1987 (Moffatt et al. 1990). Flows at Tiller had a 50 percent chance of falling below 54 cfs for 30 days in any water year between 1911 and 1987 (Wellman et al. 1993). The OWRD measured flows of 67.7 cfs on September 13, 2000 and 60.3 cfs on September 19, 2000 near the confluence of the South Umpqua River and Canyon Creek.

Table 13. Average Minimum Instream Flows in Cubic Feet per Second (cfs) on the South Umpqua River From Cow Creek to Tiller.

December Through April	May	June	July	August	September	October 1 Through 15	October 16 Through 31	November
250	180	140	90	60	60	80	180	300

Flows below those listed for instream rights and the subsequent restriction of water use occurs frequently during the summer in the watershed (Williams 2000). Water in the South Umpqua River is over-appropriated and no new water rights are being allocated above Cow Creek except where the value to the public interest is high and the uses are adjusted to protect instream values (OAR 690-410-070).

Streamflow Restoration Plan

The OWRD in cooperation with ODFW has developed a Streamflow Restoration Plan for the Umpqua Basin. Subbasins were prioritized by biological need for additional flow and existing opportunities for restoring instream flows. The South Umpqua River Watershed was identified as one of the priorities for restoring instream flows. The plan recommends a complete inventory of water rights, improving efficiency, a coordinated enforcement plan, education, additional monitoring, and other measures to increase summer flows. Elements from the plan are included in Attachment A.

BLM Water Rights and Water Use

Most streams in the higher elevations of this watershed are not impacted by irrigation withdrawals. However, water may be withdrawn from streams in the higher elevations for road maintenance and fire protection. The state requires reporting yearly water use for these activities. Individual project permits are required in some instances. No water was used by the BLM in the watershed in 2000. The BLM has one water right in the watershed located in T30S, R3W, Section 29 (Permit R 100278). The water right is for 3.6 acre feet of storage. The pond is used for forest management activities including fire suppression and road maintenance.

Management Actions, Goals, and Objectives

Work with the OWRD and the local Watermaster to maintain flows that support beneficial uses in the watershed.

Support the Streamflow Restoration Plan. This would involve continuing to report water use, examining more efficient use of water by the BLM in the watershed, and reporting illegal water diversions on BLM-administered lands to the OWRD. The OWRD has full authority over water rights in the state including those on BLM-administered lands.

Continue monitoring low summer flows, in conjunction with temperature monitoring, on tributaries draining BLM-administered lands in the watershed. Long term monitoring can help identify trends in summer low flows and may discover unauthorized diversions.

Parameter 4. pH

Introduction/Listing Validation

The beneficial uses affected by pH are resident fish and aquatic life and water contact recreation. The Oregon water quality standard [OAR 340-41 – (basin) (2) (d)] that applies is:

> Summary: pH shall not fall outside the following ranges:
> General basin standards (adopted as of 1/11/96): Umpqua Basin: 6.5 to 8.5

A stream may be listed as water quality limited if greater than ten percent of the samples exceed the standard and a minimum of at least two samples exceed the standard for a season of interest. The season of interest is from June 1 through September 30. Levels above or below the standard may have adverse effects on some life cycle stages of certain fish and aquatic macroinvertebrates (MacDonald et al. 1991).

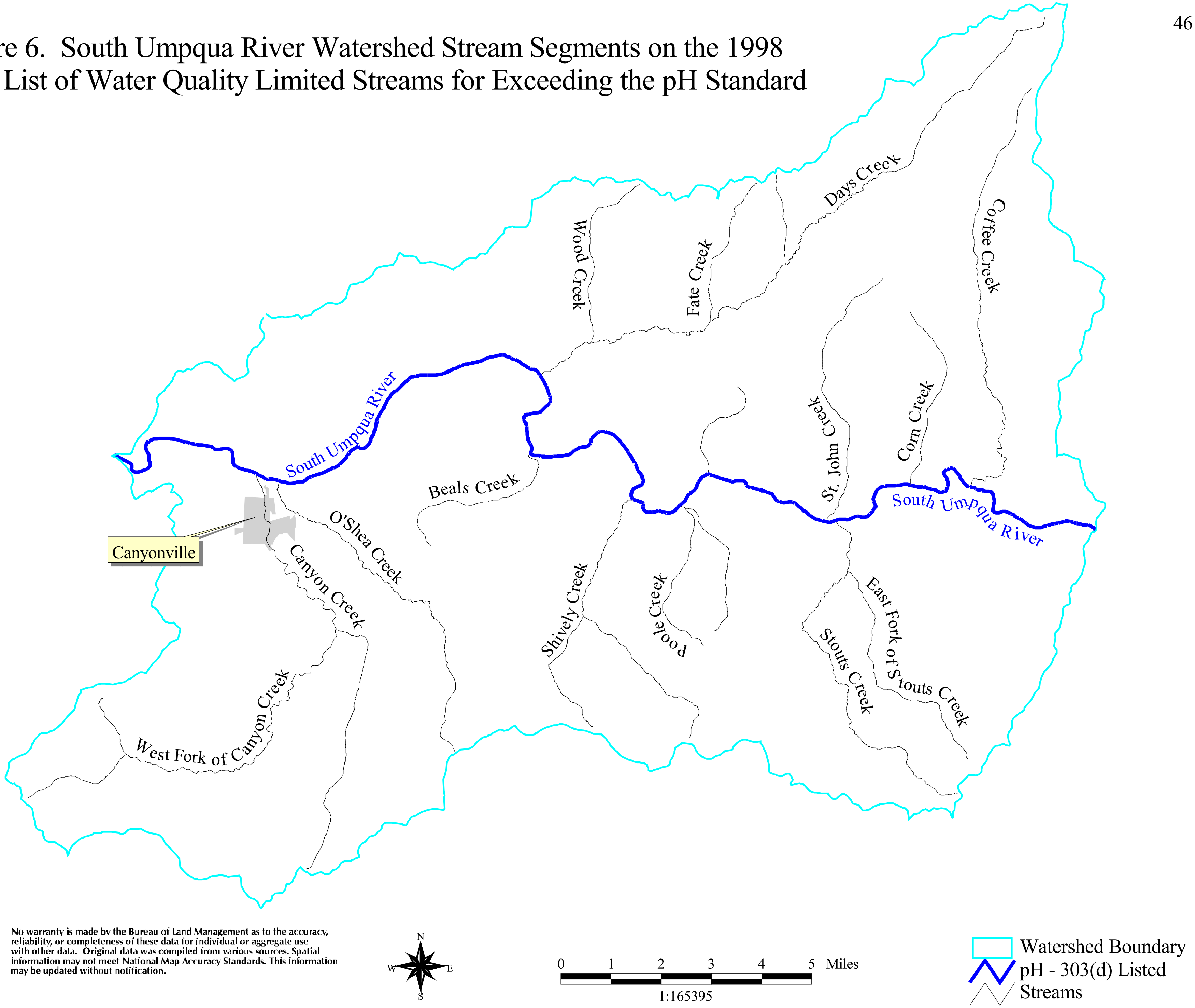
The entire South Umpqua River within this watershed is listed because the pH was greater than 8.5 (see Figure 6). The listing is based on ODEQ and USGS data. Data collected by the BLM in 2000 did not exceed the pH standards.

Many chemical and biological processes in a stream are affected by pH. The pH standards are the lower and upper limits that allow most aquatic species in western Oregon to survive. Values outside of the range (within which salmonid fish species evolved) may result in toxic effects to resident fish and aquatic life (Environmental Protection Agency 1986). When the pH falls outside of this range, stream diversity can decrease because the physiological systems of most aquatic organisms are stressed and reproduction may decline. However, the effects of elevated pH on wild fish in a natural system have not been determined. The highest juvenile steelhead trout densities on the Umpqua National Forest were documented occurring in a stream reach with a pH as high as 8.9.

Aquatic plants, in unpolluted rivers, use dissolved carbon dioxide during photosynthesis in the day and release carbon dioxide at night through respiration, causing the pH to fluctuate. The maximum pH value may reach 9.0 (Hem 1985). Algae accumulations can cause streams to become more alkaline. Photosynthesis during daylight hours consumes hydrogen ions and elevates pH. At night the pH decreases. On cloudy days or in shaded stream reaches not as much photosynthesis occurs and pH levels are lower. Diurnal algae-driven pH cycles in Little River (a similar watershed a few miles north in the North Umpqua Subbasin) were found to range from 9.1 in the late afternoon to 7.8 in the morning.

Conditions that promote higher pH by increasing algae growth and accumulation are: 1) lack of riparian shade allowing the sun to stimulate algae growth, 2) the presence of bedrock streambeds which is ideal habitat for algae and poor habitat for algae-eating aquatic insects, and 3) a nutrient supply. Conditions that promote lower pH are: 1) effective riparian shade, 2) streambeds with large wood and associated gravel/cobble substrate where algae-eating insects thrive, and 3) up slope forest stands that use nitrogen and store it in the soil and vegetation, so the nitrogen does not enter streams. Nutrient runoff into streams plays a primary role in increased algae and pH levels. Increased nutrients in streams have been reported following timber harvesting and road construction (MacDonald et al. 1991). Domestic livestock and agriculture are additional sources of nutrients.

