Upper Middle Fork Coquille Watershed Analysis

Roseburg District
South River Resource Area

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Executive Summary
Upper Middle Fork Coquille WAU

Characterization

The Upper Middle Fork Coquille WAU covers approximately 67,207 acres. The Bureau of Land Management (BLM) administers approximately 25,960 acres (39%) within the WAU. The Roseburg BLM District manages approximately 19,571 acres in the WAU. The Coos Bay BLM District manages approximately 5,776 acres and the Medford BLM District manages approximately 432 acres in the WAU. Bureau of Land Management administered lands are composed of Matrix, Late-Successional Reserve (LSR), and Riparian Reserve Land Use Allocations. Approximately 8,091 acres (31%) of BLM-administered lands are available for intensive forest management. This would be about 12% of the WAU.

Approximately 274 acres per decade are estimated to be harvested on Roseburg BLM District administered lands within the Upper Middle Fork Coquille WAU. This would be about four percent of the 6,244 acres considered available for harvesting on the Roseburg BLM District within the WAU. Although, less than one percent of the Upper Middle Fork Coquille WAU would be harvested per decade.

Timber harvesting, agriculture, and recreation have been the dominant human uses in the Upper Middle Fork Coquille WAU. The town of Camas Valley is in the WAU.

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

Key Issues

The following issues and concerns were identified during the analysis.

•Management of the Late-Successional Reserve Land Use Allocation in the Upper Middle Fork Coquille WAU.

•Potential areas for timber harvesting in the WAU.

•The amount of timber harvesting in the past 30 years on BLM-administered lands.

•Fragmentation of suitable owl habitat.

•The distribution and condition of habitat used by special status species in the WAU.

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

•Water quality.

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

•Restoration opportunities in the WAU.

Findings

Vegetation

•Sixty-eight percent of BLM-administered land in the WAU is within the Reserved or Withdrawn areas. Thirty-two percent of the BLM-administered land in the WAU is available for timber harvesting.

•Timber harvesting on Roseburg BLM District is estimated to affect less than one percent (274 acres out of 67,207 acres) of the WAU per decade.

•Port-Orford cedar, both healthy and infected with the Port-Orford cedar root disease (Phytophthora lateralis), occurs in the Upper Middle Fork Coquille WAU.

Hydrology and Fisheries

•Road densities range from 4.03 miles per square mile in the Wildcat Drainage to 6.86 miles per square mile in the Lower Twelve Mile Drainage. The road density for the entire WAU is 5.42 miles per square mile.

•Main concerns are sediment in streams and water quality. High road densities, high stream crossing densities, and cumulative effects of harvesting in the past 40 years have probably increased peak flows and increased sediment in the streams.

•Current water quality concerns are high stream temperatures that do not meet state water quality standards.

Wildlife

Northern Spotted Owl

•There are 9,891 acres of BLM Administered Land in the Upper Middle Fork Coquille WAU considered to be suitable spotted owl habitat (Habitat 1 and 2).

•There are 17 spotted owl sites within the WAU. Fifteen of the spotted owl sites are on BLM-administered land. Three sites on BLM-administered land were active sites in 1998. Six spotted owl sites on BLM-administered lands are protected with 100 acre activity centers (core areas). Nine spotted owl sites are in the LSR portion of the WAU.

Other Species of Concern

•There is habitat within the WAU that some Survey and Manage or Protection Buffer species may use.

Neotropical Birds

•Surveys from 1993 to 1998, show more than 50 bird species are present in this area.

Recommendations and Restoration Opportunities

Vegetation

•Conduct regeneration harvests on Matrix lands in conformance with the RMP.

•Manage young stands to maintain or improve growth and vigor and to improve stand structure and composition.

•Management activities should conform to the BLM Port-Orford Cedar Management Guidelines to limit the spread of the Port-Orford cedar root disease.

Soils

•Best Management Practices (BMPs) should be applied during all ground and vegetation disturbing activities. Along with the BMPs, the Standards and Guidelines brought forth from the Record of Decision (USDA and USDI 1994) should be implemented in order to achieve proper soil management. Best Management Practices should be monitored for implementation and effectiveness in order to document if soil goals are being achieved.

Hydrology

•Consider implementing bioengineering techniques with stream restoration opportunities.

•Consider classifying streams in the WAU using Rosgen stream classification.

•Consider collecting water quality data (such as pH, temperature, or dissolved oxygen) on BLM administered lands to determine if they are contributing to water quality concerns.

•When fertilizing, provide adequate buffers on streams and monitor fertilization activities to insure the fertilizer is not applied directly into streams or other bodies of water, especially those having a pH above 8.0, or if the fertilizer were to reach the stream indirectly, the pH and/or primary productivity of the stream would not be increased due to the fertilizer.

•Reducing road densities and conducting stream restoration projects would probably be the most effective restoration activities in the WAU.

•Thinning in the Riparian Reserves should be considered where opportunities exist.

•Consider determining where culverts block fish passage, need to be repaired or replaced, culverts are inadequate to accommodate a 100-year flood, and where additional culverts, waterbars, or water dips would reduce the stream network extension.

•Roads could be fully decommissioned without limiting future management activities in the WAU. Roads within Riparian Reserves, Late-Successional Reserves, identified to be causing water quality problems, and in Drainages with high road densities would be considered first for full decommissioning.

•Consider conducting stream surveys to help in designing stream restoration projects, such as removing culverts when decommissioning roads or replacing culverts on fish-bearing streams.

Fisheries

•Consider focusing watershed restoration on providing or improving fish passage at failed or failing stream crossings (especially in anadromous fish-bearing stream reaches), renovating, upgrading, or decommissioning roads, and reestablishing vegetation where it is needed.

•In-stream structures and riparian improvement projects are other restoration activities that could be conducted in the WAU.

•Consider describing how projects within Riparian Reserves meet Aquatic Conservation Strategy objectives.

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

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

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

•Consider the amount of soil disturbance, timber falling, and yarding within existing late-successional or old-growth timber stands in Riparian Reserves necessary. Salvage activities in Riparian Reserves in late seral age stands should not retard or prevent attainment of ACS objectives.

•Confirming fish passage over the multiple falls on lower Twelvemile Creek and determining the genetic similarity between the resident rainbow and winter steelhead populations would help when assessing potential impacts from proposed management activities.

•Consider monitoring two culverts in T29S, R8W, Section 31 that were replaced in the fall of 1998 to prevent future problems.

•The outlet side of one culvert in T29S, R9W, Section 26 washed out and is considered to be impassable to fish. Consider repairing this culvert to allow fish access.

•Pump chances located along roads in T29S, R8W, Sections 9 and 29, T29S, R9W, Section 23, and T31S, R7W, Section 19 block resident fish passage. Consider assessing the feasibility of constructing fish passage at these pump chances.

•Consider surveying roads and culverts to identify those at risk of failing during a high water event.

•Possible roads to consider for decommissioning include the 29-9-27.1 road, 29-9-26.1 road, 30-9-24.1 road, 30-8-11.1 road, 28-8-31.5 road, 28-8-31.4 road past the junction with the 32.0 road an unnamed spur in T30S, R9W, Section 23 in the SW quarter, an unnamed spur in T30S, R9W, Section 23 in the SE quarter, and an unnamed road in T30S, R8W, Section 19 on the south side of Boulder Creek. These roads are located in Riparian Reserves and are causing sedimentation problems. There may be other roads within Riparian Reserves causing sedimentation problems that have not been identified and could be considered for decommissioning.

•Consider continuing surveys to identify fish bearing streams and barriers to fish passage within the Upper Middle Fork Coquille WAU.

•The riparian area along Bingham/Holmes Creek was impacted from trespass cattle grazing in 1998. This area should be monitored to prevent further trespassing and insure recovery.

•Consider conducting stream habitat inventories in the Upper Middle Fork Coquille WAU.

Wildlife

Northern Spotted Owl

•Consider planning so projects that modify or remove suitable owl habitat occur in areas outside of known territories first. Consider the rankings in Table 25 if modifying or removing suitable habitat in the Upper Middle Fork Coquille WAU.

•Consider the effects of timber harvesting on dispersal and critical habitat.

The Peregrine Falcon

•Consider continuing peregrine falcon habitat evaluation in the WAU.

The Marbled Murrelet

•Two years of protocol surveys are required prior to implementing projects that modify suitable marbled murrelet habitat. Consider evaluating and surveying marbled murrelet habitat in the northwest portion of the WAU.

Other Species of Concern

•Conduct surveys following established protocols to determine if the species are present in the WAU.

Neotropical Birds

•Consider scheduling management activities, such as burning, brushing, PCT, commercial thinning, timber harvesting, and other activities that remove or modify neotropical bird habitat so they do not occur during the breeding season, between April 1 and July 30 of any given year.

•Consider continuing the Monitoring Avian Productivity and Survival (MAPS) station in the Boulder Creek Drainage. Four more years are needed to complete ten years of data collection.

Red Tree Vole

•Consider conducting general surveys for red tree voles in the WAU.

I. Characterization of the Watershed

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

Watershed analysis is one component of the Aquatic Conservation Strategy (ACS). The other components of the Aquatic Conservation Strategy are Key Watersheds, Riparian Reserves, and Watershed Restoration. These components are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems. The Upper Middle Fork Coquille WAU is not within a Key Watershed. Riparian Reserves are portions of the landscape where riparian-dependent and stream resources receive primary emphasis. Riparian Reserves help to meet the Aquatic Conservation Strategy by maintaining streambank integrity, large woody debris (LWD), riparian shade and microclimate, and surface and groundwater systems (see Appendix H). Riparian Reserves also provide sediment filtration, travel and dispersal corridors, nutrient sources, pool habitat, and drainage network connections. Watershed Restoration would be based on watershed analysis.

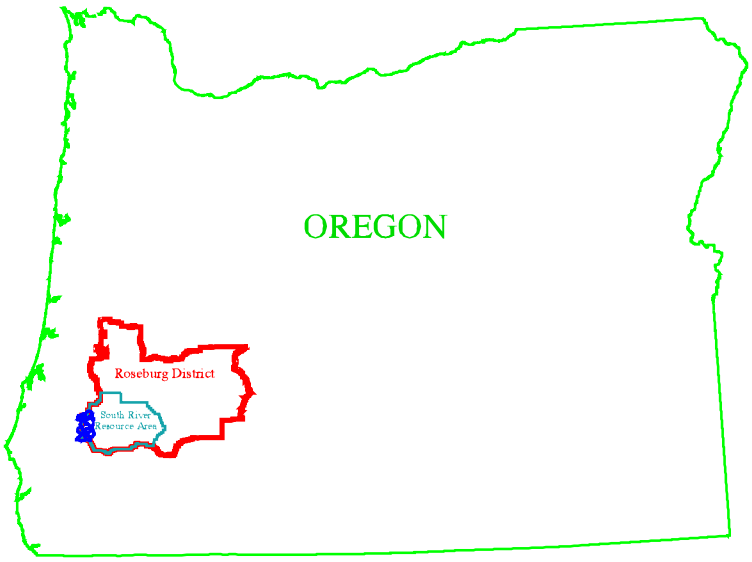
The Upper Middle Fork Coquille Watershed Analysis Unit is located in the western portion of the South River Resource Area in the Roseburg District Bureau of Land Management (see Map 1). The Watershed Analysis Unit (WAU) covers approximately 67,207 acres. Elevation ranges from about 500 feet where the Middle Fork of the Coquille River flows out of the WAU in the west to about 3,880 feet near Big Dutchman Butte in the southeast part of the WAU. The town of Camas Valley is located in this WAU.

