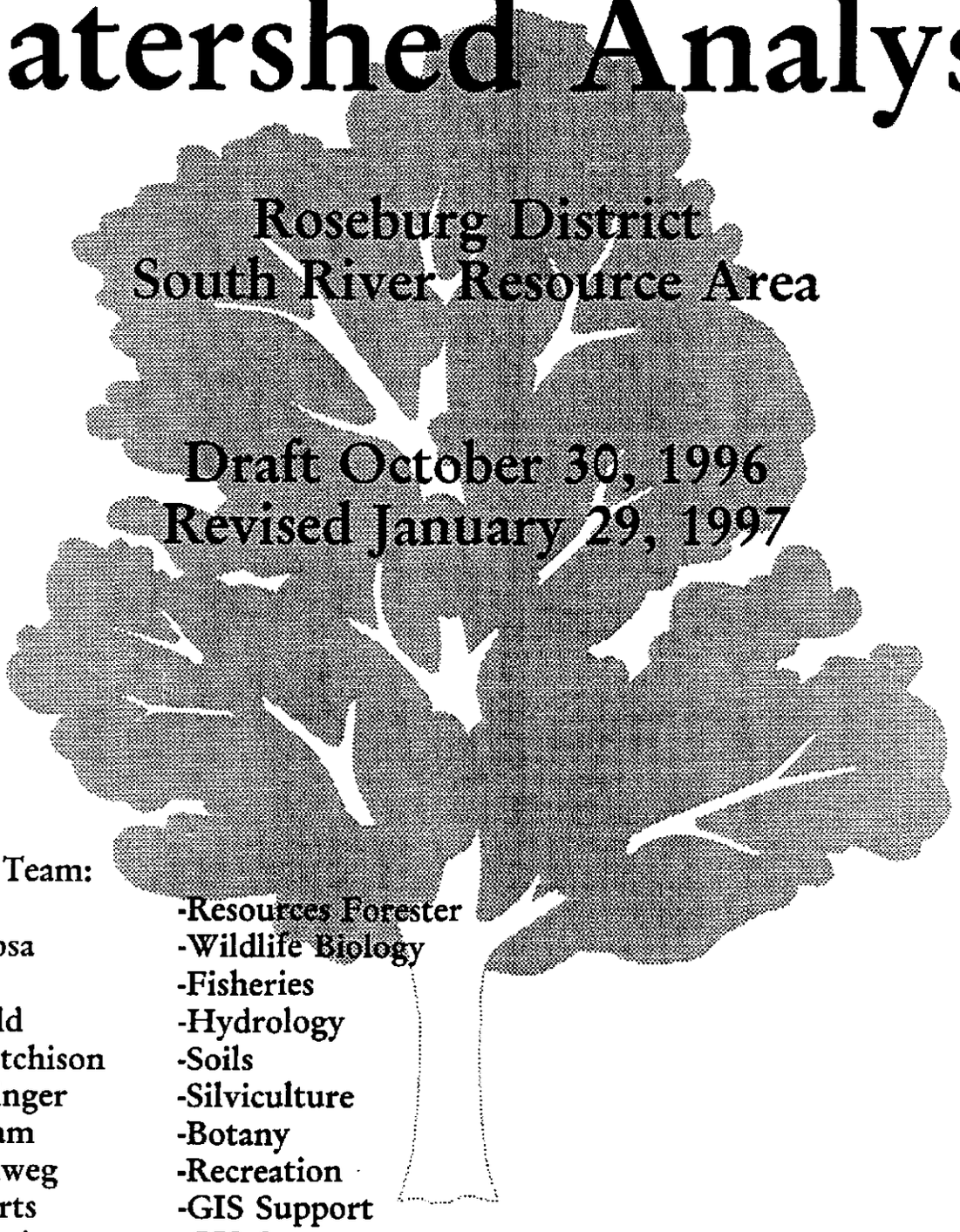
Myrtle Creek Watershed Analysis



Roseburg District
South River Resource Area

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OREGON
Roseburg District
SOUTH RIVER RESOURCE AREA
Myrtle Creek Analytical Watershed
UPPER NORTH MYRTLE
N MYRTLE HEADWATERS
BUCK FORK
LEE CR
LOWER NORTH MYRTLE
MIDDLE NORTH MYRTLE
RISER CR
UPPER SLIDE CR
FROZEN CR
CURTIN CR
WEAVER CR
LOWER SLIDE CR
UPPER LOUIS CR
S MYRTLE HEADWATERS
BILGER CR
LICK CR
NORTH MYRTLE PARK
LOWER LOUIS CR
LALLY CR
BEN BRANCH
MYRTLE CR
LOWER NORTH MYRTLE
WILEY CR
LETITIA CR
SCHOOL HOLLOW
SHORT COURSE
UPPER SOUTH MYRTLE
PACK SADDLE
CEDAR HOLLOW
MYRTLE LINKS
LOWER SOUTH MYRTLE

I. Characterization of the Watershed

The Myrtle Creek Watershed Analysis Unit (WAU) is located within the South River Resource Area on the Roseburg District (see Vicinity Map). The WAU is comprised of the Upper South Myrtle, Lower South Myrtle, Upper North Myrtle, and Lower North Myrtle Watersheds. This area is approximately 76,036 acres in size, and is roughly located east of the town of Myrtle Creek, Oregon and north of the Myrtle Creek - Days Creek Divide.

There are twenty-seven subwatersheds delineated within these four watersheds as follows:

Upper South Myrtle - Lower Louis Creek, Upper Louis Creek, Wiley Creek, Letitia Creek, Weaver Creek, Lally Creek, Curtin Creek, and South Myrtle Headwaters.

Lower South Myrtle - Myrtle Links, Cedar hollow, Short Course, Pack Saddle, School Hollow, and Ben Branch.

Upper North Myrtle - Middle North Myrtle, Lee Creek, North Myrtle Headwaters, Buck Fork, Lower Slide Creek, Upper Slide Creek, and Riser Creek.

Lower North Myrtle - Myrtle Creek, Lower North Myrtle, Bilger Creek, Lick Creek, Frozen Creek, and North Myrtle Park.

Within this WAU, BLM administers approximately 31,009 acres of land. Most of this land is intermingled with approximately 45,027 acres of private ownership in a checkerboard pattern. Upper South Myrtle Creek contains a block of BLM administered land (see Land Use Allocation Map). BLM administered lands with this WAU are composed of Matrix lands and Riparian Reserves. Matrix lands are further delineated into General Forest Management Area (GFMA - 21,736 acres), and Connectivity (CONN - 9,292 acres).

Water flows from the uplands of the WAU to the mainstem streams, which then empty into the South Umpqua River at the town of Myrtle Creek. The bottomlands, typical of private ownership in southwestern Oregon, are characterized by agricultural land, small stands of second growth and/or hardwoods, and open meadows. Uplands are generally commercial forest lands in various age classes and patch sizes.

Road building, clearing of land for agriculture, grazing, and timber harvesting have altered the landscape. Some impacts of these activities to streams are increased sedimentation, loss of large wood from some stream segments, and low summer flows. Timber harvesting, agriculture, and grazing remain important uses within the watershed. Water for irrigation and domestic consumption are important human uses. The pattern of ownership within the Myrtle Creek WAU limits some of the opportunities to improve stream conditions. Bureau of Land Management administered land is more concentrated in the uplands, and headwaters, while private land occupies more of the lower reaches along the main channels.

II. Identify Issues

The purpose of developing issues is to focus the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values, or resource conditions within the watershed. Site specific project areas identified by this watershed analysis will receive more in-depth analysis during the I.D. team project development and NEPA process. New information gathered during the I.D. team process will be appended back to the watershed analysis document as an update.

The South River Resource Area watershed team has identified the following issues/needs that will drive the information gathering process for this analysis. They are summarized as follows:

ISSUE 1 - Watershed Health and Restoration

The top priority component of a watershed restoration program involves road treatments (such as decommissioning or upgrading), which will result in reduced sedimentation, reduced erosion, and improved water quality. The next priority deals with riparian vegetation. Silvicultural treatments 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. The lowest watershed restoration priority involves the design and placement of in-stream habitat structure in an effort to increase channel complexity and the number of pools.

Key Questions

Vegetation Patterns

What is the array and landscape pattern of plant communities and seral stages in the watershed (riparian and non-riparian) and what processes caused these patterns?

How are Riparian Reserves functioning within the Watershed?

Soils / Erosion

What are the dominant erosion processes within the WAU and where have they occurred or are likely to occur?

Hydrology / Channel processes

What are the dominant hydrologic characteristics (e.g. total discharge, peak flows, and minimum flows) and other notable hydrologic features and processes in the watershed?

Water Quality

What are the limiting factors affecting water quality, and where are the priority opportunities to improve water quality and hydrologic conditions?

What beneficial uses dependant on aquatic resources occur in the watershed and which water quality parameters are critical to these uses?

Fisheries

Where are the locations of fish populations, historic and existing?

How have fish habitat and fish populations been affected by hydrologic processes and human activities?

What and where are the priority restoration opportunities to benefit fisheries?

ISSUE 2 - Harvest Potential

Matrix lands are responsible for contributing to the Probable Sale Quantity (PSQ) established in the Roseburg District RMP.

Objectives in the matrix (RMP pg. 33) include the following:

1) Produce a sustainable supply of timber and other forest commodities.
2) Provide connectivity (along with other allocations such as Riparian Reserves) between Late-Successional Reserves.
3) Provide habitat for a variety of organisms associated with both late-successional and younger forests.
4) Provide 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.
5) Provide early-successional habitat.

Conflicts with other resource values will be mitigated through the interdisciplinary process, by adjustments in the spacing and timing of activities. Once projects are identified, these areas will undergo further development and evaluation through the NEPA process.

Key Questions

Vegetation Patterns

What are the natural and human causes of changes between historic and current vegetation conditions?

Where are the stands of harvestable age within the matrix?

How can we adjust scale, timing and spacing of harvest areas to minimize fragmentation and maintain the function of large forest blocks?

Special Status Species

What is the distribution of species of concern that are important in the watershed (e.g. threatened or endangered species, special status species, species emphasized in other plans, etc.) and what is the distribution and character of their habitats?

How can scheduling of potential harvest areas be prioritized to minimize impacts to wildlife and hydrologic processes while still meeting the objectives for matrix lands established in the ROD & RMP.

III. / IV. Current and Reference Conditions

VEGETATION

Historic Overview

The watersheds that make up the Myrtle Creek WAU are located in two geographical provinces that make up the Roseburg District; the Klamath Province and the Cascade Province (Franklin and Dyrness 1984). Climax vegetation in the watershed reflects the Douglas-fir and evergreen temperate forest (Franklin and Dyrness 1984). Below 2,500 feet elevation, the overstory is predominantly Douglas -fir mixed with incense cedar, grand fir and madrone. Brush species include ocean spray, hazel and willow. Above 2,500 feet, the overstory is dominated by Douglas-fir in association with western hemlock, sugar pine and chinquapin. Brush species include Pacific rhododendron, salal and ceanothus.

Fire played a major role in the development of the historic patterns of vegetation within the Myrtle Creek WAU. Over time, the land was likely a constantly changing mosaic of different age classes - mature stands, remnant patches of old-growth trees, and younger even-aged stands that resulted from stand replacement fires. These fires were man caused (Indians used fire to clear lands, improve hunting areas, and produce desirable plant species) as well as lightning caused. Native American burning kept the lower elevations open and covered with lush native grasses. Fire suppression policies established early this century, resulted in the replacement of the open forest with a more closed canopy forest with patches of dense undergrowth.

The 1987 North Myrtle Fire is a classic example of a large stand replacement fire. It began as a series of lightening fires in the Lower and Upper North Myrtle watersheds, which quickly grew and swept through most of the Frozen Creek, Lee Creek, and North Myrtle Headwaters subwatersheds. The fires rapidly grew to approximately 7,000 acres.

Journals kept by early explorers, settlers, and surveyors indicate the Umpqua Valley was in a state of mixed conifer forests of varying age classes at the time of settlement by pioneers migrating west. As settlements were established along the interior valleys, the need for lumber and land conversion to agriculture resulted in the harvest of timber. These harvests began in the lower elevations, dictated by the logic of easy access and proximity to processing locations. At the time the O & C lands reverted back into federal management (1916), private lands in the Umpqua Valley continued to be harvested, and previously harvested areas were in

various stages of second growth or had been converted to other uses. Federally administered lands at this time were comprised mainly of uncut, natural stands. Harvest of timber on BLM administered lands began in the early 1950's and continued at a fairly steady rate through the 1980's. The current age class distribution on BLM administered lands reflect this.

Various vegetation age classes have been documented in the Myrtle Creek watershed. For this analysis, vegetation on BLM administered lands is defined as the age of the dominant conifer cover for each stand, aggregated into groupings of ten-year age classes (see BLM Age Class Distribution Map). These groupings were selected because they represent an array of wildlife habitat types. Private lands are aggregated by the same age class groupings, using either a dominant conifer or hardwood stand age. Significant agricultural acreage is also identified. The arrangement of these age classes on the landscape within the watershed is a result of natural disturbance (fire, blowdown) and historic and current disturbance conducted by people (introduced fire for clearing, timber harvest, road construction, home building and division of land by straight line boundaries).

BLM Administered Lands

BLM administered lands comprise approximately 41 percent (31,009 acres) of the WAU. A significant portion of these lands are in block ownership in the northeast portion of the WAU, in the Upper South Myrtle watershed. Curtin Creek and South Myrtle Headwaters sub-watersheds contain larger acreage of mature stands, while the Upper North Myrtle watershed reflects the impact of the 1987 North Myrtle Fire, which killed many of the mature stands in the Lee Creek and North Myrtle Headwaters subwatersheds (see Table 1).

Table 1. Acres by Age Class on BLM Administered Lands

UPPER SOUTH MYRTLE								
WATERSHED	ACRES of age class <10	ACRES of age class = 10	ACRES of age class = 20	ACRES of age class = 30 TO 70	ACRES of age class = 80 TO 110	ACRES of age class = 120 TO 190	ACRES of age class = 200+	TOTAL
Lower Louis Creek	97	66	10	146	41	15	249	624
Upper Louis Creek	109	241	373	347	21	284	990	2,365
Wiley Creek	0	208	39	267	13	191	582	1,300
Letitia Creek	23	70	85	465	0	309	668	1,620
Weaver Creek	340	57	366	847	161	7	1,340	3,118
Lally Creek	282	166	225	340	93	181	923	2,210
Curtin Creek	63	46	121	99	205	267	1,026	1,827
S. Myrtle Headwaters	98	36	73	808	246	1,250	576	3,087
TOTAL	1,012	890	1,292	3,519	780	2,204	6,354	16,151

Table 1. Acres by Age Class on BLM Administered Lands

LOWER SOUTH MYRTLE

WATERSHED	ACRES of age class <10	ACRES of age class = 10	ACRES of age class = 20	ACRES of age class = 30 TO 70	ACRES of age class = 80 TO 110	ACRES of age class = 120 TO 190	ACRES of age class = 200+	TOTAL
Myrtle Links	19	66	1	112	172	4	151	525
Cedar Hollow	0	0	0	4	176	27	0	207
Short Course	50	0	0	29	105	126	0	310
Pack Saddle	93	24	2	69	80	31	198	497
School Hollow	54	84	55	22	38	180	156	589
Ben Branch	0	114	104	46	29	74	83	450
TOTAL	216	288	162	282	600	442	588	2,578

UPPER NORTH MYRTLE

WATERSHED	ACRES of age class <10	ACRES of age class = 10	ACRES of age class = 20	ACRES of age class = 30 TO 70	ACRES of age class = 80 TO 110	ACRES of age class = 120 TO 190	ACRES of age class = 200+	TOTAL
Middle North Myrtle	51	147	0	74	4	0	151	427
Lee Creek	172	162	254	256	131	63	792	1,830
N. Myrtle Headwaters	17	681	0	236	72	32	1,202	2,240
Buck Fork	49	142	153	336	0	65	153	898
Lower Slide Creek	23	97	147	432	7	149	97	952
Upper Slide Creek	0	213	141	94	1	12	521	982
Riser Creek	132	95	203	137	8	6	657	1,238
TOTAL	444	1,537	898	1,565	223	327	3,573	8,567

LOWER NORTH MYRTLE

WATERSHED	ACRES of age class <10	ACRES of age class = 10	ACRES of age class = 20	ACRES of age class = 30 TO 70	ACRES of age class = 80 TO 110	ACRES of age class = 120 TO 190	ACRES of age class = 200+	TOTAL
Myrtle Creek	126	0	0	5	119	20	47	317
Lower N. Myrtle	1	4	97	2	60	15	1	180
Bilger Creek	298	223	79	139	258	390	42	1,429
Lick Creek	14	0	0	24	132	149	0	319
Frozen Creek	147	87	15	15	62	259	360	945
N. Myrtle Park	103	0	72	33	4	7	304	523
TOTAL	689	314	163	218	635	840	754	3,713

Vegetation: BLM Riparian Reserves

Riparian Reserves in the Myrtle Creek WAU account for approximately 42 percent of the total BLM forested land base (13,035 acres out of 31,009 total acres) (see Table 2 and BLM Age Classes in Riparian Reserves Map). 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 habitat 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" (ROD, B-13). For this analysis, the riparian reserve widths were developed using a site potential tree height of 160 feet. All intermittent streams were given a Riparian Reserve width of 160 feet on each side of the stream. Perennial streams were given a reserve width of 320 feet (2 x site tree height) on each side of the stream.

Table 2. Acres by Age Class in Riparian Reserves

UPPER SOUTH MYRTLE								
WATERSHED	ACRES of age class <10	ACRES of age class = 10	ACRES of age class = 20	ACRES of age class = 30 TO 70	ACRES of age class = 80 TO 110	ACRES of age class = 120 TO 190	ACRES of age class = 200+	TOTAL
Lower Louis Creek	19	27	0	44	25	4	116	235
Upper Louis Creek	42	78	192	95	7	80	406	900
Wiley Creek	0	93	26	94	0	53	230	496
Letitia Creek	2	13	34	195	0	98	308	650
Weaver Creek	138	7	190	503	96	1	513	1,448
Lally Creek	91	89	109	192	25	84	336	926
Curtin Creek	17	14	58	45	31	72	327	564
S. Myrtle Headwaters	26	14	36	392	89	528	172	1,257
TOTAL	335	335	645	1,569	273	920	2,498	6,476

LOWER SOUTH MYRTLE								
WATERSHED	ACRES of age class <10	ACRES of age class = 10	ACRES of age class = 20	ACRES of age class = 30 TO 70	ACRES of age class = 80 TO 110	ACRES of age class = 120 TO 190	ACRES of age class = 200+	TOTAL
Myrtle Links	18	37	0	74	129	2	92	352
Cedar Hollow	0	0	0	1	66	6	0	73
Short Course	23	0	0	15	15	25	0	78
Pack Saddle	34	3	0	28	27	7	56	155
School Hollow	18	32	31	15	15	62	67	240
Ben Branch	0	64	27	20	26	28	22	187
TOTAL	93	136	58	153	278	130	237	1,085

Table 2. Acres by Age Class in Riparian Reserves

UPPER NORTH MYRTLE								
WATERSHED	ACRES of age class <10	ACRES of age class = 10	ACRES of age class = 20	ACRES of age class = 30 TO 70	ACRES of age class = 80 TO 110	ACRES of age class = 120 TO 190	ACRES of age class = 200+	TOTAL
Middle North Myrtle	23	44	0	25	2	0	57	151
Lee Creek	84	76	127	134	45	35	342	843
N. Myrtle Headwaters	3	312	0	151	29	20	559	1,074
Buck Fork	7	49	71	171	0	31	36	365
Lower Slide Creek	11	30	67	259	0	42	51	460
Upper Slide Creek	0	141	83	55	0	4	224	507
Riser Creek	57	50	96	75	5	6	242	531
TOTAL	185	702	444	870	81	138	1,511	3,931

LOWER NORTH MYRTLE								
WATERSHED	ACRES of age class <10	ACRES of age class = 10	ACRES of age class = 20	ACRES of age class = 30 TO 70	ACRES of age class = 80 TO 110	ACRES of age class = 120 TO 190	ACRES of age class = 200+	TOTAL
Myrtle Creek	22	0	0	0	21	8	10	61
Lower N. Myrtle	0	1	26	0	23	7	0	57
Bilger Creek	101	98	56	111	138	201	24	729
Lick Creek	3	0	0	13	49	75	0	140
Frozen Creek	23	29	3	3	30	116	128	332
N. Myrtle Park	48	0	29	12	0	3	132	224
TOTAL	197	128	114	139	261	410	294	1,543

Private Lands

Private lands account for approximately 59 percent of the Myrtle Creek WAU (see Private Age Class Distribution Map). Agricultural lands total approximately 11,095 acres while forested lands account for 33,932 acres. Private ownership is concentrated on the lower elevations of the WAU, intermingled with BLM lands in the typical O & C checkerboard pattern. Almost all of the private lands have been previously harvested. Approximately 62 percent of private forested land is in the 30 to 70 age class (see Table 3).

Table 3. Acres by Age Class on Private Lands

AREA	Agriculture land	ACRES of age class <10	ACRES of age class = 10	ACRES of age class = 20	ACRES of age class = 30 TO 70	ACRES of age class = 80 TO 110	ACRES of age class = 120 TO 190	ACRES of age class 200>	Total
Upper South Myrtle	1,794	67	207	624	7,488	97	91	93	10,368
Lower South Myrtle	3,013	25	333	48	5,708	400	0	0	9,527
Upper North Myrtle	692	13	553	573	7,305	250	38	0	9,424
Lower North Myrtle	5,596	0	1,636	276	7,630	452	118	0	15,708
TOTAL	11,095	105	2,729	1,521	28,131	1,199	147	93	45,027

SOILS AND EROSION PROCESSES

Soils Overview

Soils in these watersheds have developed dominantly from intrusive rocks (granitic) and volcanic parent material. See Appendix D for detailed geologic information and Geology of Myrtle Creek AWS.

Historic erosion was most likely dominated by water induced surface erosion processes and mass wasting. The areas of granitoid soils are suspected to have higher natural rates of erosion, based on their soil properties.

The National Cooperative Soil Survey (NCSS), conducted by the Natural Resources Conservation Service (NRCS) and the Timber Production Capability Classification (TPCC) conducted by the Bureau of Land Management are the sources of information for this section.

The main soils related properties significant to planning and analysis (see Soils of Concern Map) for these watersheds are: granitic parent material, flood prone areas, hydric soils (wetlands), and landscape segments that commonly exhibit riparian/wetland characteristics (potentially wet).

There are 40,481 acres of granitic or granitoid soils mapped in this WAU. Upper South Myrtle Watershed has 17,385 acres, Lower South Myrtle Watershed has 6,718 acres, Upper North Myrtle Watershed has 12,321 acres, and Lower North Myrtle Watershed contains 4,057 acres. Flood plain soils occupy 1,362 acres and are most commonly found on private land ownership. Areas large enough to be mapped as hydric soils (wetlands), occupy 885 acres and are also normally found on private land. Hydric soil areas too small for mapping (NCSS, <5 acres) are commonly found on BLM managed lands. These wet areas usually exist as minor components within mapping units that have been labeled "potentially wet" or somewhat poorly drained. There are 6,308 acres of "potentially wet" soils in this WAU. It is anticipated that less than 20% of the these acres will classify as hydric soils. Most of these hydric inclusions will be less than one acre in size. The Roseburg District RMP states that wetlands should be avoided entirely when constructing new roads (RMP pg. 24).

Landslides

A major process that can effect water quality, erosion, and sedimentation is the occurrence of landslides. Landslides can occur naturally or be triggered by human activities such as road building or logging. The Myrtle Creek WAU landslide occurrence/potential is shown on the Landslide Potential Map and indicates problem areas of historic slope stability.

The ***translational slide areas*** (shown in red) are generally on steep slopes (60% to 100%) where debris type landslides have occurred. These areas are not suitable for forest management activities.

The area classified as ***fragile: debris type landslide potential*** (shown in gray) is characterized by slopes commonly ranging from 60% to 100% plus. Unacceptable soil and organic matter losses are expected to occur as a result of forest management activities unless mitigating measures (see Best Management Practices, Appendix D, Roseburg District Resource Management Plan) are followed to protect the soil/growing site.

The ***deep seated earthflow*** areas (shown in yellow) are characterized by undulating topography and slopes less than 60%. Two large areas associated with deep seated earthflows (White Rock Slide, and Tater Hill Slide) are located in the Upper South Myrtle watershed. The Tater Hill Slide has been designated as an Area of Critical Environmental Concern. A previously unmapped area has been located in section 34, T28S, R3W.

The area classified as ***fragile: mass movement potential*** (shown in blue) is characterized by undulating topography generally less than 60% where soil tension cracks and sag ponds may exist. Because of the slow rate of movement, forest management is feasible, when combined with Best Management Practices. An area of concern associated with this classification is also located in the Upper South Myrtle watershed.

HYDROLOGY

Overview

North Myrtle and South Myrtle Creeks are seventh order streams that flow into eighth order Myrtle Creek. Myrtle Creek flows a short distance into the South Umpqua River at river mile 28. The Myrtle Creek Watershed Analysis Unit has a Mediterranean type of climate, characterized by cool, wet winters and hot, dry summers. Weather stations used to estimate precipitation and temperature for the WAU are Riddle to the south at an elevation of 680 feet and Myrtle Creek at the mouth of the WAU. The NOAA station at Riddle has both precipitation and temperature data dating back to 1961, whereas the Myrtle Creek station has precipitation data dating back to 1991. The average precipitation for Riddle is 30.68 inches and 35.77 inches for the Myrtle Creek station, with 88% of the precipitation occurring from October to April. The normal maximum air temperature (at the Riddle Station) is 83.2 degrees Fahrenheit in August, and the normal minimum is 33.1 degrees Fahrenheit in January. A climate shift that began in the 1950s in the United States caused increased variability in temperatures and precepitation. Seven years of drought from 1988 to 1994 in the western United States was followed by a "wet" 1996.

Precipitation is dependent on elevation due to orographic effects. The WAU ranges in elevation from 600 feet at the mouth of Myrtle Creek to 4,300 feet at the headwaters of South Myrtle Creek. Most of the precipitation occurs as rainfall since approximately 78% of the WAU is below 2,000 feet elevation. The transient snow zone is between 2,000 and 5,000 feet in elevation. Within the WAU most of the transient snow zone is located in the Upper South Myrtle Watershed.

Mining and agriculture preceded logging as the dominant land use practices in the Myrtle Creek WAU, beginning predominantly in the 1850s. These practices have affected the aquatic environment spatially and temporally, while providing economic benefits to the area. Lee and Buck Fork Creeks (tributaries to North Myrtle Creek) and North Myrtle Creek were placer mined using hydraulic methods during the late 1800s. A review of old photographs indicates that these operations changed the character, functionality, and overall water quality of riparian areas. Agriculture, during this time, consisted predominantly of prune orchards and livestock grazing along the floodplains of North and South Myrtle Creeks. Many studies have documented excessive sediment inputs into streams from agricultural practices.

Water Quality

The primary objective of the Clean Water Act of 1977, Section 101 (a) is to "maintain and restore the chemical, physical, and biological integrity of the Nation's waters." The Act directs the States to set water quality standards and establish Total Maximum Daily Loads (TMDL) in order to protect water quality and designated beneficial uses.

The intent of the Oregon Administrative Rules Antidegradation Policy (OAR 340-41-026) is to maintain, and not degrade, waters in the State. The general policy for surface waters is "to guide decisions that affect water quality such that unnecessary degradation from point and nonpoint sources of pollution is prevented, and to protect, maintain, and enhance existing surface water quality to protect all existing beneficial uses."

For a current study done on the District, water samples were collected to identify the general water quality of winter baseflow conditions. Of all the streams sampled, none were found to be exceeding State or EPA water quality standards. The numbers generally show the winter baseflow for the Myrtle Creek WAU is of good quality for the sampled constituents (see Appendix A).

Temperature

The Oregon Department of Environmental Quality (DEQ) is required under Section 303(d) of the Clean Water Act to prepare a list of water bodies that are not expected to meet State water quality standards. The Department of Environmental Quality prepares a list every two years and submits it to the Environmental Protection Agency (EPA) for approval.

The 1996 proposed listing includes the main stem of South Myrtle Creek (from mouth to headwaters) for exceeding State stream temperature and "flow modification" standards (refer to water quantity and low summer flow). The DEQ increased the Umpqua Basin temperature standard from 58 to 64 degrees Fahrenheit (17.8 degrees Celsius). The criteria is a rolling seven day average of the daily maximums, in which the temperature shall not exceed 64 degrees

Fahrenheit. The beneficial uses impacted by elevated stream temperatures, as identified by DEQ, are resident fish and aquatic life, and salmonid fish spawning and rearing. Moreover, many fish species are rearing from June to September. Under OAR 340-41-(Umpqua Basin)(2)(b), no measurable increases to stream temperature are allowed.

The Roseburg District BLM is currently monitoring summer stream temperatures at two sites in South Myrtle Creek. The upstream location is above Curtin and Johnson Creeks (T28S-R3W-Sec 35), and the downstream location is below Ben Branch Creek (T29S-R4W-Sec 21) on BLM administered lands. Table 4 summarizes three summer's worth of monitoring, and is not meant to indicate a baseline.

Table 4. South Myrtle Creek Stream Temperatures

Summer 1994

SITE	Maximum Temperature (°F)	TIME/DATE	Ave. Daily Maximum Temperature (°F)	DATE
Johnson Creek	63.3	14:01 07/21/94	61.7	07/18/94 - 07/24/94
Lower South Myrtle Creek	75.4	17:16 07/21/94	72.4	0.00103427896

Summer 1995

SITE	Maximum Temperature (°F)	TIME/DATE	Ave. Daily Maximum Temperature (°F)	DATE
Upper South Myrtle Creek	75.8	16:18 08/04/95	74.3	07/31/95 - 08/06/95
Lower South Myrtle Creek	69.4	16:43 07/20/95	68.4	0.001130704 7/17/95 - 7/23/95

Summer 1996

SITE	Maximum Temperature (°F)	TIME/DATE	Ave. Daily Maximum Temperature (°F)	DATE
Upper South Myrtle Creek	64.9	16:01 7/29/96	64.3	7/24/96 - 7/30/96
Curtin Creek	62.6	17:00 7/26/96	62.2	7/24/96 - 7/30/96
Johnson Creek	63.5	17:00 7/26/96	63.1	7/24/96 - 7/30/96

The summer of 1994 was one of the lowest flow and highest stream temperature years on record. The stream temperature maximums recorded in 1994 throughout the District were higher than

previous years of record. Generally, stream temperatures tend to increase in the downstream direction, because of differences in channel morphology and increasing ambient radiation reaching the water surface. In 1995, the lower South Myrtle Creek site had a lower maximum stream temperature than the upper site, and the seven-day average daily maximums indicated the same trend. The Curtin Creek and Johnson Creek sites may provide a cool water refuge for fish during the critical summer months, and provide high quality cool water to warmer South Myrtle Creek.

The length high temperatures are sustained is critical in assessing the thermal suitability of streams to fish and aquatic life. The effects of high temperatures on fish is well documented. However, it is not understood as well for macro invertebrates. In 1996 Curtin and Johnson Creeks exhibited favorable thermal stability since the diurnal fluctuations were less than two degrees Fahrenheit. The diurnal fluctuation in stream temperatures, typically peaking in late afternoon and reaching a minimum early in the morning, is important to aquatic organisms. In 1995, upper South Myrtle Creek stream temperatures recovered and dropped below 58° F during nighttime and early morning hours, whereas in lower South Myrtle Creek very little thermal recovery occurred from June 29 to August 11, as temperatures remained above 58 degrees Fahrenheit 99% of the time. In 1994, Johnson Creek stream temperatures dropped below 58 degrees Fahrenheit 100% of the monitoring period, and lower South Myrtle Creek stream temperatures dropped below 58 degrees only 2% of the time from June 29th to September 3rd. The optimum temperature range for salmonids and cutthroat trout is between 54 and 59 degrees Fahrenheit (Meehan 1991).