Figure 6. South Umpqua River Watershed Stream Segments on the 1998 303(d) List of Water Quality Limited Streams for Exceeding the pH Standard



Existing Data

Stream pH values are greatest in the afternoon, an indirect result caused by the consumption of carbon dioxide during photosynthesis (Stumm and Morgan 1981). Photosynthesis and aquatic plant growth follow annual and diurnal cycles. The highest pH values in the South Umpqua River occur on summer afternoons. The highest pH values correspond with periods of maximum photosynthesis. Conversely, pH values tend to be lower during the early morning hours and during the winter. Photosynthesis in dense algae mats can cause carbon depletion in the water by using dissolved carbon dioxide faster than it is produced.

Bureau of Land Management personnel set out instruments at 17 locations to collect pH data every 30 minutes for two to four days during the summer of 2000. These data are summarized in Figure 7. The pH standard was not exceeded at the time of sampling. All sites were located on BLM managed lands.

Possible Causes of High pH

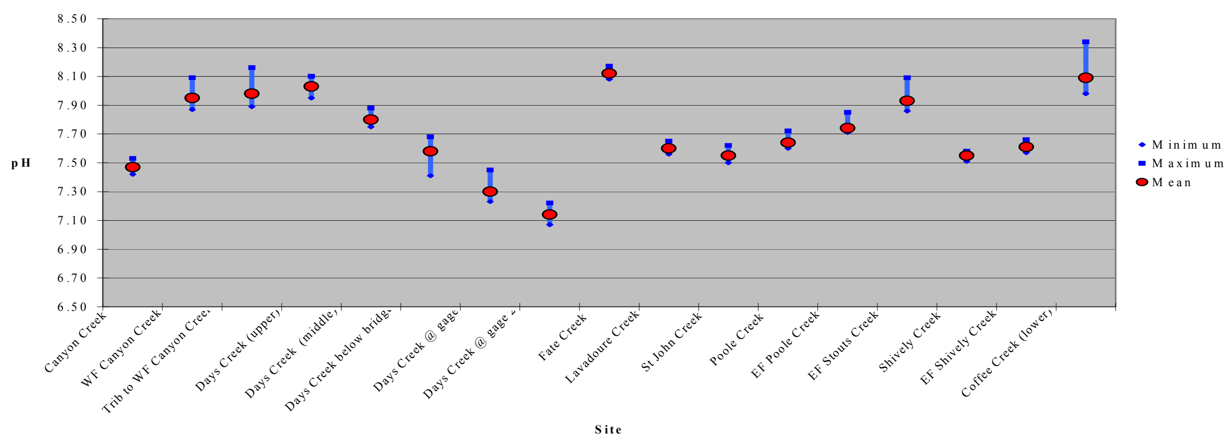
High summertime stream pH values in the South Umpqua River probably result from algae growth due to the combined effects of inadequate shade, increased nutrient levels, increased channel scouring, a lack of LWD, and natural events or naturally high pH values.

Increased nutrient levels from forest management, agriculture, poorly sited or faulty septic systems, and sewage treatment system discharges promote algae growth and elevated pH levels. Chemical fertilizers applied to forest lands, agricultural fields, and residential yards may be nonpoint sources of nutrients. Although studies are being conducted, data are not available to determine the effects fertilizer application has on water quality.

High wintertime peak flows often scour streambeds, creating channel bottoms dominated by bedrock or large grained substrate, which algae prefers. Bedrock streambeds, which are commonly found in the South Umpqua River, provide habitat and surface area for algae and is poor habitat for algae eating aquatic insects.

Channel simplification may also promote algae growth and accumulations. Timber harvesting along streams limits the recruitment of large wood to the channel and floodplain. Poor woody debris recruitment can potentially increase pH (Powell 1996). Large woody debris plays an important role in shaping stream channel complexity and bed form. Streams with a deficiency of LWD offer poor habitat for grazing macroinvertebrates that eat algae.

Figure 7. South Umpqua River Watershed pH Data Collected in the Summer of 2000 by the Bureau of Land Management.



Natural processes that may increase stream pH include floods, fires, insect damaged vegetation, diseased vegetation, and wind throw in riparian areas. These natural processes affect stream pH by increasing the amount of nutrients entering the stream, increasing solar exposure, and scouring streambeds. River systems may also have naturally occurring high pH levels due to geology and the lack of connectivity between the floodplain and the riparian area, which may affect the buffering capacity of the riparian area.

Management Actions

Due to the relationship between stream shade, LWD, and stream simplification and elevated pH values, restoration measures to address the water quality limited listing for temperature and sediment are also expected to improve elevated pH values (see Table 12). Restoration measures include:

- Improving or maintaining riparian vegetation growth to increase shade and meet target shade values, which will reduce photosynthetic chemical reactions and algal productivity and improve large wood recruitment potential.

- Reducing sediment delivery to streams will help improve channel complexity.

- Reducing the effects of roads on peak flows will reduce streambed scour and alluvial erosion.

- Placing large wood in tributaries of the South Umpqua River.

Parameter 5. Sediment

Introduction/Listing Validation

The primary beneficial uses affected by sedimentation are resident fish and aquatic life and salmonid spawning and rearing. The applicable water quality standard is

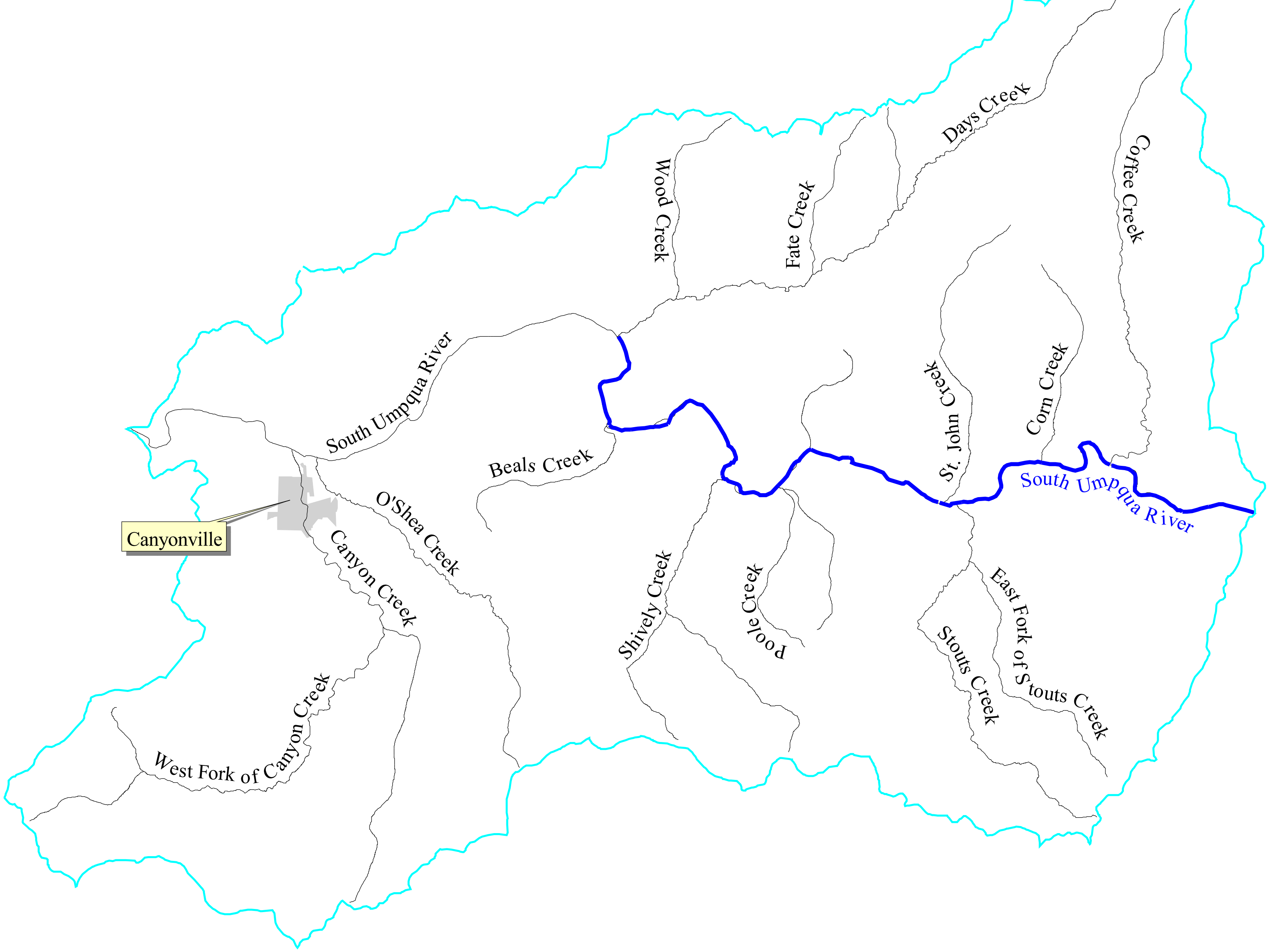
> The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry shall not be allowed (ODEQ 1998b).