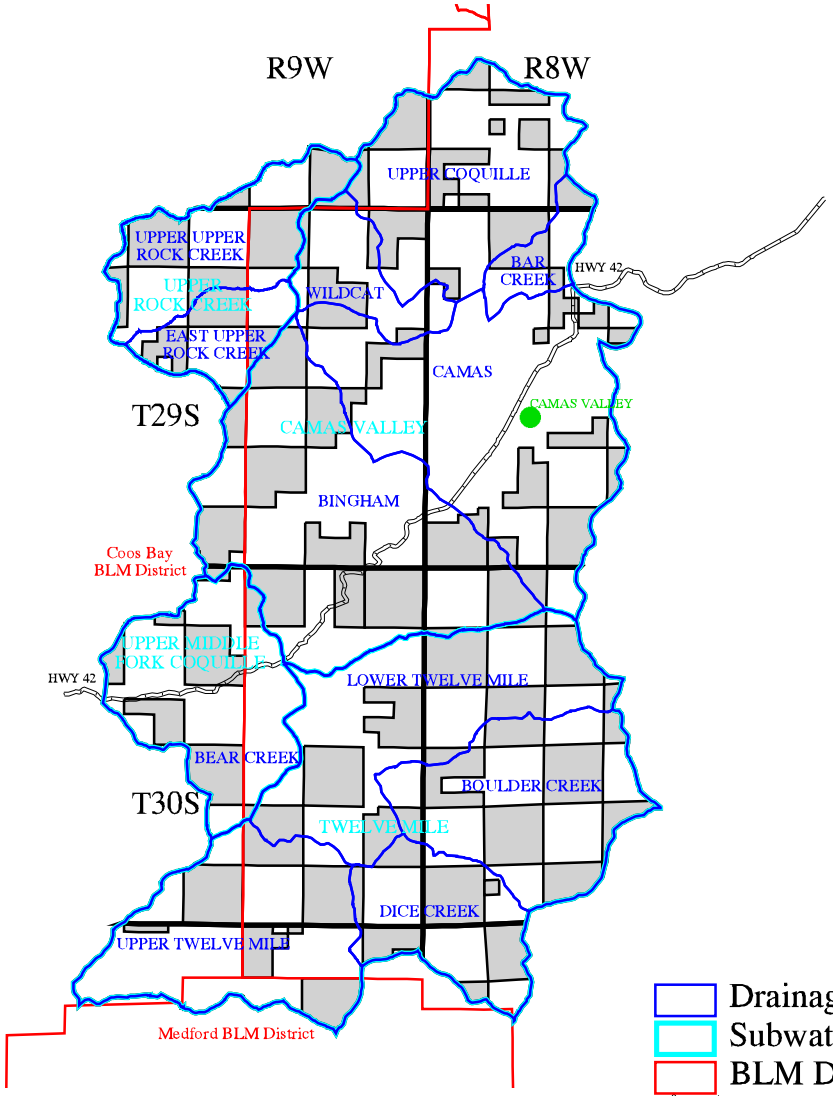
This WAU lies within the Middle Fork Coquille Watershed (fifth field). The WAU includes four subwatersheds, which are further divided into twelve drainages. The subwatersheds and their drainages are shown on Map 2 and listed in Table 1.

The Bureau of Land Management (BLM) administers approximately 25,960 acres (39%) within the Upper Middle Fork Coquille WAU. The BLM-administered land is managed by the Roseburg, Coos Bay, and Medford Districts. The Roseburg BLM District manages approximately 19,571 acres. The Coos Bay BLM District manages approximately 5,776 acres and the Medford BLM District manages approximately 432 acres. Although, this watershed analysis includes portions of three BLM Districts the primary focus is on the lands managed by the Roseburg BLM District. Camas Valley consists mostly of privately owned agricultural lands. Privately owned lands cover approximately 41,247 acres (61%) of the WAU.

Bureau of Land Management administered lands are composed of Matrix, Late-Successional Reserve (LSR), Marbled Murrelet Reserve (MMR), and Riparian Reserve Land Use Allocations established in the Northwest Forest Plan (USDA and USDI 1994b) and Roseburg, Coos Bay, and Medford District Resource Management Plans (RMP). Matrix lands are further delineated into General Forest Management Areas (GFMA), Northern General Forest Management Area (NGFMA) in the Medford District, and Connectivity/Diversity Blocks (CONN). The GFMA and NGFMA will be grouped and

Map 1. Vicinity Map
Upper Middle Fork Coquille Watershed Analysis Unit





Drainages
Subwatersheds
BLM District Boundaries
Highway 42
Township Boundaries
BLM Administered Lands

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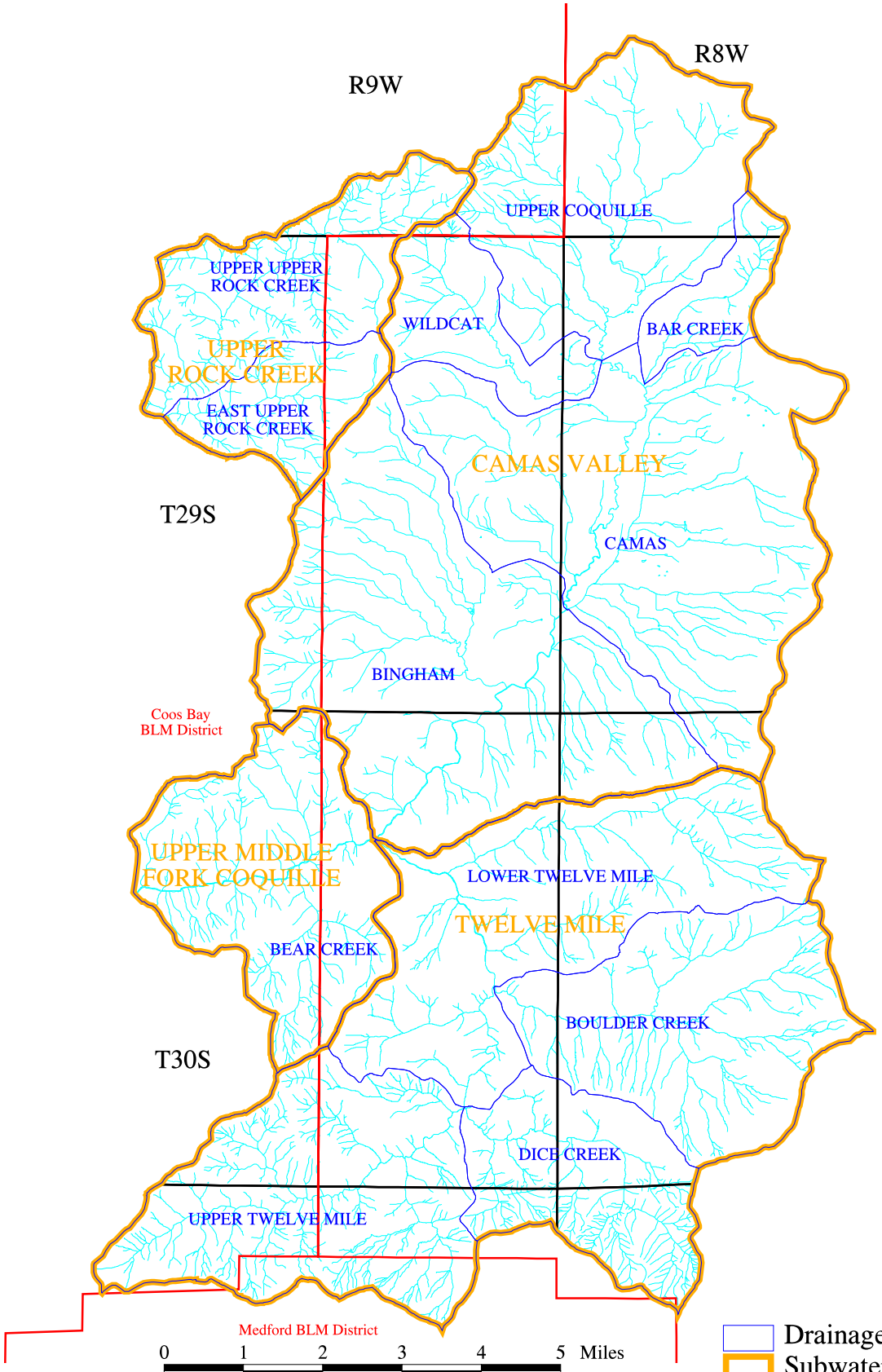
Map 2. Upper Middle Fork Coquille Watershed Analysis Unit Subwatersheds and Drainages



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considered as GFMA in this watershed analysis. Map 3 and Chart 1 show the percentage of GFMA, Connectivity/Diversity Blocks, LSR, and MMR and how they are distributed in the WAU. Table 2 and Chart 2 show the number of acres by Land Use Allocation.

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

Drainage **Subwatershed**	BLM		Private		Total Acres
	Acres	Percent	Acres	Percent	
Bar Creek	475	39	736	61	1,211
Bingham	5,029	46	5,999	54	11,028
Camas	2,330	22	8,499	78	10,829
Upper Coquille	2,533	39	3,934	61	6,467
Wildcat	658	31	1,450	69	2,108
Camas Valley Subwatershed	11,025	35	20,618	65	31,643
Boulder Creek	2,823	47	3,228	53	6,051
Dice Creek	1,795	49	1,877	51	3,672
Lower Twelve Mile	3,391	44	4,247	56	7,638
Upper Twelve Mile	2,328	35	4,343	65	6,671
Twelve Mile Subwatershed	10,337	43	13,695	57	24,032
Bear Creek	1,803	32	3,853	68	5,656
Upper Middle Fork Coquille Subwatershed	1,803	32	3,853	68	5,656
East Upper Rock Creek	846	44	1,077	56	1,923
Upper Upper Rock Creek	1,949	49	2,003	51	3,952
Upper Rock Creek Subwatershed	2,795	48	3,080	52	5,875
Upper Middle Fork Coquille WAU	25,960	39	41,246	61	67,206

The Upper Middle Fork Coquille WAU includes portions of LSR 259 (in the southeastern portion of the WAU) and LSR 261 (LSR and MMR north of Highway 42). Late-Successional Reserves were established to protect and enhance conditions of late-successional and old-growth forest ecosystems. These ecosystems serve as habitat for animal and plant species that use old-growth forests.