The diurnal fluctuation in temperature is important to aquatic organisms and overall water quality (USDA and USDI 1995). The diurnal temperature fluctuations are shown in Table 5 for 1994 and in Table 6 for 1995. Night time recovery of cooler water temperatures put fish under less stress than where night time cooling is limited, such as upper South Myrtle Creek in 1995. The average maximum daily temperatures, and diurnal fluctuations in upper South Myrtle Creek should decrease as tree crowns and understory vegetation develops.

Table 5. Diurnal fluctuations for the seven-day average daily maximum temperatures in lower South Myrtle Creek and Johnson Creek in 1994.

Lower South Myrtle (1994)		Johnson Creek (1994)
Date	Diurnal Fluctuation (°F)	Diurnal Fluctuation (°F)
7/18/94	7.4	3.9
7/19/94	8.9	4.1
7/20/94	7.6	4.1
7/21/94	6.3	3.4
7/22/94	3.6	1.1
7/23/94	8.1	4.2
7/24/94	4.3	2.5

Table 6. Diurnal fluctuations for the seven-day average daily maximum temperatures in lower and upper South Myrtle Creek in 1995.

Lower South Myrtle (1995)		Upper South Myrtle (1995)	
Date	Diurnal Fluctuation (°F)	Date	Diurnal Fluctuation (°F)
7/17/95	7.1	7/31/95	25.6
7/18/95	2.7	8/1/95	20.3
7/19/95	5	8/2/95	19.1
7/20/95	5.4	8/3/95	19.8
7/21/95	5.5	8/4/95	19.8
7/22/95	3.2	8/5/95	16.7
7/23/95	4.1	8/6/95	19.8

Erosional Processes and Sedimentation

Surface erosion and landslides are natural processes that occur in the watershed, but, can alter hydrologic regimes and affect water quality. Small slides have occurred along road prisms and have delivered sediment to both intermittent and perennial streams. The Curtin Creek and South Myrtle Headwaters subwatersheds are located in the upper reaches of South Myrtle Creek, and have been identified as having a "high probability of mass movement." The soil types are predominantly granitic, and tend to be highly erodible, especially where soils are compacted and lose their infiltration capacity. In areas underlain by granitic bedrock, dry ravel can be a significant source of surface erosion due to soils drying out early in the summer and lacking cohesion. The two main geologic formations in the watershed are Jurassic volcanic rocks (Jv) and Igneous rocks (ig) (Ramp 1972). The physical and chemical weathering of these rocks is directly related to the soil types found in the watershed. These factors must be considered prior to road building.

Higher road densities and stream crossings in "highly erodible" soils can exacerbate the effects to the aquatic environment by altering the normal sediment regime and transporting greater sediment loads to the channel. Roads adjacent to low gradient fish bearing stream reaches are highly susceptible for introducing sediment into the stream.

Large woody debris (LWD) is extremely important in low gradient streams that contain an abundant source of fine sediment. Large woody debris that is well distributed and occurs frequently adds "roughness" to the channel, increases sediment storage, and regulates the amount of sediment flowing downstream.

The mass movement of soils and large wood by landslides (debris flows, debris avalanches, earthflows, and slumps) is a major component of hillslope erosion and sediment transport to streams in the Myrtle Creek WAU. Landslides are generally triggered by prolonged periods of rain, warm rain-on-melting snow and intense winter storms. They generally have occurred in the

upper reaches of the watershed (e.g. Tater Hill slide) where streams are more "V" shaped, have steep gradients, lower infiltration capacities, and shallow soil depths.

Suspended sediment refers to that portion of the sediment load suspended in the water column (MacDonald et al. 1990). Turbidity refers to the amount of light that is scattered or absorbed by a fluid (APHA 1980). Turbidity is caused by the finer textured particles in suspension such as clay, silt, finely divided organic and inorganic matter. Turbidity is a good indicator of clarity, and how well fish can capture food. A recent review concluded that the ability of salmonids to find and capture food is impaired at turbidities in the range of 25-70 NTUs (Lloyd et al. 1987). No suspended sediment and/or turbidity data exists for this WAU.

Large Woody Debris

Large Woody Debris (LWD) that is well-distributed and occurs frequently in the stream interacts with pools in the channel through a wide range of flows to create a diversity of aquatic habitat types. Large Woody Debris is one of the most important sources of habitat and cover for fish populations in streams (MacDonald et al. 1990). Large Woody Debris is a major component of channel form in smaller streams. Smaller streams usually contain more wood than larger systems due to the ability of larger streams to flush LWD downstream (Bilby and Ward 1987).

Large Woody Debris within frequently inundated floodplains can dissipate energy associated with peakflows and trap important spawning gravel in the channel, especially in low gradient stream reaches. Stream reaches having low gradients and meandering characteristics in wide valley bottoms will tend to retain large wood moving through a drainage.

An aggressive campaign during the 1970s to clear wood from streams has left most of the watershed devoid of naturally occurring LWD today. Oregon Department of Fish and Wildlife Aquatic Habitat Surveys done in the WAU indicate a lack of well-distributed and frequently occurring large wood in surveyed stream reaches.

Streamflow

Timber harvesting, road building, and other forest management activities can result in changes in the volume and timing of runoff (Jones and Grant 1996). Changes in the size of peak flows and discharge at low flows are not considered water quality parameters, but can have an effect on water quality. Peakflows in the winter months affect channel stability, turbidity and suspended sediment, and overall aquatic habitat condition. Summer low (zero) flow has influenced maximum stream temperatures, and ultimately the aquatic habitat condition in the South Umpqua basin. The 1994 water quality status summary for the Umpqua Basin (Oregon 305b Report) identifies Aquatic Life and Aesthetic beneficial uses as "not supported" during the summer. The "not supported" designation indicates that criteria for one or more water quality parameters were exceeded 25% of the time.

Stream gaging stations were operated by the United States Geological Survey on North and South Myrtle Creeks for 31 and 17 years respectively. The site descriptions and instantaneous peak flows for these stations are located in the Statistical Summaries of Streamflow Data in Oregon (Moffatt et al. 1990). The mean annual flood and bankfull discharge data for the Myrtle Creek WAU are listed in Table 7. The data is based on Log Pearson Type III distribution.

Table 7. Mean Annual Flood and Bankfull Discharge

Station	Mean Annual Flood	Bankfull Discharge	Drainage Area (square miles)
N. Myrtle Creek	2,082 cfs	1,450 cfs	54.2
S. Myrtle Creek	1,905 cfs	1,500 cfs	43.9
Frozen Creek	156 cfs	110 cfs	3.16

The probability of occurrence for bankfull discharge and mean annual flood is approximately 1.5 years and 2.3 years respectively. The data listed above may assist engineers in culvert sizing and potential for road and stream crossing failures in the watershed.

Studies have shown that more suspended sediment is carried during flows at or near bankfull discharge than either higher or lower discharges, because of the frequency of these events. The erosion rate, sediment transport rate, and the bar building by deposition are most active at bankfull discharge. Bankfull flows affect channel forming more than less-frequent higher flows. The subbasins with higher road and stream crossing densities route water and sediment much quicker and with more intensity to the stream channel, ultimately affecting channel forming processes. Future studies would be necessary to identify impacts to channel morphology due to elevated peakflows. Peak flows of the magnitude of a mean annual flood or greater have caused culverts to plug and associated road failures. At the project level, identification of undersized culverts and road improvements are necessary to storm proof the watershed and comply with the RMP. Table 8 contains a short list of gaging stations draining similar-sized areas with flows for 5-year flood events and the flow per square mile.

Table 8. Streamflow for 5-year Flood Events

Station (Number)	Drainage Area (square miles)	Streamflow for 5-Year Return Period (cfs)	CSM
South Myrtle Creek near Myrtle Creek, OR (14310700)	43.9	2,480	56
North Myrtle Creek near Myrtle Creek, OR (14311000)	54.2	2,660	49
Canton Creek near Glide, OR (143117530)	54.6	7,670	140
Elk Creek near Drew, OR (14308500)	54.4	5070	93

csm - cubic feet per second per square mile
Data from Statistical Summaries of Streamflow Data in Oregon (Moffatt et al. 1990).

The data indicates the Myrtle Creek WAU routes water to the channel less efficiently than similar-sized Coast Range and Western Cascade drainage basins. Moreover, the average peak flow per unit is less in the Myrtle Creek WAU for a 5-year recurrence interval.

Several factors probably account for the differences, but they are not well understood. The WAU receives less annual precipitation than the other areas, including less overland flow due to warm air-on-melting snow at elevations between 2,000 and 5,000 feet. The geology, soil types, and soild depths in the Myrtle Creek WAU are different than those in the Canton Creek and Elk Creek Watersheds and are less permeable and have less water storage capacities (Rinella 1986).

Table 9 shows streamflows measured in February 1996. There is less flow for fifth order streams in the Myrtle Creek WAU than similar stream orders and drainage areas to the north. The winter of 1996 was considered a "wet" season, when the 44-year average annual precipitation was exceeded by approximately 10 inches.

Table 9. Streamflow Comparison recorded February 1996

Stream Name	Stream Order	Drainage Area (square miles)	Flow (cfs)	CSM
Upper South Myrtle	5	5	14.9	3
Louis Creek	5	3	7.5	2.5
Weaver Creek	6	3.8	9.9	2.6
Kelly Creek	3	4.9	23.6	4.8
NE Fork Rock Creek	3	3	20.2	6.7
Lower Little Wolf	5	2.7	22.6	8.4
Upper Wolf Creek	5	3.8	25.7	6.8
Middle Wolf Creek	5	5	23	4.6

Current and historical streamflow data for annual peaks in North Myrtle Creek and annual low flow conditions are displayed in Appendix A. Two floods, one in February 1956 and the other in January 1964, equaled a ten-year flood event for North Myrtle Creek. The plots of annual low flow discharges for North and South Myrtle Creeks are in Appendix A and both have very similar magnitudes for a given recurrence interval. Two other flood events occurred in November and December of 1996. The highwater marks for these flood events in November and December 1996 have not been analyzed, but may have equalled a 25-year flood.

Effects of Roads on Peakflows

Roads have been identified as the major impact on the forest environment, and many publications support this argument. The impacts from roads are threefold; snowmelt re-direction and concentration, introduction of sediment into streams, and surface flow production. The impacts of surface flow are discussed below. Road cuts take shallow subsurface water and convert it to surface flow.

There are approximately 551 miles of road in the Myrtle Creek WAU. The average road density for the WAU is 4.65 miles per square mile; with the highest road density in Lee Creek at 6.62 miles per square mile and the lowest road density in Lick Creek at 2.41 miles per square mile.

Stream and road densities by subwatershed are shown in Appendix A. Road and stream densities were derived from BLM GIS data, and have varying accuracies regarding first and second order streams and road mapping. An exhaustive study of aerial photographs by a Roseburg soil scientist found that a significant number of roads have yet to be included in GIS. In the study, road densities almost doubled in two subwatersheds.

A study of Willamette River tributaries determined peak flows had increased by as much as 50% in small basins and 100% in large basins over the past 50 years in managed watersheds. These increases are attributable to changes in flow routing (due to roads) rather than to mere changes in water storage due to vegetation removal (i.e. evapotranspiration, rain-on-snow, fog drip) invoked in early analyses of small basin hydrology (Jones and Grant 1996).

Wemple (1994) developed a process to determine the extension of stream networks resulting from road drainage, through road ditches and ditch-relief culverts. It was estimated the roads in the study area extended the stream network by 40% over storm event stream lengths and 60% over winter base flow stream lengths. The process has not been applied in this watershed analysis. However, it was applied in the Jackson Creek Watershed Analysis conducted by the Forest Service in 1995. Jackson Creek lies in the South Umpqua River Basin. That effort found the existing road system extended the stream network by 26%, based on winter base flow stream lengths.

Appendix A shows the number of roads crossing streams (road/stream crossings) and the road, stream, and crossing densities by subwatershed (compartment). The risk for potential peak flow increases by road channel extension was estimated by the number of road/stream crossings using GIS. As was stated earlier, the actual road and stream crossing densities are probably higher than this analysis depicts. Those areas with frequent stream crossings, and greater drainage densities, are likely to experience greater peakflow increases due to road-influenced runoff than areas with lower drainage densities (Jones and Grant 1996). Upper Slide Creek, Lower Slide Creek, Curtin Creek, Lower Louis Creek, and Weaver Creek subwatersheds have road/stream crossing densities greater than 1.3 per square mile. These subwatersheds have the highest potential risks for increased peakflows.

The road and stream crossing numbers can be used to identify areas for watershed restoration and where culverts should be replaced to withstand 100-year flood events, allowing fish passage to areas they occupied historically.

Effect of Canopy Closure on Peakflows

Forest canopy removal can also affect peakflows. Where the forest canopy is absent or partially removed due timber harvesting, road building, fires or debris torrents, snow accumulates in a snowpack instead of being intercepted by the canopy. Snowpacks in forest openings are exposed and more susceptible to rapid melt during warm rain-on-melting snow events than stands with at least 70% crown closure. The movement of water through a watershed occurs earlier and faster in early seral stage stands, because there is less water storing capacity than "hydrologically recovered" stands. This occurs in the transient snow zone (TSZ), defined by elevations between 2,000 and 5,000 foot elevations.

Hydrologic recovery for the Myrtle Creek WAU was based on the methodology presented in the Umpqua National Forest Standard and Guideline Procedures for Cumulative Effects and Water Quality (Hofford et al. 1990). The procedure determines the potential for peak flow increases for stands with less than 70% crown closure, based upon age and site class. Hydrologic recovery was calculated only in the TSZ. The recovered area was then weighted by the percent of land it occupies in the subwatershed. Appendix A shows the number of acres hydrologically recovered by subwatershed (compartment) and the percent of land within the Transient Snow Zone.

There are five subwatersheds (N. Myrtle Headwaters, Upper Louis Creek, Weaver Creek, Lally Creek, and Buck Fork) that have greater than one third of the acreage in the TSZ, have road densities near or greater than four miles per square mile, and high stream crossing densities. These factors combined with winter storms could potentially increase peak flows; causing culverts to plug, increased sediment transport to streams, excessive streambank erosion, and more frequent and widely dispersed road failures. Ongoing, elevated peak flows in some of the smaller drainages may also hinder the natural adjustment and recovery processes within stream channels.

Water Quantity and Low Summer Flows

Water quantity is at its lowest during the late summer and early autumn. This decline in streamflow is due to a combination of low precipitation, reduced drainage from the soil and bedrock, and sustained high evapotranspiration. Summer low flows are important for maintaining aquatic habitat, stream reaches which "dry up" reduce the available aquatic habitat.

Under Section 303 (d)(1) of the Clean Water Act, the Oregon Department of Environmental Quality has identified flow modification and summer stream temperatures as being water quality limited in South Myrtle Creek. There is no recent data for North Myrtle Creek; however, according to the Statistical Summaries of Streamflow Data in Oregon no flow conditions have occurred at times in July 1973 and August 1977 (Moffatt et al. 1990). The minimum flow observed at the South Myrtle Creek gage was 0.2 cfs in August 1971. The two parameters (flow modification and summer stream temperature) identified as impacting beneficial uses in South Myrtle Creek probably exists in North Myrtle Creek. There is no temperature data to support this assumption. The beneficial uses affected are Resident Fish, Aquatic Life, and Salmonid Fish Spawning and Rearing. Other beneficial uses impacted during extreme years are recreation, fish migration (due to isolated pools), and anthropogenic water use.

During an extreme year, such as 1994, water use by secondary water users in the watershed may be suspended because of extreme low summer flows. There are approximately 475 water rights issued for all identified uses, with a total discharge of 44.76 cubic feet per second (cfs). The total discharges allocated for the main uses are listed in Table 10.

Table 10. Total discharges allocated for the main water uses in the Myrtle Creek WAU.

Water Use	Discharge (cfs)
Domestic	1.168
Irrigation	29.709
Mining	11.265

The average combined discharge at the North and South Myrtle Creek gaging stations is 139 cfs. Approximately 32% of the average discharge is allocated for all water uses. A report by the Douglas County Planning Commission determined that the number of permits issued was greater than low summer flows could support (Bell 1955). The magnitudes and probabilities of annual low flows for North and South Myrtle Creeks are graphically represented in Appendix A. There are periods of up to 60 consecutive days (depending on the recurrence interval) when the discharge at the two gaging stations is less than the 1.168 cfs allocated for domestic water use. It seems reasonable to assume that increased water use over the years has contributed to reduced summer flow conditions and loss of aquatic habitat. The Statistical Summaries of Streamflow Data in Oregon (Moffatt et al. 1990) and the recent listing of water quality limited water bodies by the DEQ supports this assumption. The amount of aquatic habitat lost, or loss of usable space by salmonid and resident fish has yet to be determined; this will vary by climate, topography, channel form, substrate, in-stream complexity, and riparian cover. The amount of space required in the summer by juvenile salmonids during their first year in streams probably ranges from 0.25 to 10 square meters of stream per fish, depending upon the species and age of fish present, stream productivity, and quality of space (Meehan 1991).

In riparian areas devoid of conifers, it is important to establish conifers not only for potential wood recruitment, but also ultimately to replace phreatophytic vegetation. The phreatophytic vegetation, such as red alder, consumes more water and diminishes the amount of water reaching the stream channel during low summer flows. Opportunities for riparian management should be identified in the watershed restoration part of the analysis.

SPECIES AND HABITATS

Fisheries

The Myrtle Creek Watershed Analysis Unit is located within Matrix land use allocation. Most timber harvesting and other silvicultural activities would be conducted in the portion of the matrix having suitable forest lands according to the standards and guidelines. The majority of the scheduled timber harvest (those contributing to the PSQ and occurring outside of the Adaptive Management Areas) will take place in the Matrix land use allocation (ROD C-39). The Myrtle Creek Analytical Watershed is not designated as a Key Watershed under the President's Forest Plan.

Historical Fish Use in the South Umpqua Basin

The South Umpqua River historically supported healthy populations of resident and anadromous salmonid fish. A 1937 survey conducted by the Umpqua National Forest reported that salmon, steelhead, and cutthroat trout were abundant throughout many reaches of the 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 South Umpqua River favored conditions typical of old-growth forests found in the Pacific Northwest. Roth noted the shade component that existed along the stream reaches surveyed. 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 the 1937 survey was conducted, many changes have occurred within the South Umpqua Basin and in the stream reaches surveyed by Roth. A comparative study was conducted in all of the stream reaches surveyed for the 1937 report by the Umpqua National Forest during the summer low-flow period between 1989 and 1993. The results of the study show that of the 31 segments of stream surveyed, 22 stream segments were significantly different than in 1937. There were 19 of the stream segments that became significantly wider while the remaining three stream segments were significantly narrower. Of the eight streams surveyed within designated wilderness areas, only one stream channel appeared to have increased in width since 1937. In contrast, 13 of 14 stream segments located in timber harvest emphasis areas were significantly wider than in 1937.

The cause for this stream widening likely resulted from increased peak flows. Peak flows typically result from removal of vegetation (tree canopy) and the increase in compacted area within a watershed, especially within the transient snow zone (Meehan 1991). Peak flows can introduce sediment into the channel from upslope and upstream and can also simplify the channel by rearrangement of instream structure. Excessive sediment delivery to streams usually changes stream channel characteristics and channel configuration. These changes in the stream channel normally result in decreasing the depth and the number of pool habitats and reduces the space available for rearing fish (Meehan 1991). The results from the USFS study substantiate the changes in low-flow channel widths that have occurred within the South Umpqua Basin since 1937 (Dose and Roper 1994). Land management activities (road construction and timber harvest) may have contributed to the changes in the channel characteristics and it may be that these changes in channel condition has resulted in the observed decline of three of the four anadromous salmonid stocks occurring in the 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 cutthroat and resident cutthroat trout (Oncorhynchus clarki) have been documented utilizing the Myrtle Creek WAU. Over the last 150 years, salmonids have had to survive dramatic changes in the environment where they evolved. The character of streams and rivers in the Pacific Northwest have been altered through European settlement, by urban and industrial development, and by land management practices. Modifications in the landscape and waters of the South Umpqua Basin, beginning with the first settlers, have made this 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 this watershed (Nehlsen 1994). Currently, the status of salmonid populations throughout the Pacific Northwest is declining. A total of 214 native, naturally spawning stocks were identified as 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 stocks of salmonids are at-risk of extinction, and two stocks were not considered at-risk. The following information discusses the historic and present status of these species.

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 (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).

Roth (1937) reported the principal run of chinook was in the late spring and summer. Presently, spring chinook runs are considered to be depressed by ODFW. Nehlsen et al. (1991) reported the spring chinook run at high risk of extinction. Fall chinook are considered to be healthy by ODFW (Nehlsen 1994).

Coho salmon were considered abundant in the South Umpqua River in 1972 by the Oregon State Game Commission (Lauman et al. 1972). An estimated 4,000 fish spawned in the basin with many of these fish (1,450) spawning within Cow Creek. Presently, the coho salmon of the South Umpqua are suffering the same declines as other coastal stocks. These declines are potentially due to several factors, including the degradation of coho salmon habitat, the effects of extensive hatchery releases, and overfishing (Nehlsen 1994). Based on the 1937 survey, no coho salmon were sampled within the survey area (i.e. upper stream reaches of the South Umpqua River). A subsequent study conducted during the summer of 1989 documented the common presence of coho salmon within Jackson Creek, which is a major tributary to the South Umpqua River (Roper et al. 1994). The documentation of coho salmon utilizing Jackson Creek qualifies this species existence in the upper reaches of the South Umpqua Basin. Coho salmon have been observed and sampled within the Myrtle Creek WAU as well.

Sea-run cutthroat are assumed to be depressed from historic levels. The information provided in the 1937 Roth report noted cutthroat trout were common and/or abundant throughout the stream segments surveyed in the Upper South Umpqua Basin. There are limited historical records on cutthroat population size within the South Umpqua River.

The assumption that sea-run cutthroat trout abundance is currently below historic levels throughout the Umpqua Basin, including the South Umpqua River and its' tributaries, has been based upon the information provided by the fish counting station at Winchester Dam on the North Umpqua River. Between the years of 1947 and 1957 the North Umpqua boasted runs of sea-run cutthroat trout averaging approximately 900 fish/year. The highest number return of 1,800 fish occurred in 1954 and the lowest return for the ten year period was 450 fish in 1949. In the late 1950s the sea-run cutthroat trout returns declined drastically.

The stocking of Alsea River cutthroat trout into the Umpqua system began in 1961 and was continued until the late 1970s. The stocking of this genetically distinct stock of trout into the Umpqua system has apparently led to compounding the problem for the 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 <100 fish/year (ODFW 1994 - overhead packet). In 1992-93, no sea-run cutthroat returned to the North Umpqua. In subsequent years, sea-run cutthroat trout numbers have been a total of 29 fish in 1993-94, 1 fish in 1994-95, and 79 fish in 1995-96.

According to the data available, the South Umpqua River appears to have supported a larger run of sea-run cutthroat trout than did the North Umpqua River. In 1972, a total of 10,000 sea-run cutthroat trout were estimated within the South Umpqua River. Sea-run cutthroat trout

populations seemed to have the highest occurrence in those streams occupied by and accessible to coho salmon (Lauman et al. 1972). Today, these fish are limited to the upper portion of the mainstem 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 precluded their use of the lower stream reaches in the basin (Nehlsen 1994).

In August 1996, the Umpqua basin cutthroat trout (Oncorhynchus clarki) was listed by the National Marine Fisheries Service (NMFS) as an endangered species under the Endangered Species Act (ESA) of 1973, as amended. The coastal coho salmon (Oncorhynchus kisutch) and West Coast steelhead (Oncorhynchus mykiss) have been proposed for listing by NMFS as threatened species under the ESA. Two fish species, the Pacific lamprey (Lampetra tridentata) and the Umpqua chub (Oregonichthys kalawatseti), are on the USFWS list as species of concern and are considered Bureau Sensitive species by the BLM (Manual 6840). All of these species have been documented within the South Umpqua River.

Fish distribution limits have been mapped on GIS HYD and ORD theme maps for the streams with documented barriers within the Myrtle Creek WAU (refer to maps in Appendix B). Distribution limits of anadromous and resident fish are determined by the extent at which these fish are able to migrate upstream. The distribution limits of anadromous fish are based upon documented or suspected historic limits of steelhead trout and/or sea-run cutthroat trout and/or coho salmon. Natural waterfalls, log or debris jams, beaver dams, and road crossings are potential barriers to fish movement and migration.

The Myrtle Creek WAU consists of four Watersheds: Lower North Myrtle Watershed, Upper North Myrtle Watershed, Lower South Myrtle Watershed, and Upper South Myrtle Watershed. These watersheds are divided into subwatersheds (i.e. Weaver Creek is a subwatershed of Upper South Myrtle Watershed). Aquatic habitat inventories have been completed for the mainstems of South Myrtle Creek, North Myrtle Creek, Weaver Creek, Lee Creek, Riser Creek, Slide Creek, Buck Fork Creek, Frozen Creek, West Fork Frozen Creek, and Bilger Creek. The streams inventoried constitute 74.2 miles of the approximate 740 total stream miles within these four Watersheds (see Table 11). The inventories are used to describe the current condition of the aquatic habitat with a focus on the fish-bearing stream reaches within a watershed. Streams located within the Myrtle Creek WAU that have not been inventoried for aquatic habitat condition are the mainstems of Curtin Creek, Johnson Creek, Lally Creek, Letitia Creek, Long Wiley Creek, Short Wiley Creek, Louis Creek, Ben Branch Creek, School Hollow Creek, Cedar Hollow Creek, Big Lick Creek, and Little Lick Creek. With the exception of Weaver Creek, major streams tributary to South Myrtle Creek were not surveyed due to access denial by the land owners. Big Lick and Little Lick Creeks are the only two major tributaries to North Myrtle Creek that were not surveyed. These streams are not planned to be inventoried.

Although, the aquatic habitat inventory is not a fish distribution or fish abundance survey, fish use and distribution information was noted in the habitat inventories. The habitat inventory is designed only to survey physical habitat features. The stream surveyors were informed to take note of fish use by visual observation only. Fish distribution surveys are currently underway within the Roseburg District to determine the upper limits of resident fish use. The Myrtle Creek WAU was surveyed for resident fish use during the summer of 1996. The information available on the habitat condition and the distribution of fish species in the streams that have not been surveyed is in the form of personal communications and observations by ODFW and BLM biologists.

Table 11. Myrtle Creek Fish Distribution and Stream Summary

Watershed Stream name	Total WAU miles	Total BLM miles	Total miles anadromous★	BLM miles anadromous★	Total miles resident	BLM miles resident	ODFW AHR#
UPSM:	252.9	134					
South Myrtle♦			11.8	3.3	13.9	5.4	Fair
Curtin			0.05	0.05	0.4	0.4	n/a
Johnson			0.05	0.05	1.1	1.1	n/a
Lally			2.2	0.4	*n/a	0.4	n/a
Weaver♦			4.8	2.4	6.3	3.9	Fair
Letitia			2.6	0.6	3.1	1.1	n/a
Long Wiley			2.7	0.7	n/a	1.1	n/a
Short Wiley			1.7	0.0	n/a	0.0	n/a
Louis			4.8	0.4	5.8	4.0	n/a
LOSM:	122.4	19.8					
South Myrtle♦			9.8	0.05	9.8	0.05	Poor
Ben Branch			1.0	0.4	n/a	n/a	n/a
School Hollow			2.0	0.1	n/a	n/a	n/a
Cedar Hollow			3.2	0.0	n/a	n/a	n/a
UPNM:	187.3	82.5					
North Myrtle♦			16.5	1.0	3.0@	n/a	Fair
Lee♦			3.5	0.5	4.2@	n/a	Fair
Riser♦			2.0	0.5	3.0@	n/a	Fair
Slide♦			2.7	0.9	3.9@	n/a	Fair
Buck Fork♦			2.0	0.4	3.1@	n/a	Fair
LONM:	178.6	30.8					
North Myrtle♦			10.5	0.0	9.8@	n/a	Fair
Frozen♦			2.7	0.0	3.3	n/a	Fair
W. Fork Frozen♦			1.2	0.0	2.6	n/a	Poor
Big Lick∘			1.2	0.0	n/a	n/a	n/a
Little Lick			0.2	0.0	n/a	n/a	n/a
Bilger♦			4.2	0.0	4.8	n/a	Poor

♦ streams surveyed by ODFW-Aquatic Habitat Inventory methodology
ODFW Aquatic Habitat Rating (AHR) - methodology used to rate aquatic conditions
∘ potential presence of warm water fish species
@ fish distribution data from Aquatic Habitat Inventory (by visual observation only)
n/a data not available/not sampled/not surveyed, no information
*n/a fish distribution is unknown, because upper limits are located upstream of BLM administered lands
★ anadromous limits according to ODFW/ODSL fish distribution maps

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 District BLM, Roseburg District BLM, Umpqua National Forest USFS, and Pacific Power and Light Company. This group has been designed to bring all the local fisheries biologists together to work toward addressing and resolving local questions and problems associated with the fisheries resource in the Umpqua Basin. The intention of the matrix designed by the BAT team is to provide a framework by which habitat condition can be easily and meaningfully categorized. This matrix is not intended to reflect equality of the habitat condition of each stream reach, but is intended to summarize the overall condition of the surveyed reaches. The matrix is a four category rating system consisting of an *Excellent*, *Good*, *Fair*, or *Poor* rating (see example rating form, Appendix B).

Data from the 1994 ODFW Aquatic Habitat Inventories for the Myrtle Creek WAU were analyzed to determine an overall aquatic habitat rating (AHR) for each surveyed stream reach. The ratings were then correlated to the NMFS Matrix (see Appendix B), as shown in Table 12.

Table 12. Aquatic Habitat Ratings (AHR)/ NMFS Matrix Comparison.

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

Each of the four Watersheds contains different limiting factors. Limiting factors for the fishery resource may include conditions where there has been a reduction in instream habitat structure, an increase in sedimentation, the absence of a functional riparian area, a decrease in the water quantity or quality, or the improper placement of drainage and erosion control features associated with the forest road network.

Current Stream Habitat Conditions

Lower South Myrtle Watershed (LOSM)

The overall aquatic habitat inventory rating for lower South Myrtle Creek is *Poor*. There were four stream reaches and part of a fifth reach designated along the mainstem of South Myrtle Creek (refer to stream reach map in Appendix B). Surveyor access was denied on portions of reach #2 and all of reach #4. The majority of the lands in the Lower South Myrtle Watershed are in private ownership (79%) and the major land use is agriculture (32%). The major limiting factors for lower South Myrtle Creek appear to be the lack of large woody debris (LWD) pieces and the volume of LWD located in the stream channel. The potential for future recruitment of LWD to enter the stream system from the adjacent riparian areas in reaches #1-4 are low. Currently, the riparian areas adjacent to the mainstem of South Myrtle Creek in reaches #1-4 and

the lower portions of reach #5 are in stands of red alder (*Alnus rubra*) and other hardwood species (i.e. myrtlewood, cottonwood, various oak species). In reaches #1-3, the land use is dominantly residential with intermingled fields and pasture lands used for grazing livestock.

Conifer species are the desirable riparian vegetation type along fish-bearing stream reaches, because they are capable of providing the stream channel and fisheries resource a durable and lasting habitat component. The mature conifers (typically those >24" diameter) that enter the stream channel via blowdown, flood event or by landslides provide habitat for the fisheries resource and other aquatic species. This size material is also capable of staying in place and intact over time. In comparison, hardwood species are short-lived once they enter the aquatic environment (Meehan 1991).

Although large conifers (LWD) may release compounds that are toxic to stream biota, under most conditions leaching of these toxins occurs at a very slow rate. Therefore, LWD is rarely a cause for low dissolved oxygen concentrations in streams. Large woody debris has a low biochemical oxygen demand (BOD) due to having a low surface area to volume ratio and being relatively resistant to decay (MacDonald et al. 1990). Large woody debris helps maintain hydrologic conditions in the stream channel by creating pools, multiple channels, sloughs, backwater areas (Meehan 1991) and helps to reconnect the stream with it's floodplain. Large woody debris often provides the fisheries resource with resting and/or escape cover, maintains pool habitat, and creates channel complexity.