The South Umpqua River from Days Creek to Elk Creek (which is in this watershed) and upstream of this watershed is listed for sediment (see Figure 8). The water quality limited listing for sediment for the river segment in the South Umpqua River Watershed is not warranted. Supporting data used to list the South Umpqua River from Days Creek to Castle Rock/Black Rock Forks was collected outside of the watershed and subsequent data collected by BLM personnel in the watershed does not support the impaired status. Therefore, the BLM is asking the ODEQ to amend Oregon's Final 1998 Water Quality Limited Streams - 303(d) list for sediment. Based on BLM data collected in 2000 the amendment would remove from the 303 (d) list a 17 mile segment of the South Umpqua River from Days Creek to Elk Creek. The supporting data or information used for the original listing was from the United States Forest Service Jackson Creek Watershed Analysis (USDA 1995). The confluence of Jackson Creek with the South Umpqua River is about 5.5 miles upstream from the South Umpqua River Watershed. Core samples were collected in Jackson Creek, Dumont Creek, Beaver Creek, and in the South Umpqua River just upriver from Jackson Creek in order to evaluate spawning gravels. Forty-two (42) percent of the sampled sites in the South Umpqua River contained more than twenty (20) percent fine sediment that was less than one millimeter in size. The Jackson Creek Watershed Analysis concluded more than 20 percent fine sediment may impede egg to fry survival in the South Umpqua River. During the water quality listing process, a decision was apparently made that impairment by sedimentation above Jackson Creek would extend approximately 22 miles downstream to Days Creek. However, the BLM contends the water quality limited listing for sediment should have been applied only to the sampled sites or reaches. Other sediment data do not support listing the South Umpqua River inside the watershed.

Existing Data

Monitoring for macroinvertebrates and stream substrate embeddedness was conducted during the summer of 2000 by BLM personnel. Documentation of macroinvertebrate community status is one accepted criteria for determining impairment by sedimentation. Aquatic communities (primarily macroinvertebrates) are considered impaired when the expected reference community multimetric and multivariate model scores are 60 percent or less (ODEQ 1998b). Streams with either multimetric or multivariate model scores between 61 percent and 75 percent of expected reference communities are considered to be streams of concern (ODEQ 1998b). Streams greater than 75 percent of expected reference communities using either multimetric or multivariate models are considered unimpaired (ODEQ 1998b).

Figure 8. South Umpqua River Watershed Stream Segments on the 1998 303(d) List of Water Quality Limited Streams for Exceeding the Sediment Standard



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

N W E S

0 1 2 3 4 5 Miles

1:165395

Watershed Boundary
Sediment - 303(d) Listed
Streams

Results of the macroinvertebrate monitoring at five sites in the listed segment of the South Umpqua River did not support an impaired status, as defined by ODEQ (see Table 11). Compared to reference sites on the North Umpqua River, one site should be considered a stream of concern while the other four sites should be considered as unimpaired. The executive summary of the study recommended the segment of the South Umpqua River should be designated as a stream of concern and prioritized for additional investigation.

The macroinvertebrate and substrate embeddedness study also assessed sedimentation and aquatic life use in major tributaries of the South Umpqua River draining BLM-administered lands in the South Umpqua River Watershed. Three of the ten sites indicate a classification of moderate impairment from sedimentation as defined by ODEQ. Sites in Stouts Creek, Coffee Creek, and St. John Creek had high levels of substrate embeddedness and fewer numbers and species of macroinvertebrates compared to reference sites in the watershed. Additional monitoring may be necessary to determine the extent of sedimentation on these streams. Some reaches may be included on the water quality limited list for sediment in the future.

The Roseburg BLM District is committed to improving water quality on BLM-administered land and will continue to work with ODEQ to monitor water quality. However, data in the Jackson Creek Watershed Analysis should not have been used to include the South Umpqua River inside this watershed on the water quality limited list for sediment. More recent and relevant macroinvertebrate data collected by BLM in 2000 indicates the segment of the South Umpqua River in this watershed is not impaired by sedimentation. The BLM recommends the segment of the South Umpqua River in this watershed be removed from the water quality limited 303(d) list for sediment.

Management Actions

Activities are being implemented on BLM-administered land to decrease sedimentation using Standards and Guidelines in the NWFP. Roads directly influence sediment production and delivery. The BLM is firmly committed to reducing road density and improving and maintaining existing roads. For example, a recently planned restoration project included replacing six culverts, placing LWD in 3.3 miles of stream, and renovating 10 miles of road. Current conditions of BLM-managed roads and recommendations are presented in the South Umpqua Watershed Analysis (USDI 2001). Twenty-two miles of roads were recommended to be decommissioned, 125 miles of roads were identified as needing improvement, and seven miles of roads were recommended to be decommissioned or improved. Timber harvesting on BLM-administered land is designed to avoid or minimize adverse sediment impacts.

Restoration would be prioritized to occur where decreasing sediment and peak flows would have the greatest benefits for fish. Restoration activities will reduce the amount of sediment and hydrologic effects.

Parameter 6. Aquatic Weeds or Algae

Introduction/Listing Validation

The beneficial uses affected by aquatic weeds or algae include water contact recreation, aesthetics, and fishing. The Oregon water quality standard that applies is:

> The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or which are injurious to health, recreation, or industry shall not be allowed [OAR 340-41-(basin)(2)(h)].

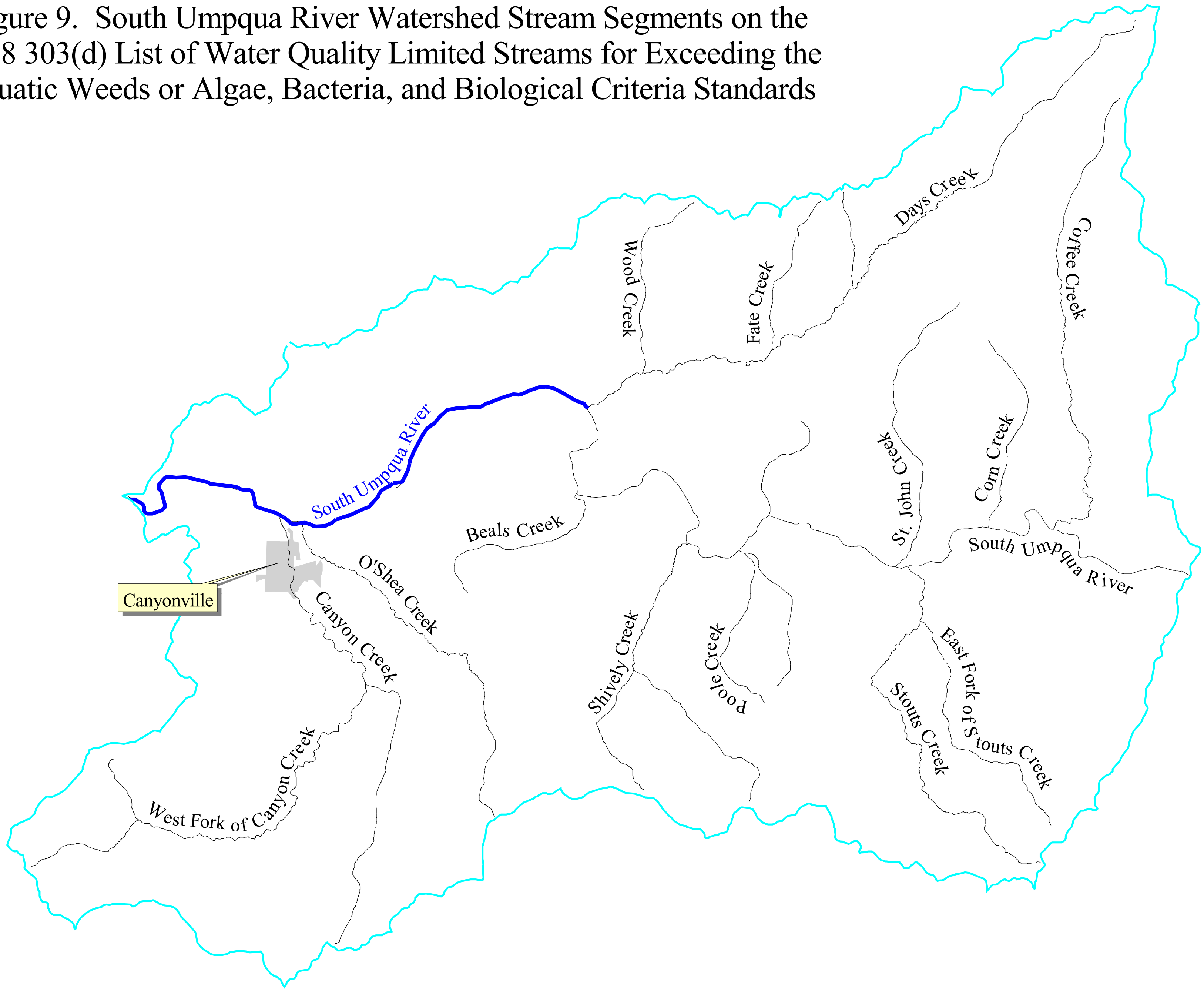
A stream is listed as water quality limited if there is documentation that invasive, non-native macrophytes (plants on the "A" or "B" Noxious Weed List maintained by the Oregon Department of Agriculture) are the dominant plants and significantly reduce the usable lake surface area, frequent herbicide treatments are needed to control aquatic weeds, or weed growth is managed with a Coordinated Resources Management Plan in response to frequent complaints about weeds interfering with various uses. A stream may also be listed as water quality limited if there is documentation that periphyton (attached algae) or phytoplankton (floating algae) are causing other standards to be exceeded (e.g. pH or dissolved oxygen) or impairing a beneficial use.