Map 3. Upper Middle Fork Coquille Watershed Analysis Unit Land Use Allocations

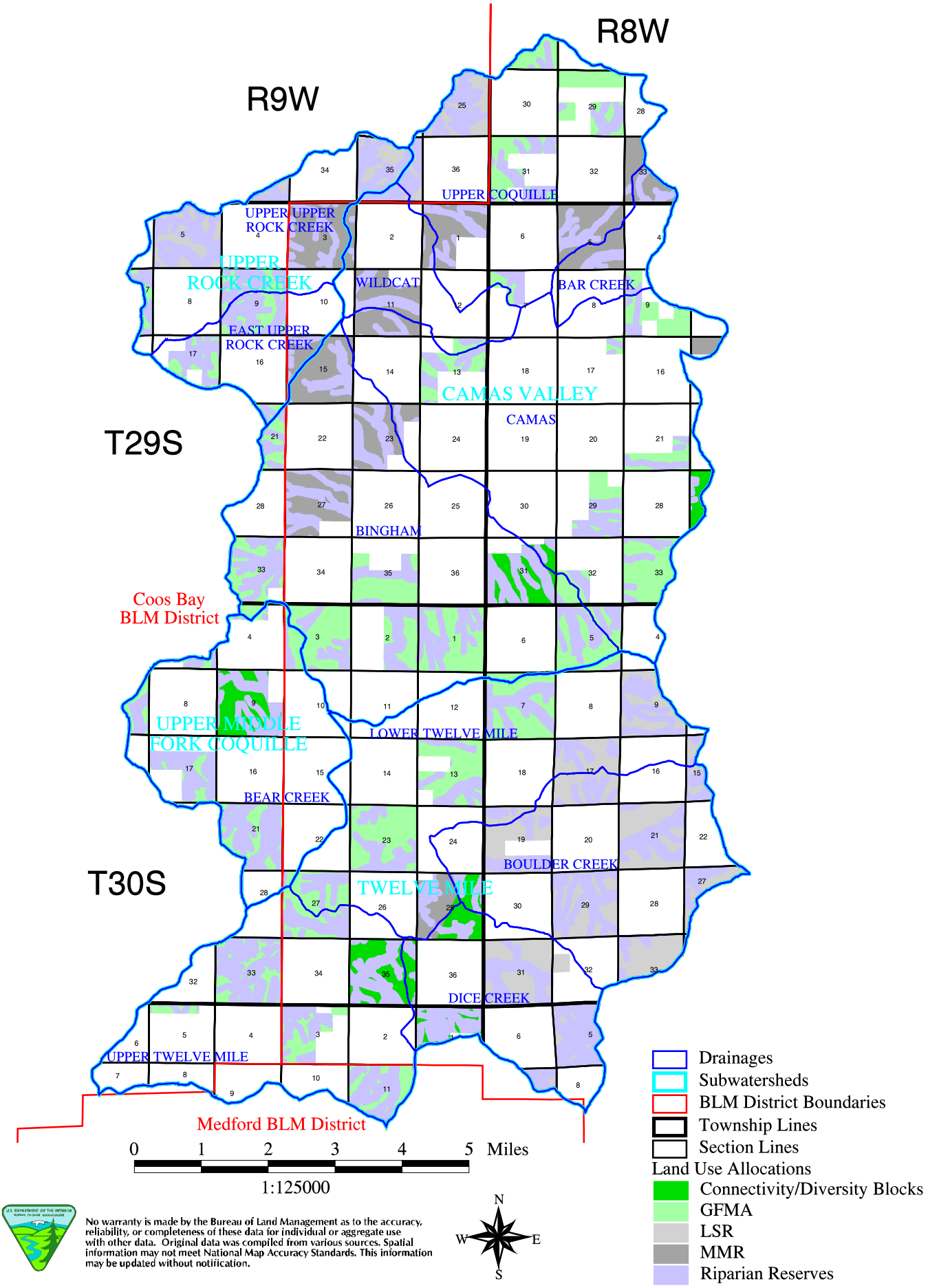

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Chart 1. Upper Middle Fork Coquille WAU

Total Land Use in WAU

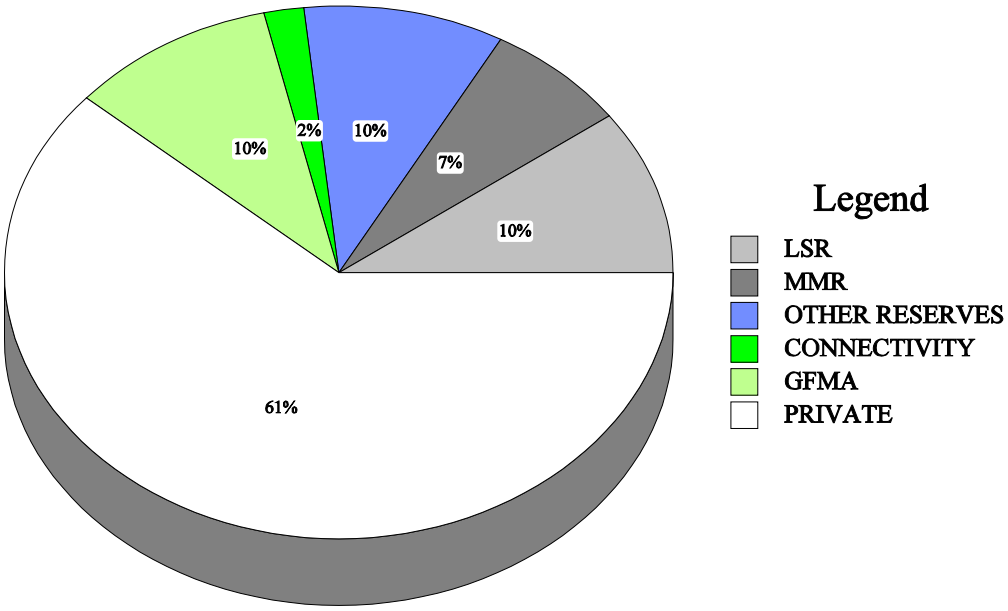
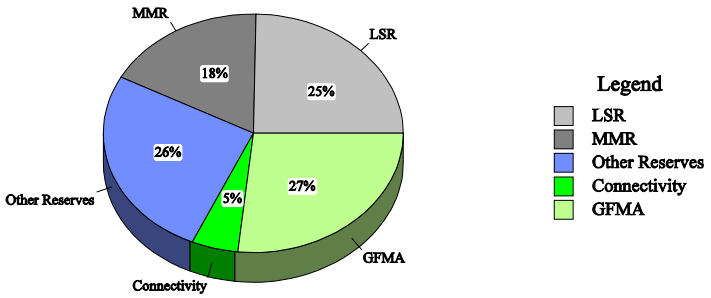


Table 2. Acres and Percentage of Federally Managed Lands by Land Use Allocation.

Land Use Allocation	Acres in Roseburg District	Acres in Coos Bay District	Acres in Medford District	Total Acres of Federally Managed Lands	Percent of Federally Managed Lands	Percent of Watershed Analysis Unit
Late-Successional Reserve	4,827	1,669	0	6,496	25	10
Marbled Murrelet Reserve	4,695	0	0	4,695	18	7
Riparian Reserves (Outside of LSR and MMR)	3,777	2,253	238	6,268	24	9
Other Reserved Areas (Owl Core Areas and TPCC Withdrawn Areas)	210	202	0	412	2	1
Connectivity/Diversity Blocks	931	246	0	1,176	5	2
General Forest Management Area (GFMA)	5,313	1,407	194	6,914	27	10
Total	19,753	5,776	432	25,961	100	39

Chart 2. Upper Middle Fork Coquille WAU

Federal Land Use Allocations



II. Issues and Key Questions

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

A. ISSUE 1 - Late-Successional Reserves

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

Key Questions

Vegetation Patterns

Where are the stands that may be treated to maintain or promote late-successional habitat within the LSR? See Map 7 on page 26, Map 23 on page 93, and pages 95 through 97.

Are there risk reduction activities which could occur in the WAU to protect late-successional/old-growth forests? See pages 95 and 96.

B. ISSUE 2 - Harvest Potential

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

Key Questions

Vegetation Patterns

What are the historic and current vegetation conditions? See pages 18 through 38.

Where are the stands of harvestable age (at least 40 years old) within the Matrix? See Map 6 on page 24, Map 23 on page 93, and Map 25 on page 108.

Can the scale, timing, and spacing of timber harvest areas be adjusted to minimize fragmentation and the effects on other resources while meeting the objectives for Matrix lands established in the SEIS ROD and the Roseburg District RMP? See page 107, page 113, Map 25 on page 108, Appendix E, and Appendix I.

C. ISSUE 3 - Watershed Health and Restoration

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

Key Questions

a. Vegetation Patterns

What are the historic and current vegetation conditions in the WAU? See pages 18 through 38.

What processes created the vegetation patterns? See page 15 and pages 18 through 38.

What is the age class distribution in the WAU? Where are the early and mid seral stands in the WAU? Where are the late-successional/old-growth stands within the WAU? See Table 5 on page 23, Table 6 on page 25, Map 6 on page 24, and Map 7 on page 26.

What is the current condition of Riparian Reserves within the WAU? See Table 7 on page 34 and Map 10 on page 35.

b. Port-Orford Cedar

Where does Port-Orford cedar occur in the WAU? See pages 29 and 30 and Map 9 on page 31.

Where does Port-Orford cedar root disease occur in the WAU? See pages 29 and 30 and Map 9 on page 31.

What is the management strategy for controlling Port-Orford cedar root disease? See page 30 and page 109.

c. Soils / Erosion

What are the dominant erosion processes within the WAU and where have they occurred or are likely to occur? See Map 13 on page 41 and page 47.

d. Hydrology / Channel Processes

What are the dominant hydrologic characteristics (e.g. total discharge, and peak, base, and low flows) and other notable hydrologic features and processes in the WAU? See pages 49, 50, 53, 54, 55, and 56.

e. Water Quality

What beneficial uses dependant on aquatic resources occur in the WAU and which water quality parameters are critical to these uses? See pages 49, 50, 57 through 62 and Table 18 on page 57.

What are the effects of management activities on hydrologic processes? See pages 56, 57, 99, and 100.

Where are the opportunities to improve water quality and hydrologic conditions? See pages 50 through 53, 99, 100, and 110 through 112.

f. Fisheries

Where are the historic and current locations of fish populations? See pages 64, 66 through 69, Map 16 on page 68, and Tables C-7 and C-8 in Appendix C.

How have fish habitat and populations been affected by hydrologic processes and human activities? See pages 63, 64, 66, 67, and 69 and Tables C-4, C-5, and C-6 in Appendix C.

What and where are the restoration opportunities that would benefit the fisheries resource? See pages 111 and 112 and Table 23 on page 101.

g. Roads

What are the current conditions and distribution of roads in the WAU? See pages 50 through 53, Table 12 on page 51, and Table 13 on page 52.

How are roads impacting other resources within the WAU? See pages 50 through 53, Table 12 on page 51, Table 13 on page 52, and Table 14 on page 53.

Are there road decommissioning or improvement opportunities in the WAU? See page 53, pages 110 through 112, Table 14 on page 53, and Appendix G.

D. ISSUE 4 - Special Status Species

Key Questions

Special Status Species and Their Habitat

What are the species of concern important in the WAU (e.g. threatened or endangered species, special status species, or species emphasized in other plans)? See pages 63 through 87, Table E-1 in Appendix E, and Table F-1 in Appendix F.

What is the distribution and character of their habitats? See pages 70 through 86, Map 15 on page 65, Map 16 on page 68, Map 17 on page 74, Map 19 on page 78, Map 20 on page 80, Map 21 on page 82, and Map 22 on page 84.

III. / IV. Reference and Current Conditions

A. Human Uses

1. Reference Conditions

The area included in the Upper Middle Fork Coquille Watershed Analysis Unit has been used by humans for probably thousands of years. Uses of the WAU have included hunting and gathering, subsistence and commercial agriculture, transportation, logging and lumbering, and recreation.

Little knowledge exists of prehistoric use within the WAU prior to the arrival of European-Americans. Thomas Connelly conducted a cultural sites inventory in the Camas Valley, in 1984. Connelly located most of the recorded sites in the valley, but did not locate any sites in the uplands (Connelly 1984). Approximately 44 of the estimated 53 recorded sites in the Upper Middle Fork Coquille WAU are on private lands. The Standley Site, located at the west end of the WAU, was excavated in 1982 and 1983 in response to the realignment of Highway 42. The site was a substantial encampment during the prehistoric period, with a wide range of activities carried out at the site (Connelly 1991). The number of sites located in the valley indicates the area was used extensively by indigenous people.

The indigenous people of the area followed a seasonal life utilizing a variety of plants and animals, hunting deer and elk and gathering nuts, berries, seeds, and roots. The Native people changed the landscape very little, although they may have burned areas to control brush for hunting and to aid in the collection of seeds for food.

a. Exploration and Settlement

The 1800s marked the arrival of fur trappers and settlers into the Upper Middle Fork of the Coquille River Valley. Settlers transformed the life and countryside of the area and began the process of shaping it into its current conditions. Exploration by fur trappers from the Hudson Bay Company began around 1820. The trappers lead by Alexander McLeod left the Coquille River on December 14, 1826 canoeing up the Middle Fork of the Coquille River. They traveled through the Camas Valley area and continued eastward to the Umpqua River Basin. In 1884 William Day, Solomon Fitzhugh, and A.R. Flint traveled through Camas Valley on their way to the coast. They returned to settle in the valley (Combs 1962). Early explorers described the valley as one mass of blue when the Camas were in bloom. The valley was originally called "Wheat Prairie" after a small patch of wheat planted by the Native inhabitants.