The subwatersheds within the LOSM Watershed containing major fish-bearing streams include Ben Branch, School Hollow, and Cedar Hollow. These subwatersheds have not been inventoried for their aquatic habitat condition.

Upper South Myrtle Watershed (UPSM)

The overall aquatic habitat rating for upper South Myrtle Creek is *Fair*. There were 10 reach breaks identified within this portion of the stream (refer to stream reach map in Appendix B). The majority of the Upper South Myrtle Watershed consists of federally managed lands (60%) and its major land use is timber production. The remaining 40% of the watershed is made up of privately owned lands. Seventeen percent of the private ownership is agricultural land. The impacts from these land uses reveal themselves in the aquatic habitat data. Habitat components absent from upper South Myrtle Creek include the number of LWD pieces and the volume of LWD in reaches of fish-bearing streams, especially those occupied by anadromous fish (i.e. upper portions of reach #5-9). The lack of deep pools (>1 meter) in reaches #5, #8-10, #12 and #13; the relatively high amounts of silt, sand, and organics (i.e. fines) in reaches #5-14; and the lack of potential for future recruitment of LWD into the stream reaches accessible to anadromous fish (i.e. reach #5) are all limiting factors on the aquatic resources in upper South Myrtle Creek.

There are large landslide areas in reaches #10 and #13 along the mainstem of South Myrtle Creek. These landslides have introduced upslope materials into the stream channel. The Tater Hill slide located in reach #10 is a major deep seated earthflow that will continue to be a source of fines, gravel, and woody debris to the mainstem of South Myrtle Creek into the future. This area has been designated as an Area of Critical Environmental Concern (ACEC) by the Roseburg District. A relatively large amount of fines were observed in-channel in the vicinity and downstream from these slides. Reaches #8-11 and #13 contained >20% fines within the stream channel. Reach #13 contained 50% fines. These percentages are based on the percent by area of stream substrates dominated by fines. Reaches #9-14 have greater than 20% gravel substrates

within the riffle habitat type. Streams having greater than 29% gravel in the riffle habitat type are rated as *good*, according to the habitat benchmark rating system. Therefore, the future recruitment potential of gravel substrates into lower gradient, fish-bearing portions of South Myrtle Creek (i.e. reaches #1-8) appears to be good.

Major streams within the UPSM Watershed include Curtin Creek, Lally Creek, Letitia Creek, Long Wiley Creek, Short Wiley Creek, Louis Creek, and Weaver Creek. Weaver Creek is the only stream that has been inventoried by ODFW surveyors.

The overall aquatic habitat inventory rating for Weaver Creek is *Fair*. There were four reach breaks identified in Weaver Creek (refer to stream reach map in Appendix B). The majority of the Weaver Creek subwatershed (79%) is in federally managed lands. The major land use in the Weaver Creek subwatershed is timber production. There are approximately 4.8 miles of total anadromous habitat in Weaver Creek. The BLM administers approximately 2.4 miles of this habitat. An existing culvert located on the 29-3-33.0 road is a low flow barrier to anadromous and resident salmonids which denies passage to approximately 1.0 mile of suitable spawning and rearing habitat. There have been no recent surveys conducted upstream of the culvert to verify the presence of anadromous fish. However, fish shocker data collected August 27, 1982 noted the presence of steelhead trout upstream of the culvert.

Lower North Myrtle Watershed (LONM)

The overall aquatic habitat rating for lower North Myrtle Creek is *Fair*. There were four reach breaks identified within this stream (refer to stream map in Appendix B). The majority of the Lower North Myrtle Watershed is in private ownership (81%) and the major land use is agriculture (36%). The impacts to the aquatic habitat in this stream include the lack of LWD pieces and volume, the relatively high width to depth ratio (W/D), and the low potential of the riparian area to provide LWD to the stream channel in the near future (i.e. next 10-20 years). Reaches #1-4 of North Myrtle Creek are low gradient stream reaches, important for spawning salmonids.

Lower stream reaches are more accessible to migrating salmonids and are typically the areas where most spawning occurs. Streamflow, water quality, and substrate type are elements important for salmonids before and during spawning (Meehan 1991). Stream order and size can vary the amount of suitable spawning substrate available to salmonids (Meehan 1991). Few first and second order streams provide spawning habitat for anadromous salmonids. Most anadromous salmonids utilize the accessible habitat in third and fourth order streams (Meehan 1991). The BLM does not administer any of the available 10.5 miles of the lower gradient reaches of North Myrtle Creek (refer to Table 11 for fish-bearing stream lengths).

The subwatersheds within the LONM Watershed containing major fish-bearing streams include Lick Creek, Frozen Creek, and Bilger Creek. Streams that have been inventoried by ODFW surveyors are Frozen, West Fork Frozen, and Bilger Creeks. Streams that have not been inventoried are Big Lick Creek and Little Lick Creek.

There were two streams surveyed in the Frozen Creek subwatershed, the mainstem of Frozen Creek and the West Fork of Frozen Creek. The overall aquatic habitat rating for the mainstem of Frozen Creek is *Fair* and the overall aquatic habitat rating for the West Fork of Frozen Creek is *Poor*. There were four reaches identified within the mainstem of Frozen Creek and three stream reach breaks identified in the West Fork of Frozen Creek (refer to stream map in

Appendix B). The majority of the Frozen Creek subwatershed (79%) is in private lands. The major land use for Frozen Creek subwatershed is agricultural use (i.e. livestock grazing) along the mainstem and timber production along the West Fork of Frozen Creek. The habitat inventory for the mainstem of Frozen Creek noted several irrigation dams and beaver activity within reaches #1 and #2. According to the information in the survey, these obstructions do not impair upstream fish passage for anadromous salmonids. Pool quantity in the lower reaches of Frozen Creek is *good* according to the Habitat Benchmark rating system. The number of pools are assumed to be due to the existence of the natural and man-made obstructions within the stream channel and not the existence of LWD in-channel. There are approximately 2.7 miles of anadromous salmonid habitat in the mainstem of Frozen Creek. The BLM does not administer lands along any of this anadromous habitat. According to the aquatic habitat inventory, resident fish were visually observed utilizing approximately 3.3 miles in Frozen Creek (resident fish are presumed to occupy greater than 3.3 miles of Frozen Creek).

The West Fork of Frozen Creek survey information noted a low pool area percentage throughout the three reaches. Reach #1 had the best percentage of pools and rated as *fair* according to the Habitat Benchmark rating system. Reach #1 has the lowest gradient (2.9%) of the three reaches surveyed. Stream gradient influences habitat type. Steep stream gradients (i.e. those >10%) typically have fewer pool habitat types and more riffle or cascade habitat types than do lower stream gradients. According to Meehan (1991), when a stream contains few steps (or pools), more energy is released to move sediment and stream substrates; resulting in a simplified, high-gradient channel. These conditions create degraded or less than optimum salmonid habitat. There were low amounts of LWD pieces and volume observed in the stream channel of the West Fork of Frozen Creek. Recruitment of LWD into the West Fork of Frozen Creek in the near future is low. The riparian data documented few trees greater than 12" to 20" in diameter in the riparian zone.

The overall aquatic habitat rating for Bilger Creek is *Poor*. There were three reaches identified in the survey (refer to stream map in Appendix B). The majority of the Bilger Creek subwatershed (74%) is in private lands. The major land use appears to be primarily rural residential and grazing. The pool area percentage throughout the Bilger Creek survey was *poor* according to the Habitat Benchmark rating system. Numerous dry channel units were observed in reach #1 of the survey. These dry channel units are assumed to be a reflection of typical summer low-flow conditions and the result of irrigation. Puddled units were also documented. Fish were visually observed in the puddled and scour pool units during the aquatic habitat survey. These pools provide the fisheries resource with a critical habitat type utilized during summer low-flow conditions. Pools provide juvenile salmonids with summer rearing areas and may also provide thermal refuge for salmonids during critical low-flow summer conditions (Meehan 1991). The puddled units were found primarily in reach #2. There were no pools >1 meter in depth identified during the survey. Large woody debris pieces and volumes are relatively low throughout the surveyed reaches. Riparian habitat condition is currently dominated by stands of hardwoods (i.e. myrtlewood, oak). There is a low probability the riparian area of Bilger Creek will provide LWD components to the stream into the future.

Beaver activity was noted in reach #2. Beaver dams have the potential to create rearing areas for juvenile fish, benefit the aquatic system by increasing the basic biological productivity, and improve the winter habitat condition for salmonids by slowing in-stream water velocities (Meehan 1991). In a situation where dry channel units are abundant throughout a stream reach, the existence of beaver activity and the presence of beaver dams is a welcomed site for the fisheries resource. During low-flow periods, these ponds contribute the water volume needed to sustain

the fisheries resource. However, the potential exists for a reduction in dissolved oxygen within these pools during extended dry periods (Meehan 1991).

Upper North Myrtle Watershed (UPNM)

The overall aquatic habitat rating for the upper mainstem of North Myrtle Creek is *Fair*. There were four stream reaches identified in the survey (refer to stream reach map in Appendix B). The majority of the Upper North Myrtle Watershed is privately owned lands (52%). The primary land use in this Watershed is timber production. Rural residential is a major land use in reach #5 of North Myrtle Creek. The pool area percentage of reaches #5 and 6 were rated as *good* and reach #7 was rated as *poor* according to the Habitat Benchmark rating system. Reach #8 had an average stream gradient of 21%. This reach was dominated by pool-step-pool unit types and pool-riffle unit types. These pool-step-pool habitat types are usually low to moderate and moderate to high stream reach gradients, typically those found in headwater stream areas.

Stream diversions and irrigation dams are less numerous in the upper reaches of North Myrtle Creek (reaches #5-8) as compared to the lower reaches (#1-4). The reduced number of water withdrawals in the upper reaches of North Myrtle Creek may provide better water quantity and quality for salmonids inhabiting North Myrtle Creek. Availability and condition of aquatic habitat becomes extremely important for the fisheries resource during the summer low flow periods. During the summer months, these reaches (#5-8) are potentially the rearing areas for juvenile anadromous and resident fish. Pools with overhanging brush or undercut banks and a constant flow of well oxygenated, cool water are ideal for providing juvenile salmonids hiding and escape cover from potential predation. The upper reaches of North Myrtle Creek may be providing the fisheries resource within the Upper North Myrtle Watershed a refuge during the summer months. These conditions are currently unknown within this watershed. Pfankuch surveys and fish distribution surveys were expected to be completed in the Upper North Myrtle Watershed during the summer of 1996.

A low percentage of fines were documented in the riffle habitat types in reach #5, but the upper reaches (#6 and #7) had a relatively high amount of sediment in the riffles. In the upper reaches, relatively low amounts of LWD were documented within the stream channel. The current condition of the riparian area in reaches #7 and #8 suggests the potential of these areas to provide the LWD component to these stream reaches in the future. The upper reaches of North Myrtle Creek are a potential source of LWD to the lower gradient stream reaches downstream. Beaver activity was documented in reaches #5-7. The presence of beaver activity in these reaches may be reflected in the pool area percentage documented for these reaches.

Major fish-bearing streams within the UPNM Watershed include Lee Creek, Riser Creek, Slide Creek, and Buck Fork Creek. These streams have been inventoried by ODFW surveyors.

The overall aquatic habitat rating for Lee Creek is *Fair*. There were two stream reach breaks identified in the survey (refer to stream reach map in Appendix B). The majority of the Lee Creek subwatershed is private lands (53%). The primary land use in the Lee Creek subwatershed is timber production. Other land uses are rural residential and mining. Past mining activities and timber harvesting activities, including road construction, have negatively impacted Lee Creek. Sedimentation in Lee Creek has reduced the quality of fish habitat. There are four stream crossings (culverts) on the mainstem of Lee Creek that block upstream passage for resident and anadromous fish (see fish distribution map in Appendix B).

Riffle habitat in the two reaches of Lee Creek are dominantly gravel substrates. Gravel percentages are relatively high in the riffle habitats in Lee Creek. Gravel substrates are important for salmonid spawning. The most desirable gravel substrates for spawning salmonids are those free of sediment located near escape/hiding cover (Meehan 1991). In Lee Creek however, a high percentage of fines was documented in the riffle habitat types. Sediment in the gravel substrate can eliminate habitat utilized by aquatic invertebrates; reduces the biodiversity and number of aquatic insects; decreases the permeability of spawning gravels; and interferes with the exchange of subsurface and surface waters (Meehan 1991).

Pool area percentage for reach #1 rated *good* and reach #2 rated as *excellent* according to the Habitat Benchmark rating system. The amount of LWD recorded for both reaches of stream rated as *poor*. The reason for these two reaches receiving good and excellent ratings for pool area percentage may be due, in large part, to the extensive beaver activity that has occurred in-channel and not due to instream LWD. With relatively high amounts of sediment in the riffle habitat unit types, it is assumed the pool habitats are filling with sediment, thus reducing the quality of pool habitat preferred by salmonids. Beaver dams act as sediment traps and can reduce downstream sedimentation significantly over time (Meehan 1991).

The riparian area in reach #1 was characterized as dominantly consisting of alder and other hardwoods. It is unlikely reach #1 would provide LWD to the stream channel of Lee Creek in the future due to the area being mostly residential use. Reach #2 was documented having a conifer/hardwood component in the riparian area.

The overall aquatic habitat rating for Riser Creek is *Fair*. There were four stream reach breaks identified in this stream (refer to stream map in Appendix B). The majority of this subwatershed (62%) is in BLM managed lands. The primary land use in Riser Creek Subwatershed is timber production. Habitat surveys documented a high percentage of pool habitats, a relatively low amount of LWD, and a high amount of sediment in the riffle habitat type. The heavy amount of beaver activity in this stream accounts for the high percentage of pool habitat. It is assumed that the high percent of fines in the riffle habitats equates to a high amount of sediment in the pool habitats.

The overall aquatic rating for Slide Creek is *Fair*. There were four stream reaches identified in Slide Creek (refer to stream map in Appendix B). The majority of the lands within the Lower Slide Creek and Upper Slide Creek subwatersheds are managed by the BLM (65%). The major land use is timber production. Heavy grazing was documented in Reach #1.

The habitat inventory identified excessive amounts of sediment in the riffle habitat types. Reach #1 had 25% fines and these percentages increased to 79% in Reach #4. The lower reaches of Slide Creek will be negatively impacted into the future by the introduction of the fines currently located in the upper reaches. Beaver activity was documented in reaches #2 and #3. The beaver have created the majority of pool habitat >1 meter in depth for this stream. The survey documented very little exposed bedrock and no boulders greater than 0.5 meters in diameter. Slide Creek has a low number of roughness components in-channel (i.e. low number and volume of LWD) and a seemingly high amount of substrate in the form of sand, silt, and organics. Opportunities for future recruitment of LWD from the adjacent riparian area in the short term is low.

The overall aquatic habitat rating for Buck Fork Creek is *Fair*. There were four stream reaches designated in Buck Fork Creek (refer to stream map in Appendix B). The majority of the lands

within the Buck Fork subwatershed are privately owned lands (70%). Timber production is the primary land use in the Buck Fork subwatershed. Reach #1 was rural residential for most of the reach.

The lack of LWD and the relatively high sediment loads in Buck Fork Creek reduces the extent of use by the fisheries resource utilizing the stream and limits the future fisheries potential of the stream. Roughness components (i.e. logs, boulders) are important to stream/aquatic health and maintenance. Large woody debris will provide the fisheries resource areas to hide, rest, and feed. Boulders create backwater areas, pools, and current breaks that migrating fish species use to rest while on their way upstream. Sediment in the stream channel creates problems for the fisheries resource by embedding gravel substrates critical to the success of spawning. Sediment can fill the pools created by LWD and boulders and also reduces the water quality of the stream. The gravel percentages in riffle habitat types in the Buck Fork Creek data suggests that this stream has high potential for providing a source of gravel to the mainstem of North Myrtle Creek into the future.

Wildlife

Four of the 35 watershed analysis units identified within the South River Resource Area (SRRA) make up the Myrtle Creek WAU. These watersheds are in the geographic areas known as the Klamath Province and the Western Cascade Province (Franklin and Dyrness 1984). Climax vegetation in the watershed reflects the Douglas-fir and evergreen temperate forest (Franklin and Dyrness 1984). In total, the Myrtle Creek WAU is 76,136 acres in size. Various vegetation age classes are present in the Myrtle Creek WAU. The arrangement of these age classes within the watershed is a result of natural and artificial events. Natural disturbance like fire, wind storms, and flood, historically changed the landscape by altering the distribution and vegetation age classes. Other disturbances include past and current forest alterations caused by people (introduced fire for clearing, tree harvest, road construction, home building and division of land by straight line boundaries). The eastern portion of the watershed has a large block of public land approximately 19 square miles in size. The remaining area in the watershed has private and public land in a checkerboard pattern.

A variety of wildlife species inhabit the different forest age classes and other vegetation present in the watershed. These vegetation types and age classes provide habitat to over 200 vertebrate species and thousands of invertebrate species. Of these species, 38 species are of special concern because they are federally threatened (FT), endangered (FE), Bureau Sensitive (BS) or Bureau Assessment species (BA). In addition to these species, the Record of Decision (ROD) for the Management of Habitat for Late Successional and Old Growth Forest Related Species Within the Range of the Northern spotted Owl (1994), also known as the Forest Plan, has a list of species to survey and manage for in Oregon, Washington and California (USDA and USDI FEIS Appendix J2 1994a). A list of species (from Appendix J2) that may occur in the Roseburg District (South River Resource Area) is given in Appendix D. Elevations present in the watershed, range from 400 to 4,200 feet above sea level.

Wildlife: Historical Overview

American Bald Eagle and Peregrine Falcon

Historical distribution of the bald eagle included the entire northwestern portion of the United

States (California, Oregon, Washington), Alaska, and western Canada. Declines in bald eagle populations probably started in the 19th century but noticeable declines in numbers did not start 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 of organochloride pesticides (DDT) on the quality of egg shells produced by bald eagles (USDI 1986). Because DDT use in western Oregon from 1945 to the 1970s was high, decline of bald eagle numbers probably happened in the Roseburg District (Henny 1991). Other causes of eagle decline included shooting and habitat deterioration (Anthony et al. 1983). Historically, removal of old growth forests in the vicinity of major water systems (e.g., South Umpqua River) contributed to habitat deterioration through loss of bald eagle nesting, feeding, and roosting habitat.

Data collected by Fierstine and Anthony (1978) showed no bald eagle nest sites were present in the South Umpqua Planning Unit (SUPU), an area that included the Myrtle Creek WAU. In 1979, the Roseburg District Biologist believed the SUPU was "never a high density nesting area, but prior to timber harvest activities adjacent to the South Umpqua River the carrying capacity in the planning unit could have been as high as four nesting pairs" (SUPU 1979). Current information from yearly inventories (1971-1995) of known bald eagle sites by Isaacs and Anthony (1995) does not list any sites, nests, or territories within or in the vicinity of the South Umpqua River in the southwestern portion of the Myrtle Creek WAU. This portion of the South Umpqua River is considered possible winter habitat but no data is available to support this. Sporadic observations and reports of bald eagles along the South Umpqua River may represent migrating individuals. Midwinter surveys from Days Creek to Melrose have not detected bald eagles wintering in this reach of the South Umpqua River (Isaacs 1995).

Peregrine populations in the Pacific Northwest also declined as a result of the increased use of organochloride pesticides, shooting, use of other chemicals (avicides: organophosphates to kill bird species considered pests), and habitat disturbance (loss of wetlands, loss of fresh water marsh environments in interior valleys, and increased rural development) (Aulman 1991).

In Oregon, peregrine falcons were a "common breeding resident" along the Pacific coastline and were present in many areas including the southwestern portion of Oregon (Haight 1991). Although the peregrine falcon occurs (reported sightings) in the South River Resource Area no nest locations are known within the Myrtle Creek WAU.

The Northern Spotted Owl

The geographic range of the northern spotted owl has not changed much from its historical boundaries. However habitat available and historically used by spotted owls has changed to the point that owl population numbers have declined and distribution rearranged. These changes are considered a result of habitat alteration and removal by timber harvest, fire, and land development (Thomas et al. 1990). An extensive review of the history and population changes of spotted owls is available in the 1990 Interagency Scientific Committee (ISC) report by Thomas et al. and will not be repeated here.

Columbian White-tailed Deer and Marbled Murrelet

A discussion about natural and human caused changes of the historical distribution and habitat quality of the Columbian white-tailed deer and the marbled murrelet will not be given here. The Myrtle Creek WAU is outside the current and historical distribution range of the Columbian white-tailed deer. It is also outside the range of suitable marbled murrelet habitat (USDI 1983, USDA and USDI FEIS 1994, USDI 1992b). Specifically, the western boundary of the watershed is 10 miles east of the western boundary of the 50 mile (from the coast) marbled murrelet zone.

Neotropical and Resident Bird Species

Bird species that migrate and spend the winter in the various ecosystems found south of the North American Continent are neotropical bird species. Bird species that spend the winter on the North American Continent year round are resident birds. Widespread concern for neotropical species and related habitat alterations, impacts from pesticide use, and other threats began in the 1970s and 1980s (Peterjohn et al. 1995). Population trends of neotropical migrants in Oregon show declines and increases. Oregon populations of "19 bird species show statistically significant declining trends and ... nine species show significant increasing trends" (Sharp 1990). Including all species that show declines or increases as a proportion of routes, or almost statistically significant trends, there are a total of 33 decreasing species and 12 increasing species in Oregon (Sharp 1990).

Big Game Species (Elk and Deer)

Historically, the range of Roosevelt Elk extended from the summit of the Cascade Mountains to the Oregon coast. A population estimate in 1938 gave 7,000 as the number of elk in Oregon (Graf 1943). Numbers and the distribution of elk changed as people settled in the region. Over time, the elk habitat areas shifted from historical distribution to "concentrated population centers which occur as islands across forested lands of varying seral stages" (SUPU 1979). Information about the historical distribution of elk within the Myrtle Creek WAU and the equivalent Dixon management unit (set by ODFW) is not available. Given the increased number of people in the area, road construction, and home construction, it is likely that elk numbers have declined as reported in other parts of the region (Brown 1985).

Like elk, the black-tailed deer was present throughout Oregon. During the logging that occurred after WW II, suitable young seral age stands (less than 20 years old) were abundant and black-tailed deer populations increased to the point that liberal hunting seasons were permitted. Overall black-tailed deer numbers remained stable through the late 1970s in the SUPU (1979). Creation of early seral stands as a result of timber harvest benefited deer and elk as a by product not as part of a specific management plan for these game species.

Wildlife Species-Current Condition

THREATENED AND ENDANGERED SPECIES

Five species that occur in the Roseburg District are legally listed as federally threatened (FT) or federally endangered (FE). These include the American bald eagle (Haliaeetus leucocephalus) (FT), the marbled murrelet (Brachyramphus marmoratus) (FT), the northern spotted owl (Strix occidentalis caurina) (FT), the peregrine falcon (Falco peregrinus anatum) (FE), and the

Columbian white-tailed Deer (Odecoilus virginianus leucurus) (FE).

The Northern Spotted Owl

The northern spotted owl is found in the Pacific Northwest, from northern California to lower British Columbia in Canada. The reader should consult the available literature on the biology of this species for more information (Thomas et al. 1990, USDI 1992a).

In the Myrtle Creek WAU, the spotted owl is found in 15 areas throughout BLM administered lands. One owl site known as MSNO 2086 is within the watershed boundary but outside the South River Resource Area boundary. Habitat important to the spotted owl was identified by Roseburg District BLM biologists based upon on-the-ground knowledge, inventory descriptions of forest stands, and known characteristics of the forest structure. These habitats are Habitat 1 (HB1) and Habitat 2 (HB2). Habitat 1 describes forest stands that provide nesting, foraging and resting components, and Habitat 2 describes forest stands that provide foraging and resting components but lack nesting components. Other areas not fitting into the HB1 or HB2 category and greater than 40 years old, are part of dispersal habitat. Dispersal habitat refers to forest stands greater than 40 years of age that provide cover, roosting, foraging and dispersal components that spotted owls use while moving from one area to another (Thomas et al. 1990, USDI 1992a, USDI 1994). Tables 13 and 14 give the acres of HB1 and HB2 present in the Myrtle Creek WAU.

Table 13. Spotted Owl Suitable Habitat Within The Myrtle Creek Watershed**

Species	Habitat 1	Habitat 2	Total
Spotted Owl	15,437	7,290	22,727
	68.0%	32.0%	100%

Table 14. Percent Area Of Habitat 1 and 2 Related To The Total Land Area In The Myrtle Creek WAU (Includes Only Federal Land).

Habitat 1	Habitat 2	Habitat 1 AND 2	Total Area in Myrtle Creek WAU
15,437	7,290	22,727	76,152
20.2%	9.5%	29.8%	100%

** See text for definition of habitat 1 & 2.

Another habitat component is 50-11-40 acres. This number (50-11-40) refers to the amount (in acres) of forested land that is at this time in a condition where 50% is composed of 11 inch diameter trees with a minimum of 40% canopy closure. This habitat condition is important as dispersal habitat outside the Late Successional Areas. The number describes the minimum standards to describe dispersal habitat in these areas. Table 15 gives the acres of 50-11-40 present in the Myrtle Creek WAU in each quarter township that overlaps the watershed boundary. Two quarter townships overlap the watershed but are outside the South River Area boundary (Table 15).

Table 15. Acres Of 50-11-40 Habitat In The Myrtle Creek WAU.

Qtr Township	Total Available	1140 Acres	1140 Available	1140 %
27-04-SE	1,130	426	0	38[A]
27-04-SW	160	144	64	90[A]
28-02-SW	1,371	1,211	526	88
28-03-NW	1,801	818	0	45
28-03-SW	5,303	3,226	575	61
28-03-SE	4,470	3,414	1,179	76
28-04-NW	1,296	665	17	51
28-04-NE	3,137	1,454	0	46
28-04-SW	1,394	912	215	65
28-04-SE	1,555	679	0	44
28-05-SE	1,077	538	0	50
29-02-NW	4,374	3,014	727	66
29-03-NW	1,750	1,198	323	68
29-03-NE	2,321	1,301	141	56
29-03-SW	2,328	1,387	223	60
29-04-NW	1,058	636	107	60
29-04-NE	2,268	711	0	31
29-04-SW	1,008	712	208	71
29-04-SE	927	720	257	78
29-05-NE	594	151	0	25
29-05-SE	394	344	147	87
30-05-NE	1,949	1,265	291	65
TOTALS	40,375	25,496	6,076	

TOTAL AVAILABLE: Total forested acres including 50-11-40 acres.
1140 ACRES: Amount of 50-11-40 acres in the total forest acres.
1140 AVAILABLE: Number of acres above the 50% level of total acres available.
1140%: Percent of 50-11-40 acres in the township (1140 acres/total available).
A- Quarter townships within the analytical watershed boundary but outside the South River Resource Area.

Critical Habitat for the Recovery of the Northern Spotted Owl

The Myrtle Creek WAU boundary overlaps critical habitat unit CHU OR-29. Gross acres for this critical habitat unit are 97,151 acres. BLM lands make up 12 percent (11,654 acres) and Forest Service lands make up 88 percent (85,497 acres). Of the 11,654 BLM acres, 67 percent (7,576 acres) is suitable spotted owl habitat (Chris Cadwell, November 1992 Final Critical Habitat, SO). The portion of the Myrtle Creek WAU that overlaps CHU-OR-29 has 882 acres

of suitable spotted owl habitat. Total BLM ownership in the overlap is 1,963 acres. So, 45 percent (882/1,963 acres) of the overlap area has suitable spotted owl habitat (see Appendix D).

The American Bald Eagle and the Peregrine Falcon

These two birds of prey species occur in the Roseburg District. Yearly inventories (1971-1995) of known bald eagle sites (in Douglas Co.) by Isaacs and Anthony (1995) do not list any sites, nests, or territories within or in the vicinity of the Myrtle Creek WAU. The southwestern portion of the WAU has forest stands considered potential bald eagle habitat. These stands are approximately one mile from the South Umpqua River. Midwinter bald eagle counts (Isaacs 1995) from Days Creek to Melrose did not detect any bald eagles near the South Umpqua River. Bald eagles are occasionally seen along the South Umpqua River, but these observations occur during the fall or spring when adults are moving through. On occasion, bald eagles are observed 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 in the area where the watershed overlaps the South Umpqua River.

The peregrine falcon also occurs in the Roseburg District. Some areas in the Myrtle Creek WAU have exposed bedrock as a result of erosion and other geological processes. An inventory and evaluation of cliffs, and rock outcrops in the WAU was started during 1995. This evaluation of potential peregrine habitat indicates that two areas have physical characteristics that merit management and further monitoring. These areas are labeled PR0 (has medium potential (7)) and PR1 (has high potential, (9-10)).

Recent surveys have confirmed peregrines using one of the habitats mentioned above. Consult the area biologist for details needed for planning and use recommendations given later in this analysis.

The Marbled Murrelet and The Columbian White-tailed Deer

The marbled murrelet is found in the Roseburg District, but the Myrtle Creek WAU is outside the 50 mile zone distance from the Oregon coast. The western edge of the WAU is 60 air miles from the coast. Information about the biology and inland nest sites of the murrelet indicates that it is unlikely to be found beyond the 50 mile zone set in the forest plan (USDA and USDI FEIS 1994, USDI 1992b). Because of this, surveys to detect murrelets will not be done in the Myrtle Creek WAU.

Another species, the Columbian white-tailed deer, is not present in the WAU. Historically this species may have been present in the lower elevations of the WAU. Today, the known white-tailed deer population is restricted to an area northeast of Roseburg; approximately 15 air miles from the northern boundary of the WAU.

Remaining Species of Concern

Animal species not threatened or endangered, fall into a Federal Candidate, Bureau Sensitive, or Bureau Assessment category. Of these, 19 are Bureau Sensitive, and 14 are Bureau assessment (Federal Register 1996). See Appendix D for the species that occur in the Roseburg District.

Although there is information about the biology and habitat requirements of these species, the

population levels and current distribution are not available. Many of these animals use unique features (ponds, seeps, caves, or talus) found throughout the landscape and associated vegetation cover. In the Myrtle Creek WAU, the forest age classes are available, but the distribution patterns and abundance of unique habitats are not available at this time. The following is a short discussion about selected species in Appendix D.

The amphibian species listed in Appendix D (northern red-legged frog, foothill yellow-legged frog, and Clouded salamander) use unique habitats often found across many vegetation types. These habitats include large down woody material, talus slopes, creeks, seeps, ponds and wetlands. These features are abundant in the WAU. These species are documented in the South River Resource Area and are expected in the Myrtle Creek WAU.

An inventory of amphibians in the South River Resource Area was completed in 1994 (Bury 1995). This inventory serves to document the extent of amphibian species in the area. Species like the spotted frog is not expected in the WAU and was not found during the 1994 inventory. The tailed frog is present in the Myrtle Creek WAU. This species serves as an indicator of watershed water quality, because of its sensitivity to changes in sediment loads, and water temperature. Two other species, the Cascades Frog and the Southern Torrent salamander (Rhyacotriton variegatus) were documented in the WAU.

During the summer of 1994, a survey to identify the bat species present in the South River Resource Area was conducted under contract by Dr. Steve Cross (Southern Oregon College, Ashland, OR). Bat species use unique habitats like caves, talus, cliffs, snags, and tree bark for roosting, hibernating, and maternity sites. These components are present near or within vegetated areas (young to old forest stands). Bats also use other unique habitats (ponds, creeks, and streams) for feeding and drinking. Both the special status bat species and the listed (unofficial version 2) C-3 species (USDA AND USDI 1994) are present in the District and expected in the Myrtle Creek WAU.