The South Umpqua River from Roberts Creek (which is downriver from the South Umpqua River Watershed) to the mouth of Days Creek is on the water quality limited list for aquatic weeds or algae (see Figure 9). Periphyton data collected by the ODEQ and USGS were used to place the South Umpqua River on the water quality limited list. Periphyton act as an effective sink for nutrients entering the South Umpqua River (Tanner and Anderson 1996). Nutrients increase algal activity immediately downstream from a source resulting in nutrient storage in algal tissue. Consequently, nutrients in the water decrease markedly the first few miles below the addition. The first significant point source for nutrients downriver from Elk Creek is the Canyonville wastewater treatment plant. Algal conditions immediately downriver from the Canyonville wastewater treatment plant were not impairing a beneficial use but small amounts of algae may adversely affect DO and pH in the South Umpqua River (Tanner and Anderson 1996). The water quality limited listing was based on severe data in segment 66, which is the segment of the South Umpqua River from Roberts Creek downriver to the confluence with the North Umpqua River (ODEQ 1998b).

Management Actions

Algae require light, nutrients, and heat to grow. A nutrient point source does not occur on BLM-administered lands in the watershed. However, due to the relationship between algae and water temperature, restoration activities addressing the water quality limited listings for temperature are expected to decrease algae productivity. Management actions include maintaining or increasing riparian vegetation growth to increase shade, which will decrease algae productivity in tributaries of the South Umpqua River.

Figure 9. South Umpqua River Watershed Stream Segments on the 1998 303(d) List of Water Quality Limited Streams for Exceeding the Aquatic Weeds or Algae, Bacteria, and Biological Criteria Standards



Parameter 7. Bacteria

Introduction/Listing Validation

The beneficial use affected by bacteria is water contact recreation. The Oregon water quality standards that apply are:

> Organisms of the coliform group commonly associated with fecal sources (MPN or equivalent membrane filtration using a representative number of samples) shall not exceed the criteria for fresh and non-shellfish growing estuarine water. No single sample shall exceed a 30-day log mean of 126 E. coli organisms per 100 ml, based on a minimum of five samples or 406 E. coli organisms per 100 ml. Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing, shellfish propagation, or otherwise injurious to public health shall not be allowed. [OAR 340-41-(basin)(2)(e and f)]
>
> [Before 1/11/96 the fecal coliform standard for fresh and non-shellfish growing estuarine water was not to exceed a log mean of 200 fecal coliform per 100 milliliters based on a minimum of five samples in a 30 day period with no more than ten percent of the samples in the 30 day period exceeding 400 per 100 ml. Fecal Coliform data was used to develop the 303(d) list since it was the most commonly measured indicator of organisms of the coliform group associated with fecal sources.]

A stream is listed as water quality limited if a 30-day log mean of 126 E. coli organisms per 100 milliliters occurs or more than ten percent of at least two samples exceed 406 E. coli organisms per 100 milliliters. If E. coli data is not available, the geometric mean shall not exceed 200 fecal coliform bacteria per 100 milliliters or more than ten percent of at least two samples shall not exceed 400 fecal coliform bacteria per 100 milliliters for the season of interest. The season of interest is June 1 through September 30, which is when water contact recreation occurs most often.

The South Umpqua River from Roberts Creek (which is downriver from the South Umpqua River Watershed) to the mouth of Days Creek is on the water quality limited list for bacteria (see Figure 9). Fecal coliform data (using the 1996 standard) collected by the ODEQ was used to place the South Umpqua River on the water quality limited list. The data were collected at two sites. The lower site was near Winston, Oregon and the upper site was about two miles downriver from Days Creek at river mile (RM) 55.5, which is about eight miles upriver from the beginning of the South Umpqua River Watershed. The data collected at the upper site (RM 55.5) did not meet the listing criteria for bacteria. Only two percent (1 out of 51 samples) of the data exceeded the fecal coliform standard.

Fecal coliform and fecal streptococcal bacteria are indicator organisms used to evaluate the potential health hazards of drinking water or water used for recreation (Tanner and Anderson 1996). The presence of indicator bacteria is usually interpreted as a potential health hazard unless species identification determines the indicator is non-fecal bacteria. Tanner and Anderson (1996) found the ODEQ standards for bacteria were not exceeded at one sample site in the South Umpqua River Watershed.

Management Actions

Point sources do not occur on BLM-managed lands in the South Umpqua River Watershed. However, management actions to address other water quality limited listings in the South Umpqua River Watershed are being implemented.

Parameter 8. Biological Criteria

Introduction/Listing Validation

The beneficial uses affected by biological criteria are resident fish and aquatic life. The Oregon water quality standard that applies is:

> Waters of the state shall be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities. [OAR 340-41-027]

A stream is listed as water quality limited if aquatic communities (primarily macroinvertebrates) are 60 percent or less of the expected reference community for both multimetric and multivariate model scores. Streams with multimetric or multivariate model scores between 61 and 75 percent of expected reference communities are considered to be streams of concern. Streams with greater than 75 percent of expected reference communities using either multimetric or multivariate model scores are considered to be unimpaired.

A stream may also be listed as water quality limited when a Biotic Condition Index, Index of Biotic Integrity, or similar metric rating determines conditions are poor or a significant departure from reference conditions exists, using a suggested EPA biomonitoring protocol or other technique acceptable to ODEQ.

The South Umpqua River from Roberts Creek (which is downriver from the South Umpqua River Watershed) to the mouth of Days Creek is on the water quality limited list for biological criteria (see Figure 9). Data collected by the ODEQ at one site about 40 miles downriver from the South Umpqua River Watershed was used to place the South Umpqua River on the water quality limited list. Macroinvertebrate and stream substrate embeddedness surveys conducted by the BLM in 2000 assessed sedimentation and aquatic life use in the South Umpqua River and major tributaries of the South Umpqua River draining BLM-administered lands in the watershed. Results of the macroinvertebrate study did not support an impaired status for the South Umpqua River, as defined by ODEQ. The executive summary of the study recommended some segments of the South Umpqua River should be designated as a stream of concern and prioritized for additional investigation.

Management Actions

Management actions to address water quality limited listings in the South Umpqua River Watershed are being implemented. Restoration activities to address temperature and sediment water quality limited listings will also improve the biological criteria. Table 12 shows a particular management action can affect numerous processes and that it is important actions occur in both upland and riparian areas.

Parameter 9. Dissolved Oxygen

Introduction/Listing Validation

The beneficial uses affected by dissolved oxygen (DO) are resident fish and aquatic life and salmonid spawning and rearing. The Oregon water quality standards that apply are:

> Standards applicable to all basins (adopted 1/11/96, effective 7/1/96)
> During times and in waters that support salmonid spawning until fry emergence from the gravels dissolved oxygen shall not be less than 11.0 mg/l, unless intergravel dissolved oxygen is greater than 8.0 mg/l (as a spatial median minimum), then the dissolved oxygen criteria is 9.0 mg/l. Where barometric pressure, altitude, and naturally occurring temperatures preclude attainment of the 11.0 or 9.0 mg/l standard, then dissolved oxygen levels shall not be less than 95 percent saturation. Spatial median minimum intergravel dissolved oxygen concentration shall not fall below 6.0 mg/l. For waters identified as providing cold-water aquatic resources, the dissolved oxygen shall not fall below 8.0 mg/l (unless diurnal monitoring data can be used to estimate the seven-day minimum, then the dissolved oxygen shall not fall below 6.5 mg/l). Where barometric pressure, altitude, and naturally occurring temperatures preclude attainment of the 8.0 mg/l standard, then dissolved oxygen levels shall not be less than 90 percent saturation. For waters identified as providing cool-water aquatic resources, the dissolved oxygen shall not be less than 6.5 mg/l. For waters identified as providing warm-water aquatic resources, the dissolved oxygen shall not be less than 5.5 mg/l. [OAR 340-41-(basin)(2)(a)].