The passage of the Donation Land Claim Act in 1850 opened the region to settlers. William Day, Patterson, Alston Martindale, C. B. Rawson, and Jesse Dryer were early settlers in the Camas valley (Walling 1884). As more settlers arrived in Southern Oregon the troubles between the European-Americans and the Indians escalated. One incident occurred in 1856 when Rogue River Indians passing through Camas Valley stole fifty head of cattle. The next day settlers pursued and fought the Indians to a stand off along a stream, which was later called Battle Creek (Murry 1951).

Commercial deer hunters, called "skinners", killed large numbers of deer for the hides. The commercial deer hunters had an impact on the number of deer and elk in the WAU. Deer roamed the hills in bands and were as thick as sheep before the time of the commercial deer hunters in the 1880s. The hunters left the carcasses in the woods and sold the hides, which were hauled to Roseburg and then shipped to San Francisco to be made into gloves by an Eastern manufacturer. The Tenmile Store owner acquired over four thousand hides from the various "skinners" in one winter (Harvey Wesley Lawson 1938). By the 1890s commercial hunting declined due to overkilling and efforts by Federal officials to regulate hunting on both public and private lands.

The primary period of settlement in the WAU was between 1850 and 1900. The town of Camas Valley had two mercantile stores in 1858. Camas Valley continued to grow until 1950 when it had three markets and general stores, a freezer locker plant, two cafes, two beer taverns, a pool hall, and an assortment of service stations and repair shops (Murry 1951).

b. Agriculture/Grazing

The early settlers maintained a subsistence lifestyle until a market was established for grain and livestock. These became the main sources of income in the 1880s and 1890s. Products were transported to markets by pack animals or wagon and the cattle were driven to market. The farmers hauled their grain to Roseburg. A large variety of fruit, grains, and grasses were grown in the Camas Valley area. Two water powered grist mills operated in the valley. The railroad reached Roseburg from the north in 1872. This opened a new avenue of transportation and the possibility of new markets.

Cadastral survey notes from the mid-nineteenth century indicate the vegetation consisted of grasslands on the valley floor, oak openings on the middle of the hill slopes, and timber on the upper hill slopes.

c. Transportation

A wagon road from Camas Valley to Myrtle Point was completed in 1879. A stage line ran between Tenmile and Camas Valley and continued to Myrtle Point. The Roseburg-Coos Bay Stage line operated from 1888 to 1891. The owner of the stage line maintained a hotel and barn for the stage line at Sheep-Camp, eight miles west of Camas Valley. The stage line had ceased operating by 1903 (Murry 1938 and Combs 1962).

The wagon road following the Middle Fork of the Coquille River, connecting Coos Bay and Roseburg, was improved between 1922 and 1924. By 1924 the Pacific Highway was paved through Douglas County opening it to all weather travel. State Officials approved construction of Highway 42 in 1945, which improved the road from Roseburg to Coos Bay. The construction of Highway 42 allowed for faster and easier access and an increase in travel throughout the WAU. After the construction of Highway 42 was completed the BLM and private timber companies began building more roads on their timber lands. The new improvements to the transportation system allowed for faster transportation of commodities and year around harvest of timber. Receipts from the Oregon

and California (O&C) revested lands contributed immensely to the improvement of roads throughout Douglas County.

Camp Remote, a Civilian Conservation Corps (CCC) camp, was established in Camas Valley in the early 1930s. The CCC camp housed approximately 200 men. The men at the camp slashed timber for road right-of-way construction and conservation work (Meyers 1983). A second CCC Camp was located at Camp Bradford.

d. Timber/Logging/Mining

Sawmills were opened around 1870 by Jacob Lehnherr, 1880s by James Kirkendall, 1882 by William Ferguson, 1889 by Ferguson and Amsten, and the 1890s by Abram Thrush and Vinnie Arrington (Combs 1962). Prior, Ferguson, and Devitt operated a saw mill at the headwaters of the Middle Fork of the Coquille River. The mill was surrounded by excellent timber of fir, cedar, and sugar pine with a production capacity of 3,000 board feet per day (Walling 1884). Kirkendall produced 352,000 board feet annually in 1902 and Eitt Thrush produced 196,000 in 1903. By the 1920's gypo loggers focused on cedar, because the clear lumber could be used for boat building and battery stock (Beckham 1986). The Middle Fork Lumber Company operated until 1936 (Combs 1962). The first C&D sawmill was built at Bradford Station, which was the site of the old Arrington Mill. It burned in 1942. The owners then purchased a mill in Camas Valley, which burned in 1951, so they moved their operation to the present site in Riddle. Timber production became the major influence on the landscape in the Upper Middle Fork Coquille WAU after World War II. The increased demand for housing lumber and the transportation improvements allowed for a marked increase in lumber production.

In 1955, the Uranium Oil and Gas Company drilled 4,368 feet and found gas deposits at 1,900 feet. The deposits were not considered commercially significant (Beckham 1986). A deposit of coal is located on southeast side of the Camas valley but it is of poor quality. The Camas Valley Coal Company was incorporated on October 30, 1909. The coal was needed for forges in the blacksmith shops. The coal was made by digging a long trench with fire started in the bottom. Small poles and limbs were placed over the fire and buried with dirt. After the fire had burned out the dirt was removed and all that remained was charcoal. By 1913 the company had ceased operating.

2. Current Conditions

The dominant human uses in the Upper Middle Fork Coquille WAU have been timber production, transportation, agriculture, and service-related activities. There are no treaty rights or tribal uses in the WAU, although individual tribal members may utilize the area.

a. Timber

Timber harvesting has had a major influence on the WAU. Spurred by the demand for lumber after World War II, timber became a major influence within the WAU. Both private and Federally-managed land contributed to the harvest of timber and lumber production over the last 50 years.

b. Agriculture

There are approximately 5,916 acres (nine percent) of agricultural/pasture lands within the WAU. A variety of grain and fruit crops were important agricultural products in the past. Livestock and Christmas trees are the primary agricultural commodities in the WAU now.

c. Mining and Minerals

Mining and minerals activity within the Upper Middle Fork Coquille WAU is mostly limited to small quarry developments and a small amount of recreational mining or fossil and rock collecting. The area consists of sandstones, siltstone, and some conglomerates with a minor coal deposit near Twelvemile Creek. Petrified wood has been reported to occur at one location.

Minor quantities of gold have been removed from Twelvemile Creek but there are presently no mining claims on BLM administered lands within this WAU. Minor recreational dredging and panning may occur occasionally. No Notice or Plan level activity is expected to occur in the immediate future. A mercury and a coal occurrence have been reported within the WAU, although no mining activity has occurred or is expected at these locations.

Solid minerals developments in this WAU consist mostly of small, single entry rock pits. The materials being mined are mostly the harder sandstones and conglomerates containing larger rocks occasionally found throughout the WAU. These harder materials are the exception as most of the WAU consists of softer, more weathered rock. There are no large rock quarries located in this WAU. The potential for a new discovery or the development of an existing quarry into a "Regional Pit" is very small. Most of the existing quarries have not been entered recently since the rock is poor in quality for being used as road surfacing material. However, the rock is well suited for use as a base course. Good quality rock needs to be hauled a long way, so the rock in the WAU could be expected to be used as a base course.

Most of the small, single entry quarries in the WAU have not been entered for years and are being reclaimed by natural vegetation. Some of these pits may need to be re-opened as the BLM and private timber companies re-enter the area for commercial thinning and other timber harvesting activities.

There are no Community Pits within this WAU. The Hunter Point Community pit is located just outside the southern boundary of the WAU in T31S, R8W, Section 7 in the SW1/4 of the NE1/4 in the Dothan-Otter Point formation. This quarry is a source of reasonably good quality rock. An estimated 30,000 cubic yards of material remains in this quarry. However, a large portion of the quarry with the best rock is within 200 feet of a seasonal stream. Another quarry located just east of the WAU in T28S, R8W, Section 23 is a commercial source of pit-run/base course material.

d. Recreation

Recreation use in the Upper Middle Fork Coquille Watershed Analysis Unit is determined by the land ownership, topography, and forest types and ages in the area. Special Use Permits are not

required for recreation use in the WAU. Recreation in the WAU is basically limited to dispersed forms. One improved recreation site currently exists on BLM-administered land in the WAU. However, it is closed due to problems along State Highway 42, which would allow access to the area. Trail, day use, and interpretive opportunities may require development of the sites or permits.

The Recreation Opportunity Spectrum (ROS) considers the vast majority of the Federally managed lands in the Upper Middle Fork Coquille WAU to be Roaded Natural. The area around the town of Camas Valley has a strong Rural setting. However, the BLM has limited holdings in this area. The areas with Federally managed lands are characterized by predominantly natural appearing environments with moderate evidence of the sights and sounds of man. Resource modification and utilization practices are evident but usually harmonize with the natural environment. Interaction between users may be low to moderate but with evidence of other users prevalent. Rustic facilities are provided for user convenience as well as for safety and resource protection. Facilities are designed and constructed to provide for conventional motorized use.

(1) Off Highway Vehicles (OHV)

The predominant OHV designation in the RMP for the Upper Middle Fork Coquille WAU is 'Limited' to existing roads and trails. Under this designation, existing roads and trails are open to motorized access unless otherwise identified (e.g. hiking trails). Licensed vehicles may use maintained roads and natural surface roads and trails. Registered OHVs, such as All Terrain Vehicles (ATV) and motorcycles, not licensed for the public roads may only use existing roads and trails that are not maintained (graveled). Areas 'Closed' to OHV use include five progeny test sites for Douglas-fir consisting of fifty two acres.

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

(2) Visual Resource Management (VRM)

Visual Resource Management classes are assigned through an inventory system and range from Class I through IV. Class I lands are reserved for their scenic quality and allow for very limited management, whereas Class IV lands allow for major modifications to the existing character of the landscape. The basis for these classes are a combination of scenic quality, sensitivity level, and distance zones.

The Upper Middle Fork Coquille WAU contains VRM Class II, Class III, and Class IV lands. Under the Class II designation, low levels of change to the characteristics of the landscape would be allowed. Management on Class III designated lands should partially retain the visual character. A Class IV designation allows for major modifications. Class II and III lands occur along the Highway 42 corridor. The remainder of the WAU is designated as Class IV.

Management recommendations within Class II lands stresses a light touch by using timber harvesting methods, such as single tree selection, uneven aged harvest, retention of shelterwood overstory trees, or group selection. Regeneration harvests are not to exceed 6.6 percent of the land base per decade in visible areas of the Class II land.

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

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

(3) Recreation Management

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

Forms of recreation commonly observed in the Upper Middle Fork Coquille WAU include driving for pleasure, hunting, photography, picnicking, camping, shooting or target practice, and gathering (berries, flowers, mushrooms, greenery, and rocks). The areas along major roads and the larger streams are common sites for these various forms of recreation.

B. Vegetation

1. Historical Perspective and Reference Vegetation Conditions

The reference condition being used for the Upper Middle Fork Coquille WAU is 1936 vegetation types. A map in the Roseburg BLM District Geographic Information System (GIS) gives general forest type descriptions of vegetation in 1936 for Douglas County in terms of diameter class and species (see Table 3 and Map 4). Table 4 compares the percentage of the WAU in three different seral stages of forest vegetation and non-forested areas for 1936 and 1993. The most current data for the entire WAU was derived from satellite imagery from 1993.