Mammals like the white-footed vole and the red tree vole, which have geographic ranges including the Roseburg District, are expected in the Myrtle Creek WAU. Information about the biology and life history of the white-footed vole is limited (Marshall 1991). This species is associated with riparian zones, woody materials, and heavy cover. More recent information indicates association with mature forests (Marshall 1991). Surveys have not been done for this species. The red tree vole is an arboreal rodent that lives inside the canopy of trees in Douglas-fir forests of Oregon and Northern California. Its primary food is the needle of the Douglas-fir, but needles from Sitka spruce, western hemlock, and grand fir are also eaten by red tree voles (Huff et al. 1992).

Information about the northern goshawk is readily available (Marshall 1991). However the majority of the work with this species was done east of the Cascades. Current geographic distribution indicates that the goshawk is not expected in the majority of the Roseburg District. Observation records since 1984, show that the goshawk is present north of the expected distribution range. In the early 1980s, two nest sites were found in the Roseburg District but neither one was located within the Myrtle Creek WAU. Surveys to detect adult goshawks and/or goshawk nesting sites were conducted during 1995. Goshawks were not detected and the search continued in 1996.

All suitable spotted owl habitat has physical characteristics that also make it potential goshawk

habitat. The greater number of continuous forest habitat in the eastern portion of the watershed increases the potential use of the area by the goshawk.

The Myrtle Creek WAU supports bird of prey species common to the region but estimates of local populations are not available. General raptor surveys have been done. These raptor species occur in the WAU where suitable habitat is present. Some information is available about ospreys. The South Umpqua River crosses through the southwestern portion of the WAU. The river provides ideal hunting habitat for ospreys and nesting habitat is present on BLM or private land along the river. Within the WAU, nesting habitat for osprey is present approximately 1/2 mile from the river and northwest of the town of Myrtle Creek. Osprey surveys have been conducted along this section of the river. No osprey nests are present in the BLM forest stands in this portion of the WAU (based on South River RA osprey survey data collected from 1989 to 1995).

Neotropical Species

Oregon has over 169 bird species that are considered neotropical migrants; that is, these birds breed north of Mexico and migrate south to Mexico, Central America, and South America to spend the winter. Of these species, over 25 species are documented to be declining in numbers (Sharp 1990). During 1993, 1994, and 1995 the South River Resource Area conducted neotropical bird capture, banding, and habitat evaluation. However, none of this work was done in the higher elevation areas common in the Myrtle Creek WAU. A variety of habitat types and vegetation classes are used by neotropical bird species during migration and the breeding season. No information is available about the local neotropical population numbers in the Myrtle Creek WAU.

Big Game Species (Elk and Deer)

Exact numbers on the Roosevelt Elk and black-tailed deer populations in the Myrtle Creek WAU are not available (Personal communication from ODF&W). Both species are present and use similar habitats. Elk and deer forage for food in open areas where the vegetation includes grass-forb, shrubs, and open sapling communities. Both species use a range of vegetation age classes for hiding. This hiding component is provided by large shrub, open sapling, closed sapling, and mature or old growth forest components (Brown 1985).

The Myrtle Creek WAU includes portions of two elk management areas (Myrtle Creek and Deadman Mtn.) identified in the Roseburg District RMP/ROD (USDI 1995) and the Proposed Roseburg District Resource Management Plan/EIS (USDI 1994). Communication with Oregon Department of Fish and Wildlife identified this area as lacking current estimates of the elk population (ODFW personal communication). The quality of elk habitat in these management areas was discussed in the Proposed Roseburg District Resource Management Plan/EIS (USDI 1994). Using the Wisdom model (Wisdom et al. 1986), the cover quality, forage quality and road density indices were calculated. These numbers are not absolute and serve as a guide to the concerns that should be addressed within these management areas.

The Oregon Department of Fish and Wildlife (ODFW) set minimum quality indices for cover, forage, and road density. Details of the results are given in the Proposed Roseburg District Resource Management Plan/EIS (USDI 1994). In the Myrtle Creek WAU, all three indices are below the minimum levels considered important for optimum use by elk.

PLANTS

Surveys have been conducted for Special Status Plants on portions of the Myrtle Creek Analytical Watershed (Plant Atlas). However, there are many additional suspected "Survey and Manage" and "Protection Buffer" species as directed by the SEIS ROD that survey protocols have not been developed for these species. Current information on suspected fungi, lichens & bryophytes "Survey & Management" species and their habitat was taken primarily from Appendix J2 of FSEIS. For some suspected species, the survey would start at the watershed analysis level with identification of likely species locations based on habitat.

The following descriptions are of special status plants that have been documented or suspected in the Myrtle Creek Analytical Watershed. Table 16 shows in which watershed the special status plants may be located.

Table 16. Documented and Suspected Plants in the Myrtle Creek Analytical Watershed

Plant	Upper South Myrtle	Lower South Myrtle	Upper North Myrtle	Lower North Myrtle
Aster vialis	D	S	S	S
Astragalus umbracticus	D	S	S	S
Cypripedium montanum	D	S	S	S
Lupinus sulphureus var. kincaididii	D	S	S	S
Bensoniella oregona	X	S	S	S
Calochortus umpquaensis	X	X	D	X
Calochortus coxii	X	X	X	D
Phacelia capitata	X	X	D	D
Phacelia verna	X	X	X	D
Pellaea andromedaefolia	X	X	X	D

D - documented; S - suspected; X - not suspected

Aster vialis; Bureau Sensitive, "Survey and Manage" Species
This is a rare locally endemic taxon known only from Lane, Linn, and Douglas Counties in Oregon. It occurs primarily along ridges between Eugene and Roseburg.

The population in the UPSM Watershed is concentrated along a ridge dividing Letitia Creek and Long Wiley Creek at approximately 1,760 feet elevation and scattered individuals extend east downhill in a narrow band toward Letitia Creek to about 1,320 feet.

Plant succession leading to the closure of the forest canopy over these plants could be a significant management concern. Long term survival of this species at this site 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 to maintaining viability. It seems to thrive most vigorously in open gaps within old growth or edge habitat (Alverson and Kuykendall 1989). Monitoring plots were established in 1993 on the portion of the population within 10 meters of the ridgetop.

Lupinus sulphureus var kincaidii; Bureau Sensitive
This is one of three varieties of Lupinus sulphureus found in Oregon. It is known to exist 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. The population is concentrated along the ridge-top dividing Letitia Creek and Long Wiley Creek. Most of the population area, including the ridge-top, was cut for timber at least thirty years ago. Long term survival of this population at this site 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).

The monitoring plots established in 1993 for Aster vialis along the ridge-top between Letitia Creek and Long Wiley Creek could also be used as a framework for monitoring Lupinus sulphureus var. kincaidii. Research and monitoring data are unavailable (Kaye 1993).

Cypripedium montanum; Tracking, "Survey and Manage" Species
Populations are small and scattered; less than 20 are extant west of the Cascades. Small populations may reflect the slow establishment and growth rate of this species. Cypripedium montanum seems to persist in areas which have been burned. The species ranges from Southern Alaska and British Columbia south to Montana, Idaho, Wyoming, Oregon, and California. Survival of the species may depend on protection of known populations and development of a conservation plan (USDA and USDI SEIS Appendix J2 1994a).

Astragalus umbraticus; Assessment Species
Woodland milk vetch grows in open woods at low to mid elevation from Southwest Oregon to Northwest California.

Bensoniella oregona; Bureau Sensitive
This species occurs along intermittent streams or meadow edges in mixed evergreen forest and white fir communities from 3,000 to 5,000 feet in elevation. It is typically less frequent in riparian shrub and forest openings, usually occupying upper slopes and ridgetop saddles with north aspects. It appears to tolerate some disturbance, if subsurface drainage is not altered. Populations along streams in clearcuts are very small. According to Copeland (1980, in Lang 1988), Bensoniella occurs within very specific meadow and stream edge habitat on soils derived from ancient sedimentary rocks.

Calochortus umpquaensis; Federal Candidate (FC)
This plant is a distinct showy, perennial forb in the lily family that blooms late May to early June. It is restricted to serpentine habitats in southwestern Oregon from southern Douglas County to northern Jackson and Josephine Counties. The plant is found in a number of different habitats ranging from woodlands to open grasslands (Fredricks 1989).

Calochortus coxii; Bureau Sensitive
This is a newly discovered and described species known to exist only along a twelve mile serpentine ridge system between Dodson Butte and Riddle. As currently known, C. coxii occurs exclusively in Douglas County, Oregon. C. coxii is a distinct showy, perennial forb in the lily family that blooms late June to July. C. coxii is restricted to serpentine habitats. It is found in a number of different habitats ranging from woodlands to open grasslands. Currently, there are only two real populations which are separated by the Interstate 5 freeway (Fredricks 1989).

A Conservation Strategy is currently being developed for Calochortus coxii to identify and schedule management actions that will remove or limit threats to Calochortus umpquaensis and provide for its long term survival.

Pellaea andromedaefolia; Assessment Species
This fern occurs on dry rock outcrops mostly in the open sun but at times along shaded stream banks below 4,000 feet elevation. Distribution ranges from Lane County, Oregon south to Baja, California.

Phacelia capitata; Tracking Species
This perennial forb in the waterleaf family blooms from mid April to June. It is presently known to exist from Little River south to Galice in southwest Oregon. It is found on serpentine grasslands and open woods at elevations from 750 to 3,000 feet.

Phacelia verna; Tracking Species
This is an annual forb in the waterleaf family that blooms 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.

HUMAN USES

The Myrtle Creek WAU has several prevalent uses important to those living in these watersheds, as well as in the surrounding communities.

Timber

Production of forest products is an important human use. The Myrtle Creek WAU contains approximately 34,000 acres of private land capable of forest production, some are currently being harvested. Bureau of Land Management administered lands contain tracts of timber potentially available for harvest as well. These activities are important to the local economy, providing both jobs and revenue to local inhabitants.

Minerals

Mineral production is another human use within the WAU. Historic mining activities occurred in the Lee Creek and Letitia Creek subwatersheds. Two principle lode mines were discovered around 1898. The Chieftain and Continental gold mines worked a disconnected vein of quartz which extended approximately 1 1/4 miles. These mines operated during the early 1900s with most production prior to the 1930s. The mining town of Nugget sprang up along South Myrtle Creek to support these operations. Little evidence of this settlement remains today.

The area has high and moderate potential areas for gold, silver, copper, mercury, lead/zinc, and chromium/nickel deposits. There are numerous mining claims within the WAU. Gold is being produced from placer mines in the Lee Creek drainage. Mining activities conducted in or near riparian areas can pollute streams and other bodies of water by releasing suspended and bedload sediments and toxic metals and acids. It is expected the production of gold from placer deposits will continue.

During most types of mining, vegetation is removed from the land and/or streams are dredged or channelized. The disruptions caused by mining to land and stream channels subsequently increase sedimentation rates, produce higher peak flows during storms, and reduce base flows during the summer low flow months. Streams are often diverted to provide water to mining operations. The diversions result in lower streamflows in-channel and alter channel hydraulics (Meehan 1991).

Acid is another pollutant arising from mine drainage. In general terms, the soils of southwestern Oregon have a low pH. Low pH levels may eliminate sensitive aquatic species while the more tolerant, usually less-desirable species proliferate resulting in a reduced density and diversity of aquatic species.

The construction of roads within the Myrtle WAU has led to the development and mining of rock quarries to provide surfacing material. Decomposed granite, shale, and sandstone are common, with few viable rock sources available. Of the nine quarries existing in the WAU, two are located on private land, and seven are on BLM administered lands. Most of the quarries have been exhausted of any real quantity of useable rock. Surfacing rock will continue to be in demand in these watersheds, and will be a major tool used to reduce sediment and soil runoff through upgrading roads.

Agriculture

There are approximately 11,000 acres of agriculture/farm land in the WAU. These lands contain pastures for grazing cattle and sheep, fields for grain production, and farmlands for seasonal crops of fruits and vegetables. Grazing permits on BLM lands are not a major factor in these watersheds.

Recreation

These watersheds fall within the South River Extensive Recreation Management Area. Recreation is mainly unstructured and dispersed, where limited needs or responsibilities require minimal recreation investment. These areas, which constitute the bulk of public land, give recreational visitors the freedom of choice with minimal regulatory constraints. Recreation in these watersheds

is mainly in the form of dispersed casual use. Dispersed forms of recreation commonly observed in this area include scenic driving, hunting, photography, picnicking, camping, target shooting, and gathering (berries, flowers, mushrooms, greens, and rocks).

V. Interpretation

VEGETATIVE CONDITION

Although private lands are a major component of this WAU, the focus of interpretation will be on BLM administered lands. Private lands are in a constant state of change, and although we can assume stands in the 30 to 70 year age classes will continue to be harvested, we cannot predict the timing or amount of harvest.

Bureau of Land Management administered lands available for intensive forest management are basically those lands outside of Riparian Reserves and other outs. Based on the age class of the various stands, they would be available for the following treatments:

Age Class: < 10 years
Treatments prescribed for this age class would be those designed to promote the survival and establishment of conifers and other vegetation by reducing competition from undesired plant species and protecting them from natural hazards. Maintenance and protection actions would include mulching, cutting or pulling unwanted species, grazing, herbicide application, tubing/netting, shading and trapping.

Age Class: 10-20 years
Treatments prescribed for this aggregation of age classes would involve precommercial thinning and release that would be designed to control stand density, maintain stand vigor and influence species dominance. Fertilization would be employed after thinning to augment the supply of soil nutrients, further enhancing stand growth.

Age Class: 30-70 years
Treatments prescribed for this age class would involve pruning and commercial thinning. These activities would enhance wood quality through the production of clear wood, increase timber yields through the harvest of merchantable trees that would otherwise be lost due to mortality and improve the growth rates of residual trees. Timing of thinning activity would depend on stand density, minimum average diameter for an economic entry, site quality and previous silvicultural treatments, but would not likely occur before age 35. Thinning in Riparian Reserves could occur with the specific objective of hastening the restoration of large conifers to areas where they are currently deficient.

Age Class: 80-200+ years
Treatments prescribed for this aggregation of age classes would involve commercial thinning, density management, regeneration harvest or all of the above, depending on Land Use Allocation (General Forest Management Area vs. Connectivity). For GFMA, regeneration harvest with a retention of 6-8 green conifers per acre > 20" diameter would be programmed at culmination of mean annual increment (CMAI), which is at 80 to 110 years on the average for this area. For Connectivity, commercial thinning and density management would be the priority harvest in stands < 120 years old. Regeneration harvest resembling a shelterwood cut

with a retention of 12-16 green conifers per acre > 20" diameter would be programmed using a 150 year rotation.

The Roseburg District RMP (RMP pg. 38) restates the requirement in the SEIS ROD that in fifth field watersheds, 15 percent of all federal land use allocations should always remain in late-successional forest stands. Within the Riparian Reserves alone, each of the watersheds in the Myrtle Creek WAU contains greater than 15 percent in late-successional forests. Table 17 shows the number of acres and the percentage of Riparian Reserves in stands greater than 80 years old.

Table 17. Acres in Riparian Reserves greater than Age Class 80

Watershed	Acres in Riparian Reserves > 80 years	Total BLM Acres	% of Total BLM Acres that are Riparian Reserves > 80 years
Upper South Myrtle	3,601	16,151	22 percent
Lower South Myrtle	645	2,578	25 percent
Upper North Myrtle	1,730	8,567	20 percent
Lower North Myrtle	965	3,713	25 percent

Matrix lands within the Myrtle Creek WAU are expected to be managed for timber production to meet the Probable Sale Quantity (PSQ) established in the RMP. Table 18 shows estimates of acres per decade of GFMA and Connectivity to be harvested in each Watershed.

Table 18. Acres of Proposed Harvest (per decade) in Matrix.

Watershed	Acres of GFMA per decade	Acres of CONN per decade
Upper South Myrtle	868	81
Lower South Myrtle	203	24
Upper North Myrtle	262	65
Lower North Myrtle	147	20

SOILS / EROSION

When looking at the watersheds from the standpoint of soils and erosion, it becomes clear that most of the BLM administered lands fall within granitic or landslide potential categories. The RMP provides Best Management Practices (USDI 1995, Appendix D) with respect to most forest management practices that are designed to minimize soil loss and maintain soil productivity.

HUMAN USES

The demand for forest products will continue to drive the harvest of timber from private lands. There is no way to predict the timing and magnitude of these harvests. The RMP has designated Matrix lands within the Myrtle WAU as available for harvest (see Table 18). The demand for minerals, agricultural/farm products, and recreational opportunities is going to continue to be important in these watersheds. These activities will have some negative impacts to soils, water quality/quantity, fisheries, and wildlife. Since we cannot control private landowners, we must focus on mitigating impacts through implementation of BMP's on federally managed lands where feasible.

Mining

It is expected that production of gold from placer deposits will continue. This will result in impacts to riparian zones including the loss of forest cover over long periods of time. Wetlands will be altered and may not recover as wetlands. Short term turbidity increases may affect Lee Creek, North Myrtle Creek, and potentially others.

Prospecting for metallic lode deposits are also expected to continue. Acid rock drainage from outcrops containing sulfides is likely occurring at this time. The potential for stream acidity problems and contamination from heavy metals from past mining exists. Future exploration and development work may cause an increase in acid rock drainage problems.

FISHERIES

The available aquatic habitat data for the Myrtle Creek WAU suggests the fishery resource has been influenced negatively from past land management activities within these watersheds. Limiting factors affecting the fishery resource in each watershed are similar in nature, but have differing levels of effects on the aquatic system for each watershed. The recovery of at-risk and depressed stocks of anadromous salmonids within these watersheds will be a difficult task given that each of these watersheds are influenced by land ownership patterns and the differing land management objectives for each ownership. For this reason, aquatic restoration efforts leading to the conservation of the anadromous salmonids may be difficult in these watersheds. Cooperative agreements between county, state, federal agencies, and private landowners should be fostered to encourage the rehabilitation and restoration of aquatic habitats.

The beneficial uses associated with these watersheds differ to a certain degree. The watersheds provide water for irrigation, and land for timber production and for the extraction of minerals. The impacts associated with each of these activities eventually influence the habitat conditions of the aquatic system.

The BLM administers lands and resident fish-bearing streams upstream of the private ownership in the Upper South Myrtle Watershed and the Upper North Myrtle Watershed and to a much lesser degree in the two lower watersheds. This is a result of the BLM block ownership pattern in the upper portions of these watersheds. The BLM is capable of addressing water quality parameters affecting downstream anadromous fish bearing streams located on the private lands by diligently applying Best Management Practices and the

Standards and Guidelines described in the SEIS ROD for the various land use allocations within the Myrtle Creek WAU (USDA and USDI 1994).

The Bureau's role for restoration in the Myrtle Creek WAU should concentrate on improving the water quality conditions. Water quality conditions would benefit from road renovation, road decommissioning, and road obliteration. Proper drainage structures and erosion control measures applied to the existing forest road network would benefit these watersheds' sediment and water routing processes and would hasten the recovery of their aquatic habitats. The Transportation Management Objectives (TMO) should identify potential restoration opportunities within these watersheds. More intensive surveys should be conducted at the project level to determine the need for road renovation opportunities in the area of proposed projects.

WILDLIFE

Suitable forest habitat where spotted owls are located are known as spotted owl activity centers or master sites. Based on direction in the Forest Plan ROD, all activity centers in Matrix lands prior to January of 1994, must be protected by maintaining the best 100 acres of suitable habitat in the vicinity of known owl sites. With this in mind, a ranking of the activity centers is given in Table 19. This ranking is to provide management with a guide and **does not represent a clearance as needed, or may affect determination as required by section 7 of the Endangered Species Act (ESA) of 1973, as amended.**

Ranking provides an evaluation of the spotted owl sites based on the number of years occupied, years unoccupied, general history, reproduction history, habitat present, and professional judgment about the function of a site based on field experience (Table 19). Habitat evaluation was done using the provincial radius (1.3 or 1.2 miles) and the .7 mile radius around a master site.

The Myrtle Creek WAU is located in the land use allocation known as Matrix. The Roseburg District RMP/ROD (USDI 1995) and SEIS ROD (USDA and USDI 1994) have identified these lands for timber management while providing for forest connectivity, various habitat types, a variety of forest successional stages, and ecological functions like dispersal of organisms. The spotted owl is an example of a species that requires habitat connectivity, dispersal areas, and nesting areas. To assist in the decision making process, and to guide the selection of areas where projects (i.e. timber harvesting, roads, and recreation) may be located, a ranking of the owl master sites was created.

Dispersal Habitat

Information about dispersal habitat is also given as a guide. Some quarter townships in the Myrtle Creek WAU, are currently below the 50% thresholds for dispersal habitat. The data in Table 15 indicates that six quarter townships are below or equal the 50% threshold level, two townships are at the 51-59% level, seven quarter townships are in the 60-69% level, and five quarter townships are above or equal the 70% level. See Appendix D for the distribution of quarter townships across the watershed. Management actions should maintain dispersal habitat at or above 50% in each quarter township and physically connected to other forest areas.

Table 19. Spotted Owl Activity Center Ranking Data within the Myrtle Creek AWS in the South River Resource Area (1995).

MSNO	YEAR SITE WAS LOCATED	LAST YEAR OF KNOWN ACTIVE PAIR (PAIR STATUS + # JUVENILES)	LAST YEAR OCCUPIED & (PAIR STATUS)	No. OF YEARS OF REPRODUCTION/ PAIR STATUS SINCE 1985	ACRES IN PROVINCE RADIUS (RADIUS IN MILES)	ACRES IN .7 MILE RADIUS	OCCUPANCY RANK	ACRES RANK	HISTORY RANK
0292	1976	1992 (P+0J)	1995 (M)	0/2	1,055 (1.2)	391	1	B	2
0293	1977	1977 (P+2J)	1995 (M)	0/0	1,032 (1.2)	459	2	B	3
0294	1976	ND	1994 (M)	0/0	772 (1.2)	291	2	D	3
0294A	1991	1991 (M+F+0J)	1993 (M+F)	0/0	383 (1.2)	173	2	D	3
0362	1982	ND	ND	0/0	463 (1.2)	156	3	D	3
1811	1986	1995 (P+0J)	1995 (P)	0/2	1,272 (1.2)	394	1	B	2
1814	1986.	1986 (P+0J)	1991 (M)	0/0	1,450 (1.2)	326	3	B	3
2086^	1989	1989(P+0J)	1996(U)	0/1	946 (1.2)	406	2	D	3
2196	1990	1995 (P+0J)	1995 (P)	3/3	426 (1.3)	92	1	D	1
2204	1990	1990 (P+1J)	1991 (M)	1/1	471 (1.2)	123	2	D	3
2291	1990	1990 (P+0J)	1995 (M)	0/1	612 (1.2)	288	2	D	2
2294	1990	1991 (P+0J)	1991 (P)	0/1	535 (1.3)	235	3	D	3
2295	1990	1992 (P+0J)	1992 (P)	0/1	1,831 (1.2)	661	3	A	2
2381	1989	1994 (P+0J)	1994 (P)	0/2	1,730 (1.2)	721	1	A	2
3097	1991	1995 (P+0J)	1995 (P)	2/3	658 (1.2)	457	1	D	1

2086^ - This owl site is located within the watershed boundary but is outside the South River Resource Area boundary.

1/01/97

Definitions

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

LAST YEAR OF KNOWN ACTIVE PAIR - Gives the year, pair status and young produced; NP = site has not had a pair; ND = No Data.

ACRES RANK - These acres are in regards to suitable spotted owl habitat. A: These sites have greater than 1,000 acres in the provincial radius and greater than 500 acres within a .7 mile radius; B: These sites have greater than 1,000 acres in the provincial radius but less than 500 acres within a .7 mile radius; C: These sites have less than 1,000 acres in the provincial radius and greater than 500 acres in the .7 mile radius; D: These sites have less than 1,000 acres in the provincial radius and less than 500 acres in the .7 mile radius.

HISTORY RANKING - 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 spotted owls and the owls have produced young consistently; 2: site is consistently used by spotted owls but reproduction has been sporadic; 3: site where owls have had some reproduction, occupation has been sporadic, or no occupation.

PAIR STATUS - M = MALE; F = FEMALE; J = JUVENILE; P = PAIR STATUS; (M+F) = TWO ADULT BIRDS, PAIR STATUS UNKNOWN; PU = PAIR STATUS UNDETERMINED, INCOMPLETE OR NO DATA; ND = No Data.

NUMBER OF YEARS OF REPRODUCTION/PAIR STATUS SINCE 1985 - The first number gives the number of years with spotted owl reproduction at this site since 1985. The second number gives the number of years with pair status for the entire history of the activity center since 1985 (including the original and alternate sites, i.e. 0294A).

Critical Habitat

Approximately four sections in the eastern portion of the Myrtle Creek WAU overlap critical habitat unit OR-29. This critical habitat unit continues south to the John-Days-Coffee WAU. Overall, the portion of OR-29 in both Watershed Analysis Units has the most contiguous blocks of suitable habitat in any of the critical habitat units present in the South River Resource Area. This is the result of having only BLM ownership in the eastern portion of both WAUs.

Other Federally Listed Species

Information about the Columbian white-tailed deer, the marbled murrelet, and the bald eagle was presented in an earlier section. The Myrtle Creek WAU is being inventoried to locate, evaluate, and survey suitable peregrine falcon habitat. Some of this work started in 1995 and continued in 1996. The area known as PR1 should follow management guidelines set in the literature (Paegel 1991), the Peregrine Falcon Recovery Plan (Pacific Coast American Peregrine Falcon Recovery Team 1982), and the Roseburg District RMP/ROD (USDI 1995).

Potential bald eagle habitat is present in the southwestern portion of the WAU. The number of acres on BLM lands is small; about 100 acres within one mile of the South Umpqua River.

VI. Recommendations

HARVEST POTENTIAL

Areas with the best potential for providing timber harvest units need to be identified for each watershed. Areas should be sufficient to meet the decadal targets identified in section V. Harvest planning for the Upper South Myrtle Watershed has recently been completed, and sales have been identified. The following is a brief discussion of the remaining three watersheds, with recommendations for potential harvest areas.

Upper North Myrtle

Of the subwatersheds in the Upper North Myrtle Watershed, North Myrtle Headwaters, Lee Creek, and Buck Fork seem to have the most areas available for harvest. In particular, T28S, R4W, sections 1, 14, 15, and 21; and T28S, R3W, section 17 should receive further consideration through the ID Team process.

Lower North Myrtle

Of the subwatersheds in the Lower North Myrtle Watershed, Lick Creek contains the largest block of available timber. However, there is currently no access to this tract. Some opportunities may also exist in Bilger Creek. If feasible, harvest in this area should be scheduled toward the end of the decadal period, to allow for recently harvested stands in the area to recover.

Upper South Myrtle

Of the subwatersheds in the Lower South Myrtle Watershed, Ben Branch and School Hollow have the most area available for harvest. In particular, T29S, R4W, sections 15, 17, 19, and 21 should receive further consideration.

FISHERIES / HYDROLOGY / RESTORATION

Recommendations on future land management activities may arise from rating the fisheries potential in each subwatershed from "most" important to "least" important.

Criteria used to rate current and future fisheries potential in subwatersheds--

What is current aquatic habitat condition?
What is current and historic species diversity?
What is the amount of accessible stream habitat for anadromous fish?
What are the upstream limits of distribution of resident and anadromous fish?

Those subwatersheds rated as "most" important should be maintained and only limited activities should be considered for these areas (i.e. commercial thinnings, pct, road maintenance, culvert replacements, or road improvements/upgrading).

Most important streams to maintain and/or restore are located in the following subwatersheds:

1. South Myrtle Headwaters
2. Weaver Creek
3. Louis Creek
4. North Myrtle Headwaters
5. Letitia Creek
6. Upper Slide Creek
7. Riser Creek
8. Buck Fork

Those subwatersheds rated as "least" important should be considered for regeneration harvests first.

Subwatersheds in which to consider regeneration harvesting include:

1. Frozen Creek
2. Lick Creek
3. Cedar Hollow
4. Bilger Creek
5. Ben Branch
6. Pack Saddle
7. Lee Creek
8. Lower Slide Creek
9. Riser Creek

Other recommendations for maintaining or improving aquatic habitat:

Roads

Prioritize road systems that need maintenance or decommissioning. Refer to TMO's.

Replace undersized culverts or old, dilapidated culverts. Those culverts that are located in fish-bearing streams should be replaced with structures that would survive the 100-year flood event as well as provide upstream and downstream passage for anadromous and resident fish. Concentrate the upgrades in areas of "high importance" to fish and aquatic species. Many of these culverts are noted in the TMO's (Weaver Creek, Lee Creek, etc...) and/or on the Fish Distribution Maps in Appendix B.

Reduce the potential for erosion due to the existing road network and other sources of perpetual erosion by removing or stabilizing road fills or sidecast landing materials, upgrading stream crossings that are at risk of failing, not concentrating road drainage onto highly erosive and unstable soils to avoid a "gullying" effect into stream channels, and reducing stream network extension by reducing road densities and ultimately sediment routing. The ID team should identify priorities at the project level, e.g. low gradient fish bearing stream reaches.

Structures

Implement bioengineered stream stabilization improvements to control stream erosion and sedimentation where appropriate, instead of the traditional use of rip-rap. This would save money and provide rock for other projects in the future. Maintain existing instream structures in Weaver Creek.

Locate by field review/survey those stream reaches that may benefit from the placement of LWD into the stream channel. Methods used to add LWD could be by felling trees from the adjacent riparian area and/or by pulling trees adjacent to the stream channel, or placing logs and boulders with heavy mechanized equipment (i.e. tracked excavator or rubber tired skidder) into the stream.

WILDLIFE

The Northern Spotted Owl

Use the priority system presented below as a guide to locate areas in suitable spotted owl habitat where harvest activities may occur. In the selection of harvest areas in the Matrix, attempt to minimize the rate of forest fragmentation, maintain physical connectivity of suitable spotted owl habitat, consider current status of spotted owl dispersal habitat, and account for the role of connectivity blocks in Matrix lands in relation to owl habitat and owl sites.

To evaluate the status of spotted owl sites in relation to habitat, a priority list must be established. This priority can be created from data in Table 19. The goal is to evaluate the habitat, connectivity of habitat, fragmentation of that habitat, and owl site history to create the priority

list. This list can then be used to locate project areas while taking into account the location of current and active spotted owl sites. Once a general guide is created, the list can be used to evaluate the location of projects (i.e. timber harvesting, recreation, or roads) in Matrix lands as directed in the S&Gs (USDA and USDI 1994).

Table 19 gives the list of owl sites located in the Matrix lands within the Myrtle Creek WAU, suitable habitat present in the provincial radius (1.3 or 1.2 miles), the .7 mile radius, occupancy ranking, acres ranking, history ranking, reproduction history, year site located, and pair status.

Use the following list when planning projects that remove or disturb suitable spotted owl habitat. Numbers on the left side indicate the priority of the action in its relationship to spotted owl sites.

1) Areas where owl sites are **not** present should be considered first

2) If sites can not be avoided then sites that have above 1,000 acres in the provincial radius and above 500 acres in the .7 mile radius, with occupancy and history ranking of "3" should be **second**.

3) Sites with suitable habitat below 1,000 acres in the provincial radius and below 500 acres in the .7 mile radius, with occupancy and history ranking of "3" should be considered **third**.

4) Sites with suitable habitat above or below 1,000 acres in the provincial radius and above or below 500 acres in the .7 mile radius, with occupancy ranking of "2" and history ranking of "3" should be considered **fourth**.

5) Sites with suitable habitat above or below 1,000 acres in the provincial radius and above or below 500 acres in the .7 mile radius, with occupancy ranking of "3" and history ranking of "2" should be considered **fifth**.

6) Sites with suitable habitat above 1,000 acres in the provincial radius and above 500 acres in the .7 mile radius, with occupancy and history ranking of "2" should be considered **sixth**.

7) Sites with suitable habitat below 1,000 acres in the provincial radius and below 500 acres in the .7 mile radius with occupancy and history ranking of "2" should be considered **seventh**.

8) Sites with suitable habitat above 1,000 acres in the provincial radius and above 500 acres in the .7 mile radius, with occupancy ranking of "1" and history ranking of "2" should be considered **eighth**.

9) Sites with suitable habitat above 1,000 acres in the provincial radius and above 500 acres in the .7 mile radius, with occupancy ranking of "2" and history ranking of "1" should be considered **ninth**.