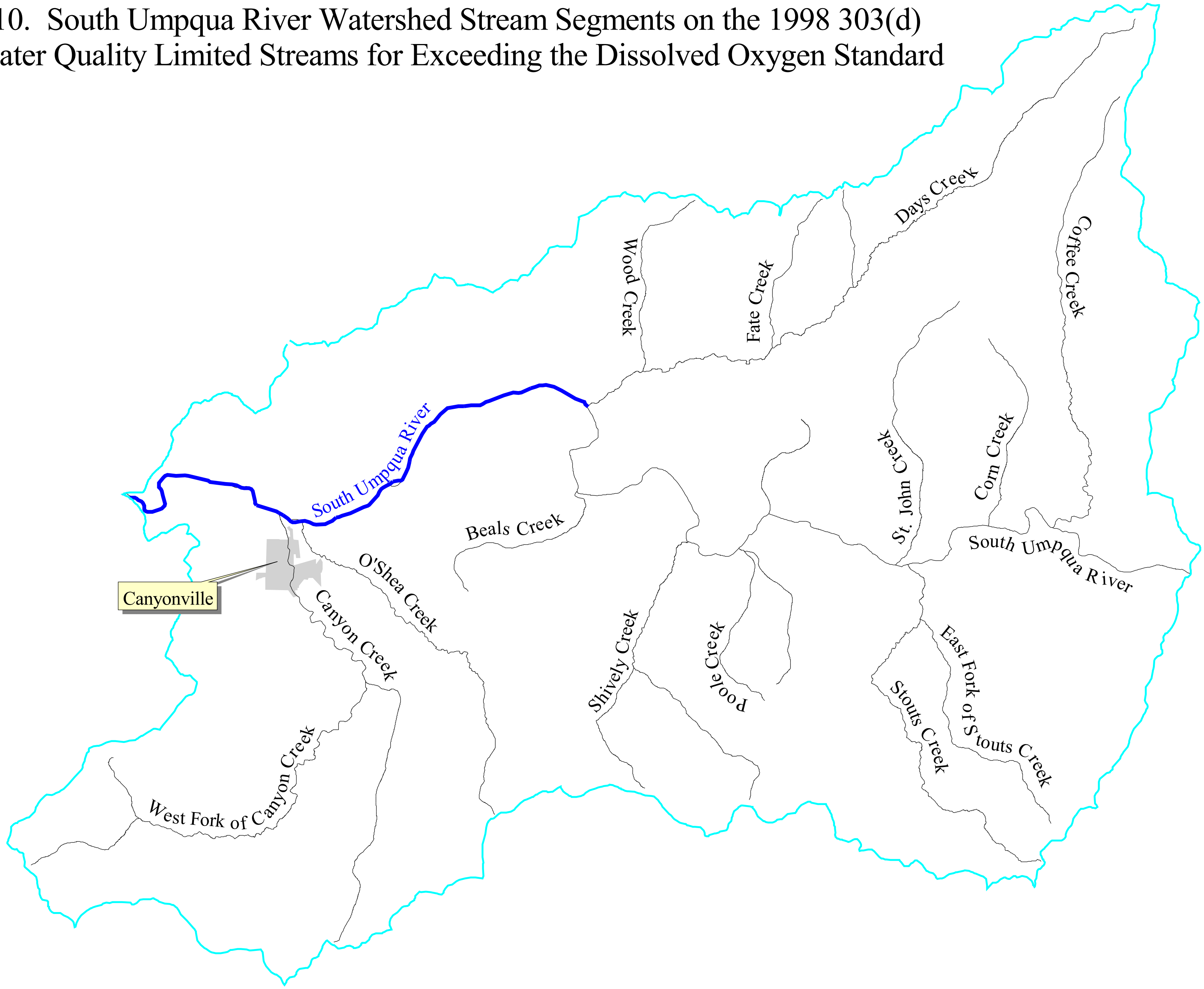
A stream is listed as water quality limited if greater than ten percent of the samples exceed the appropriate standard and at least two samples exceed the standard for a season of interest. The season of interest is identified by ODFW Staff for rearing and spawning through fry emergence.

Existing Data

The South Umpqua River from Roberts Creek (which is downriver from the South Umpqua River Watershed) to the mouth of Days Creek is on the water quality limited list for dissolved oxygen (see Figure 10). Data collected by the ODEQ and Tanner and Anderson (1996) were used to list the South Umpqua River as water quality limited for dissolved oxygen for the season of interest from April 1to September 30. The ODEQ did not place the South Umpqua River on the water quality limited list for the season of interest from October 1 to March 31.

As stream discharge decreased during the summers of 1990, 1991, and 1992, dissolved oxygen did not meet water quality standards in most of the South Umpqua River downstream from Cow Creek, which is downriver from the South Umpqua River Watershed (Tanner and Anderson 1996). Dissolved oxygen did not meet water quality standards in the South Umpqua River near Days Creek reach in June, August, and September 1992 because of the drought. Nighttime respiration of biota caused dissolved oxygen levels to decrease and not meet water quality standards.

Figure 10. South Umpqua River Watershed Stream Segments on the 1998 303(d) List of Water Quality Limited Streams for Exceeding the Dissolved Oxygen Standard



N
W E
S

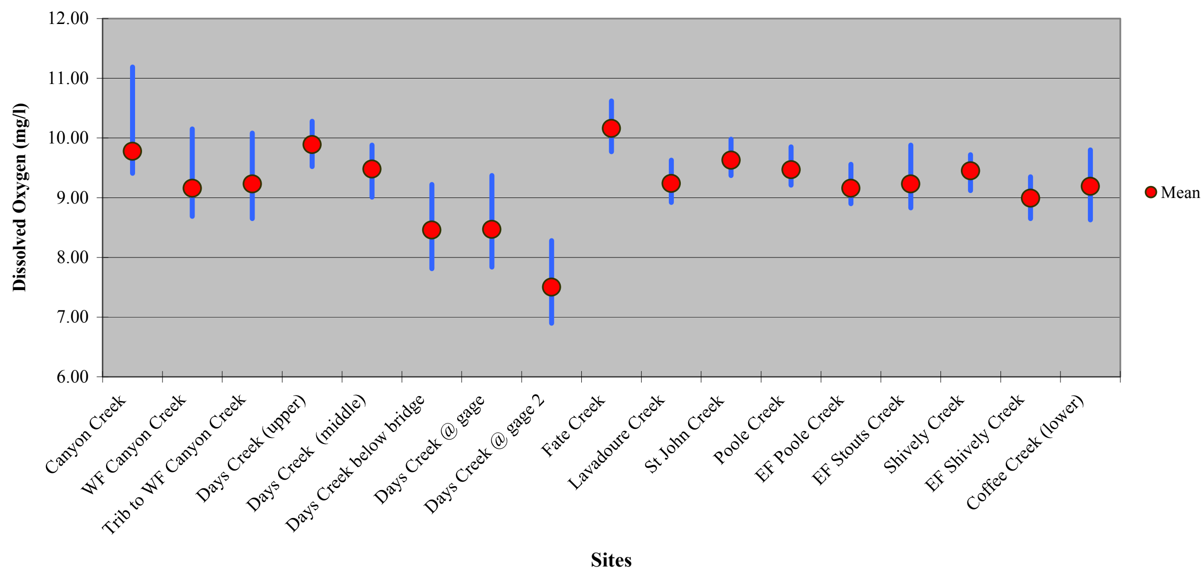
0 1 2 3 4 5 Miles

1:165395

Watershed Boundary
Dissolved Oxygen - 303(d) Listed
Streams

The BLM collected DO data at 17 sites in the South Umpqua River Watershed during the summer of 2000. Dissolved oxygen was measured continuously every 30 minutes for two to four days (see Figure 11). Days Creek at the gage was the only site that indicated the DO may not be meeting the standard. All sites except Days Creek at the gage were located on BLM-administered lands.

Figure 11. Dissolved Oxygen Data Collected at Sites in the South Umpqua River Watershed by the Bureau of Land Management in 2000.



Management Actions

Dissolved oxygen in streams is dependent on flow volume, water temperature, and biotic respiration. Flow augmentation, effluent storage, land application, and tertiary treatment could be used to improve DO conditions in the South Umpqua River (Tanner and Anderson 1996). Nutrient point sources do not occur on BLM-administered land in the watershed. However, due to the relationship between dissolved oxygen and water temperature, restoration activities addressing the water quality limited listings for temperature are expected to increase dissolved oxygen levels. Management actions include maintaining or improving riparian vegetation growth to increase shade, which will increase dissolved oxygen levels in tributaries of the South Umpqua River. Table 12 shows a particular management action can affect numerous processes and that it is important actions occur in both upland and riparian areas.