Table 3. 1936 Age Class Distribution in the Upper Middle Fork Coquille WAU.

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		Hardwoods		
Drainage **Subwatershed**	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bar Creek	179	15	0	0	0	0	1,033	85	0	0	1,212
Bingham	716	6	903	8	616	6	8,630	78	162	1	11,027
Camas	4,023	37	0	0	1,127	10	5,679	52	0	0	10,829
Upper Coquille	529	8	48	1	0	0	5,890	91	0	0	6,467
Wildcat	0	0	0	0	0	0	2,108	100	0	0	2,108
Camas Valley Subwatershed	5,447	17	951	3	1,743	6	23,340	74	162	1	31,643
Boulder Creek	0	0	0	0	400	7	5,652	93	0	0	6,052
Dice Creek	0	0	31	1	0	0	3,641	99	0	0	3,672
Lower Twelve Mile	0	0	145	2	285	4	7,208	94	0	0	7,638
Upper Twelve Mile	0	0	102	2	0	0	6,385	96	184	3	6,671
Twelve Mile Subwatershed	0	0	278	1	685	3	22,886	95	184	1	24,033
Bear Creek	0	0	114	2	461	8	4,924	87	157	3	5,656
Upper Middle Fork Coquille Subwatershed	0	0	114	2	461	8	4,924	87	157	3	5,656
East Upper Rock Creek	0	0	0	0	0	0	1,923	100	0	0	1,923
Upper Upper Rock Creek	0	0	0	0	0	0	3,952	100	0	0	3,952
Upper Rock Creek Subwatershed	0	0	0	0	0	0	5,875	100	0	0	5,875
Upper Middle Fork Coquille WAU	5,447	8	1,343	2	2,889	4	57,025	85	503	1	67,207

Map 4. Upper Middle Fork Coquille Watershed Analysis Unit
1936 Age Class Distribution

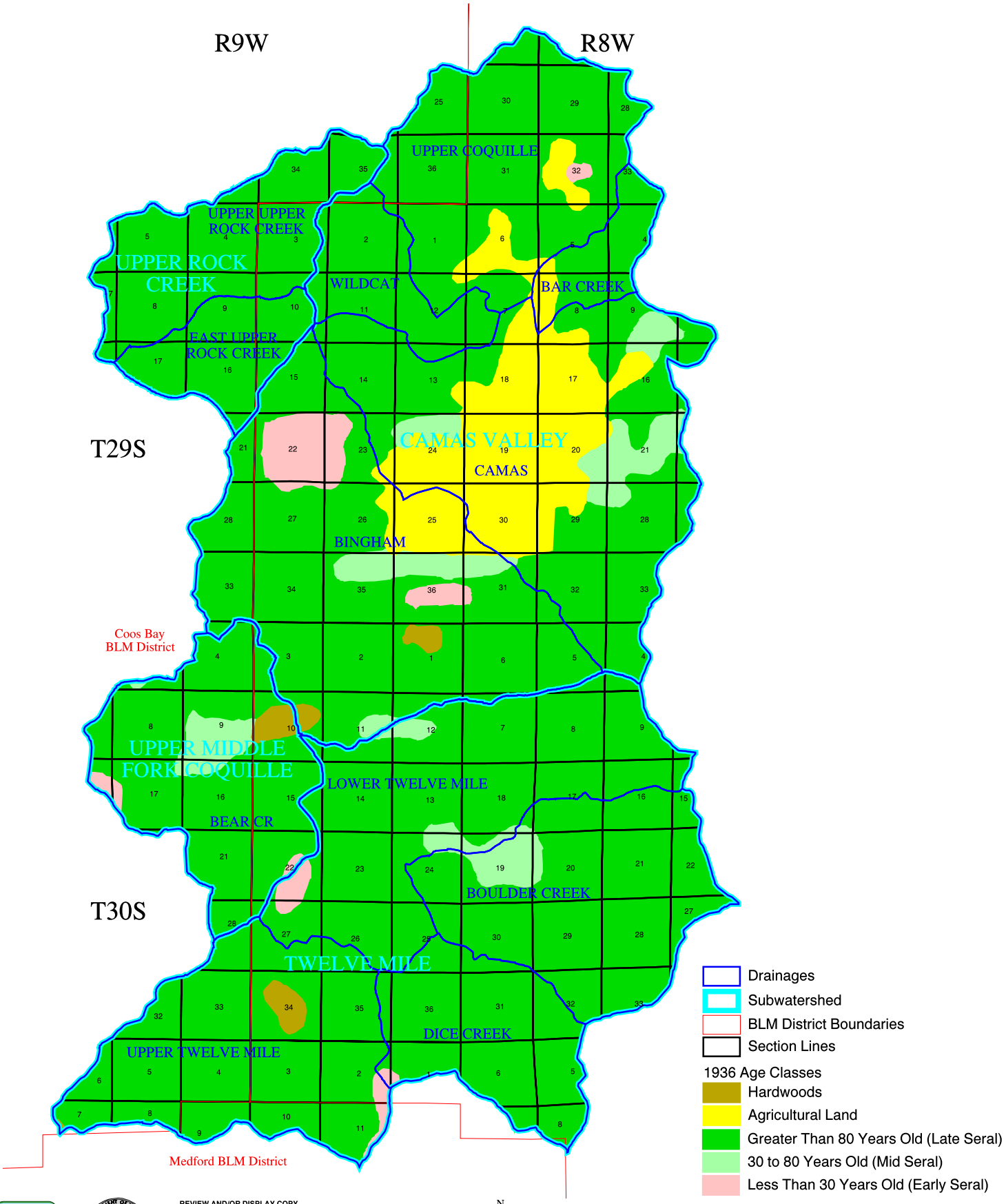


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Table 4. Comparison of Seral Stage Percentages Between 1936 and 1993 in the Upper Middle Fork Coquille WAU.

Seral Stage	1936		1993	
Early	Burned, Cut <1920	2%	0-30 years	32%
Mid	6-20"	4%	30-80 years	35%
Late	20-40", >22"	85%	>80 years	24%
Non-forest		9%		9%

In 1936, the early and mid seral stages occurred as relatively small patches, probably as a result of fires, within the larger late seral blocks. Teensma (1991) estimated 49 to 68% of the forests in the Oregon Coast Range in the late 1850s to the early 1900s was comprised of late seral stages. The 1936 information shows the Upper Middle Fork Coquille WAU consisted of more late seral stands than was considered typical for the Oregon Coast Range.

a. Fire History and Natural Fire Regimes

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

Fire regimes of the Pacific Northwest have been described by Agee (1981). Fire regimes are broad, artificially grouped categories, which overlap considerably with one another. Forests are considered to have a similar fire regime when fires occur with similar frequency, severity, and extent. Effects of forest fires can be more precisely described if effects can be grouped by fire regimes. The Upper Middle Fork Coquille WAU is considered to have a high-severity fire regime where fires are very infrequent (more than 100 years between fires) and are usually high-intensity, stand replacing fires. High-severity fire regimes typically occur in cool, moist forest types. In high-severity fire regimes, fires occur under unusual conditions such as during droughts, during east wind weather events (hot and dry foehn winds), and with an ignition source such as lightning. Fires are often of short duration (days to weeks) but of high intensity and severity (Pickford et al. 1980). Most of the lands on the Roseburg BLM District are classified as being in the high-severity fire regime, which is common to the coastal mountains of Oregon, the middle to northern Cascades, the Olympic Mountains, and other typical westside forests.

Other fire regimes exist within the Upper Middle Fork Coquille WAU. Lower elevations have more open, grass covered forest types which transition to Western hemlock/Douglas-fir forests. The transition occurs with changes in aspect and elevation.

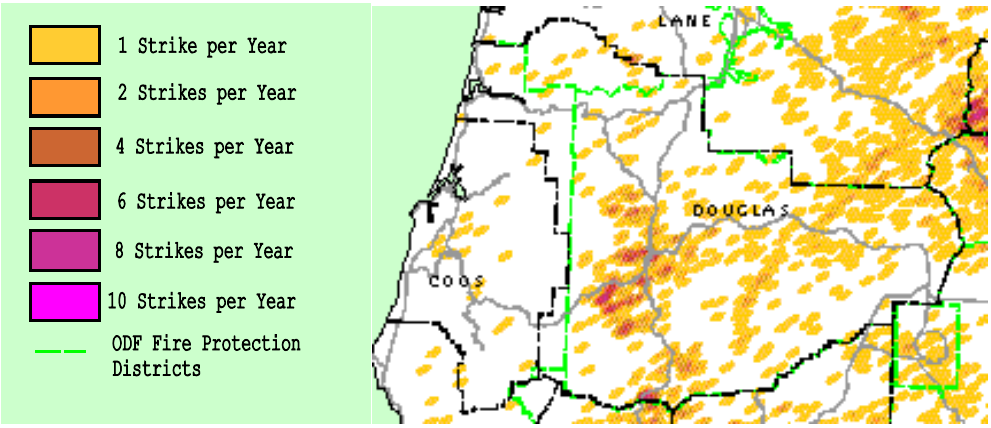
Accurate fire return intervals have not been calculated in Pacific Northwest forests, because the intervals between fires are long and may not be cyclic (Agee and Flewelling 1983). On drier sites, forests may burn every 100 to 200 years. Fahnestock and Agee (1983) estimated the regional average to be 230 years. Douglas-fir begins to be replaced by the more shade tolerant western hemlock at approximately 250 years of age and continues until the stand is about 700 to 1,000 years old, when western hemlock dominates the stand. The cycle from Douglas-fir to western hemlock rarely is completed because fires, which create stand openings allowing Douglas-fir to regenerate, usually occur before the Douglas-fir disappears from the stand (Agee 1981).

b. Recent Fire History

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

Lightning is the primary natural source of forest fires in the world. Although the Pacific Northwest has relatively mild thunderstorm activity compared to the southeastern United States, the average annual number of lightning fires is greater in the West because less precipitation accompanies the thunderstorms (Agee 1993). Considerable variation in thunderstorm tracking patterns exists from year to year and from storm to storm, some are widespread and others consist of localized events (Morris 1934). The lightning strike frequency map (Map 5) shows less than one lightning strike per year occurred over most of the Roseburg BLM District during the four year period from 1992 to 1996. This map graphically displays the widespread and random distribution of lightning across Douglas County but gives no indication of which lightning strikes may have ignited wildfires.

Map 5. Number of Lightning Strikes in Douglas County from 1992 to 1996.



Nineteen eighty-seven was the most severe fire year in the last 50 years, and one of the two worst in the last 120 years, yet the acreage burned was only 30 percent of the average acreage historically burned by wildfire in Oregon. Modern fire suppression and fire management strategies have had a

profound effect on natural fire frequency and intensity, species composition, vegetative density, and forest structure in many forests of the Pacific Northwest (Norris 1990).

From 1980 to 1992, 12 fires burned approximately 230 acres within the Upper Middle Fork Coquille WAU. Most of the fires were human caused. Five fires were caused by lightning burning approximately one acre.

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

2. Current Vegetation Conditions

Various vegetation age classes occur in the Upper Middle Fork Coquille WAU. For this analysis, 1998 vegetation condition on BLM-administered land is described by the age of the dominant conifer cover for each stand (see Table 5 and Map 6). There is great diversity of seral stages, plant communities, and landscape patterns within the Upper Middle Fork Coquille Watershed Analysis Unit. The area around Camas Valley includes agricultural uses, Christmas tree farms, and valley oak stands. In the surrounding forested lands, structural classes ranging from establishment (early seral) to late seral are represented (see Table 6 and Map 7).

a. Vegetative Characterization

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

Table 5. 1998 BLM Age Class Distribution.