10) Sites with suitable habitat above 1,000 acres in the provincial radius and above 500 acres in the .7 mile radius, with occupancy ranking of "1" and history ranking of "2" should be considered **tenth**.

11) Sites with suitable habitat below 1,000 acres in the provincial radius and below 500 acres in the .7 mile radius, with occupancy ranking of "1" and history ranking of "2" should be considered **eleventh**.

12) Sites with suitable habitat below 1,000 acres in the provincial radius and below 500 acres in the .7 mile radius, with occupancy ranking of "2" and history ranking of "1" should be considered **twelfth**.

13) Sites with suitable habitat above or below 1,000 acres in the provincial radius and above or below 500 acres in the .7 mile radius with occupancy ranking of "1" and history ranking of "1" should be considered **last**.

Within the scope of Matrix land management as directed in the Forest Plan (USDA and USDI 1994) topics like connectivity of mature and late-successional blocks to other similar blocks, evaluation of the blocks and their relationship to topography, evaluation of spotted owl sites by determining suitable habitat present, where it is located, its connectivity to other suitable habitat, and status of dispersal habitat should be considered when planning management activities. Areas where critical habitat overlaps the Matrix should be managed so the function of critical habitat is not compromised by further fragmentation.

Connectivity of suitable habitat should be done with the aid of a photo of the Myrtle Creek WAU and seral age class maps. This is the best way to appreciate the connection of late-successional blocks and the relationship to topography. Topography is important because knowing where connectivity is lacking or present, and its relationship to riparian systems or uplands can 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 straight line flying require connectivity of habitat for movement. 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 and move by crawling or walking across the ground.

The following is an example of the priority list creation process.

1. Select owl sites that fall below habitat acre thresholds mentioned in the text (.7 mile = 500 acres, 1.3 miles = 1,335 acres or 1.2 miles = 1,286 acres) (Table 19 and Appendix D).

2. Selected sites (below thresholds) must also be prioritized by looking at the reproductive history of the site, occupancy ranking, history ranking, and number of years site has been occupied by a pair. These variables are listed in Table 19.

3. Owl sites selected must be further evaluated by finding the seral age classes within the radii

around the owl sites. The purpose here is to locate forest age classes, next to suitable habitat that may be manipulated to speed up the rate that stands develop late-successional characteristics.

4. Within the watershed, evaluate the connectivity of suitable spotted owl habitat within the sites to other late successional habitat in the vicinity. In general terms, locate older age class stands (80+ years old) and analyze how the current blocks are connected to other similar blocks. Review and answer the following questions and comments.

1. Does the provincial radii of owl sites contain forest stands suitable for harvest or manipulation?

2. Will manipulation of forest stands speed up attaining older age class characteristics in Matrix lands that can be used for connectivity between owl sites and current suitable spotted owl habitat?

3. Will harvest of the stands aid or reduce connectivity between current owl site habitat and adjacent habitat?

4. Where is the connectivity needed? In the upland or in the riparian area of the drainage ?

5. Evaluate the need to leave the stand as is, without manipulation and likely pros and cons of such choice.

Dispersal Habitat and Critical Habitat for the Spotted Owl

Recommendations about dispersal habitat are based on data in Table 15 (Acres of 50-11-40).

1) Projects that further reduce dispersal habitat in quarter townships currently below 40% should be avoided.
2) Quarter townships with dispersal habitat in the 51 to 60 % range should be managed to diminish the possibility the 50% threshold will be broken.
3) Manage to keep the highest dispersal percentages within well-connected parcels.
4) Projects planned in quarter townships currently below the 50% level require "may affect" assessment and consultation with the USFWS.

Critical habitat objectives are to provide now and in the future suitable habitat for a recovering population. The well connected, and currently present suitable owl habitat in OR-29 makes this critical habitat unit important to manage so fragmentation does not reduce or eliminate its role as critical habitat. Planning should take this into account when determining project areas.

OTHER FEDERALLY LISTED SPECIES

Bald Eagle and Peregrine Falcon

Although the inventory of potential peregrine falcon habitat is not complete, area PR1 is considered a high potential habitat site. Application of management guides to PR1 indicates that

a no harvest buffer be placed around this high quality potential peregrine site. This buffer should extend 800 meters (2,400 feet) from the face of the cliffs and cover an arc from SE to W in the area south of the cliffs. The rest of the buffer should cover 400 meters (1,200 feet) in an arc from SE to W but covering the area north of the cliffs. The reason for this odd looking buffer is that the area north of the cliffs is a flat area above the cliffs, not directly visible from the cliffs. To the south, the cliffs drop vertically to a bowl that is connected to the foothills of the mountain. Forested habitat covers the immediate vicinity and perennial streams flow from areas east and west of the cliffs toward the lowlands to the south. A secondary zone (800 to 2,400 meter radius) must be considered and should reflect the shape of primary zone given above.

The forest habitat and adjacent open areas from previous harvesting activities provide habitat for bird species and other animals peregrines are known to eat. To maintain the site integrity of a potential peregrine nesting site it should be managed as if the site was occupied. Site PR1 has been documented as occupied as of June 1996. The distances presented above would help meet this management direction. Other specific protection measures may be used based on occupancy and considered during environmental assessments related to projects in the vicinity of this habitat. Any proposed project must be evaluated and applicable seasonal restrictions should be applied, depending on the survey information. As a general rule, an occupied or unsurveyed high potential site should have no activities (i.e. timber harvesting, road construction, helicopters, or other forest management activities) occurring within the primary zone buffer given above. A secondary zone of 800 to 2,400 meter radius should not have forest management activities during the peregrine breeding season, but are allowed 14 days after fledgling or nest failure is confirmed.

Potential peregrine site PR0 should also be managed so the integrity of the habitat is maintained. Surveys are ongoing at this site. Future projects that require blasting or modification of the forest in the vicinity (secondary zone) of this potential site must not be done during the nesting season or within 1/4 mile (primary zone) of the habitat. Monitoring of both habitat sites should provide updated information to aid management decisions.

Potential bald eagle habitat is present near the South Umpqua River in the southwestern corner of the WAU. Forest stands within 1 mile of the river and facing the river corridor should be managed so tree characteristics provide the features used by bald eagles. In the Myrtle Creek WAU this refers to forest stands in section 21, of T29S-R5W. Opportunities in these forest stands and other forest stands along the river are given below.

1. Consider using the one mile buffer along the South Umpqua River as a management zone. In this zone use a prescription that would allow keeping bald eagle habitat characteristics through time. In particular manage for dominant old growth trees among younger age classes.

2. Select forest stands to keep bald eagle habitat. This option could select only the forest stands that currently have suitable habitat characteristics, like larger diameter trees, dominant trees, close to the river (1/2 mile), and facing the river.

3. The Myrtle Creek WAU has a small amount of potential bald eagle habitat. Another option

could include no management for bald eagle habitat along the river corridor. Management may be more productive in the long river corridor of the John-Days-Coffee WAU.

An evaluation of the forest stands along the South Umpqua River is being done. This information may help decide the management direction for forest stands along the river corridor.

Big Game Species (Elk and Deer)

The opportunity is present to develop an elk management goal for the identified management areas and the overlapping Watershed Analysis Unit. Several questions need to be answered prior to developing specific methods.

1) What level of elk management is envisioned by the Roseburg District and the Resource Area?
2) Manage for elk numbers through careful habitat management?
3) Manage for habitat only and let the elk numbers be what they will be?
Any habitat benefit is achieved as a by-product of mature forest conversion to younger age classes.
4) Maintain early age classes by not allowing growth to older age classes in areas currently 20 years old and younger, and less than 40 acres in size.
5) Consider size of harvest units to be 40 acres or less to accommodate use by elk and deer.
6) Consider road closures in an amount large enough to influence positive use of habitat by elk.
7) Manage so that miles of road per acre decrease, increase cover, and increase or maintain forage areas.

Any approach to elk management would benefit from information about distribution and use of the Myrtle Creek WAU by elk. This information is not available from the ODF&W. A potential conflict is the goal of habitat manipulation for elk and spotted owl habitat.

Management of road use by people can help management objectives for elk and deer. The habitat indices are only guidelines for the quality of the habitat as it relates to roads, forage, or hiding cover. In general, decommissioning or closing unwanted or unneeded roads, and reducing the construction rate and quantity of new roads would likely increase the use of undisturbed areas by elk.

MONITORING

Watershed analysis supports decisions for a variety of planned ecosystem management actions within watersheds. Specific actions may include habitat restoration, sediment reduction, road removal and management, or timber harvesting. Monitoring will be an essential component of these actions and will be guided by the results of the watershed analysis (S&G's B-32)

General objectives of monitoring as stated in the Standards and Guidelines are:
1) To determine if Best Management Practices have been implemented.

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 allocations and resources covered under the plan. Implementation, effectiveness, and validation monitoring questions are addressed. At least 20 percent of all management actions on the Roseburg District BLM will be examined prior to project initiation and re-examined following project completion.

Some key resource elements to monitor in the Myrtle Creek WAU are as follows:

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 being protected?
Are the sites of amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropod species listed in Appendix H being surveyed?
Are high priority sites for species management being identified?

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?
Are watershed analyses being completed prior to on-the-ground actions being initiated in Riparian Reserves?

Matrix
Are suitable numbers of snags, coarse woody debris, and green trees being left, following timber harvest, as called for in the SEIS ROD Standards 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?

Monitoring Specific to Fisheries and Hydrology
1. Monitor smolt production from the Myrtle Creek Watershed. Place a rotary screw trap downstream from Louis Creek.
2. Continue coho spawning surveys in the index stream reaches established in Weaver Creek and South Myrtle Creek.
3. Continue water temperature monitoring in South Myrtle Creek, Curtin Creek, and Johnson Creek.

July 6, 1998

Myrtle Creek Watershed Analysis (2nd Iteration)
Update of Myrtle Creek Watershed Analysis - Revised January 29, 1997

Introduction

Watershed Analysis is an ongoing, iterative process used to help define important resource and information needs. This revision of the Myrtle Creek Watershed Analysis is to update, make corrections, and provide new or additional information to the Myrtle Creek Watershed Analysis, which was completed January 29, 1997. This revision is not meant to replace the Myrtle Creek Watershed Analysis, just to update portions of it.

Land Use Allocations

Approximately 16,663 acres are available for regeneration harvests in Matrix. Approximately 14,346 acres are located in reserved areas, such as Riparian Reserves, Northern Spotted Owl core areas, Timber Productivity Capability Classification (TPCC) Nonsuitable Woodlands (NW), or Research Natural Areas (RNA)/Areas of Critical Environmental Concern (ACEC).

Table 1-S. Acres by Age Class on BLM Administered Lands

UPPER SOUTH MYRTLE															
Drainage	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	TOTAL
Lower Louis Creek	97	16	66	11	10	2	146	23	41	7	15	2	249	40	624
Upper Louis Creek	109	5	241	10	373	16	347	15	21	1	284	12	990	42	2,365
Wiley Creek	0	0	208	16	39	3	267	21	13	1	191	15	582	45	1,300
Letitia Creek	23	1	70	4	85	5	465	29	0	0	309	19	668	41	1,620
Weaver Creek	340	11	57	2	366	12	847	27	161	5	7	0	1,340	43	3,118
Lally Creek	282	13	166	8	225	10	340	15	93	4	181	8	923	42	2,210
Curtin Creek	63	3	46	3	121	7	99	5	205	11	267	15	1,026	56	1,827
S. Myrtle Headwaters	98	3	36	1	73	2	808	26	246	8	1,250	40	576	19	3,087
TOTAL	**1,012**	**6**	**890**	**6**	**1,292**	**8**	**3,319**	**21**	**780**	**5**	**2,504**	**16**	**6,354**	**39**	**16,151**

Table 1-S. Acres by Age Class on BLM Administered Lands

LOWER SOUTH MYRTLE

Drainage	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	TOTAL
Myrtle Links	19	4	66	13	1	0	112	21	172	33	4	1	151	29	525
Cedar Hollow	0	0	0	0	0	0	4	2	176	85	27	13	0	0	207
Short Course	50	16	0	0	0	0	29	9	105	34	126	41	0	0	310
Pack Saddle	93	19	24	5	2	0	69	14	80	16	31	6.2	198	40	497
School Hollow	54	9	84	14	55	9	22	4	38	6	180	31	156	26	589
Ben Branch	0	0	114	25	104	23	46	10	29	6	74	16	83	18	450
TOTAL	216	8	288	11	162	6	283	11	600	23	442	17	588	23	2,578

UPPER NORTH MYRTLE

Drainage	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	TOTAL
Middle North Myrtle	51	12	147	34	0	0	74	17	4	1	0	0	151	35	427
Lee Creek	172	9	162	9	254	14	256	14	131	7	63	3	792	43	1,830
N. Myrtle Headwaters	17	1	681	30	0	0	236	11	72	3	32	1	1,202	54	2,240
Buck Fork	49	5	142	16	153	17	336	37	0	0	65	7	153	17	898
Lower Slide Creek	23	2	97	10	147	15	432	45	7	1	149	16	97	10	952
Upper Slide Creek	0	0	213	22	141	14	94	10	1	0	12	1	521	53	982
Riser Creek	132	11	95	8	203	16	137	11	8	1	6	0	657	53	1,238
TOTAL	444	5	1,537	18	898	10	1,565	18	223	3	327	4	3,573	42	8,567

LOWER NORTH MYRTLE

Drainage	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	TOTAL
Myrtle Creek	126	40	0	0	0	0	5	2	119	38	20	6	47	15	317
Lower N. Myrtle	1	1	4	2	97	54	2	1	60	33	15	8	1	1	180
Bilger Creek	298	21	223	16	79	6	139	10	258	18	390	27	42	3	1,429
Lick Creek	14	4	0	0	0	0	24	8	132	41	149	47	0	0	319
Frozen Creek	147	16	87	9	15	2	15	2	62	7	259	27	360	38	945
N. Myrtle Park	103	20	0	0	72	14	33	6	4	1	7	1	304	58	523
TOTAL	689	19	314	8	263	7	218	6	635	17	840	23	754	20	3,713

Table 1-S. Acres by Age Class on BLM Administered Lands

	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	TOTAL
TOTAL IN MYRTLE CREEK WAU	2,361	8	3,029	10	2,615	8	5,384	17	2,238	7	4,113	13	11,269	36	31,009

Riparian Reserves

The Myrtle Creek Watershed Analysis updated the Riparian Reserve widths used in the Upper South Myrtle Watershed Analysis for the Upper South Myrtle Subwatershed. The Upper South Myrtle Watershed Analysis used a site potential tree height of 178 feet, based on the average site index calculated from forest inventory plots throughout the Roseburg BLM District. The Myrtle Creek Watershed Analysis used a site potential tree height of 160 feet, based on the average site index calculated from forest inventory plots in the Myrtle Creek Watershed. The average site index calculated using plots from the lower one-third of the slope in the Myrtle Creek Watershed resulted in the same average site tree height of 160 feet. The method used in the Myrtle Creek Watershed Analysis provides a more site specific approach than what was used in the Upper South Myrtle Watershed Analysis. This method approved by the Regional Ecosystem Office (REO) had not been developed when the Upper South Myrtle Watershed Analysis was prepared.

Table 2-S. Acres by Age Class in Riparian Reserves

UPPER SOUTH MYRTLE															
Drainage	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	TOTAL
Lower Louis Creek	19	3	27	11	0	2	44	23	25	7	4	2	116	40	235
Upper Louis Creek	42	5	78	10	192	16	95	15	7	1	80	12	406	42	900
Wiley Creek	0	0	93	16	26	3	94	21	0	1	53	15	230	45	496
Letitia Creek	2	1	13	4	34	5	195	29	0	0	98	19	308	41	650
Weaver Creek	138	11	7	2	190	12	503	27	96	5	1	0	513	43	1,448
Lally Creek	91	13	89	8	109	10	192	15	25	4	84	8	336	42	926
Curtin Creek	17	3	14	3	58	7	45	5	31	11	72	15	327	56	564
S. Myrtle Headwaters	26	3	14	1	36	2	392	26	89	8	528	40	172	19	1,257
TOTAL	335	6	335	6	645	8	1,560	21	273	5	920	16	2,408	39	6,476

Table 2-S. Acres by Age Class in Riparian Reserves

LOWER SOUTH MYRTLE

Drainage	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	TOTAL
Myrtle Links	18	4	37	13	0	0	74	21	129	33	2	1	92	29	352
Cedar Hollow	0	0	0	0	0	0	1	2	66	85	6	13	0	0	73
Short Course	23	16	0	0	0	0	15	9	15	34	25	41	0	0	78
Pack Saddle	34	19	3	5	0	0	28	14	27	16	7	6.2	56	40	155
School Hollow	18	9	32	14	31	9	15	4	15	6	62	31	67	26	240
Ben Branch	0	0	64	25	27	23	20	10	26	6	28	16	22	18	187
TOTAL	**93**	**0**	**136**	**11**	**58**	**6**	**153**	**11**	**278**	**23**	**130**	**17**	**237**	**23**	**1,085**

UPPER NORTH MYRTLE

Drainage	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	TOTAL
Middle North Myrtle	23	15	44	29	0	0	25	17	2	1	0	0	57	38	151
Lee Creek	84	10	76	9	127	15	134	16	45	5	35	4	342	41	843
N. Myrtle Headwaters	3	0	312	29	0	0	151	14	29	3	20	2	559	52	1,074
Buck Fork	7	2	49	13	71	19	171	47	0	0	31	8	36	10	365
Lower Slide Creek	11	2	30	7	67	15	259	56	0	0	42	9	51	11	460
Upper Slide Creek	0	0	141	28	83	16	55	11	0	0	4	1	224	44	507
Riser Creek	57	11	50	9	96	18	75	14	5	1	6	1	242	46	531
TOTAL	**185**	**5**	**702**	**18**	**444**	**11**	**870**	**22**	**81**	**2**	**138**	**4**	**1,511**	**38**	**3,931**

LOWER NORTH MYRTLE

Drainage	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	TOTAL
Myrtle Creek	22	36	0	0	0	0	0	0	21	34	8	13	10	16	61
Lower N. Myrtle	0	1	1	2	26	54	0	1	23	33	7	8	0	0	57
Bilger Creek	101	14	98	13	56	8	111	15	138	19	201	28	24	3	729
Lick Creek	3	2	0	0	0	0	13	9	49	35	75	54	0	0	140
Frozen Creek	23	7	29	9	3	1	3	1	30	9	116	35	128	39	332
N. Myrtle Park	48	21	0	0	29	13	12	5	0	0	3	1	132	59	224
TOTAL	**197**	**13**	**128**	**8**	**114**	**7**	**139**	**9**	**261**	**17**	**410**	**27**	**294**	**19**	**1,543**

Table 2-S. Acres by Age Class in Riparian Reserves

	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	TOTAL
TOTAL IN MYRTLE CREEK WAU	810	6	1,301	10	1,261	10	2,722	21	893	7	1,598	12	4,450	34	13,035

An additional analysis of Riparian Reserves shows that approximately 144 acres originally determined to be in a vegetative condition may actually be categorized as non-forest due to roads. This affects about 1% of the BLM administered land in Riparian Reserves in the Myrtle Creek Watershed.

Roads within Riparian Reserves can also influence the amount of Large Woody Debris (LWD) available to streams. Some roads follow along streams and the effect of salvaging trees and down wood along these roads can decrease the amount of LWD which may reach the streams. Approximately 547 acres of Riparian Reserves may have a reduce amount of LWD available to the streams due to roadside salvaging of trees and down logs. This may affect about 4% of the Riparian Reserves on BLM administered land in the Myrtle Creek Watershed.

Private Lands

Table 3-S. Acres by Age Class on Private Lands

Subwatershed	Agricultural land	%	Acres of age class <10	%	Acres of age class 10	%	Acres of age class 20	%	Acres of age class 30 to 70	%	Acres of age class 80 to 110	%	Acres of age class 120 to 190	%	Acres of age class 200+	%	Total
Upper South Myrtle	1,794	17	67	1	207	2	624	6	7,488	72	97	1	91	1	93	1	10,368
Lower South Myrtle	3,013	32	25	0	333	3	48	1	5,708	60	400	4	0	0	0	0	9,527
Upper North Myrtle	692	7	13	0	553	6	573	6	7,305	78	250	3	38	0	0	0	9,424
Lower North Myrtle	5,596	36	0	0	1,636	10	276	2	7,630	49	452	3	118	1	0	0	15,708
TOTAL	11,095	25	105	0	2,729	6	1,521	3	28,131	62	1,199	3	247	1	93	0	45,027

HYDROLOGY

Temperature

Some questionable stream temperature data was presented in the January 29, 1997 version of the Myrtle Creek Watershed Analysis on page 11 through page 14. The Oregon Department of

Environmental Quality (DEQ) final 1996 303(d) list changed which portions of South Myrtle Creek were included in this list. This update of the Myrtle Creek Watershed Analysis deletes references to the suspected bad data and identifies the portion of South Myrtle Creek included in the DEQ listing.

The Oregon Department of Environmental Quality (DEQ) is required under Section 303(d) of the Clean Water Act to prepare a list of water bodies that are not expected to meet State water quality standards. The Department of Environmental Quality prepares a list every two years and submits it to the Environmental Protection Agency (EPA) for approval.

The 1996 listing included the main stem of South Myrtle Creek (from the mouth to the confluence with Weaver Creek) for exceeding State stream temperature and "flow modification" standards (refer to water quantity and low summer flow). The DEQ increased the Umpqua Basin temperature standard from 58 to 64 degrees Fahrenheit (17.8 degrees Celsius). The criteria is a rolling seven day average of the daily maximums, in which the temperature shall not exceed 64 degrees Fahrenheit. The beneficial uses impacted by elevated stream temperatures, as identified by DEQ, are resident fish and aquatic life, and salmonid fish spawning and rearing. Moreover, many fish species are rearing from June to September. Under OAR 340-41-(Umpqua Basin)(2)(b), no measurable increases to stream temperature are allowed.

The Roseburg District BLM is currently monitoring summer stream temperatures at two sites in South Myrtle Creek. The upstream location is above Curtin and Johnson Creeks (T28S-R3W-Sec 35), and the downstream location is below Ben Branch Creek (T29S-R4W-Sec 21) on BLM administered lands. Table 4-S summarizes three summer's worth of monitoring, and is not meant to indicate a baseline.

Table 4-S. South Myrtle Creek Stream Temperatures

Summer 1994

SITE	Maximum Temperature (°F)	TIME/DATE	Ave. Daily Maximum Temperature (°F)	DATE
Johnson Creek	63.3	14:01 07/21/94	61.7	07/18/94 - 07/24/94
Lower South Myrtle Creek	75.4	17:16 07/21/94	72.4	07/18/94 - 07/24/94

Summer 1995

SITE	Maximum Temperature (°F)	TIME/DATE	Ave. Daily Maximum Temperature (°F)	DATE
Lower South Myrtle Creek	69.4	16:43 07/20/95	68.4	7/17/95 - 7/23/95

Summer 1996

SITE	Maximum Temperature (°F)	TIME/DATE	Ave. Daily Maximum Temperature (°F)	DATE
Upper South Myrtle Creek	64.9	16:01 7/29/96	64.3	7/24/96 - 7/30/96
Curtin Creek	62.6	17:00 7/26/96	62.2	7/24/96 - 7/30/96
Johnson Creek	63.5	17:00 7/26/96	63.1	7/24/96 - 7/30/96

The summer of 1994 was one of the lowest flow and highest stream temperature years on record. The stream temperature maximums recorded in 1994 throughout the District were higher than previous years of record. Generally, stream temperatures tend to increase in the downstream direction, because of differences in channel morphology and increasing ambient radiation reaching the water surface. The Curtin Creek and Johnson Creek sites may provide a cool water refuge for fish during the critical summer months, and provide high quality cool water to warmer South Myrtle Creek.

The length high temperatures are sustained is critical in assessing the thermal suitability of streams to fish and aquatic life. The effects of high temperatures on fish is well documented. However, it is not understood as well for macro invertebrates. In 1996 Curtin and Johnson Creeks exhibited favorable thermal stability since the diurnal fluctuations were less than two degrees Fahrenheit. The diurnal fluctuation in stream temperatures, typically peaking in late afternoon and reaching a minimum early in the morning, is important to aquatic organisms. In 1995, lower South Myrtle Creek had very little thermal recovery from June 29 to August 11, as temperatures remained above 58 degrees Fahrenheit 99% of the time. In 1994, Johnson Creek stream temperatures dropped below 58 degrees Fahrenheit 100% of the monitoring period, and lower South Myrtle Creek stream temperatures dropped below 58 degrees only 2% of the time from June 29th to September 3rd. The optimum temperature range for salmonids and cutthroat trout is between 54 and 59 degrees Fahrenheit (Meehan 1991).

The diurnal fluctuation in temperature is important to aquatic organisms and overall water quality (USDA and USDI 1995). The diurnal temperature fluctuations are shown in Table 5-S for 1994

and Table 6-S for 1995. Night time recovery of cooler water temperatures put fish under less stress than where night time cooling is limited.

Table 5-S. Diurnal fluctuations for the seven-day average daily maximum temperatures in lower South Myrtle Creek and Johnson Creek in 1994.

Lower South Myrtle (1994)		Johnson Creek (1994)
Date	Diurnal Fluctuation (°F)	Diurnal Fluctuation (°F)
7/18/94	7.4	3.9
7/19/94	8.9	4.1
7/20/94	7.6	4.1
7/21/94	6.3	3.4
7/22/94	3.6	1.1
7/23/94	8.1	4.2
7/24/94	4.3	2.5

Table 6-S. Diurnal fluctuations for the seven-day average daily maximum temperatures in lower South Myrtle Creek in 1995.

Lower South Myrtle (1995)	
Date	Diurnal Fluctuation (°F)
7/17/95	7.1
7/18/95	2.7
7/19/95	5
7/20/95	5.4
7/21/95	5.5
7/22/95	3.2
7/23/95	4.1

Connectivity/Diversity Blocks

There are 17 Connectivity/Diversity Blocks either completely or partially within the Myrtle Creek WAU. Connectivity/Diversity Blocks are to be managed to maintain 25 to 30 percent of each

block in late-successional forest at any point in time (USDI 1995). All of the Connectivity/Diversity Blocks contain greater than 30% in late-successional forests (see Table 7-S).

Table 7-S. Acres of Late-Successional Stands in Connectivity/Diversity Blocks in the Myrtle Creek WAU.

Connectivity/Diversity Block Number	Total Acres in Block	Total Acres in Late-Successional Stands (80 Years Old or Older	Percent of Block in Late-Successional Stands (80 Years Old or Older)
Block 11	1,169	828	71
Block 12	884	360	41
Block 13	1,625	852	52
Block 14	372	226	61
Block 15	839	342	41
Block 16	986	758	77
Block 17	529	383	72
Block 18	195	67	34
Block 19	626	199	32
Block 20	581	246	42
Block 21	618	261	42
Block 22	633	277	44
Block 23	638	230	36
Block 24	612	540	88
Block 25	581	372	64
Block 26	611	236	39
Block 36	648	322	50

Roads

The Myrtle Creek WAU contains approximately 553 miles of roads mapped in GIS. Miles of roads on BLM Administered land total approximately 185 miles.

Transportation Management Objectives identified roads within the Myrtle Creek WAU to consider decommissioning or improving. Table 8-S shows the miles of roads to identified for decommissioning or improving in the Upper North Myrtle and Upper South Myrtle Subwatersheds.

Table 8-S. Miles of Roads in the Upper North Myrtle and Upper South Myrtle Subwatersheds Identified for Decommissioning or Improving.

Subwatershed	Miles of Road Identified for Decommissioning	Miles of Road Identified for Improving
Upper North Myrtle	4.47	11.66
Upper South Myrtle	6.70	13.53

Passive Restoration

There are approximately 31,009 acres of BLM administered land within the Myrtle Creek WAU. Approximately 14,346 acres (47%) are in some type of reserve.

Approximately 1,670 acres per decade are estimated to be harvested in the Myrtle Creek Watershed. This would be about 5.4% of the BLM administered land in the Myrtle Creek Watershed (which is a fifth field watershed). In 30 years about 16% of the BLM administered land would have been harvested and less than 30 years old based on the estimated amount of timber harvesting. The amount of BLM administered land is estimated to be maintained at this level after 30 years.

Currently, 26% of BLM administered land in the Myrtle Creek Watershed is less than 30 years old. The estimated amount of timber harvesting in the Myrtle Creek Watershed would allow the vegetation to recover in comparison to current conditions.

Vegetative conditions in the Riparian Reserves will also be recovering over time. Approximately 53% (6,941 acres out of 13,035 acres of BLM administered land) of the Riparian Reserves are currently greater than 80 years old. In 60 years 84% (10,924 acres out of the 13,035 acres of BLM administered land) of the Riparian Reserves will be greater than 80 years old.

Active Restoration

Watershed restoration is an integral part of a program to aid recovery of fish habitat, riparian habitat, and water quality. Watershed restoration components include controlling and preventing road related runoff and sediment production, restoring the condition of riparian vegetation, restoring in-stream habitat complexity, restoring meadows and wetlands, and mine reclamation.

Restoration activities have not been conducted in the Myrtle Creek Watershed. However, some activities have been identified, such as potential roads to decommission. Some restoration activities are planned to be accomplished in the Fiscal Years (FY) 1998 and 1999. Approximately 2.8 miles of the Curtin Creek jeep road is planned to be decommissioned in FY 1998.

FISHERIES / HYDROLOGY / RESTORATION

This is an attempt to clarify what was written on page 49 in the Myrtle Creek Watershed Analysis. The intent of rating some of the Drainages from a fisheries perspective was to identify where restoration opportunities would provide the most benefit and not to exclude regeneration harvesting in these Drainages.

Current and future fisheries potential in each Drainage was rated based on the current aquatic habitat condition, current and historic species diversity, amount of accessible stream habitat for anadromous fish, and the distribution limits of resident and anadromous fish. Eight of the 27 Drainages in the Myrtle Creek Watershed were rated as having the most potential for restoration opportunities for fisheries. Activities such as commercial thinnings, pct, road maintenance, culvert replacements, or road improvements/upgrades could be considered in the following Drainages for helping to restore streams and habitat in the watershed.

1. South Myrtle Headwaters
2. Weaver Creek
3. Louis Creek
4. North Myrtle Headwaters
5. Letitia Creek
6. Upper Slide Creek
7. Riser Creek
8. Buck Fork

The following Drainages were rated as "least" important from a fisheries perspective where regeneration harvesting might be considered first. This is not intended to be a priority list but to provide input on where regeneration harvesting would have the least impact from a fisheries perspective.

1. Frozen Creek
2. Lick Creek
3. Cedar Hollow
4. Bilger Creek
5. Ben Branch
6. Pack Saddle
7. Lee Creek
8. Lower Slide Creek

9. Riser Creek

Maintaining or improving aquatic habitat may be accomplished by maintaining or decommissioning roads, or replacing undersized or old, dilapidated culverts. Removing or stabilizing road fills or sidecast landing materials, upgrading stream crossings that are at risk of failing, not concentrating road drainage onto highly erosive and unstable soils to avoid a "gullying" effect into stream channels, and reducing stream network extension by reducing road densities, which can route sediment to streams may reduce the erosion potential. Culverts located in fish-bearing streams should be replaced with structures that would accommodate the 100-year flood event, as well as provide fish passage. Consider concentrating restoration activities in areas of "high importance" to fish and aquatic species. Many of these culverts are noted in the TMOs (such as in Weaver Creek or Lee Creek) and/or on the Fish Distribution Maps in Appendix B.

Structures

Implement bioengineered stream stabilization improvements to control stream erosion and sedimentation where appropriate, instead of the traditional use of rip-rap. This would save money and provide rock for other projects in the future. Maintain existing instream structures in Weaver Creek.

Locate by field review/survey those stream reaches that may benefit from the placement of LWD into the stream channel. Methods used to add LWD could be by felling or pulling trees from the adjacent riparian area or placing logs and boulders with heavy mechanized equipment (i.e. tracked excavator or rubber tired skidder) into the stream.