Parameter 10. Toxics

Introduction/Listing Validation

The beneficial uses affected by toxics are resident fish and aquatic life and drinking water. The Oregon water quality standards that apply are:

> Toxic substances shall not be introduced above natural background levels in the waters of the state in amounts, concentrations, or combinations which may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or bioaccumulate in aquatic life or wildlife to levels that adversely affect public health, safety, or welfare, aquatic life, wildlife, or other designated beneficial uses. Levels of toxic substances shall not exceed the criteria established by EPA and published in Quality Criteria for Water (EPA 1986), unless otherwise noted. Where no published EPA criteria exist for a toxic substance, public health advisories and other published scientific literature may be considered and used, if appropriate, to set guidance values. [OAR 340-41-445(2)(p)].

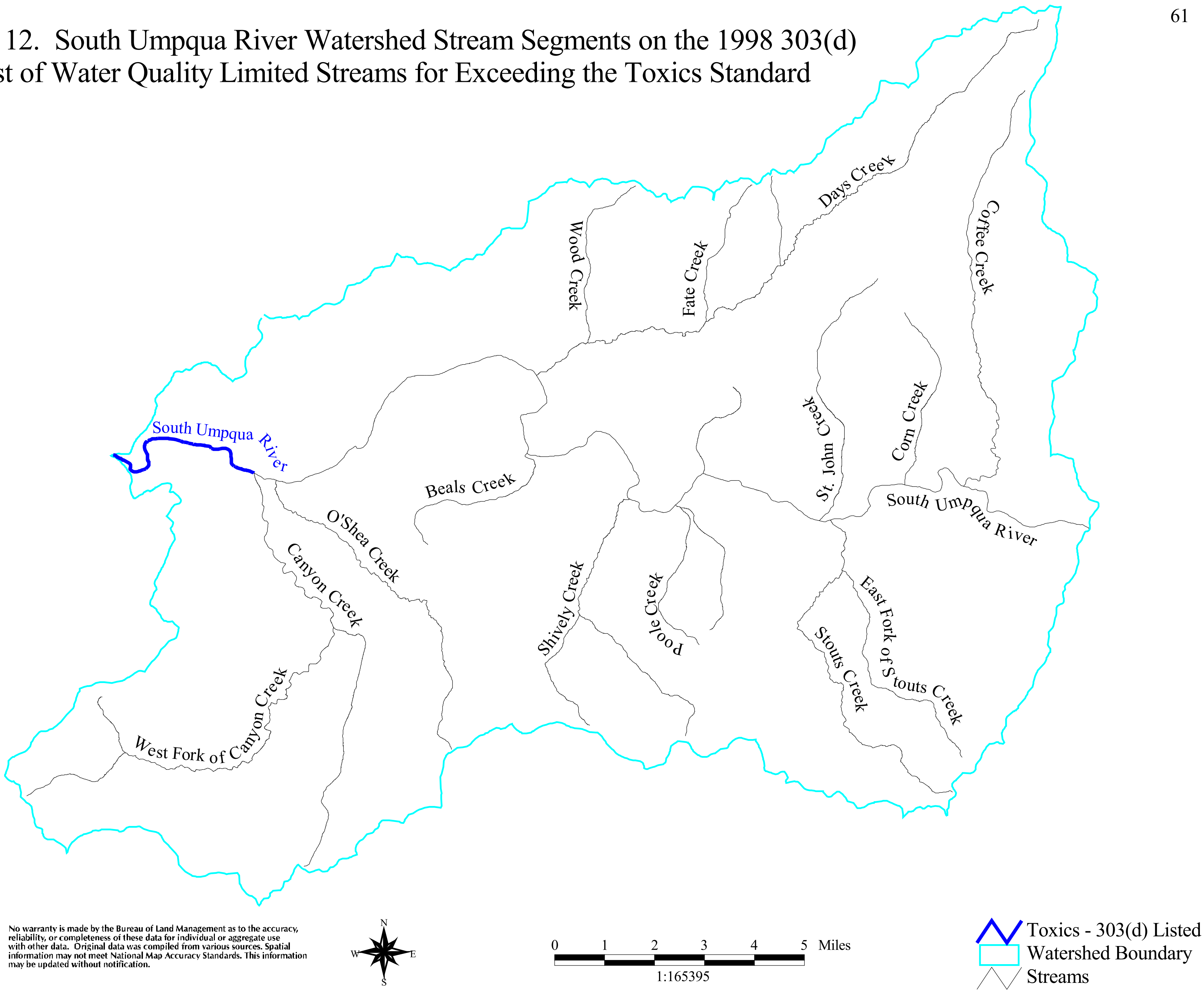
A stream is listed as water quality limited if the water quality standard for a chemical is exceeded more than ten percent of the time with a minimum of two values. Other evidence of beneficial use impairment include a fish or shellfish consumption advisory or recommendation issued by the Health Division for a specific chemical or the chemical has been found to cause a biological impairment by a field test of significance, such as a bioassay. The field test must involve comparison to a reference condition.

The South Umpqua River from the mouth to Canyonville is on the water quality limited list for toxics (see Figure 12). Oregon Department of Environmental Quality TMDL data was used to place the South Umpqua River on the water quality limited list due to chlorine. The season of interest is year around.

Management Actions

Management activities on BLM-administered land are not contributing to the chlorine toxicity in the South Umpqua River Watershed. Management actions to address other water quality limited listings in the South Umpqua River Watershed are being implemented.

Figure 12. South Umpqua River Watershed Stream Segments on the 1998 303(d) List of Water Quality Limited Streams for Exceeding the Toxics Standard



Chapter 3 - Recovery Goals, Objectives, and Restoration Plan

Recovery goals and plans associated with this WQRP are designed to maintain components of the ecosystem currently functioning and improve sites showing the greatest potential for recovery in the shortest amount of time. This WQRP maximizes recovery while minimizing expensive and ineffective restoration treatments.

The objective of this plan is to prescribe activities to meet water quality standards, where they are not being met. When the water quality standards are met, beneficial uses for the Umpqua Basin under Oregon Administrative Rules (OAR) 340-41-362 will be protected.

The recovery of habitat conditions in the South Umpqua River Watershed are dependent, in part, on implementation of the Roseburg BLM District Resource Management Plan. However, since 57 percent of the watershed is privately owned, habitat recovery would require involvement by private owners in cooperative restoration plans. Recovery projects on Federally-administered lands will follow the Standards and Guidelines in the NWFP to meet the ACS. This includes designating Riparian Reserves and some silvicultural work to reach vegetative potential most rapidly. Some instream large tree placement may be beneficial where favorable channel and riparian conditions exist.

Restoration Plan to Achieve Objectives

The following Standards and Guidelines in the NWFP, some of which are summarized in Table 14, will be used to attain the goals of the South Umpqua River WQRP:

Stream Temperature - Shade

Aquatic Conservation Strategy - B-9 to B-11, C-30
Standard and Guidelines for Key Watersheds - C-7
Riparian Vegetation - B-31
Riparian Reserves - B-12 to B-17 and ROD 9
Watershed Restoration - B-30 to B-34

Stream Temperature - Channel Form

Aquatic Conservation Strategy - B-9 to B-11, C-30
Standard and Guidelines for Key Watersheds - C-7
Riparian Vegetation - B-31
Riparian Reserves - B-12 to B-17 and ROD 9
Watershed Restoration - B-30 to B-34
Roads - B-31, C-32, 33
Instream Habitat Structures - B-31

Flow Modification

Aquatic Conservation Strategy - B-9 to B-11, C-30
Roads - B-31, C-32, 33

Habitat Modification

Aquatic Conservation Strategy - B-9 to B-11, C-30
Standard and Guidelines for Key Watersheds - C-7
Riparian Vegetation - B-31
Riparian Reserves - B-12 to B-17 and ROD 9
Watershed Restoration - B-30 to B-34
Roads - B-19, B-31 to B-33
Instream Habitat Structures - B-31

Dissolved Oxygen, pH, and Aquatic Weeds or Algae

Aquatic Conservation Strategy - B-9 to B-11, C-30
Standard and Guidelines for Key Watersheds - C-7
Riparian Vegetation - B-31
Riparian Reserves - B-12 to B-17 and ROD 9
Watershed Restoration - B-30 to B-34

Sediment

Aquatic Conservation Strategy - B-9 to B-11, C-30
Standard and Guidelines for Key Watersheds - C-7
Riparian Vegetation - B-31
Riparian Reserves - B-12 to B-17 and ROD 9
Watershed Restoration - B-30 to B-34
Roads - B-31, C-32, 33
Instream Habitat Structures - B-31

Other Parameters (Toxics, Bacteria, and Biological Criteria)

Aquatic Conservation Strategy - B-9 to B-11, C-30, 34

Adaptive Management, Review, Prioritization, and Revision

Monitoring will provide information whether Standards and Guidelines are being followed and actions prescribed in the WQRP are achieving the desired results. In addition to the monitoring identified in Chapter 4 of the WQRP, Resource Management Plan (RMP) monitoring occurs annually to assess implementation of Standards and Guidelines. Information obtained from both monitoring sources will determine whether management actions need to be changed. The monitoring plan will be evaluated periodically to assure the monitoring remains relevant and will be adjusted as appropriate.