	Number of Acres by Age Class and Percent of Total																		
AREA	Nonforest	%	0 to 10	%	10 to 20	%	20 to 30	%	30 to 50	%	50 to 80	%	80 to 120	%	120 to 200	%	200 +	%	TOTAL
Bar Creek	0	0	32	7	47	10	81	17	48	10	88	18	0	0	0	0	180	38	476
Bingham	58	1	278	6	237	5	738	15	1,727	34	758	15	299	6	321	6	613	12	5,029
Camas	7	0	128	5	174	7	505	22	687	29	26	1	230	10	79	3	493	21	2,329
Upper Coquille	37	1	60	2	164	6	440	17	370	15	286	11	103	4	577	23	496	20	2,533
Wildcat	0	0	56	8	83	13	22	3	137	21	0	0	0	0	64	10	297	45	659
Camas Valley Subwatershed	102	1	554	5	705	6	1,786	16	2,969	27	1,158	11	632	6	1,041	9	2,079	19	11,026
Boulder Creek	0	0	337	12	271	10	536	19	41	1	8	0	184	7	97	3	1,355	48	2,829
Dice Creek	41	2	139	8	30	2	371	21	20	1	179	10	57	3	60	3	898	50	1,795
Lower Twelve Mile	3	0	259	8	176	5	1,086	32	291	9	679	20	327	10	70	2	500	15	3,391
Upper Twelve Mile	17	1	472	20	365	16	246	11	205	9	85	4	83	4	408	18	445	19	2,326
Twelve Mile Subwatershed	61	1	1,207	12	842	8	2,239	22	557	5	951	9	651	6	635	6	3,198	31	10,341
Bear Creek	5	0	172	10	211	12	147	8	581	32	94	5	479	27	114	6	0	0	1,803
Upper Middle Fork Coquille Subwatershed	5	0	172	10	211	12	147	8	581	32	94	5	479	27	114	6	0	0	1,803
East Upper Rock Creek	0	0	43	5	37	4	81	10	240	28	171	20	0	0	84	10	190	22	846
Upper Upper Rock Creek	1	0	64	3	200	10	336	17	501	26	93	5	5	0	195	10	554	28	1,949
Upper Rock Creek Subwatershed	1	0	107	4	237	8	417	15	741	27	264	9	5	0	279	10	744	27	2,795
Upper Middle Fork Coquille WAU	169	1	2,040	8	1,995	8	4,589	18	4,848	19	2,467	10	1,767	7	2,069	8	6,021	23	25,965

Map 6. Upper Middle Fork Coquille Watershed Analysis Unit
1998 BLM Age Class Distribution

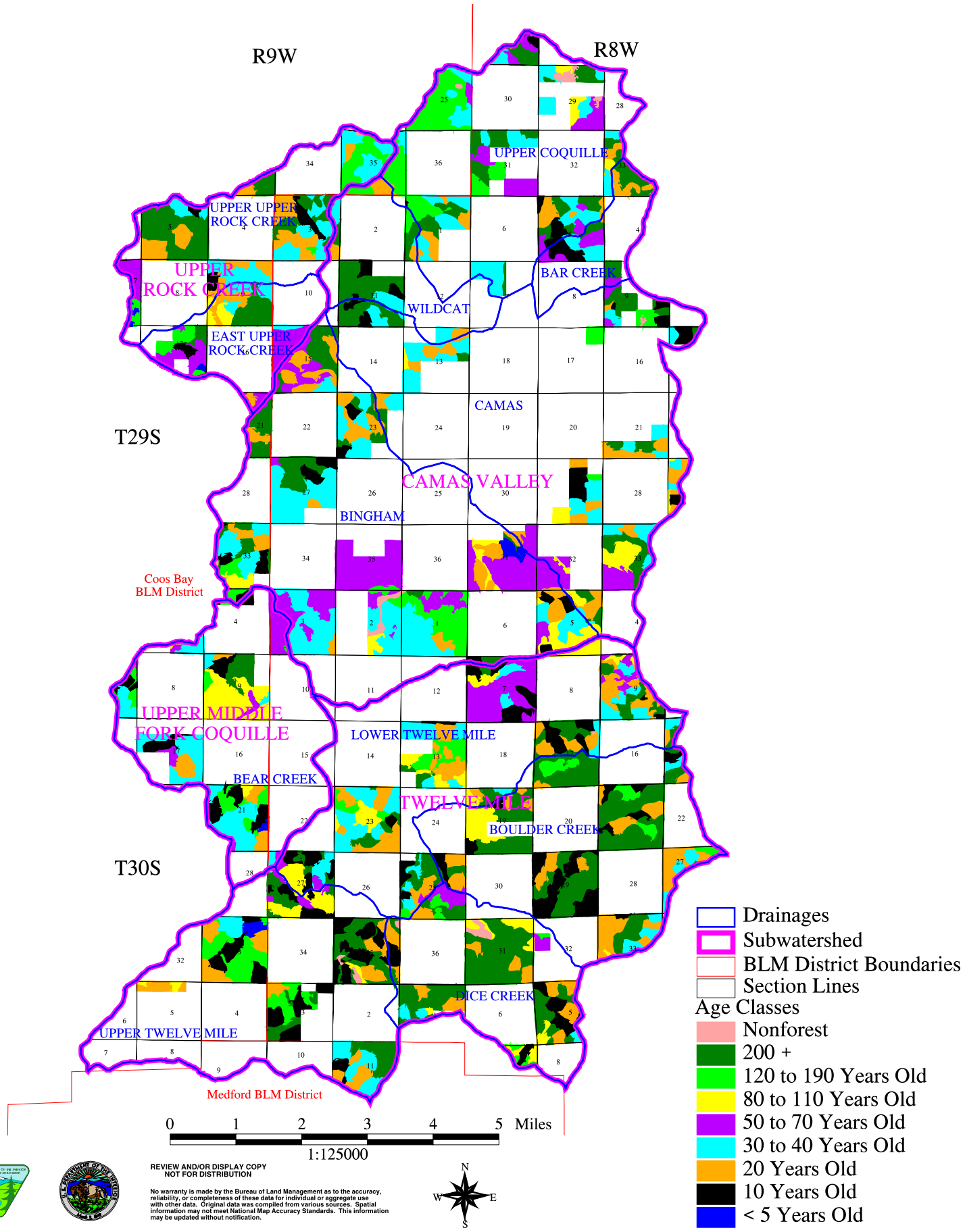
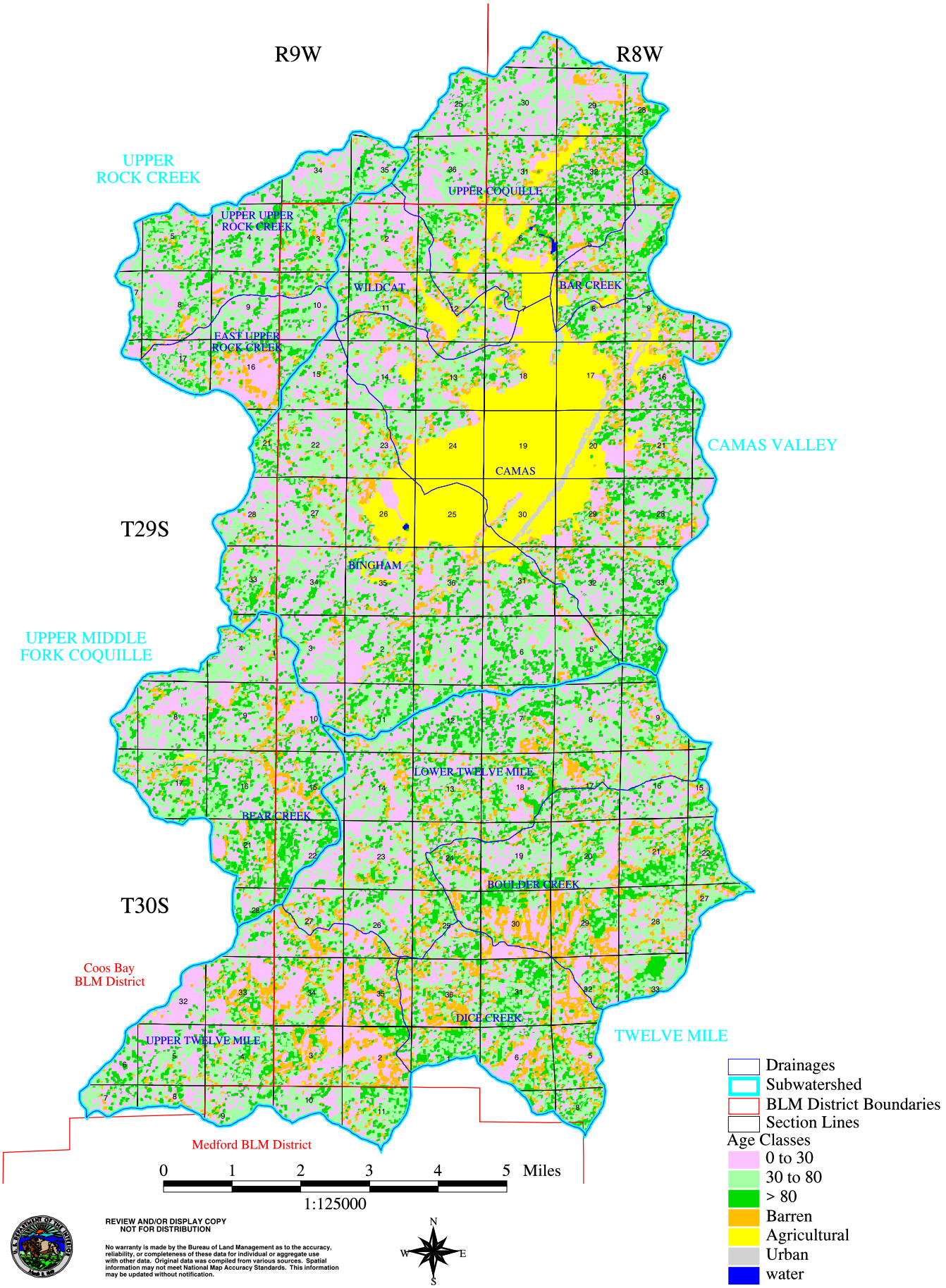


Table 6. 1993 Age Class Distribution in the Upper Middle Fork Coquille WAU. (Using Satellite Imagery Data).

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bar Creek	69	6	456	38	493	41	194	16	1,212
Bingham	1,210	11	4,366	40	4,547	41	905	8	11,028
Camas	3,917	36	2,633	24	3,319	31	959	9	10,828
Upper Coquille	666	10	2,635	41	2,390	37	776	12	6,467
Wildcat	251	12	1,190	56	463	22	205	10	2,109
Camas Valley	6,113	19	11,280	36	11,212	35	3,039	10	31,644
Boulder Creek	1	0	3,095	51	1,759	29	1,196	20	6,051
Dice Creek	2	0	1,869	51	842	23	960	26	3,673
Lower Twelve Mile	1	0	3,652	48	2,900	38	1,085	14	7,638
Upper Twelve Mile	5	0	4,030	60	1,755	26	880	13	6,670
Twelve Mile	9	0	12,646	53	7,256	30	4,121	17	24,032
Bear Creek	72	1	2,343	41	2,433	43	808	14	5,656
Upper Middle Fork Coquille	72	1	2,343	41	2,433	43	808	14	5,656
East Upper Rock Creek	1	0	974	51	724	38	224	12	1,923
Upper Upper Rock Creek	1	0	1,760	45	1,618	41	572	14	3,951
Upper Rock Creek	2	0	2,734	47	2,342	40	796	14	5,874
Upper Middle Fork Coquille WAU	6,196	9	29,003	43	23,243	35	8,764	13	67,206

Map 7. Upper Middle Fork Coquille Watershed Analysis Unit 1993 Age Class Distribution (From Satellite Imagery)



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Three vegetative zones are identified within the Upper Middle Fork Coquille Watershed Analysis Unit (see Map 8). The Grand Fir and Western Hemlock Zones make up most of the WAU. The Cool Douglas-fir/Hemlock Zone makes up a small portion of the WAU at the higher elevations.