APPENDIX A

HYDROLOGY

Ben Branch

AWS: Myrtle - Lower South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
1.81	6.20	3.42

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
1.81	11.71	6.48

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.70	3.48	4.94

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.70	3.90	5.54

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Cedar Hollow

AWS: Myrtle - Lower South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
1.73	8.96	5.19

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
1.73	10.60	6.14

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.33	0.71	2.18

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.33	0.65	1.99

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Myrtle Links

AWS: Myrtle - Lower South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.73	9.85	2.65

STREAM DENSITY (Total)

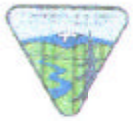
TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.73	21.18	5.69

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.82	2.44	2.98

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.82	5.27	6.43



Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Pack Saddle

AWS: Myrtle - Lower South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
4.10	30.11	7.34

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
4.10	27.95	6.82

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.78	5.81	7.47

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.78	3.14	4.04

Legend

- DC
- PD
- TRB
- HYD
- DRD

miles

0 .5 1

GIS-South Douglas

School Hollow

AWS: Myrtle - Lower South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.41	15.88	4.66

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.41	26.74	7.85

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.92	4.50	4.88

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.92	5.16	5.59

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Short Course

AWS: Myrtle - Lower South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
4.15	18.14	4.37

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
4.15	24.17	5.82

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.48	0.86	1.78

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.48	1.72	3.56

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Curtin Creek

AWS: Myrtle - Upper South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
2.858859	11.267820	3.94137

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
2.858859	11.245421	3.93353

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
2.858827	11.267820	3.94141

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
2.858827	11.245376	3.93356

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Lally Creek

AWS: Myrtle - Upper South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
6.45	31.93	4.95

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
6.45	42.31	6.56

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.47	17.09	4.92

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.47	19.16	5.52

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Letitia Creek

AWS: Myrtle - Upper South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
6.96	28.10	4.04

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
6.96	43.90	6.31

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
2.53	6.10	2.41

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
2.53	13.32	5.26

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Lower Louis Creek

AWS: Myrtle - Upper South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.20	12.60	3.94

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.20	21.74	6.84

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.98	5.10	5.23

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.98	4.79	4.91

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

South Myrtle Headwaters

AWS: Myrtle - Upper South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
5.248628	17.17415	3.27215

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
5.248628	28.852889	5.49723

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
4.823306	15.444952	3.20215

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
4.823306	26.167499	5.42522

Legend

- DC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Upper Louis Creek

AWS: Myrtle - Upper South Myrtle

ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
5.565791	30.670190	5.51048

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
5.565791	32.434699	5.82746

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.832015	19.548651	5.10140

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.832015	19.553021	5.10254

Legend

- DC
- PD
- TRB
- HYD
- DRD

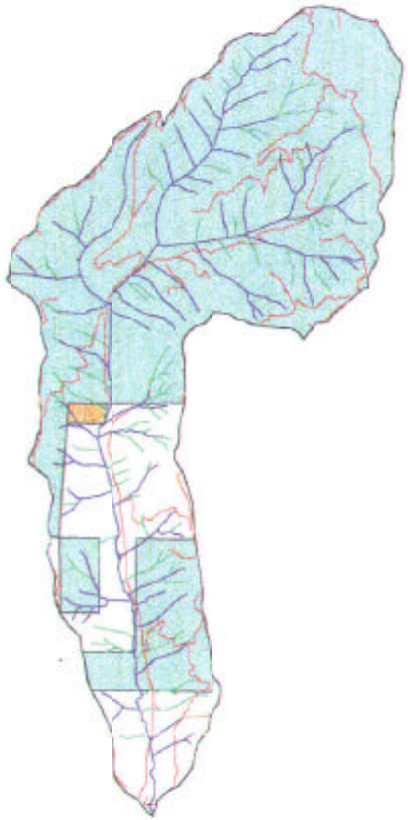
miles

0 .5 1

GIS-South Douglas

Weaver Creek

AWS: Myrtle - Upper South Myrtle



ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
6.191362	24.737310	3.99546

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
6.191362	40.766772	6.58349

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
4.872271	19.412693	3.98428

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
4.872271	29.409784	6.03616

Legend

- DC
- PD
- TRB
- HYD
- ORD

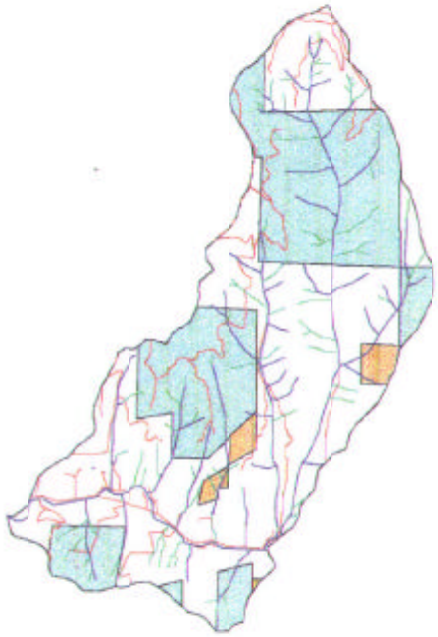
miles

0 .5 1

GIS-South Douglas

Wiley Creek

AWS: Myrtle - Upper South Myrtle



ROAD DENSITY (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
5.132341	19.733079	3.84485

STREAM DENSITY (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
5.132341	31.605814	6.15817

ROAD DENSITY (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
2.031318	5.222466	2.57097

STREAM DENSITY (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
2.031318	10.338693	5.08965

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Buck Fork

AWS: Myrtle - Upper North Myrtle

BUCKFRK ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
4.685791	22.336293	4.76681

BUCKFRK STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
4.685791	30.324553	6.47160

BUCKFRK ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
1.404639	9.460624	6.73527

BUCKFRK STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
1.404639	7.050057	5.00489

Legend

- OC
- PD
- TRB
- HYD
- ORD

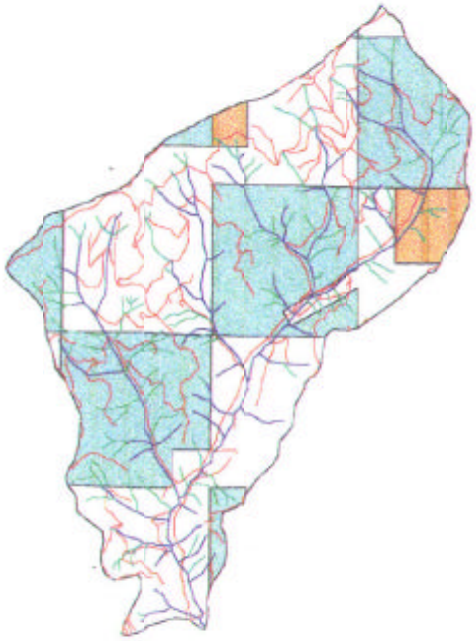
miles

0 .5 1

GIS-South Douglas

Lee Creek

AWS: Myrtle - Upper North Myrtle



LEECR ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
6.024859	39.844951	6.61343

LEECR STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
6.024859	39.900642	6.62267

LEECR ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
2.360804	15.290383	5.34478

LEECR STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
2.360804	18.320093	6.40383

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Lower Slide Creek

AWS: Myrtle - Upper North Myrtle

LOWSLIDE ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
2.806007	15.964877	5.68953

LOWSLIDE STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
2.806007	19.951452	7.11026

LOWSLIDE ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
1.488760	9.511830	6.38909

LOWSLIDE STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
1.488760	10.030691	6.73761

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Middle North Myrtle

AWS: Myrtle - Upper North Myrtle

MIDNMYRT ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.211441	19.795089	6.16393

MIDNMYRT STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.211441	24.251050	7.55145

MIDNMYRT ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.656977	3.737208	5.68849

MIDNMYRT STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.656977	3.177724	4.83689

Legend

- OC
- PD
- TRB
- HYD
- ORD

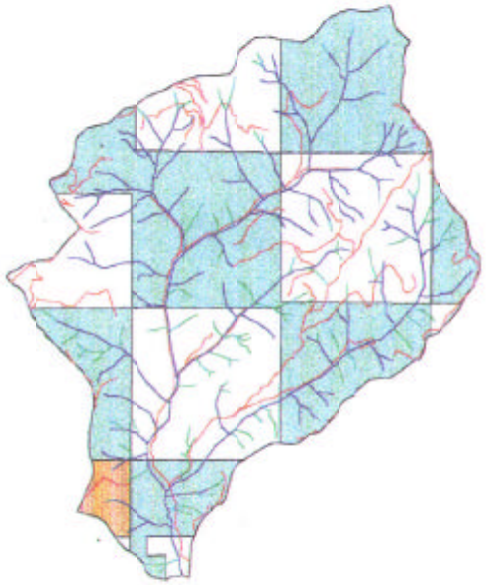
miles

0 .5 1

GIS-SouthDouglas

North Myrtle Headwaters

AWS: Myrtle - Upper North Myrtle



NMYRTHEAD ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
6.414290	24.287989	3.78654

NMYRTHEAD STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
6.414290	41.015684	6.39442

NMYRTHEAD ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.500988	10.920906	3.11938

NMYRTHEAD STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.500988	22.130927	6.32134

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-Scott Douglas

Riser Creek

AWS: Myrtle - Upper North Myrtle

RISERCR ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.143787	15.282857	4.86129

RISERCR STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.143787	19.455495	6.18855

RISERCR ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
1.934393	9.085432	4.69679

RISERCR STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
1.934393	10.712749	5.53804

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Upper Slide Creek

AWS: Myrtle - Upper North Myrtle

UPSLIDE ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
1.797603	7.708360	4.28813

UPSLIDE STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
1.797603	12.408369	6.90273

UPSLIDE ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
1.535616	6.389805	4.16107

UPSLIDE STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
1.535616	11.106288	7.23246

Legend

- OC
- FD
- TRB
- HYD
- ORD

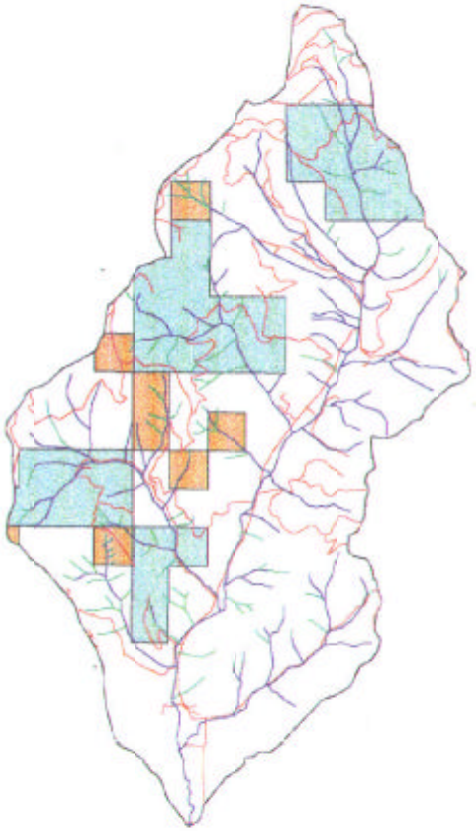
miles

0 .5 1

GIS-South Douglas

Bilger Creek

AWS: Myrtle - Lower North Myrtle



BILGERCR ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
8.701996	37.199577	4.27483

BILGERCR STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
8.701996	46.807133	5.37890

BILGERCR ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
2.239264	7.786351	3.47719

BILGERCR STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
2.239264	13.364700	5.96834

Legend

- OC
- PD
- TRB
- HYD
- ORD

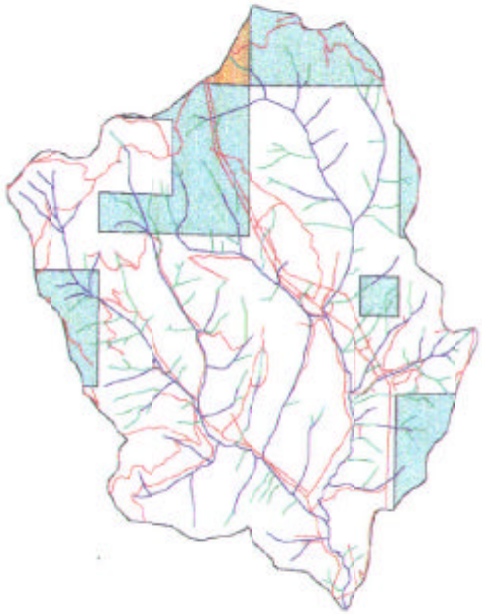
miles

0 .5 1

GIS-South Douglas

Frozen Creek

AWS: Myrtle - Lower North Myrtle



FROZENCR ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
7.178124	35.885455	4.99928

FROZENCR STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
7.178124	45.823283	6.38374

FROZENCR ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
1.478558	5.517234	3.73150

FROZENCR STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
1.478558	7.478076	5.05768

Legend

- OC
- PD
- TRB
- HYD
- ORD

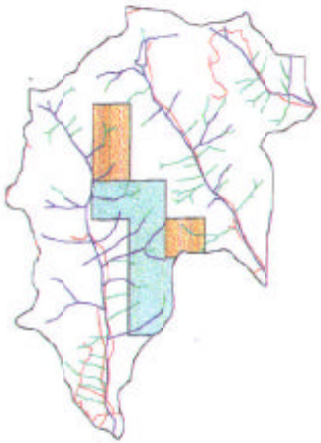
miles

0 .5 1

GIS-South Douglas

Lick Creek

AWS: Myrtle - Lower North Myrtle



LICKCR ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.122811	7.540920	2.41479

LICKCR STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.122811	20.664460	6.61726

LICKCR ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.499629	0.000000	0.00000

LICKCR STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.499629	2.820954	5.64609

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

Lower North Myrtle

AWS: Myrtle - Lower North Myrtle

LNMYRTLE ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.942781	17.623207	4.46974

LNMYRTLE STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.942781	22.964693	5.80927

LNMYRTLE ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.280331	0.458316	1.63491

LNMYRTLE STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.280331	1.054765	3.76257

Legend

- OC
- PD
- TRB
- HYD
- ORD

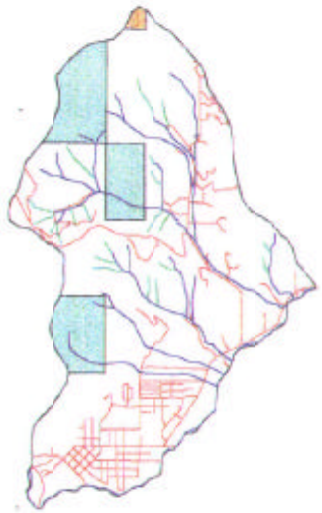
miles

0 .5 1

GIS-South Douglas

Myrtle Creek

AWS: Myrtle - Lower North Myrtle



MYRTLECR ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.631048	24.350621	6.70621

MYRTLECR STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.631048	16.610942	4.57470

MYRTLECR ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.495049	0.000000	0.00000

MYRTLECR STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.495049	0.941580	1.90199

Legend

- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas

North Myrtle Park

AWS: Myrtle - Lower North Myrtle

NMYRTPARK ROAD DENSITIES (Total)

TOTAL AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
3.780055	18.586489	4.91699

NMYRTPARK STREAM DENSITIES (Total)

TOTAL AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
3.780055	25.779449	6.81986

NMYRTPARK ROAD DENSITIES (BLM)

BLM AREA (SQ.MILES)	ROAD LENGTH (MILES)	ROAD DENSITY
0.817650	1.624150	1.98636

NMYRTPARK STREAM DENSITIES (BLM)

BLM AREA (SQ.MILES)	STREAM LENGTH (MILES)	STREAM DENSITY
0.817650	5.124119	6.26689

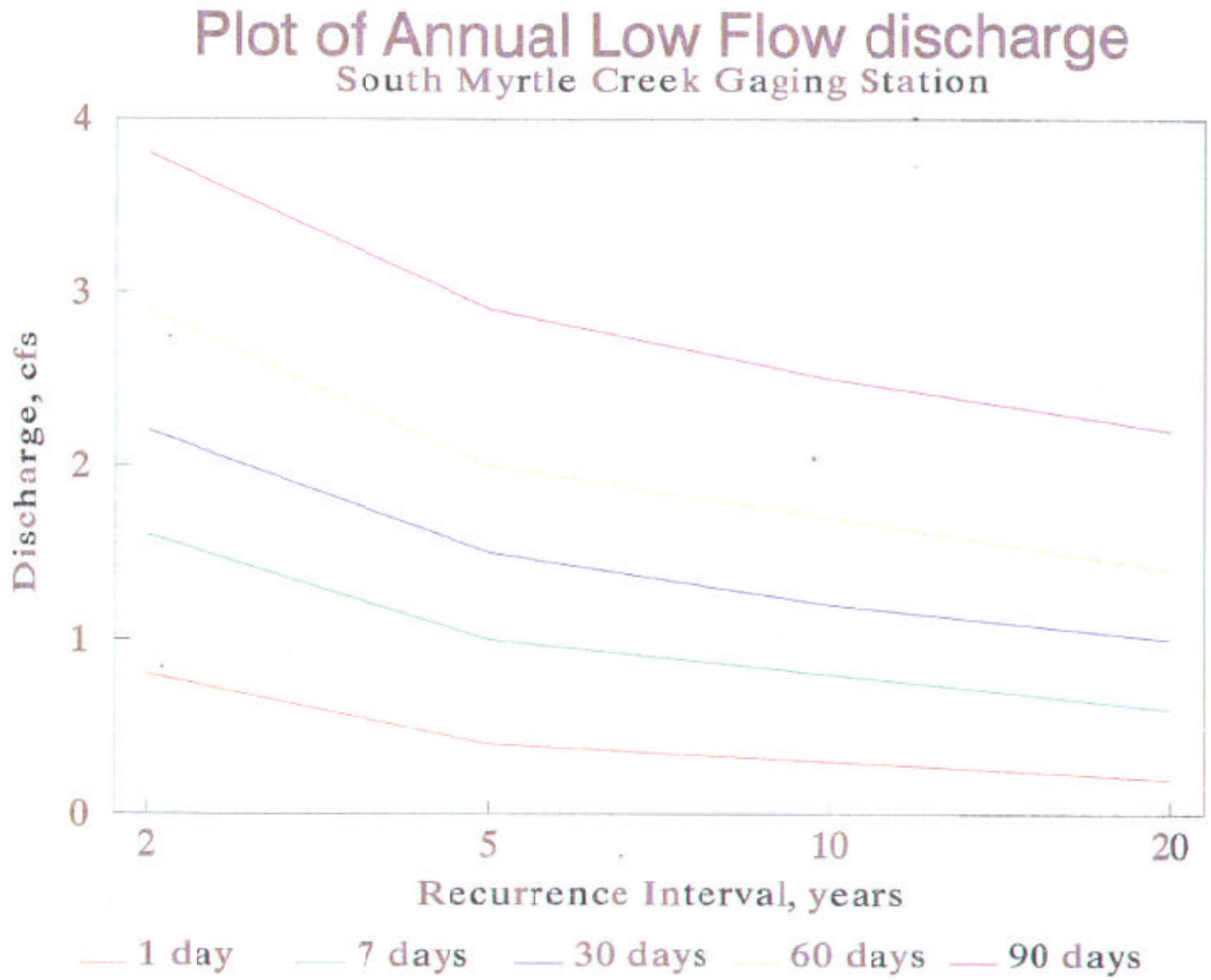
Legend

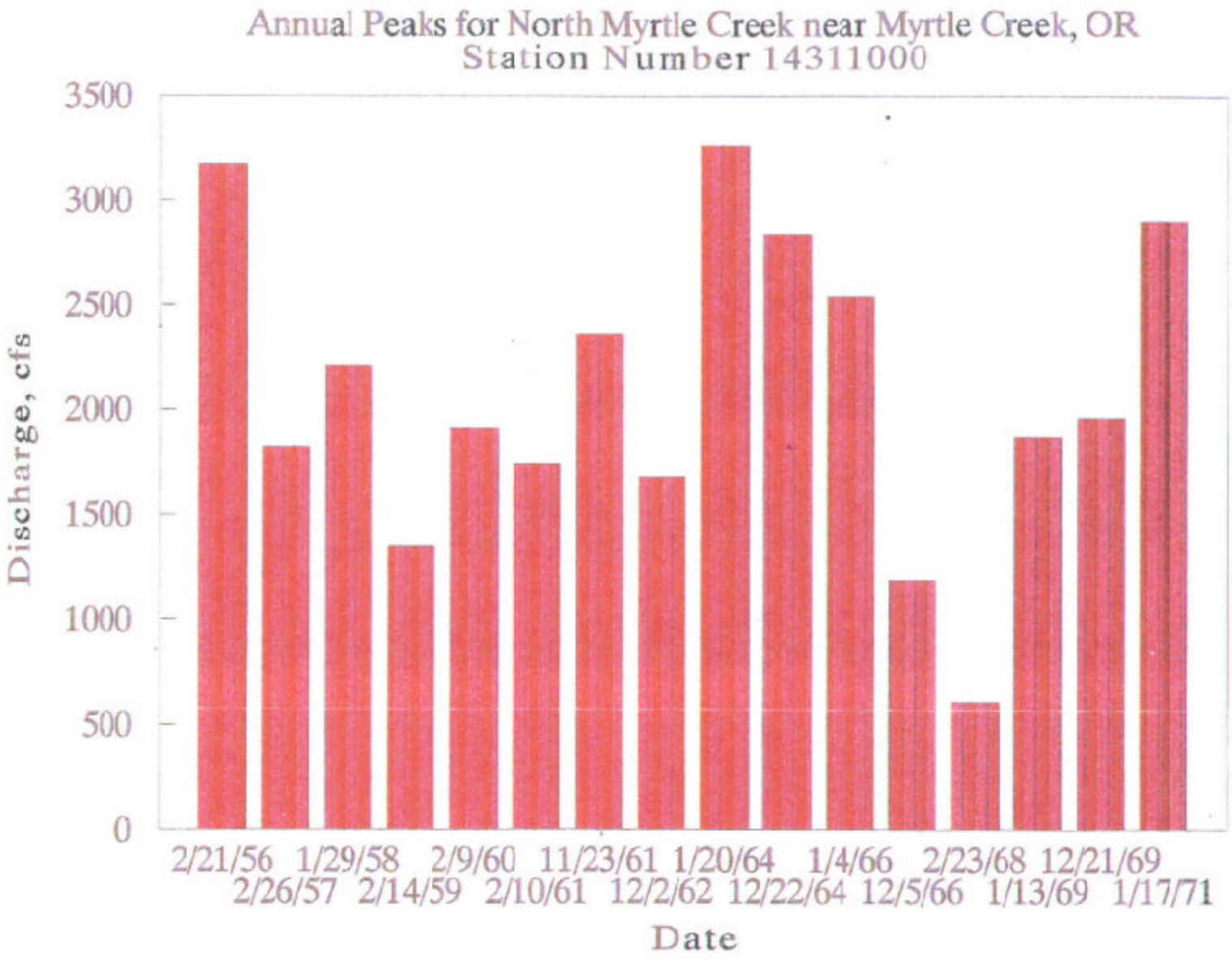
- OC
- PD
- TRB
- HYD
- ORD

miles

0 .5 1

GIS-South Douglas


Plot of Annual Low Flow discharge
South Myrtle Creek Gaging Station
Discharge, cfs
4
3
2
1
0
2
5
10
20
Recurrence Interval, years
1 day
7 days
30 days
60 days
90 days


Annual Peaks for North Myrtle Creek near Myrtle Creek, OR
Station Number 14311000
Discharge, cfs
3500
3000
2500
2000
1500
1000
500
0
2/21/56
2/26/57
1/29/58
2/14/59
2/9/60
2/10/61
11/23/61
12/2/62
1/20/64
12/22/64
1/4/66
12/5/66
2/23/68
1/13/69
12/21/69
1/17/71
Date

Plot of Annual Low Flow discharge

North Myrtle Creek Gaging Station

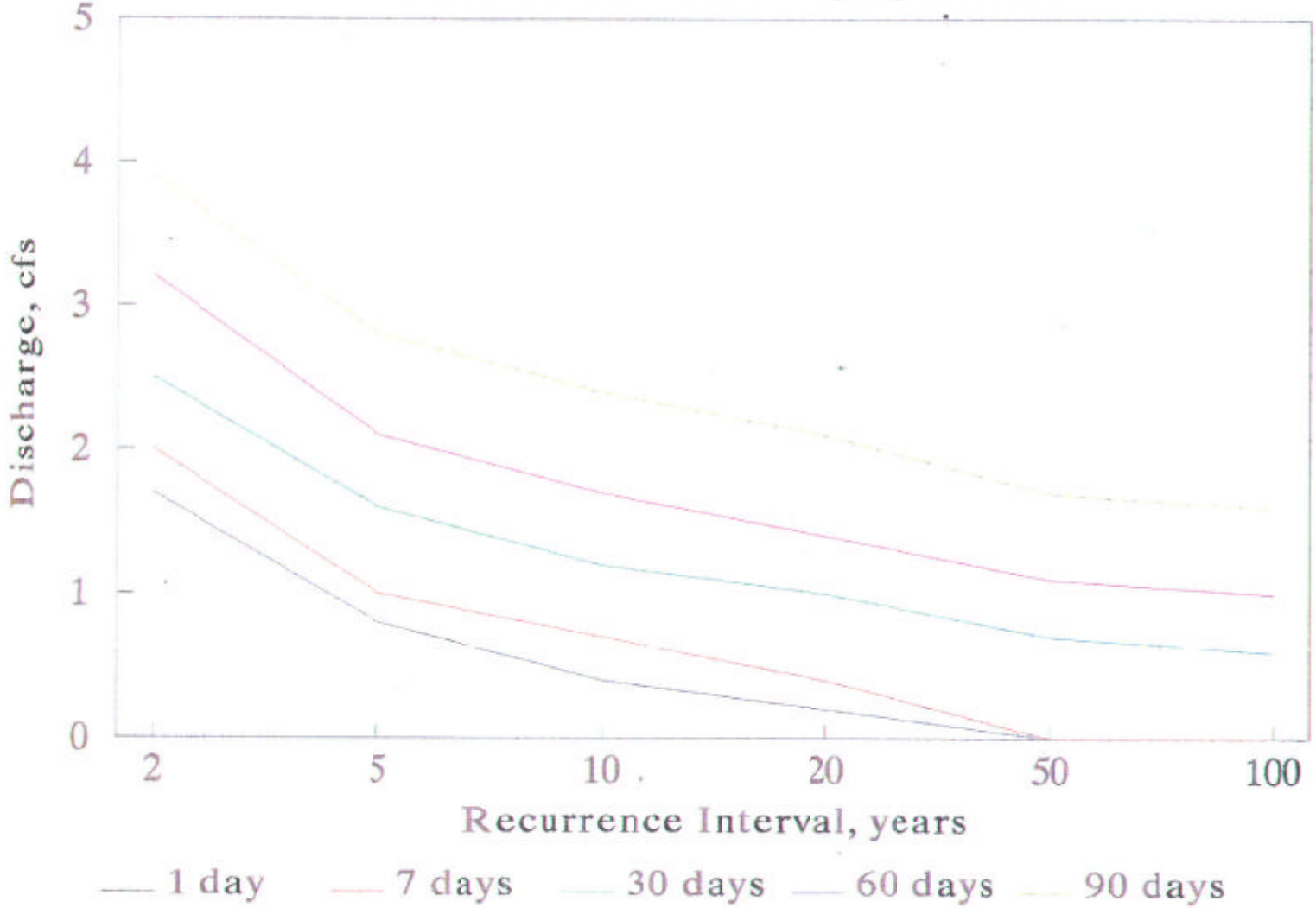


TABLE _

SUBBASIN	COMPARTMENT	Hydrologically Recovered (%)	Percent of acreage in Transient Snow Zone
LOWER NORTH MYRTLE	BILGER CR	83	7
	FROZEN CR	94	11
	LICK CR	N/A	-----
	LOWER NORTH MYRTLE	N/A	-----
	MYRTLE CR	97	06
	NORTH MYRTLE PARK	N/A	-----
LOWER SOUTH MYRTLE	BEN BRANCH	N/A	<1
	CEDAR HOLLOW	N/A	-----
	MYRTLE LINKS	N/A	<1
	PACK SADDLE	82	02
	SCHOOL HOLLOW	N/A	<1
	SHORT COURSE	N/A	
UPPER NORTH MYRTLE	BUCK FORK	93	36
	LEE CR	95	28
	LOWER SLIDE CR	N/A	-----
	MIDDLE NORTH MYRTLE	N/A	-----
	N MYRTLE HEADWATERS	81	49
	RISER CR	97	22
	UPPER SLIDE CR	96	17.00
UPPER SOUTH MYRTLE	CURTIN CR	85	89
	LALLY CR	89	32
	LETITIA CR	97	08
	LOWER LOUIS CR	98	-----
	S MYRTLE HEADWATERS	95	92
	UPPER LOUIS CR	81	39
	WEAVER CR	88	50
	WILEY CR	96	06

Table 4
North Myrtle Creek Near Myrtle Creek, OR Gaging Station
Station Number 14311000

Location: Lat 43 deg 02'30" Lon 123 deg 15' 30", in SW 1/4 sec 14, T29S R5W.
Drainage Area: 54.2 square miles

		Discharge, cfs for consecutive days				
Recurrence	Interval	1	7	30	60	90
2		1.7	2	2.5	3.2	3.9
5		0.8	1	1.6	2.1	2.8
10		0.4	0.7	1.2	1.7	2.4
20		0.2	0.4	1	1.4	2.1
50		0	0	0.7	1.1	1.7
100		0	0	0.6	1	1.6

South Myrtle Creek Near Myrtle Creek, OR Gaging Station
Station Number 14310700

Location: Lat 43 deg. 01" 55" Lon 123 deg. 11' 30" in SE 1/4 sec 20, T29S R4W.
Drainage Area: 43.9 square miles

		Discharge, cfs for consecutive days				
Recurrence	Interval	1	7	30	60	90
2		0.8	1.6	2.2	2.9	3.8
5		0.4	1	1.5	2	2.9
10		0.3	0.8	1.2	1.7	2.5
20		0.2	0.6	1	1.4	2.2
50		---	---	---	---	---
100		---	---	---	---	---