Maintenance of Effort Over Time

In the 1994 Record of Decision, the Secretary of Agriculture and the Secretary of the Interior jointly amended current planning documents with the Land Use Allocations and Standards and Guidelines of the NWFP. The Roseburg District RMP incorporated the final Land Use Allocations and Standards and Guidelines. The RMP can be revised if resource or management conditions change.

Assessing the Potential for Recovery of Water Quality

Recovery of riparian areas, stream channels, and aquatic habitat requires a base condition with adequate vegetation, channel form, and LWD to dissipate stream energy associated with high stream flows. The potential for recovery on BLM-administered lands will be assessed using watershed analysis and information stored on GIS as a first step in determining the feasibility of restoration and recovery.

Restoration in the South Umpqua River Watershed will be both active and passive (see Table 14). Growth of vegetation on floodplains is important to recovery. The overall goal is to improve pool frequency, large wood, riffle width/depth ratio, and riparian vegetation conditions from the present poor and fair ratings to fair and good ratings using the ODFW benchmarks. These attributes are used to measure if and when the stream is nearing its biological potential for supporting aquatic and riparian species, including anadromous fish. Natural variation will cause changes in stream and floodplain conditions and cause some attributes to be considered in fair condition. These attributes and benchmarks should be validated with subsequent inventory and monitoring work in the watershed. The attributes and benchmarks would be refined to suit the range of conditions expected in the stream channels as more is learned about the watershed.

Table 14. Active and Passive Restoration in the South Umpqua River Watershed.

Element	Goals	Passive Restoration	Active Restoration
Temperature - Shade Component	Achieve maximum shading possible per segment. Margin of Safety: Recognize wildfire and flood effects to riparian vegetation.	Let riparian vegetation grow to reach potential.	Prescriptions to increase or maintain growth rates and insure long term health.
Temperature - Channel Form Component	Reestablish historic channel form, focusing on reducing width/depth ratios. Reduce sediment inputs to the stream channel. Increase wood-to-sediment ratio during mass failures.	Allow natural channel evolution to continue (time required varies with channel type. Allow historic mass wasting sites to re-vegetate. Maintain Riparian Reserves for slope stability. Maintain Riparian Reserves for potential large wood and slope stability.	Place large wood to manipulate channel form. Minimize failures through stability review and land reallocation, if necessary. Insure unstable sites retain large wood to increase wood-to-sediment ratio. Decommission, obliterate, or improve roads that are sediment sources. Reconstruct roads to reduce erosion, channel network extension, diversion potential, and accommodate a 100 year flood event. Riparian prescriptions to increase or maintain growth rates and vegetation diversity.
Habitat Modification	Increase size and number of large wood pieces in the channel. Reestablish historic channel form, focusing on reducing width/depth ratios and increasing the volume and frequency of pools. Restore channel and floodplain connections. Reduce sediment input to stream channels.	Allow large wood to remain in channel and maintain Riparian Reserves for potential large wood. Allow natural channel evolution to continue. Maintain Riparian Reserves for slope stability.	Riparian prescriptions to increase or maintain vegetation growth rates and diversity. Place large wood in channels to manipulate channel form. Decommission, obliterate, or improve roads that are sediment sources. Reconstruct roads to reduce erosion, channel network extension, diversion potential, and accommodate a 100 year flood event.

Table 14. Active and Passive Restoration in the South Umpqua River Watershed.

Element	Goals	Passive Restoration	Active Restoration
Flow Modification Withdrawals	Maintain optimum flows for fish. Maintain minimum flows for fish passage.		Improve water use efficiency by BLM. Enforce existing regulations. Report illegal water diversions from BLM-administered lands. Monitor low summer flows on tributaries draining from BLM-administered land.
pH	Reduce influences on pH fluctuation.	Maintain Riparian Reserves for stream shade and nutrient uptake. Allow large wood to remain in channel. Maintain Riparian Reserves for potential large wood.	Riparian prescriptions to increase or maintain vegetation growth rates and diversity. Place large wood in channels to manipulate channel form. Prevent fertilizer from entering streams.
Other Parameters: Dissolved Oxygen and Aquatic Weeds or Algae. Toxics, Bacteria, and Biological Criteria.	Reduce adverse impacts to these parameters.	Maintain Riparian Reserves for stream shade and nutrient uptake.	Riparian prescriptions to increase or maintain vegetation growth rates and diversity. Prevent fertilizer from entering streams. Pump contained sewage systems at designated recreation sites regularly. Prevent herbicides from entering streams. Implement hazardous materials BMPs on Federally-administered land.

Restoration Prioritization and Funding

Restoration funds received by the District is dependent on the amount of money appropriated each year. Restoration funds for activities on BLM-administered land are mostly available through the NWFP Jobs-In-The-Woods program. The District prioritizes projects based on if they are located in a Key Watershed and the resource benefits the project provides. The State Office evaluates the submitted projects and prioritizes the projects at the State level using similar criteria.

Part of the South Umpqua River Watershed is in a key watershed and is a high priority watershed for restoration. The Roseburg BLM District will seek funds for implementing and monitoring components of this WQRP as a high priority. However, due to the limitations of the Federal budget process, the funds cannot be guaranteed. As part of the Clean Water Action Plan, the State of Oregon began an interagency effort that identifies high priority watersheds in need of restoration and protection as part of the Unified Watershed Assessment. It is possible that funding associated with the Clean Water Action Plan could be pursued to carry out protection and restoration actions in the South Umpqua River Watershed. Efforts will be made to apply for grants under the Clean Water Action Plan and Oregon Watershed Enhancement Board (OWEB).

Another potential funding source, starting in fiscal year 2001, is Douglas County funds received through section 103 of the "Secure Rural Schools and Community Self-Determination Act of 2000" (P.L. 106-393). In accordance with Title II of the Act, the County may elect to spend a significant portion of these funds for restoration projects on Federal and non-Federal lands.

Recovery to Full Physical and Biological Potential

The present condition of stream and riparian habitat in the South Umpqua River Watershed is discussed in previous sections. Even if changes in land management practices and comprehensive restoration are initiated, it is possible that all degraded aquatic systems will not completely recover within the next 100 years (USDA et al. 1993). It is estimated that aquatic habitat recovery in this watershed will take more than 100 years. The estimate accounts for some variability in recovery based on current aquatic and riparian conditions and natural foreseeable events (floods or fires).

Many interrelationships exist between riparian and floodplain vegetation, summer stream temperatures, sediment storage and routing, and the complexity of habitats in the South Umpqua River Watershed. Large mature conifers or hardwoods would continue to be rare on private lands, particularly agricultural lands, within the watershed unless major changes in land uses or land use regulations occur. These agricultural lands include streams with low gradients that have a high biological potential for salmon. Recovery of the large tree component on upstream public lands would not directly benefit these habitats on private lands but would have indirect impacts, such as decreased sediment delivery and cooler stream temperatures.

Generally, in transport or steeper reaches of the watershed, the aquatic and riparian habitat are in fair to good condition. Downstream, in lower gradient stream reaches, aquatic and riparian habitat is in poor to fair condition. The low gradient reaches are generally not located on Federally-administered lands.

Stream shade recovery will occur quicker than habitat recovery. Habitat recovery and sediment storage and routing in the channel will only recover to an optimum range of conditions with the maturation of riparian trees. A mature riparian forest will provide shade, increase bank and channel stability, decrease channel width, and increase pool depths. Lower summer water temperatures and higher quality habitat conditions for salmonids will be created by the maturation of riparian forests, addressing road-related problems, and reduced amount of timber harvesting under the NWFP.

Margin of Safety

The Clean Water Act requires a margin of safety (MOS). A margin of safety is to account for uncertainty in available data or in the actual effect activities will have on load reductions and water quality.

Assumptions

Natural Fire Disturbance

The South Umpqua River Watershed has a variable fire history. The lower elevations burned more frequently than the higher elevations of the watershed. Recovery of riparian vegetation in areas disturbed by fire and flood may be interrupted by future events. This is a conservative assumption that does not account for fire suppression as a management tool. Fire suppression has reduced the number of acres burned by wildfire in riparian areas.