(1) Grand Fir Zone

The Grand Fir Zone forms a transition between moist hemlock forests and the drier central valleys. This zone makes up about 55 percent of the Upper Middle Fork Coquille WAU. This area of mountains and foothills receives from 40 to 55 inches average annual precipitation. Elevation remains below about 1,500 feet.

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

The Camas Valley area has an unusually high proportion of oak dominated stands in relation to Douglas-fir or grand fir communities. This is probably due to the history of tree clearing and farming that have taken place in these areas.

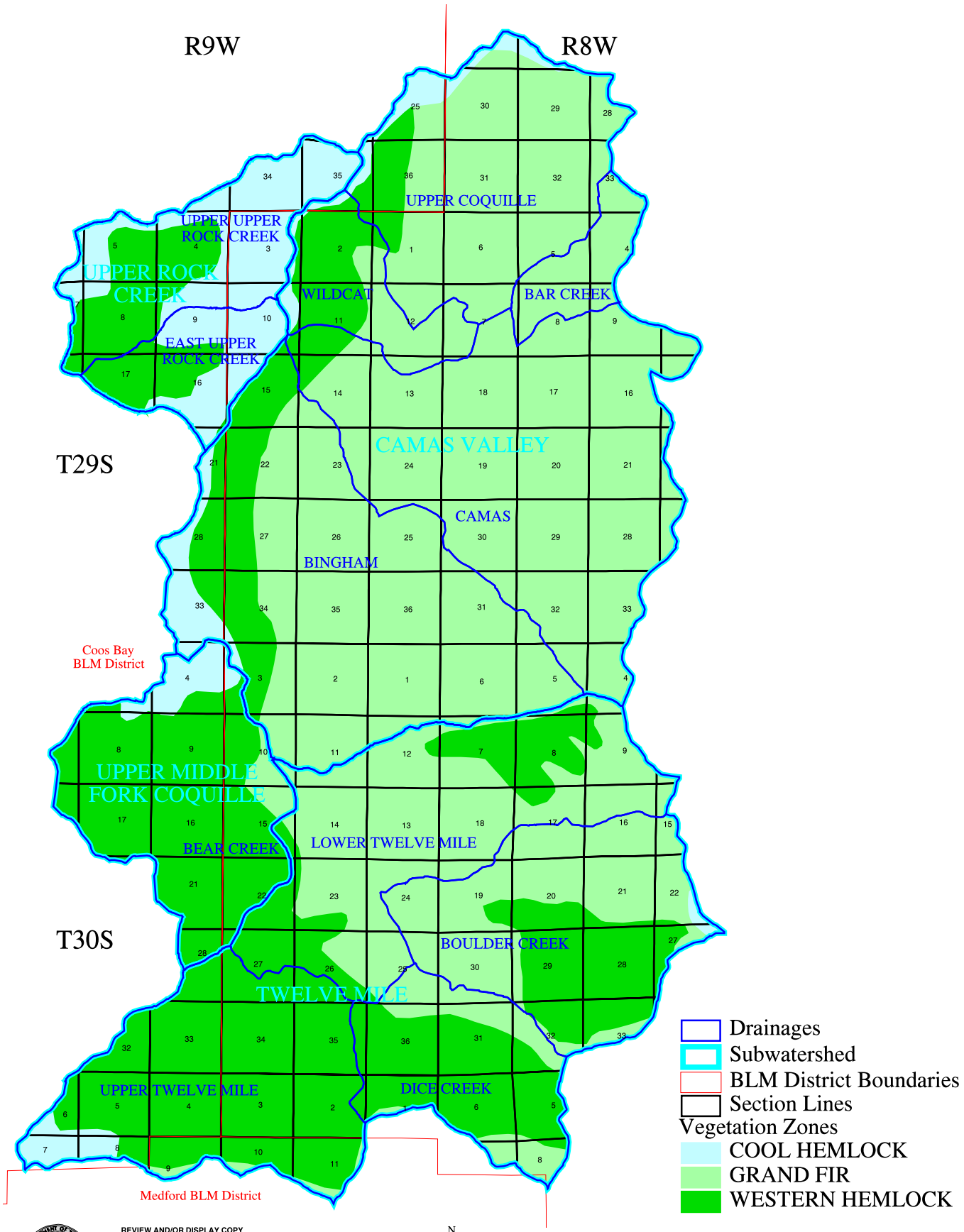
Understory shrubs on north slopes include salal, cascade Oregon grape, western hazel, creambush oceanspray, red huckleberry, western prince's pine, whipplevine, yerba buena, and hairy honeysuckle. South slopes support any of the above, although red huckleberry, cascade Oregon grape, and salal, which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

The Grand Fir Zone in this WAU represents a transition area with the northern portion. The vegetation in this area is more like forests of the southern Willamette Valley foothills. The southern portion overlaps the Klamath Mountain geologic province. Geological differences and climatic changes result in more species diversity and increasing importance of California black oak, sugar pine, ponderosa pine, canyon live oak, incense cedar, and grasses in the southern portion.

(2) Western Hemlock Zone

This zone occupies 36 percent of the Upper Middle Fork Coquille WAU, mostly along the western and southern edges of the WAU. Douglas-fir is the dominant species. Western hemlock is a significant understory species or overstory dominant in older stands on north aspects. It may be present in minor amounts on south aspects. Grand fir, western redcedar, and chinkapin can also occur in the stands. Red alder and bigleaf maple occur in favorable locations. Understory species

Map 8. Upper Middle Fork Coquille Watershed Analysis Unit Vegetation Zones



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include western sword fern, oxalis, vine maple, currant, western hazel, creambush, oceanspray, Pacific rhododendron, salal, red huckleberry, cascade Oregon grape, and evergreen huckleberry.

(3) Cool Douglas-fir/Hemlock Zone

This zone makes up about nine percent of the Upper Middle Fork Coquille WAU. This zone occupies high elevations, generally above 2,500 feet on Signal Tree Ridge and Ketchin Butte at the western edge of the WAU. A portion of the average annual precipitation would come in the form of snow.

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

Forest managers can expect lower tree growth rates, climatic limitations for regeneration, and severe competition from evergreen shrubs in this zone. Areas burned or with the overstory removed develop dense brush fields.

b. Insects and Pathogens

Insects and pathogens are capable of causing both large and small-scale disturbances across the landscape. However, the risk of large scale habitat loss due to insects and pathogens over the WAU is minor. Port-Orford cedar and white pine blister rust are introduced disease that are concerns in the WAU. All other diseases in the WAU are native to the region and have evolved with their hosts. Native insect and diseases may cause mortality of a single tree or small patches of trees (less than one acre). The magnitude of insect and disease-related disturbance is greatly influenced by species composition, age class, stand structure, and history of other disturbances on the same site.

(1) Port-Orford Cedar

The Upper Middle Fork Coquille WAU probably contains more Port-Orford cedar (POC) than any other area in the Roseburg BLM District. Port-Orford cedar root disease is caused by the introduced fungus Phytophthora lateralis, which is present in the WAU. The pathogen was first reported killing nursery stock around Seattle, Washington in 1923. The disease appeared in the native range of Port-Orford cedar in 1952. The disease has spread throughout much of the range of Port-Orford cedar in Oregon and northern California.

Old-growth trees die within two to four years after infection. Seedlings die within a few weeks (Roth et al. 1987). As the disease spreads, discoloration occurs simultaneously throughout the crown. Infected trees are often attacked by bark beetles, which speeds the death of the tree and may modify foliage discoloration by altering the mortality rate. In virtually all cases, infection of POC occurs in areas where obvious avenues for water borne spore dispersal exists. Infection is highly

dependent on the presence of water in the immediate vicinity of susceptible tree roots. High risk areas for infection are stream courses, drainages, or low lying areas down slope from infection centers or below roads and trails where new inoculum may be introduced. Major spread of the disease is through movement of infected soil in road construction, road maintenance, daily road use, and logging operations. The fungus may also be moved on the feet of game animals, particularly elk.

Port-Orford cedar regenerates profusely from surviving trees. The continuing supply of susceptible seedlings on high risk sites is likely to sustain a chronic disease source, threatening trees on more favorable sites.

Port-Orford cedar occurs in numerous natural and planted mixed conifer stands within the Upper Middle Fork Coquille WAU. Extensive roadside surveys in the South River Resource Area during the summer of 1996 identified where healthy and infected POC occur adjacent to roads. Aerial photography interpretation, conducted in 1998, identified areas of infection (see Map 9). The areas of infection identified on BLM-administered land were confirmed by on-site surveys.

Study sites were established in 1998 within the WAU to learn more about POC and Phytophthora lateralis. The Battle Axe common garden study site was established in T29S, R8W, Section 31 to test the genetic variability of Port-Orford cedar.

Throughout the WAU, individual POC trees appear to be resistant to the Port-Orford root disease. Cuttings from these trees are being screened for resistance to the Port-Orford cedar root disease at Oregon State University (OSU).

A site in the Bingham Creek and Holmes Creek area has diseased trees. Planting seedlings in this area would attempt to field verify the resistance shown in lab tests of certain Port-Orford cedar families to the disease.

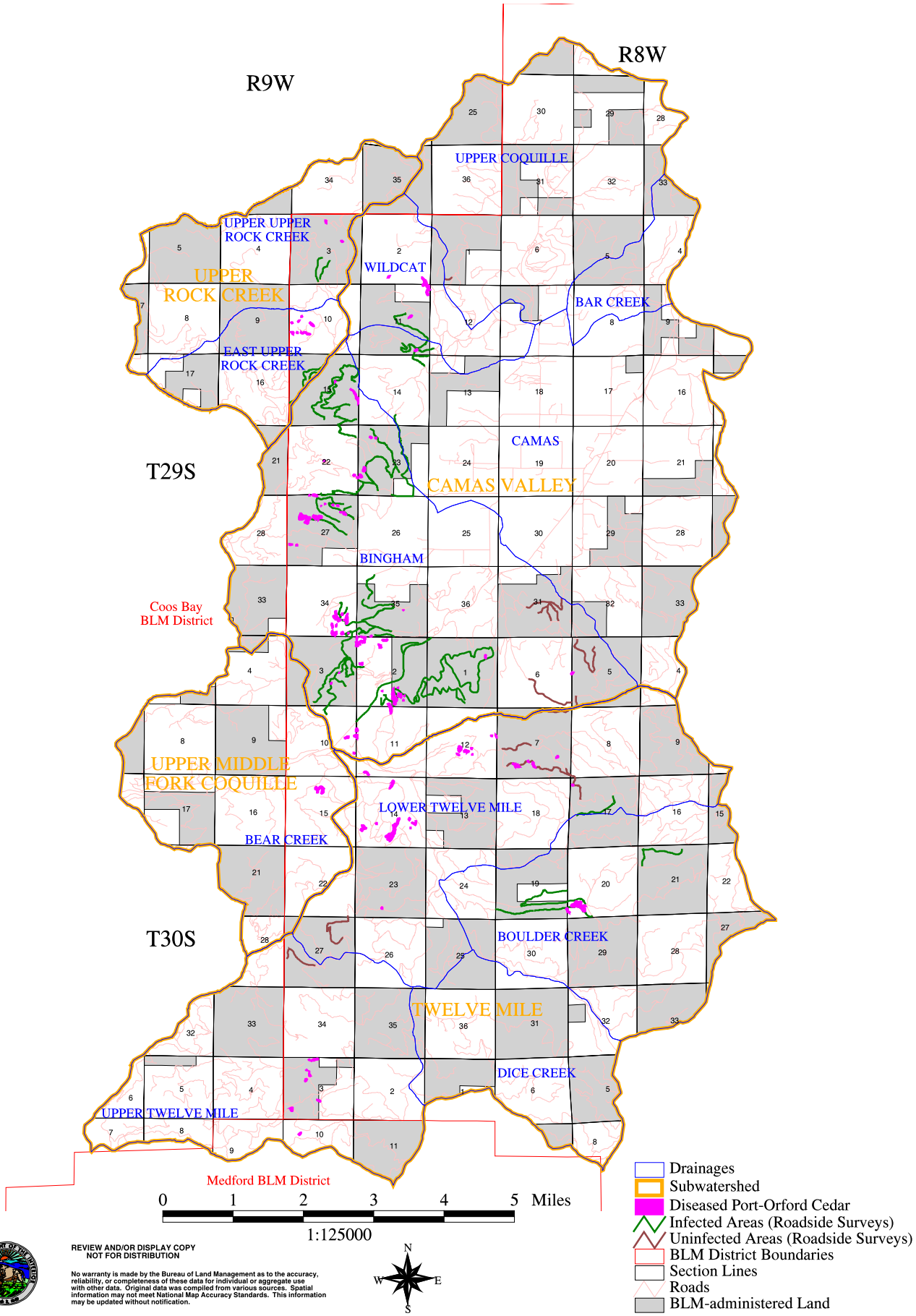
Sanitation, by removing POC adjacent to roads, has the potential to reduce the amount of inoculum. Preliminary tests indicate inoculum levels remain high the first three years following sanitation. Inoculum levels decrease after the third year. Sites could become reinfected if POC seeds back into the site. The type of road surfacing is also a factor for success of sanitation. Paved roads have the most success, followed by gravel roads, then dirt roads. Rocking natural surfaced roads would also limit the spread of inoculum by reducing the amount of soil adhering to vehicles.