SUBBASIN	COMPARTMENT	Road Miles	Acres	Square Miles	Number of Road/ Stream Crossings	Crossing Density Crossings/Road Mile	Stream Density MI./SQ. MI	Road Density MI./SQ. MI
LOWER SOUTH MYRTLE	BEN BRANCH	6.15	1157.35	1.81	16.00	2.60	5.41	3.40
LOWER SOUTH MYRTLE	CEDAR HOLLOW	9.09	1104.68	1.73		0.00	5.36	5.27
LOWER SOUTH MYRTLE	MYRTLE LINKS	9.91	2384.03	3.73	2.00	0.20	5.32	2.66
LOWER SOUTH MYRTLE	PACK SADDLE	30.08	2624.22	4.10	4.00	0.13	5.43	7.34
LOWER SOUTH MYRTLE	SCHOOL HOLLOW	16.02	2180.96	3.41	6.00	0.37	6.78	4.70
LOWER SOUTH MYRTLE	SHORT COURSE	18.13	2657.71	4.15		0.00	4.67	4.37
	LOWER SOUTH MYRTLE TOTALS	89.39	12108.96	18.92	28.00	0.55	5.50	4.62
LOWER NORTH MYRTLE	BILGER CR	37.12	5569.30	8.70	21.00	0.57	4.66	4.27
LOWER NORTH MYRTLE	FROZEN CR	35.84	4594.02	7.18	3.00	0.08	5.76	4.99
LOWER NORTH MYRTLE	LICK CR	7.53	1998.61	3.12		0.00	5.46	2.41
LOWER NORTH MYRTLE	LOWER NORTH MYRTLE	17.62	2523.39	3.94		0.00	4.93	4.47
LOWER NORTH MYRTLE	MYRTLE CR	24.36	2323.88	3.63		0.00	4.25	6.71
LOWER NORTH MYRTLE	NORTH MYRTLE PARK	18.57	2419.25	3.78	3.00	0.16	5.81	4.91
	LOWER NORTH MYRTLE TOTALS	141.05	19428.46	30.36	27.00	0.14	5.15	4.63
UPPER NORTH MYRTLE	BUCK FORK	22.40	2998.92	4.69	13.00	0.58	5.90	4.78
UPPER NORTH MYRTLE	LEE CR	39.89	3855.93	6.02	37.00	0.93	5.60	6.62
UPPER NORTH MYRTLE	LOWER SLIDE CR	15.83	1795.85	2.81	28.00	1.77	5.85	5.64
UPPER NORTH MYRTLE	MIDDLE NORTH MYRTLE	19.67	2055.33	3.21	3.00	0.15	6.25	6.13
UPPER NORTH MYRTLE	N MYRTLE HEADWATERS	24.39	4105.17	6.41	23.00	0.94	5.18	3.80
UPPER NORTH MYRTLE	RISER CR	15.12	2012.03	3.14	9.00	0.60	5.82	4.81
UPPER NORTH MYRTLE	UPPER SLIDE CR	7.75	1150.47	1.80	14.00	1.81	6.48	4.31
	UPPER NORTH MYRTLE TOTALS	145.06	17973.71	28.08	114.00	0.97	5.87	5.16
UPPER SOUTH MYRTLE	CURTIN CR	11.28	1829.68	2.86	15.00	1.33	3.91	3.95
UPPER SOUTH MYRTLE	LALLY CR	31.94	4126.04	6.45	28.00	0.88	6.26	4.95
UPPER SOUTH MYRTLE	LETITIA CR	28.14	4455.65	6.96	4.00	0.14	5.71	4.04
UPPER SOUTH MYRTLE	LOWER LOUIS CR	12.57	2045.63	3.20	18.00	1.43	5.77	3.93
UPPER SOUTH MYRTLE	S MYRTLE HEADWATERS	17.23	3359.14	5.25	10.00	0.58	5.19	3.28
UPPER SOUTH MYRTLE	UPPER LOUIS CR	30.31	3562.12	5.57	18.00	0.59	5.08	5.45
UPPER SOUTH MYRTLE	WEAVER CR	24.66	3962.49	6.19	30.00	1.22	5.62	3.98
UPPER SOUTH MYRTLE	WILEY CR	19.75	3284.71	5.13	5.00	0.25	5.51	3.85
	UPPER SOUTH MYRTLE TOTALS	175.87	20669.74	41.60	85.00	0.80	5.38	4.18
WATERSHED TOTALS & AVERAGES		551.36	70180.86	118.96	254.00	0.61	5.47	4.65

MYRTLE CREEK STREAM LENGTHS, ORDERS & DENSITIES

SUBBASIN	COMPARTMENT	Drainage Area SQ. MI	Miles of Streams by Stream Order										Totals By Compartment	Stream Density MI/SQ. MI
				1	2	3	4	5	6	7	9	UNKNOWN		
LOWER NORTH MYRTLE	BILGER CR	8.70	6.12	4.48	15.10	6.85	4.26	3.00	0.04	0.00	0.00	6.79	46.65	5.36
	FROZEN CR	7.18	4.37	17.24	14.21	6.48	2.70	0.69	0.02	0.00	0.00	0.00	45.70	6.37
	LICK CR	3.12	3.14	5.75	4.75	3.28	2.08	0.00	0.01	0.00	0.00	1.15	20.16	6.46
	LOWER NORTH MYRTLE	3.94	3.35	4.67	7.48	1.02	0.05	0.00	4.93	0.00	0.00	1.28	22.78	5.78
	MYRTLE CR	3.63	1.09	0.00	6.27	1.76	1.16	0.78	1.26	0.42	0.65	3.14	16.53	4.55
	NORTH MYRTLE PARK	3.78	3.75	7.41	7.77	1.72	0.63	1.34	3.10	0.00	0.00	0.00	25.72	6.80
Lower North Myrtle Totals		30.35	21.81	39.56	55.58	21.10	10.88	5.81	9.38	0.42	0.65	12.36	177.54	5.85
LOWER SOUTH MYRTLE	BEN BRANCH	1.81	1.90	3.27	3.96	2.55	0.00	0.00	0.00	0.00	0.00	0.00	11.69	6.46
	CEDAR HOLLOW	1.73	1.33	0.00	3.83	1.10	1.19	0.00	0.00	0.00	0.00	3.15	10.60	6.13
	MYRTLE LINKS	3.73	1.31	0.00	6.39	2.62	0.99	0.00	1.89	0.00	0.00	7.98	21.18	5.68
	PACK SADDLE	4.10	5.61	7.40	8.41	3.93	0.82	0.00	1.68	0.00	0.00	0.00	27.85	6.79
	SCHOOL HOLLOW	3.41	3.35	9.91	7.19	2.48	1.44	0.01	2.08	0.00	0.00	0.00	26.46	7.76
	SHORT COURSE	4.15	4.55	5.01	6.26	2.59	0.03	0.00	4.02	0.00	0.00	1.46	23.93	5.77
Lower South Myrtle Totals		18.93	18.06	25.60	36.04	15.27	4.46	0.01	9.67	0.00	0.00	12.59	121.70	6.43
UPPER NORTH MYRTLE	BUCK FORK	4.69	2.53	10.34	7.75	6.25	3.34	0.00	0.00	0.00	0.00	0.00	30.22	6.44
	LEE CR	6.02	6.18	16.42	9.37	4.93	2.98	0.00	0.00	0.00	0.00	0.00	39.87	6.62
	LOWER SLIDE CR	2.81	3.39	6.20	6.00	1.58	0.03	2.63	0.00	0.00	0.00	0.00	19.82	7.05
	MIDDLE NORTH MYRTLE	3.21	4.16	7.36	8.91	0.00	0.06	3.75	0.00	0.00	0.00	0.00	24.23	7.55
	N MYRTLE HEADWATERS	6.41	7.68	9.98	11.14	6.35	3.45	2.28	0.00	0.00	0.00	0.00	40.88	6.38
	RISER CR	3.14	1.16	6.54	6.00	2.27	3.47	0.00	0.00	0.00	0.00	0.00	19.44	6.19
	UPPER SLIDE CR	1.80	0.70	4.79	3.69	1.92	1.26	0.00	0.00	0.00	0.00	0.00	12.36	6.87
Upper North Myrtle Totals		28.08	25.80	61.62	52.87	23.30	14.59	8.65	0.00	0.00	0.00	0.00	186.82	6.65
UPPER SOUTH MYRTLE	CURTIN CR	2.86	0.00	3.99	3.98	2.50	0.71	0.01	0.00	0.00	0.00	0.00	11.19	3.91
	LALLY CR	6.45	1.76	15.49	13.45	7.29	0.23	3.89	0.00	0.00	0.00	0.00	42.11	6.53
	LETITIA CR	6.96	3.17	11.19	15.77	6.02	1.15	2.47	3.13	0.00	0.00	0.00	42.90	6.16
	LOWER LOUIS CR	3.20	3.22	6.31	7.00	1.39	1.83	1.92	0.00	0.00	0.00	0.00	21.68	6.77
	S MYRTLE HEADWATERS	5.25	1.10	11.78	8.01	4.71	2.75	0.00	0.00	0.00	0.00	0.00	28.34	5.40
	UPPER LOUIS CR	5.57	4.13	8.78	10.86	2.30	6.33	0.00	0.00	0.00	0.00	0.00	32.40	5.82
	WEAVER CR	6.19	5.71	11.86	11.80	4.31	2.34	4.50	0.00	0.00	0.00	0.00	40.52	6.55
	WILEY CR	5.13	3.07	8.90	10.17	2.99	3.99	0.12	2.13	0.00	0.00	0.00	31.36	6.11
Upper South Myrtle Totals		41.61	22.16	78.29	81.03	31.52	19.33	12.91	5.26	0.00	0.00	0.00	250.50	6.02
TOTALS		118.97	87.84	205.06	225.52	91.18	49.26	27.39	24.30	0.42	0.65	24.94	736.56	6.19

MYRTLE CREEK STREAM LENGTHS, ORDERS & DENSITIES

SUBBASIN	COMPARTMENT	Drainage Area SQ. MI	Miles of Streams by Stream Order 1	2	3	4	5	6	7	9	UNKNOWN	Lakes	Totals By Compartment	Stream Density MI/SQ. MI
LOWER NORTH MYRTLE	BILGER CR	8.70	6.12	4.48	15.10	6.85	4.26	3.00	0.04	0.00	0.00	6.79	0.07	46.66	5.36
	FROZEN CR	7.18	4.37	17.24	14.21	6.48	2.70	0.69	0.02	0.00	0.00	0.00	0.07	45.70	6.37
	LICK CR	3.12	3.14	5.75	4.75	3.28	2.08	0.00	0.01	0.00	0.00	1.15	0.43	20.16	6.46
	LOWER NORTH MYRTLE	3.94	3.35	4.67	7.48	1.02	0.05	0.00	4.93	0.00	0.00	1.28	0.04	22.78	5.78
	MYRTLE CR	3.63	1.09	0.00	6.27	1.78	1.16	0.78	1.26	0.42	0.65	3.14	0.07	16.53	4.55
	NORTH MYRTLE PARK	3.78	3.75	7.41	7.77	1.72	0.63	1.34	3.10	0.00	0.00	0.00	0.04	25.72	6.80
Lower North Myrtle Totals		30.35	21.81	39.56	55.58	21.10	10.88	5.81	9.36	0.42	0.65	12.36	0.71	177.54	5.85
LOWER SOUTH MYRTLE	BEN BRANCH	1.81	1.90	3.27	3.96	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.69	6.46
	CEDAR HOLLOW	1.73	1.33	0.00	3.83	1.10	1.19	0.00	0.00	0.00	0.00	3.15	0.00	10.60	6.13
	MYRTLE LINKS	3.73	1.31	0.00	6.39	2.62	0.99	0.00	1.89	0.00	0.00	7.98	0.00	21.18	5.68
	PACK SADDLE	4.10	5.61	7.40	8.41	3.93	0.82	0.00	1.68	0.00	0.00	0.00	0.06	27.85	6.79
	SCHOOL HOLLOW	3.41	3.36	9.91	7.19	2.48	1.44	0.01	2.08	0.00	0.00	0.00	0.21	26.46	7.76
	SHORT COURSE	4.15	4.55	6.01	6.28	2.59	0.03	0.00	4.02	0.00	0.00	1.46	0.23	23.93	5.77
Lower South Myrtle Totals		18.93	18.06	25.60	36.04	15.27	4.46	0.01	9.67	0.00	0.00	12.59	2.96	121.70	6.43
UPPER NORTH MYRTLE	BUCK FORK	4.69	2.53	10.34	7.75	6.25	3.34	0.00	0.00	0.00	0.00	0.00	0.07	30.22	6.44
	LEE CR	6.02	6.18	16.42	9.37	4.93	2.98	0.00	0.00	0.00	0.00	0.00	0.00	39.87	6.62
	LOWER SLIDE CR	2.81	3.39	6.20	6.00	1.58	0.03	2.63	0.00	0.00	0.00	0.00	0.09	19.82	7.05
	MIDDLE NORTH MYRTLE	3.21	4.16	7.36	8.91	0.00	0.06	3.75	0.00	0.00	0.00	0.00	0.00	24.23	7.55
	N MYRTLE HEADWATERS	6.41	7.68	9.98	11.14	6.35	3.45	2.28	0.00	0.00	0.00	0.00	0.00	40.88	6.38
	RISER CR	3.14	1.18	6.54	6.00	2.27	3.47	0.00	0.00	0.00	0.00	0.00	0.00	19.44	6.19
	UPPER SLIDE CR	1.80	0.70	4.79	3.69	1.92	1.26	0.00	0.00	0.00	0.00	0.00	0.00	12.36	6.87
Upper North Myrtle Totals		28.08	25.80	61.62	52.87	23.30	14.59	8.65	0.00	0.00	0.00	0.00	0.16	186.82	6.65
UPPER SOUTH MYRTLE	CURTIN CR	2.86	0.00	3.99	3.98	2.50	0.71	0.01	0.00	0.00	0.00	0.00	0.00	11.19	3.91
	LALLY CR	6.46	1.76	15.49	13.45	7.29	0.23	3.89	0.00	0.00	0.00	0.00	0.00	42.11	6.53
	LETITIA CR	6.96	3.17	11.19	15.77	6.02	1.15	2.47	3.13	0.00	0.00	0.00	0.79	42.90	6.16
	LOWER LOUIS CR	3.20	3.22	6.31	7.00	1.39	1.83	1.92	0.00	0.00	0.00	0.00	0.00	21.68	6.77
	S MYRTLE HEADWATERS	5.25	1.10	11.78	8.01	4.71	2.75	0.00	0.00	0.00	0.00	0.00	0.36	28.34	5.40
	UPPER LOUIS CR	5.57	4.13	8.78	10.86	2.30	6.33	0.00	0.00	0.00	0.00	0.00	0.00	32.40	5.82
	WEAVER CR	6.19	5.71	11.86	11.80	4.31	2.34	4.50	0.00	0.00	0.00	0.00	0.09	40.52	6.55
	WILEY CR	5.13	3.07	8.90	10.17	2.99	3.99	0.12	2.13	0.00	0.00	0.00	0.17	31.36	6.11
Upper South Myrtle Totals		41.61	22.16	78.29	81.03	31.52	19.33	12.91	5.26	0.00	0.00	0.00	1.42	280.50	6.02
TOTALS		118.97	87.84	206.06	225.52	91.18	49.26	27.39	24.30	0.42	0.65	24.94	5.26	736.56	6.19

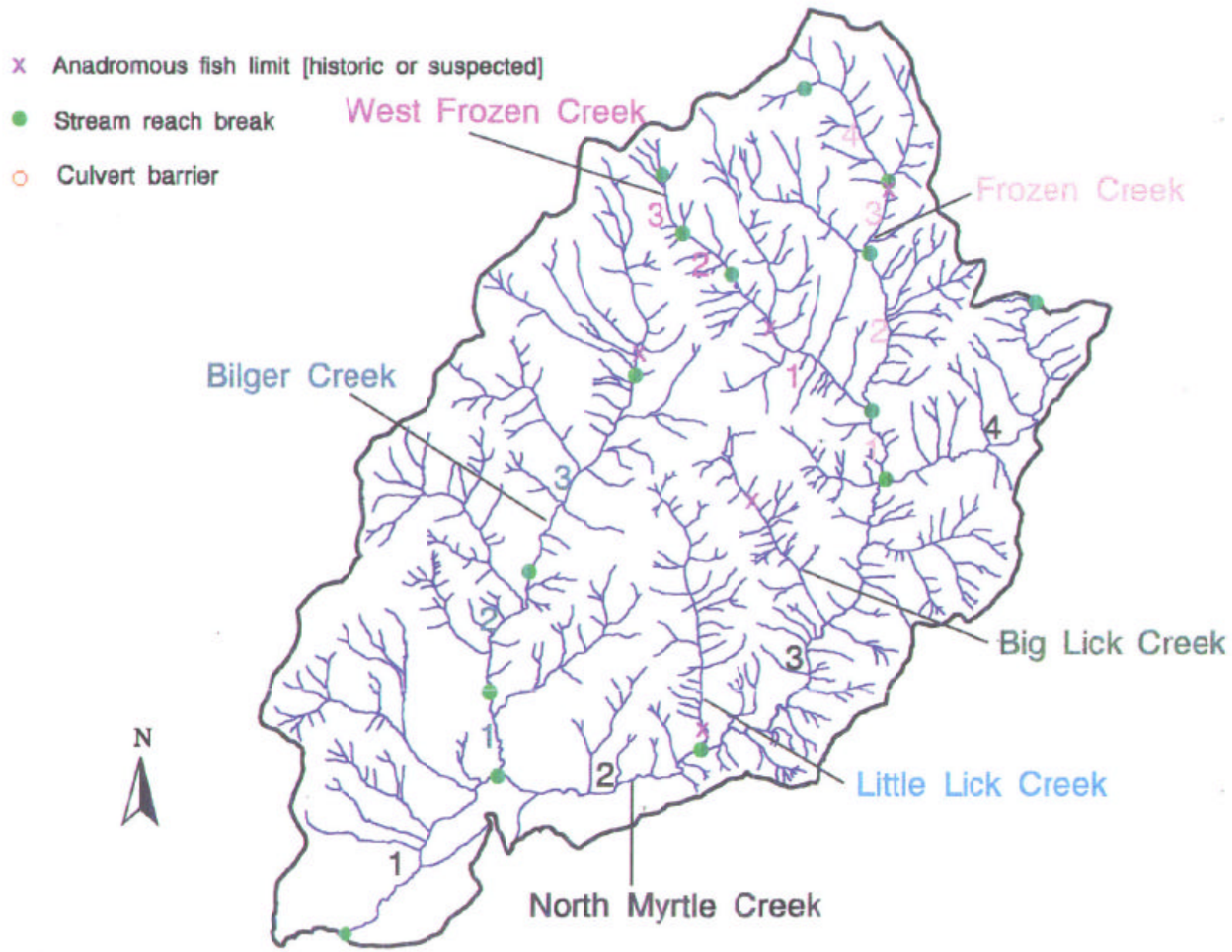
Creek	Location	Elevation	Date	Time	Discharge	Specific Conductance	pH	Temperature	Barometric pressure	Dissolved Oxygen	Turbidity
Little Wolf	T25S/R8W-11	470	2/22/96	1400	36.1	58	7.4	8.0	765	11.8	3
Lower Little Wolf	T25S/R8W-11	469	2/26/96	1000	22.6	37	7.3	7.0	765	11.2	4
Case Knife	T24S/R8W-27	469	2/26/96	1300	24.2	47	7.2	7.0	764	11.6	3
Miner	T24S/R8W-27	470	2/26/96	1400	38.2	46	7.3	7.5	764	11.8	5
Wolf	T24S/R8W-23	395	2/27/96	0900	23.0	42	7.6	7.0	763	11.6	6
Rader	T24S/R8W-23	396	2/27/96	1030	57.4	42	7.3	7.0	763	12.1	4
Upper Wolf	T24S/R8W-23	396	2/27/96	1200	25.7	40	7.4	7.0	763	12.1	8
Cougar	T24S/R8W-27	320	2/27/96	1400	52.9	51	7.7	7.0	764	12.0	5
South Myrtle	T28S/R3W-35	1560	2/29/96	1000	14.9	70	7.6	5.0	736	11.8	14
Weaver	T29S/R3W-32	1480	2/29/96	1200	9.9	111	7.9	6.0	739	10.8	8
Louis	T28S/R4W-36	1360	2/29/96	1430	7.5	114	7.7	7.0	743	10.4	5
Middle F Deadman	T29S/R2W-27	1680	3/7/96	1000	18.4	41	7.6	6.5	739	10.4	3
Deadman	T29S/R2W-27	1680	3/7/96	1100	15.9	46	7.6	7.1	739	10.5	4
East Fork Stouts	T31S/R3W-3	1000	3/7/96	1300	7.2	125	7.9	8.5	757	10.2	4
Stouts	T31S/R3W-3	1000	3/7/96	1400	19.9	135	8.1	9.0	757	10.1	2
Cleghorn	T20S/R7W-3	680	3/11/96	1030	3.6	36	7.5	9.0	757	10.8	3
Summit	T20S/R6W-34	790	3/11/96	1400	3.7	34	7.4	9.0	757	10.8	1
Kelly	T25S/R2W-31	1105	3/13/96	1100	23.6	32	7.8	7.5	755	10.8	1
North E Fork Rock	T24S/R2W-13	1320	3/13/96	1430	20.2	22	7.5	7.0	715	10.2	1
N F Big Tom Folley	T22S/R7W-2	205	3/15/96	1000	10.7	44	7.5	8.0	782	10.8	3

Creek	Location	Elevation	Date	Time	Discharge	Specific Conductance	pH	Temperature	Barometric pressure	Dissolved Oxygen	Turbidity
Thissleburn	T22S/R6W-19	310	3/15/96	1130	6.2	61	7.5	9.0	780	11.0	4
Blue Hole	T22S/R6W-19	310	3/15/96	1300	8.7	56	7.5	9.0	775	10.8	4
Bear	T24S/R6W-5	420	3/15/96	1500	7.0	55	7.5	9.0	774	10.8	4
Jim	T27S/R3W-9	1240	3/20/96	1100	3.3	170	8.0	8.0	750	11.0	1
Pass	T24S/R1W-26	1880	3/20/96	1430	41.4	26	7.6	7.0	724	11.0	1

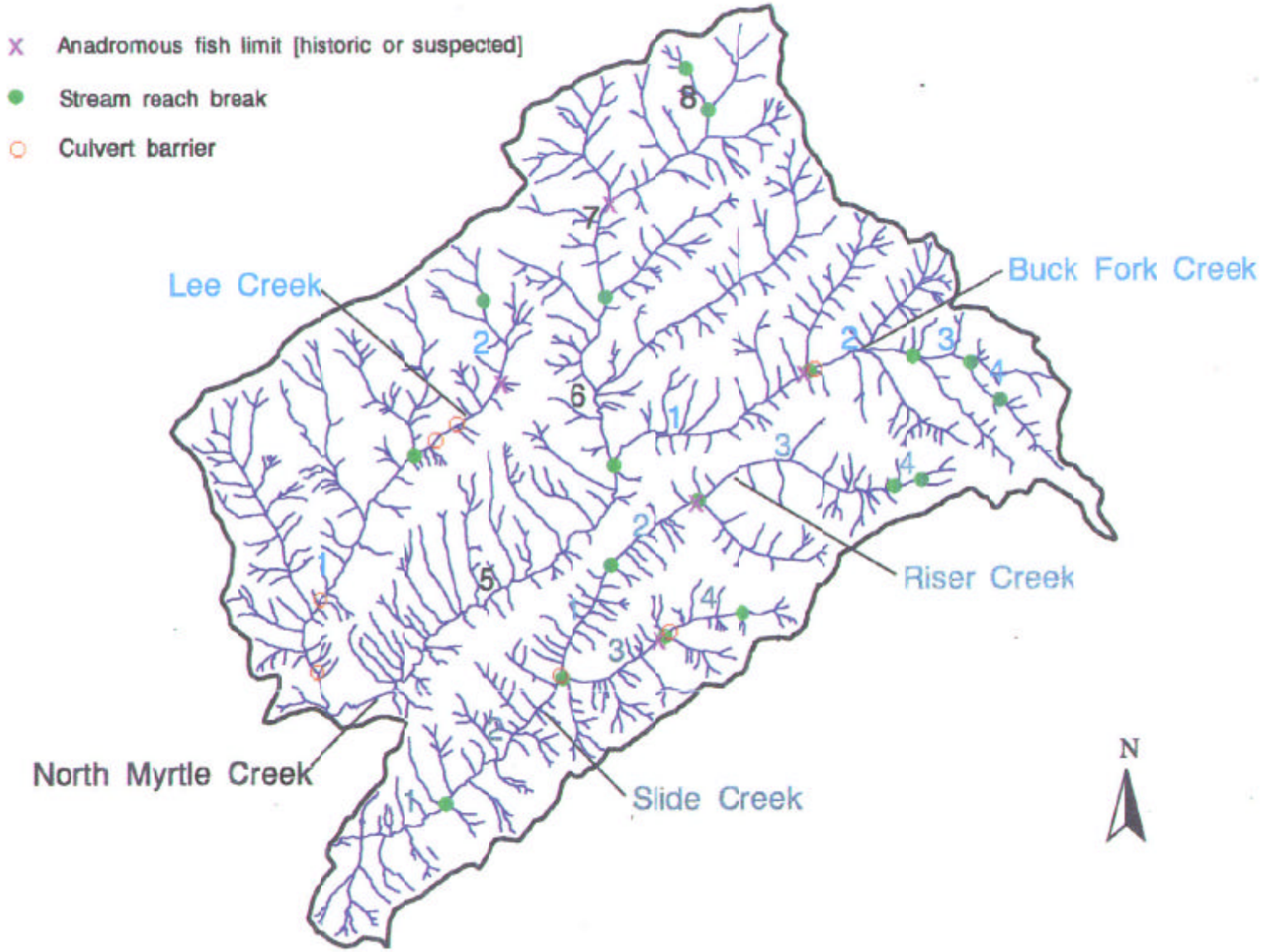
APPENDIX B

FISHERIES

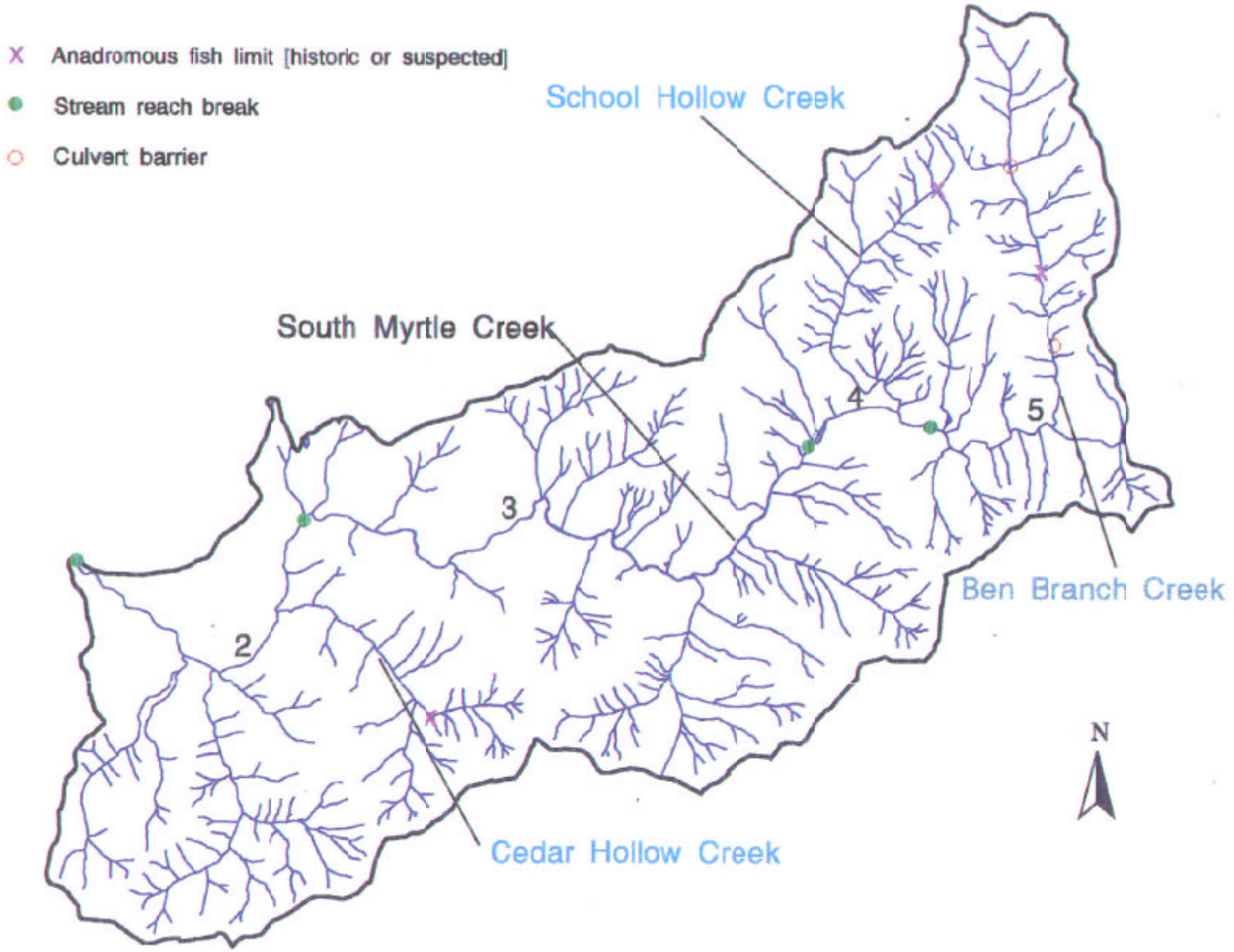
LONM Watershed



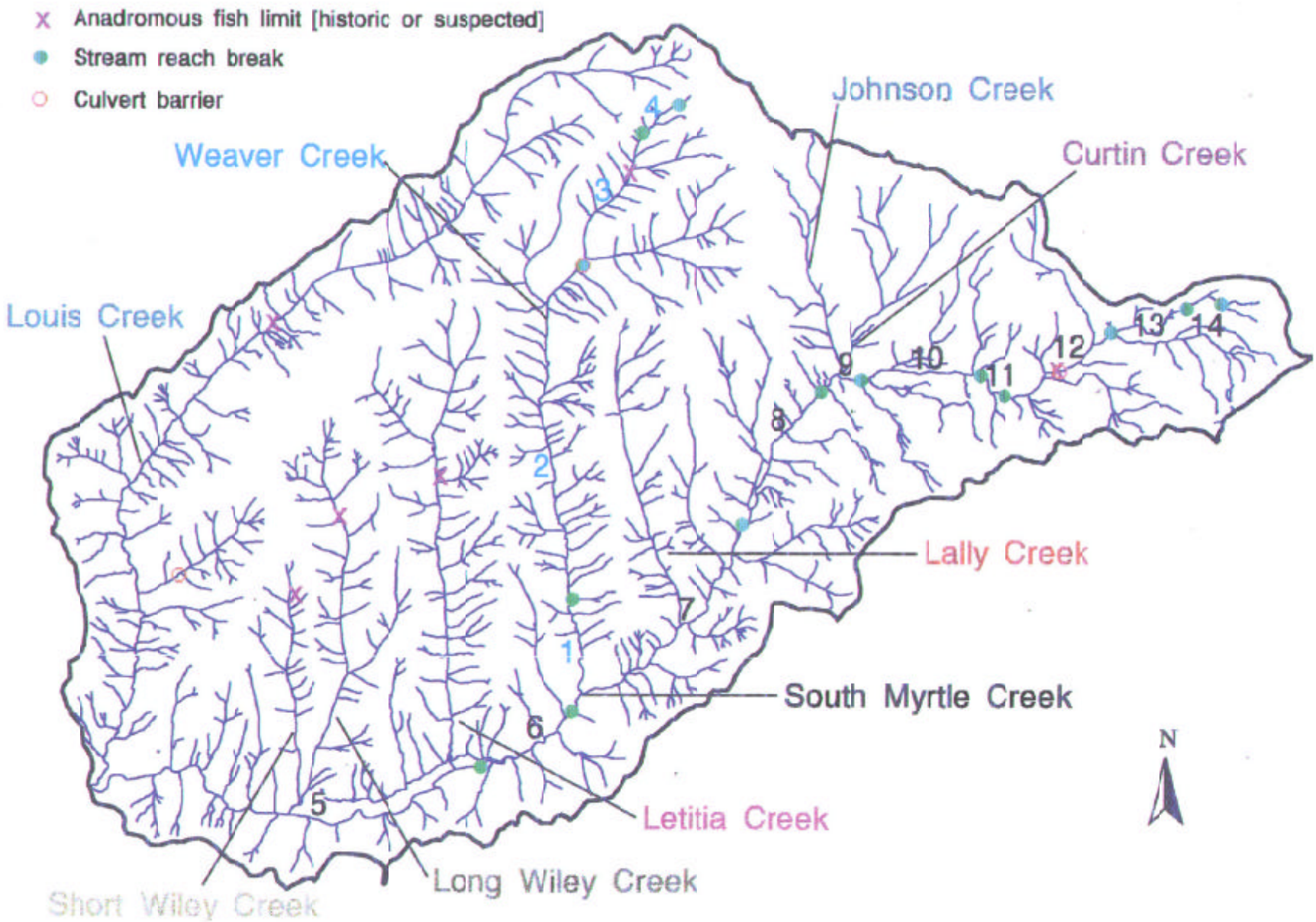
UPNM Watershed



LOSM Watershed



UPSM Watershed



Appendix B. List of Fish in the Umpqua River Basin

TYPE	COMMON NAME	SCIENTIFIC NAME
NATIVE ANADROMOUS	Sea-run Cutthroat trout	*Oncoryhnchus clarki*
	Coho salmon	*Oncoryhnchus kisutch*
	Summer/Winter Steelhead trout	*Oncoryhnchus mykiss*
	Spring/Fall Chinook salmon	*Oncoryhnchus tshawytscha*
	Green Sturgeon	*Acipenser medirostris*
	White Sturgeon	*Acipenser transmontanus*
	Pacific lamprey	*Lampetra tridentata*
NATIVE RESIDENT	Cutthroat trout	*Oncoryhnchus clarki*
	Rainbow trout	*Oncoryhnchus 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