Channel Form Recovery

Stream habitat surveys, conducted by ODFW, identified streams in the South Umpqua River Watershed where channel width is wider than expected. This condition is probably contributing to stream heating. Channel recovery was not considered when projecting shade recovery values. Narrower channels will allow stream temperatures to decrease. Restoration activities will also lead to channel recovery by decreasing the amount of sediment entering streams. Improved pool frequency conditions will help restore the groundwater and floodplain connection and increase the groundwater and stream interaction with an expected increase in cool water refugia. Increased amounts of LWD will reduce flow velocity and bed and bank shear stress. Channel stability and bank building processes will increase and will help restore the desired channel width/depth conditions. The improved temperatures and channel widths were not included in the shade recovery values.

Wind Speed

Wind speed is one of the controlling factors for evaporation, which is another stream cooling process. The shade recovery targets do not account for any cooling from evaporation due to wind speed.

Riparian Restoration

Riparian restoration will increase storage capacity for subsurface and groundwater inflow. Two benefits that have not been included in the shade recovery values are groundwater inflow cooling stream temperatures directly by the mass transfer of energy and groundwater inflow increasing streamflow and maintaining stream temperatures.

Timber Harvest on Private Land

Fifty-seven percent of the watershed is privately owned and some is managed for timber production. Because of the lack of information, shade recovery was not determined on private lands. The assessment of private lands in this watershed is beyond the scope of this WQRP. The WQMP prepared by ODEQ will decide how to determine the shade recovery expected, as well as, the site potential for recovery on private lands. While Standards and Guidelines on Federally-administered land establish wider stream shade buffers than the Oregon Forest Practices Act, the Oregon Forest Practices Act guidelines do offer some stream shade protection.

A statewide demonstration of the Oregon Forest Protection Act's ability to protect water quality is expected to address the specific parameters affected by forest management practices (temperature, sediment and turbidity, aquatic habitat modification, and biological criteria). The schedule and other requirements for addressing these parameters are included in the ODEQ/ODF Memorandum of Understanding (MOU) of May 16, 1998.

Riparian Reserves

The Standards and Guidelines for Riparian Reserve widths on fish bearing streams are used to protect fish habitat and other riparian dependent species and resources. The additional protection for the other species and resources provides an additional margin of safety for fish and stream protection.

Chapter 4 - Monitoring Plan

The NWFP provides the framework[1] to accommodate a nesting of geographic scales (region, province, subbasin, watershed, and site) in a manner that allows localized information to be compiled and summarized in a broader context. Monitoring at all scales should:

- Detect changes in ecological systems from both individual and cumulative management actions and natural events
- Provide a basis for natural resource policy decisions
- Provide standardized data
- Compile information systematically
- Link overall information management strategies for consistent implementation
- Ensure prompt analysis and application of data in the adaptive management process
- Distribute results in a timely manner

The NWFP monitoring provides a framework for three types of monitoring (implementation, effectiveness, and validation) to meet objectives and evaluate the efficacy of management practices. The Roseburg BLM Resource Management Plan (RMP) contains a monitoring plan that addresses implementation, effectiveness, and validation monitoring. It includes statements of expected future conditions and outputs along with key questions and specific monitoring requirements (USDI 1995, page 84 and Appendix I, page 189).

Implementation monitoring is meant to ensure that management actions are following the prescribed management direction. The Roseburg District Annual Program Summary and Monitoring Report tracks how management actions are being implemented according to standard and guidelines. It also outlines the progress of watershed restoration work. Roseburg BLM produces this document yearly and it shows the success and progress of implementing water quality related objectives.

Effectiveness monitoring answers the question of whether or not prescribed management actions meet the desired objectives. For aquatic and riparian objectives (including water quality) this will provide the necessary information to evaluate natural conditions, ranges, and distributions of water quality parameters and watershed processes, and the dominant processes determining their distribution and trends. Inventory and monitoring will help identify sources and causal factors for water quality and watershed condition. The goal is to improve prescribed management actions and achieve the goals of the standards and guidelines. If results of monitoring indicate existing management practices are not achieving water quality objectives, plan amendments may be written to provide for new actions. The amendment process includes programmatic compliance with NEPA and other environmental laws.

Validation monitoring, the testing of basic assumptions, will be accomplished through formal research. The Roseburg District could be involved in some of this research but most likely would defer to larger scale efforts.

[1] Final Supplemental Environmental Impact Statement, Appendix I

The NWFP calls for an interagency monitoring network using a common design framework and common indicators. The Aquatic/Riparian Effectiveness Monitoring Plan (AREMP), which was approved March 12, 2001 and published in 2003 (Reeves et al. 2003) is a broad based tool spanning the NWFP area for meeting this need. The Aquatic/Riparian Effectiveness Monitoring Plan will provide information in a decade or more at the province scale. In the adaptive management process, adjustments would take place as the result of feedback from action-based planning, monitoring, researching, and evaluation.

Key questions from the effectiveness and validation monitoring section of the Roseburg RMP provide a framework to address water quality and aquatic issues (USDI 1995, Appendix I, pages 191, 196, and 198). These questions are valid for the life of the RMP however they would need to be revisited if a new planning document were adopted. The following are a sample of monitoring questions that could be answered through AREMP or by other means initiated by the Roseburg District:

- Is the health of Riparian Reserves improving?
- Are the management actions that are designed to rehabilitate Riparian Reserves effective?
- Are State water quality criteria being met? When State water quality criteria are met, are the beneficial uses of riparian areas protected?
- Are prescribed Best Management Practices maintaining or restoring water quality consistent with basin specific State water quality criteria for protection of specified beneficial uses?
- Is the ecological health of the aquatic ecosystems recovering or sufficiently maintained to support stable and well-distributed populations of fish species and stocks?
- Is fish habitat in terms of quantity and quality of rearing pools, coarse woody debris, water temperature, and width to depth ratio being maintained or improved as predicted?
- Are desired habitat conditions for listed, sensitive, and at-risk fish stocks maintained where adequate, and restored where inadequate?

The Roseburg District is developing a water quality/aquatics monitoring strategy. This strategy will provide the framework for how to answer monitoring questions, what tools to use for answering these questions, as well as for coordinating with other agencies within the Umpqua Basin to monitor aquatic and riparian issues. The AREMP may be incorporated into this strategy for answering some of the above questions and providing feedback for changes in management. Completion of this strategy is expected sometime in 2004.

Over the last several years the Roseburg District has cooperated with ODEQ, ODFW, and the Umpqua Basin Watershed Council in monitoring efforts. The following is a summary of the types of monitoring completed over the last several years:

- Stream Temperature – Approximately 150 Sites
- Macroinvertebrate Sampling - Approximately 20 Sites
- Riparian and Stream Condition Classification – 50 to 100 Stream Miles

The Roseburg District will continue to cooperate with these types of efforts and with other agencies as needed. The Roseburg District monitoring strategy will guide future monitoring efforts.

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Attachment A

Streamflow Restoration Plan

Watershed Description
Basin: Umpqua
WAB: 0105742700000000 - S UMPQUA R ab COW CR
Restoration Plan

WRD 08 - Increased Distribution and Enforcement

Monitor streamflow with existing gages to determine if instream water rights are being met. Regulate junior users when flows are not sufficient to meet the instream rights. Regulate unauthorized water uses identified during point of diversion inventories.

WRD 10 - Inventory Water Diversions

Conduct a point of diversion inventory during 1999 and correlate findings with water rights of record to identify potential compliance problems. This inventory would be contingent on funding for a seasonal technician.

WRD 07 - Coordinated Enforcement Plan

Provide OSP personnel with water rights information needed to identify and report unauthorized diversions.

WRD 12 - Improve Efficiency and Prohibit Waste

Work with the watershed council and water users to develop efficiency goals and regulate against waste.

WRD 13 - Agricultural Water Conservation

Work with the watershed council to identify irrigation problems and assist irrigators in conservation planning.

WRD 15 - Instream Transfers and Leases

Provide the Oregon Water Trust with water rights information needed to identify potential leasing opportunities. Monitor and regulate stream uses to insure that any instream leases or transfers are protected.

WRD 16 - Water Right Forfeiture

Compile information to identify unused water rights. Contact land owners with rights subject to forfeiture and assist with voluntary cancellations.

WRD 17 - Public Outreach and Information

Participate in watershed council meetings to inform them on streamflow restoration activities. Assist with the prioritization of restoration projects and provide necessary water rights information.

WRD 18 - Ground Water Studies

Assist regional and watershed council staff in developing and implementing studies to document impacts of ground water use on streamflow. Use the findings of such studies to aid in regulation and distribution.

WRD 19 - Watershed Council Technical Information

Work with the watershed council and county government in evaluating off-channel storage opportunities.

WRD 20 - Water Use Measurement and Reporting

Not applicable.

This information was copied from the Streamflow Restoration Plan Report internet site at http://deschutes.wrd.state.or.us/apps/sw/oregon plan/plan_report.asp.