Current Condition in Myrtle Creek Watershed

Watershed: Subwatershed-	Road density (mi./mi.^{2})	BLM stream density (str.mi./mi.^{2})	BLM % ownership	BLM stream crossing density (x-ing/str. mi.)	ECA %°	HRP %	% Riparian Reserves >80 years old
LOSM:	4.62	6.43	21.0	1.42	10.06		59
Ben Branch	3.42	6.48	38.9	4.12	20.17	N/A	41
Cedar Hollow	5.19	6.14	18.8	0.00	26.04	N/A	98
Myrtle Links	2.65	5.69	22.0	0.38	12.43	N/A	63
Pack Saddle	7.34	6.81	18.9	1.27	4.06	N/A	58
School Hollow	4.66	7.85	27.0	1.17	9.21	N/A	60
Short Course	4.38	5.82	11.7	0.00	3.48	N/A	51
UPSM:	4.18	5.91	60.0	0.96	18.64		56
Curtin Creek	3.94	3.93	99.9	1.34	14.84	85★	76
Lally Creek	4.95	6.56	53.8	1.47	20.14	89★	48
Letitia Creek	4.04	6.31	36.3	0.30	12.39	97	62
Lower Louis Creek	3.94	6.80	30.5	3.76	15.58	98	62
South Myrtle Headwaters	3.27	5.50	96.2	2.62	4.92	95★	63
Upper Louis Creek	5.51	5.83	66.4	0.96	41.91	81★	55
Weaver Creek	4.00	6.58	78.7	1.02	19.85	88★	42
Wiley Creek	3.84	6.16	39.6	0.48	15.54	96	57
°LONM:	4.63	5.89	19.0	0.88	14.86		63
°Bilger Creek	4.27	5.38	25.7	1.58	21.67	83	50
Frozen Creek	5.00	6.38	20.6	0.40	18.21	94	82
Lick Creek	2.41	6.62	16.0	0.00	13.63	N/A	88
Lower North Myrtle	4.47	5.81	7.1	0.00	15.70	N/A	53
Myrtle Creek	6.71	4.57	13.6	0.00	0.31	N/A	64
North Myrtle Park	4.92	6.82	21.6	0.58	6.85	N/A	60
UPNM:	5.16	6.73	48.0	1.54	29.80		44
Buck Fork	4.77	6.47	30.0	1.86	25.45	93	18
Lee Creek	6.61	6.62	47.5	2.02	23.21	95	50
Lower Slide Creek	5.69	7.11	53.1	2.79	17.63	N/A	20
Middle North Myrtle	6.16	7.55	20.5	0.92	14.44	N/A	39
North Myrtle Headwaters	3.79	6.39	54.6	1.04	36.45	81	57
Riser Creek	4.86	6.19	61.5	0.84	48.77	97	48
Upper Slide Creek	4.29	6.90	85.4	1.26	52.77	96	45

N/A = Little (<1%) or no BLM-administered lands occur in TSZ, therefore BLM activities in this subwatershed would not alter HRP value

★ = Value includes harvest units in Lean Louis, Louis Weaver, UPSM Harvest Plan, Olalla Wildcat Mod.#6(old Curtin Cr.) Timber Sales

° = Percentage of Forested acres <30 years old in the entire watershed (private + BLM administered lands)

Habitat Bench Marks Related to Category Types

	Bench Mark Weighing Scale 1-5	4-Excellent	3-Good	2-Fair	1-Poor	Row Totals
Pools						
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 & 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. (>15cm)	2	conifer/hdwd* Klam-hdwd*	conifer/hdwd* Klam-hdwd*	hdwd*/conifer	alder/anything	
[illegible] (Conifers)	3	≥ 36" Klam- ≥ 24"	24 - 35" Klam.: 12 - 23"	7 - 23"	≤6"	
b) Shade (%) (ODFW)						
Stream Width < 12M	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/100M Stream	2	≥39.5	29.5-39.4	20.5-29.4	≤20.4	
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 2. MATRIX OF FACTORS AND INDICATORS
Western Cascades Physiographic Region

FACTORS	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
Water Quality:	Temperature	2nd-3rd order basins: <58 degrees F. 4th and larger basins: <65 " "	2nd-3rd order: 59-65 degrees F 4th+ order: 66-72 degrees F.	2nd-3rd order basins: >65 degrees F. 4th order and larger: > 72 degrees F.
	Sediment/ Turbidity *	<12% fines (<0.85 mm) in gravel, turbidity low, or cobble imbeddedness <35%.	12-17% fines (<0.85mm) in gravel.	> 17% fines (<0.85mm) in gravels, turbidity high, or cobble embeddedness >35%.
	Chemical Contamination/ Nutrients	Low levels of chemical contaminants from agricultural, industrial and other sources, no excess nutrients, no CWA 303d designated reaches.		Mod+ levels of chemical contamination from agricultural, industrial and other sources, any level of excess nutrients, one or more CWA 303d designated reaches.
Habitat Access:	Physical Barriers	Any man-made barriers present in watershed allow upstream and downstream fish passage at all flows of age 1+ salmonids.		Any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows of age 1+ salmonids
Habitat Elements:	Substrate *	Dominant substrate is gravel or cobble (interstitial spaces clear), embeddedness <20%.	Gravel and/or cobble is sub-dominant, or if dominant, embeddedness 20-35% (3)	Bedrock, sand, silt, or small gravel dominant, or if gravel and cobble dominant, embeddedness >35% (2)
	Large Woody Debris	>60 pieces/mile, >24" diam. and >50 feet in length. Adequate sources of future LWD to maintain the above standard. Little evidence of stream clean-out or management related debris flows.	30-60 pieces/mile, >24" and >50 ft. in length or lacks potential sources of LWD sufficient to maintain or achieve the fully fuctioning standard.	<30 pieces/mile, >24" and >50' long and lacks potential sources of LWD. Evidence of stream clean-out and/or management related debris flows.
	1) Pool Characteristics *	>30% pool habitat by area. Little reduction in pool volume due to filling by fine sediment or unsorted substrates.	>30% pool habitat by area but with obvious filling by fines or unsorted substrates or <30% pool habitat by area and little reduction in pool volume due to filling.	<30% pool habitat by area and obvious reduction in pool volume due to filling with fines and/or unsorted substrates.
	Off-channel Habitat *	Water velocity refugia present. Backwaters frequent and the result structural influence (LWD). Side channel connectivity maintained.		Little or no velocity refugia. Few or no backwaters, no off-channel ponds. Evidence of abandoned side channels due to past management activities.

1) Pool characteristic numerics are applicable to 3rd order or larger basins.

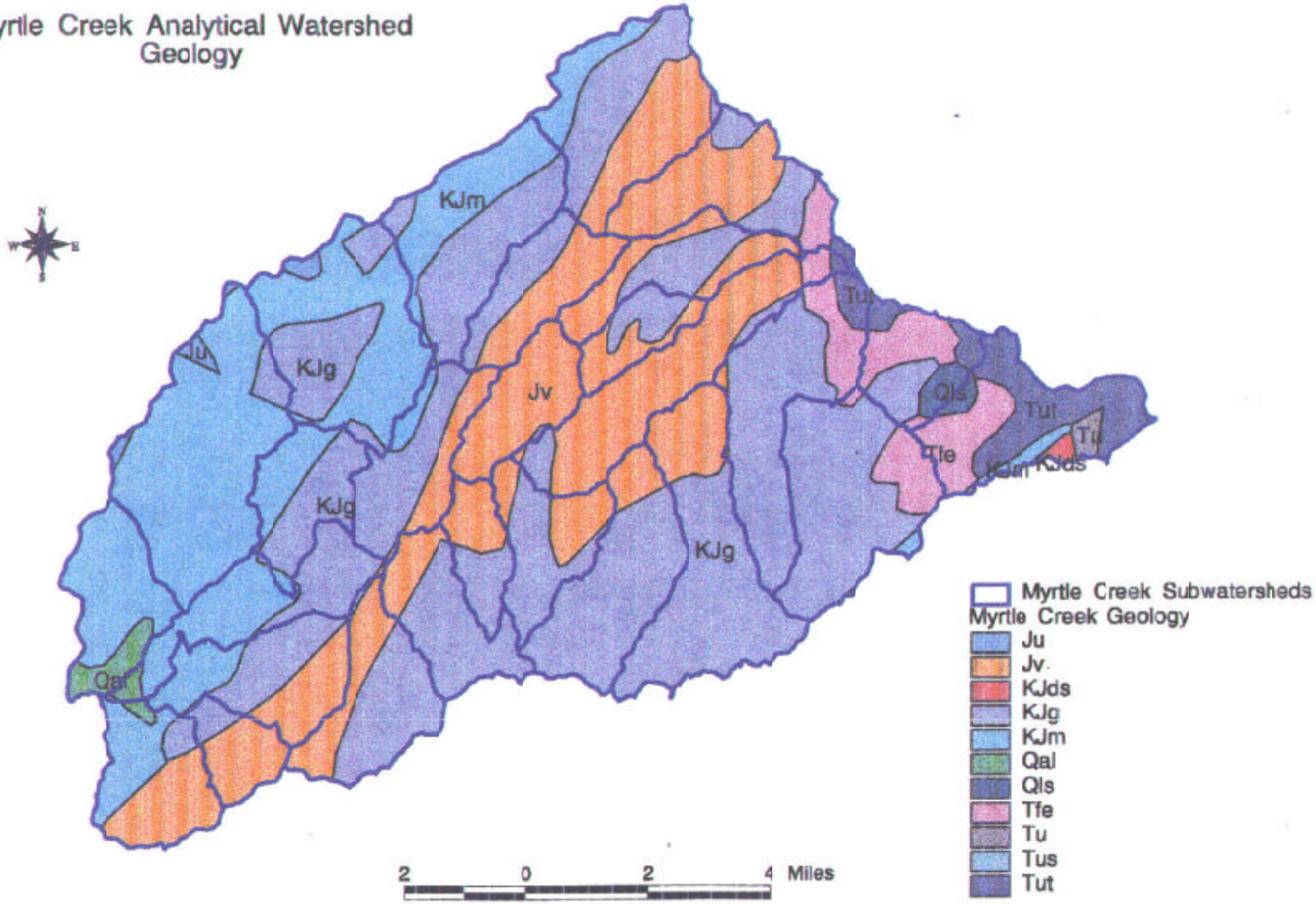
= Numeric values for Elements followed with the "" symbol will be determined by measurements or estimates taken in low-gradient (<2%) , adjustable segments. These elements are not applicable if none are present.

Habitat Elements (Con't):	Refugia (important remnant habitat for sensitive aquatic species)	Habitat refugia exist and are adequately buffered (e.g. by intact riparian reserves); existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations	Habitat refugia exist but are not adequately buffered (e.g. by intact riparian reserves); existing refugia are insufficient in size, number and connectivity to maintain viable populations or sub-populations	Adequate habitat refugia do not exist.
Channel Condition and Dynamics:	Width/Depth Ratio	W/D ratio and channel types are within historic ranges and site potential as per Rosgen typing.		W/D ratios and channel types are outside of historic ranges and site potentials.
	Streambank Condition *	Basinwide, in low gradient reaches, > 90% stable; i.e., on average, less than 10% of banks are actively eroding.	Basinwide, in low gradient reaches, stream banks 80-90% stable. Active erosion limited to outcurves.	<80% of streambanks are stable. Active erosion widespread throughout basin in low gradient reaches.
	Floodplain Connectivity *	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession.		Obvious reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetland extent noticably reduced and riparian vegetation/ succession altered significantly.
Flow/Hydrology:	Drainage Network	Little increase in drainage network due to roads.		Substantial increases in drainage network density due to roads (e.g., ~20-25%)
Watershed Conditions:	Road Density & Location	<2 mi/mi square , with no valley bottom roads	2-3 mi/mi square, with some valley bottom roads.	>3 mi/mi square and/or substantial amount of valley bottom roads.
	Disturbance History	<5% ECA/decade (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian reserves.		>5% ECA/decade (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian reserves.
	Riparian Reserves	Riparian Reserves are intact, with >80% in late seral condition.		Riparian Reserves are fragmented, poorly connected or provide inadequate protection of habitats and refugia for sensitive aquatic species. <80% are in late seral condition.
	Landslide Rates	Within 20% of historic natural rates. Stream conditions not *evidently altered due to management* related landslides.		Not within 20% of historic natural rates. Stream conditions obviously altered by management related landslides.

APPENDIX C

GEOLOGY

Myrtle Creek Analytical Watershed Geology



Geologic Formations Found in the Myrtle Creek Analytical Watershed

Jv - 19384 acres

Volcanic rocks (Jurassic) - Lava flows, flow breccia, and agglomerate dominantly of plagioclase, pyroxene, and hornblende porphyriffc and aphync 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. Includes the Rogue
Formation and volcanic rocks commonly assigned to the Galice Formaffon (Wells and Walker, 1953; Wells and Peck, 1961). Considered to be accreted island-arc terrane

Kjm - 16526 acres

Myrtle Group (Lower Cretaceous and Upper Jurassic)—Conglomerate sandstone, siltstone, and limestone. Locally fossilifereous. As shown, includes Riddle and Days Creek Formabons (Imlay and others, 1959, Jones, 1969)

KJg - 32552 acres

Granitic rocks (Cretaceous and Jurassic) Mostly tonalite and quartz diorite but including lesser amounts of other granitoic rocks. Potassium-argon ages determined on hornblende indicates plutons range in age from 143 to 166 Ma (Hotz, 1971)

Ju - 310 acres

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.Comprises Josephine ophiolite of Harper (1980), ophiolites of Onion Mountain,Sexton Mountain,

Kjds - 109 acres

Dothan Formation and related rocks (Lower Cretaceous and Upper Jurassic)
Sedimentary rocks Sandstone, conglomerate, graywacke, rhythmically banded chert lenses. Includes western Dothan and Otter Point Formations of M.C. Blake, Jr. and A.S. Jayko (unpub. data, 1985) in Curry and southern Coos Counties
COAST RANGE AND KLAMATH MOUNTAINS

Qal - 670 acres

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

Qls - 410 acres

Landslide and debris-flow deposits (Holocene and Pleistocene) - Unstratified mixtures of fragments of adjacent bedrock. Locally includes slope wash and colluvium. May include some deposits of late Pliocene age

Tfe - 3499 acres

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, of the marine Eugene Formation, and coeval and older andesitic lapilli tuff, breccia, water-laid and air-fall silicic ash of the continental Fisher and Colestin Formations; upper parts of the Fisher Formation apparenfly lap onto and interfinger with the Eugene Formation. Megafauna in the Eugene Formation were assigned an Oligocene age by yokes and others (1951) and foraminifers have been assigned to the upper part of the lower Refugian Stage (McDougaD, 1980), or of late Eocene age. Basalt lava flows in the Fisher Formation have yielded isotopic ages as old as 40 Ma (Lux, 1982), and south of the latitude of Cottage Grove the Fisher is overlain by a welded tuff in unit Tu dated at about 35 Ma. North of Eugene, rocks of this unit are overlain unconformably by continental volcanogenic rocks of unit Tu, induding an ash-flow tuff with a K-Ar age of 30.9+0.4 Ma

Tu - 177 acres

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. Includes extensive rhyodacitic to andesitic ash-flow and air-fall tuffs,abundant lapilli tuff and tuff breccia, andesitic to dacitic mudflow (lahar) deposits, poorly bedded to well-bedded, fine- to coarse-grained tuffaceous sedimentary rocks, and volcanic conglomerate. Originally included in Little Butte Volcanic Series (Peck and others, 1964); includes Mehama Volcanics and Breitenbush Tuffs or Series of Thayer (1933, 1936, 1939), Breitenbush Formation of Hammond and others (1982), Mehama Formation of Eubanks (1960), and Molalla Formation of Miller and Orr (1984a). In Columbia River Gorge, includes Miocene and older rocks previously assigned to the Skamania Volcanic Series (Tnmble, 1963), or to the Eagle CreekFormation(Waters, 1973). Lower parts of unit exhibit low-grade metamorphism with primary constituents altered to clay minerals, calcite, zeolites (stilbite, laumontite,heulandite), and secondary silica minerals. In contact aureoles adjacent to stocks and larger dikes of granitic and dioritic composition or in areas of andesitic dike swarms, both wallrocks and intrusions are pervasively propylitized; locally rocks also have been subjected to potassic alteration. Epiclastic part of assemblage locally contains fossil plants assigned to the Angoonian Stage (Wolfe, 1981) or of Oliyocene age. A regionally extensive biotite-quartz

rhyodacite ash-flow tuff, the ash-flow tuff of Bond Creek of Smith and others(1982), is exposed in southern part of Western Cascade Range near and at base of unit. A K-Ar age of 34.9 Ma was determined on biotite from the tuff (Smith,1980). Ash-flow tuffs, higher in the section and in the same area, have been radiometrically dated at 22 to 32 Ma by potassium-argon methods (J.G. Smith, unpub. data, Evernden and James, 1964,Fiebelkorn and others, 1983). In the central part of the Western Cascade Range, the unit has yielded a number of K-Ar ages in the range of about 32 to 19 Ma (Verplanck, 1985, p. 53-54). A fission-track age of 23.8 +- 1.4 Ma was obtained on a red, crystal-rich ash-flow tuff(J.A. Vance,oral commun.,1983) collected at an elevation of about 3,000 ft on U.S. Highway 20 west-southwest of Echo Mountain. Most ages from basalt and basaltic andesite lava flows are in the range of about 35 to 18 Ma. Locally intruded by small stocks of granitoid rocks and by dikes, sills, plugs, and invasive flows of basaltic andesite and basalt; in many places, theintrusions are indishnguishable from poorly exposed interbedded lava flows; K-Ar ages on several of the mafic intrusions or invasive flows are about 27 to 31 Ma. In places subdivided into:

Tus - 6 acres

Sedimentary and volcaniclastic rocks Lapilli tuff, mudflow deposits (lahars), flow breccia, and volcanic conglomerate, mostly of basaltic to dacitic composihon; rare iron-stained palagonitic tuff and breccia of basaltic and andesitic composition; and ash-flow, air-fall, and water-laid tuff of dacitic to rhyolitic composition. The palagonite tuff and breccia grade laterally into peperite and into lava flows of basalt and basaltic andesite

Tut - 2493 acres

Tuff Welded to unwelded, mostly vitric crystal and vitric ash-flow tuff of several ages.Glass in tuff locally altered to clay, zeolites, and secondary silica minerals

APPENDIX D

WILDLIFE

APPENDIX D
SPECIAL STATUS SPECIES
MYRTLE CREEK WATERSHED ANALYSIS UNIT ROSEBURG BLM 8/96

FISH	STATUS	PRESENCE	MONITORING LEVEL
Coho Salmon	FP, SC, AS	D	3
Umpqua Cutthroat Trout	FE	D	3
Steelhead Trout (Winter Run)	AS	D	3
Pacific Lamprey	SoC, BS	D	3
Umpqua Chub	SoC, BS, SV	S	1
INVERTEBRATES			
Oregon shoulderband	S&M	U	1
Oregon megomphix	S&M	U	1
Shasta hesperian	S&M	U	1
Pacific sideband snail	SoC, BS	U	1
Evening fieldslug	S&M	U	1
Blue-gray tail-dopper	S&M	U	1
Papillose tail-dopper	S&M	U	1
California floater	SoC, BS	U	1
Vertree's ceraclean caddisfly	SoC, BS	U	1
Vertree's ochrotrichian micro caddisfly	SoC, BS	U	1
Mt. Hood primitive brachycentrid caddisfly	SoC, BS	U	1
Alsea ochrotichian micro caddisfly	SoC, BS	U	1
Franklin's bumblebee	SoC, BS	U	1

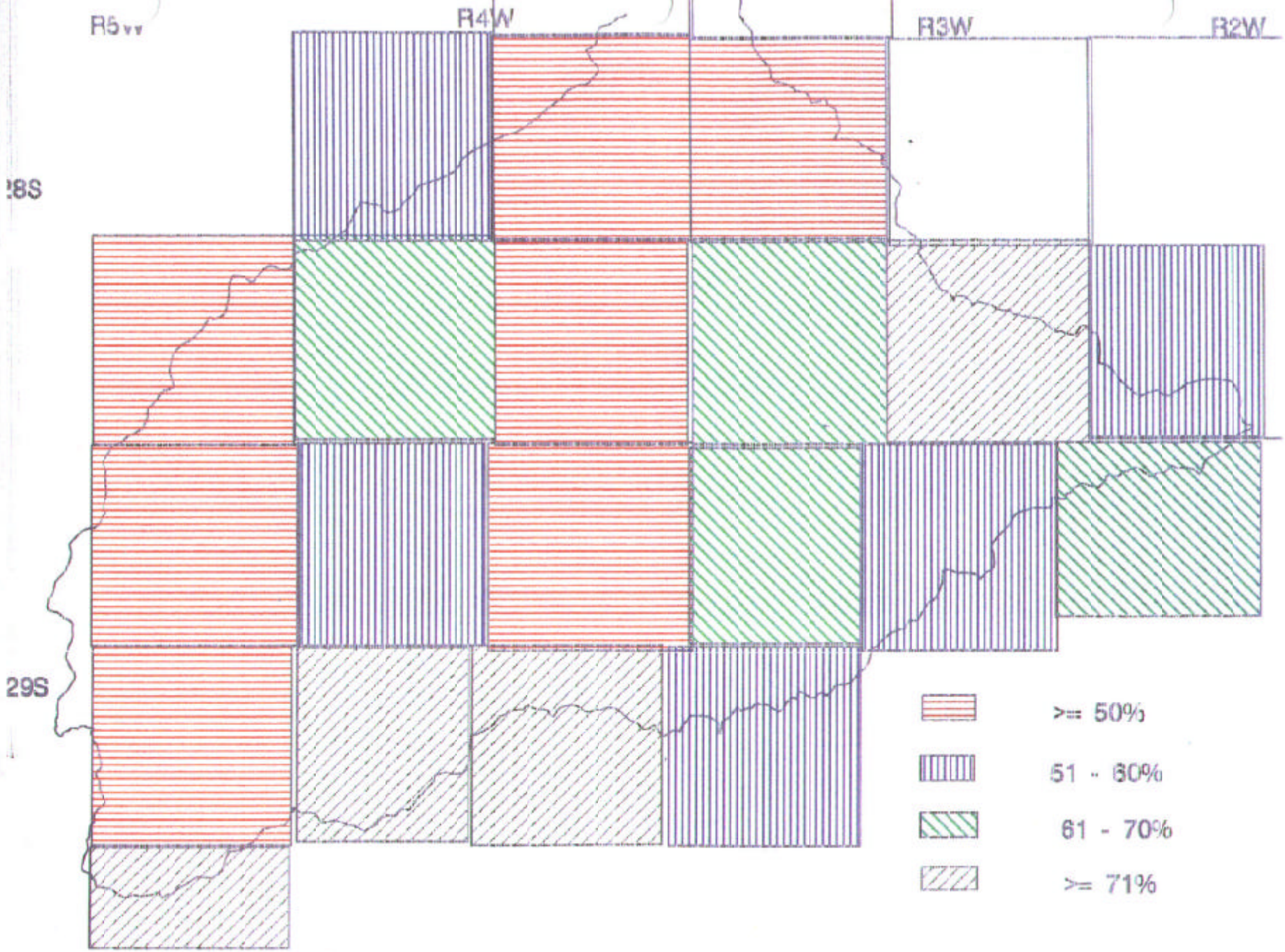
STATUS ABBREVIATIONS:	PRESENCE ABBREVATIONS:
FE -- Federal Endangered	D -- Documented
FT -- Federal Threatened	S -- Suspected, habitat present
FP -- Federal Proposed	U -- Uncertain
FC -- Federal Candidate	
SE -- State Endangered	SoC-- Federal species of concern Use to be Fed. C-2.
ST -- State Threatened	
SC -- ODFW Critical	
SV -- ODFW Vulnerable	
SP -- ODFW Peripheral/Naturally Rare	S&M--Survey and Manage (ROD)
SU -- ODFW Undetermined	
BS -- Bureau Sensitive	
AS -- Assessment Species (BLM)	

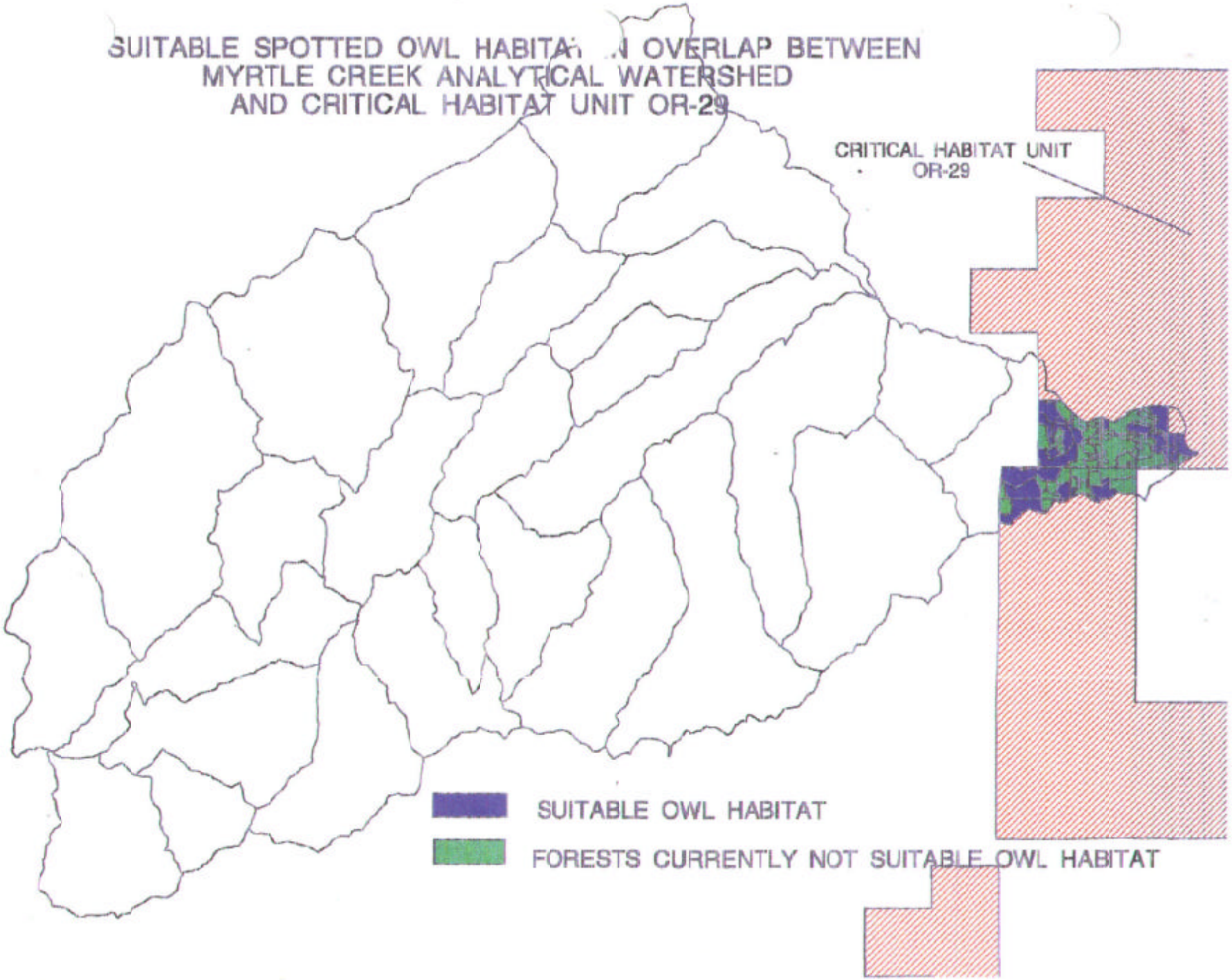
MONITORING LEVELS:
N -- No surveys done or planned
1 -- Literature search only
2 -- One field search done
3 -- Some surveys completed
4 -- Some type of protocol completed
5 -- S&M Protocol completed

APPENDIX D
SPECIAL STATUS SPECIES
MYRTLE CREEK WATERSHED ANALYSIS UNIT ROSEBURG BLM 8/96

SPECIES (common name)	STATUS	PRESENCE	MONITORING LEVEL
BIRDS			
Peregrine falcon	FE,ST	U	1
Bald eagle	FT,ST	S	1
Northern spotted owl	FT,ST	D	4
Flammulated owl	SC, AS	U	1
Great gray owl	S&M,SV,AS	U	1
Pygmy owl	SU	S	1
Northern Saw-whet Owl	AS	S	1
Northern goshawk	SoC, BS,SC	S	1
Mountain quail	FC3	D	1
Pileated woodpecker	SC, AS	S	1
Acorn Woodpecker	SU	U	1
Purple martin	SC, AS	U	1
Western bluebird	SV, AS	U	1
AMPHIBIANS AND REPTILES			
Sharptail snake	SV,AS	U	1
California Mountain Kingsnake	SP, AS	U	1
Common kingsnake	SP, AS	U	1
Western pond turtle	SoC, BS,SC	S	1
Del Norte salamander	S&M,BS,SV	U	1
Clouded salamander	SC, AS	S	3
Mountain yellow-legged frog	SoC, BS,SU	U	1
Red-legged frog	SoC,BS,SU	S	3
Cascades frog	SoC, BS, SV	S	3
Southern torrent salamander	SoC,BS,SC	S	3
Tailed frog	SoC,BS,SV	S	3
MAMMALS			
Townsend's big-eared bat	SoC, BS,SC	S	1
Yuma Myotis	SoC, SU, BS	S	1
Fringed myotis	SoC,BS,SV	S	1
Pacific pallid bat	SC,AS	S	1
Silver Haired Bat	SU	S	1
Long-eared Myotis	SoC, BS	S	1
Long-legged Myotis	SoC,BS,SU	S	1
White-footed vole	SoC,BS,SP	S	1
Red Tree Vole	S&M	D	1
Fisher	SoC,BS,SC	U	1
Pine marten	SC, AS	S	1
Ringtail	SU	S	1
Lynx	S&M	U	1

PERCENT ACRES OF 50-11-40 HABITAT AVAILABLE BY QUARTER TOWNSHIP IN THE MYRTLE AWS




SUITABLE SPOTTED OWL HABITAT IN OVERLAP BETWEEN
MYRTLE CREEK ANALYTICAL WATERSHED
AND CRITICAL HABITAT UNIT OR-29
CRITICAL HABITAT UNIT
OR-29
SUITABLE OWL HABITAT
FORESTS CURRENTLY NOT SUITABLE OWL HABITAT

APPENDIX E

GLOSSARY

Appendix E

Glossary

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

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.

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.

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 (BMP) - 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 Fish and Wildlife Service (FWS) for listing as threatened or endangered. There are two categories that are of primary concern to BLM. These are:

> 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.
>
> Category 2. Taxa for which the Fish and Wildlife Service has information to indicate that listing is possibly appropriate. Additional information is being collected.

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.

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.

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.

50-11-40 Rule - A proposed guideline requiring maintenance of adequate spotted owl dispersal habitat on lands outside designated "habitat conservation areas" for the Northern Spotted Owl. It would assure that, on the quarter township basis, 50 percent of the stands would have conifers averaging 11 inches dbh and a 40 percent canopy closure.

General Forest Management Area - 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.

GIS - Geographic Information System, 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.

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.

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.

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 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 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 1/2 to 1-1/2 miles in length unless channel character, confluence distribution, or management considerations require variance.

Transportation Management Objectives - (TMO's) 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.

APPENDIX F

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REFERENCES

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