Seedling and sapling sized POC along road sides in the WAU were burned as a test of the effectiveness of this sanitation method. This could be a successful sanitation method in areas with high concentrations of small POC along roads. Larger trees would need to be slashed prior to burning in the fall or spring.

(2) White Pine Blister Rust

White pine blister rust is caused by the fungus Cronartium ribicola and is evident on sugar pine in the southeast portion of the Upper Middle Fork Coquille WAU. The pathogen girdles and kills

Map 9. Port-Orford Cedar in the Upper Middle Fork Coquille Watershed Analysis Unit



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infected stems and branches causing top and branch death in larger hosts and outright mortality in seedling, sapling, and pole-sized hosts. Infections in larger trees can predispose these trees to bark beetle attack. Ribes (gooseberry and currant plants) are alternate hosts for the fungus and under the right environmental conditions release spores that infect the pines. Moist cool weather in summer and fall favor the disease, whereas warm dry weather is unfavorable. Infection of pine requires at least two days of saturated atmosphere and maximum temperatures not exceeding 68 degrees Fahrenheit (°F) (Scharpf 1993). Pruning lower limbs of small sugar pines can affect the micro-habitat and reduce the chance of infection.

Tree improvement programs have developed resistant sugar pine trees that can tolerate infection by the fungus. Rust resistant stock should be used with all reforestation efforts for this species. Sugar pine is desirable because it is highly resistant to laminated root rot and is a preferred species for planting in root disease centers.

(3) Root Diseases

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

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

(4) Insects

Insect activity within stands in the WAU is present at endemic levels. Insect attacks and out breaks are almost always associated with conditions that stress the tree. There is a common association between root diseases and bark beetles. A high proportion of laminated root rot infected trees are actually killed by bark beetles and not by the fungus. Laminated root rot plays a significant role in maintaining endemic bark beetle populations over time. Bark beetle populations are most likely to increase the year after a minimum of three Douglas-fir trees per acre, which are at least ten inches in diameter at breast height (DBH), are downed (Goheen 1996).

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

When epidemic insect populations are reached, healthy trees may be attacked and killed. Direct control measures are impractical and generally not recommended. Damage can be reduced indirectly

by thinning. Keeping trees in a healthy, vigorous condition is the most practical means of reducing the impact from bark beetles (Filip and Schmitt 1990).

c. Riparian Vegetation

Riparian Reserves within the Upper Middle Fork Coquille WAU and outside of the LSRs and MMRs account for approximately 24 percent (6,268 acres out of 25,961 acres) of BLM-administered land (see Table 7 and Map 10). The purpose of Riparian Reserves is to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide greater connectivity of the watershed (USDA and USDI 1994b). Silvicultural treatments applied within Riparian Reserves would be to control stocking or reestablish, establish, or maintain desired vegetation characteristics to attain Aquatic Conservation Strategy objectives.

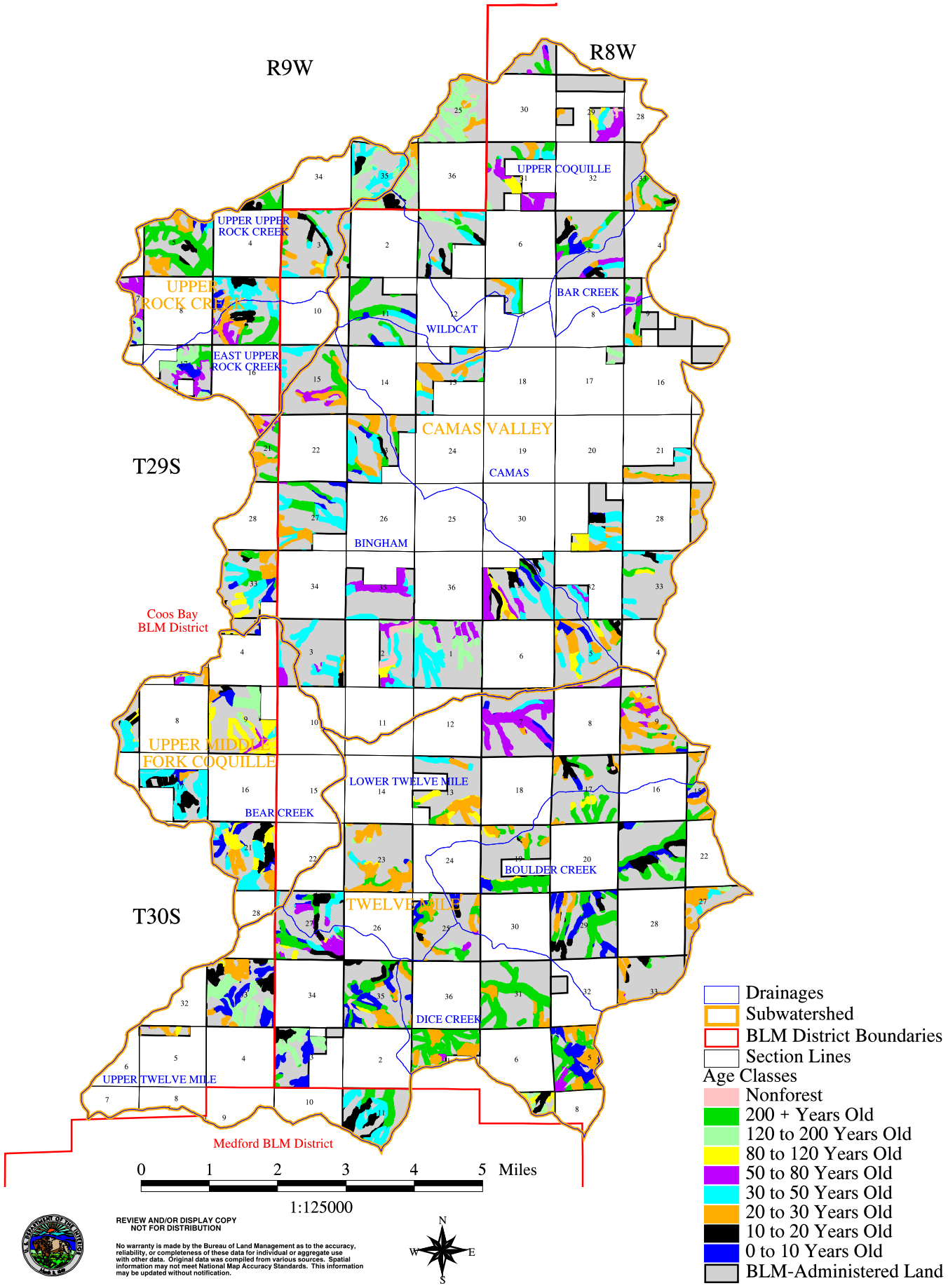
For this watershed analysis, Riparian Reserve widths were developed using a site potential tree height of 180 feet. All intermittent streams, which are considered to be non-fish bearing streams for this watershed analysis, were given a Riparian Reserve width of 180 feet on each side of the stream. Perennial streams, which are considered to be fish bearing streams for this watershed analysis, were given a Riparian Reserve width of 360 feet (two times the site potential tree height) on each side of the stream. Actual projects would use site specific information, such as if a stream was fish bearing, to determine if a stream needed a Riparian Reserve width of 180 or 360 feet.

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

Table 7. 1998 Riparian Reserve Age Class Distribution.

	Number of Acres by Age Class and Percent of Total																		
AREA	Nonforest	%	0 to 10	%	10 to 20	%	20 to 30	%	30 to 50	%	50 to 80	%	80 to 120	%	120 to 200	%	200 +	%	TOTAL
Bar Creek	0	0	7	6	22	19	27	23	18	15	3	3	0	0	0	0	40	34	117
Bingham	53	3	108	6	70	4	324	17	644	34	264	14	103	5	87	5	230	12	1,883
Camas	0	0	12	2	53	8	212	31	238	35	15	2	60	9	14	2	84	12	688
Upper Coquille	6	1	29	3	50	6	119	13	129	14	145	16	34	4	280	31	116	13	908
Wildcat	0	0	15	7	40	18	7	3	40	18	0	0	0	0	28	13	94	42	224
Camas Valley Subwatershed	59	2	171	4	235	6	689	18	1,069	28	427	11	197	5	409	11	564	15	3,820
Boulder Creek	0	0	171	17	122	12	205	20	15	1	1	0	24	2	25	2	470	45	1,033
Dice Creek	1	0	91	10	25	3	269	28	0	0	33	3	16	2	32	3	478	51	945
Lower Twelve Mile	3	0	58	5	82	7	465	40	79	7	264	23	48	4	5	0	146	13	1,150
Upper Twelve Mile	10	1	237	19	218	17	142	11	124	10	50	4	24	2	229	18	230	18	1,264
Twelve Mile Subwatershed	14	0	557	13	447	10	1,081	25	218	5	348	8	112	3	291	7	1,324	30	4,392
Bear Creek	5	1	80	8	142	15	94	10	319	33	47	5	212	22	67	7	0	0	966
Upper Middle Fork Coquille Subwatershed	5	1	80	8	142	15	94	10	319	33	47	5	212	22	67	7	0	0	966
East Upper Rock Creek	0	0	28	7	30	7	62	15	86	20	64	15	0	0	61	14	96	22	427
Upper Upper Rock Creek	0	0	32	4	116	13	163	18	186	20	56	6	5	1	89	10	262	29	909
Upper Rock Creek Subwatershed	0	0	60	4	146	11	225	17	272	20	120	9	5	0	150	11	358	27	1,336
Upper Middle Fork Coquille WAU	78	1	868	8	970	9	2,089	20	1,878	18	942	9	526	5	917	9	2,246	21	10,514

Map 10. Riparian Reserve Age Class Distribution Within the Upper Middle Fork Coquille Watershed Analysis Unit



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d. Private Lands

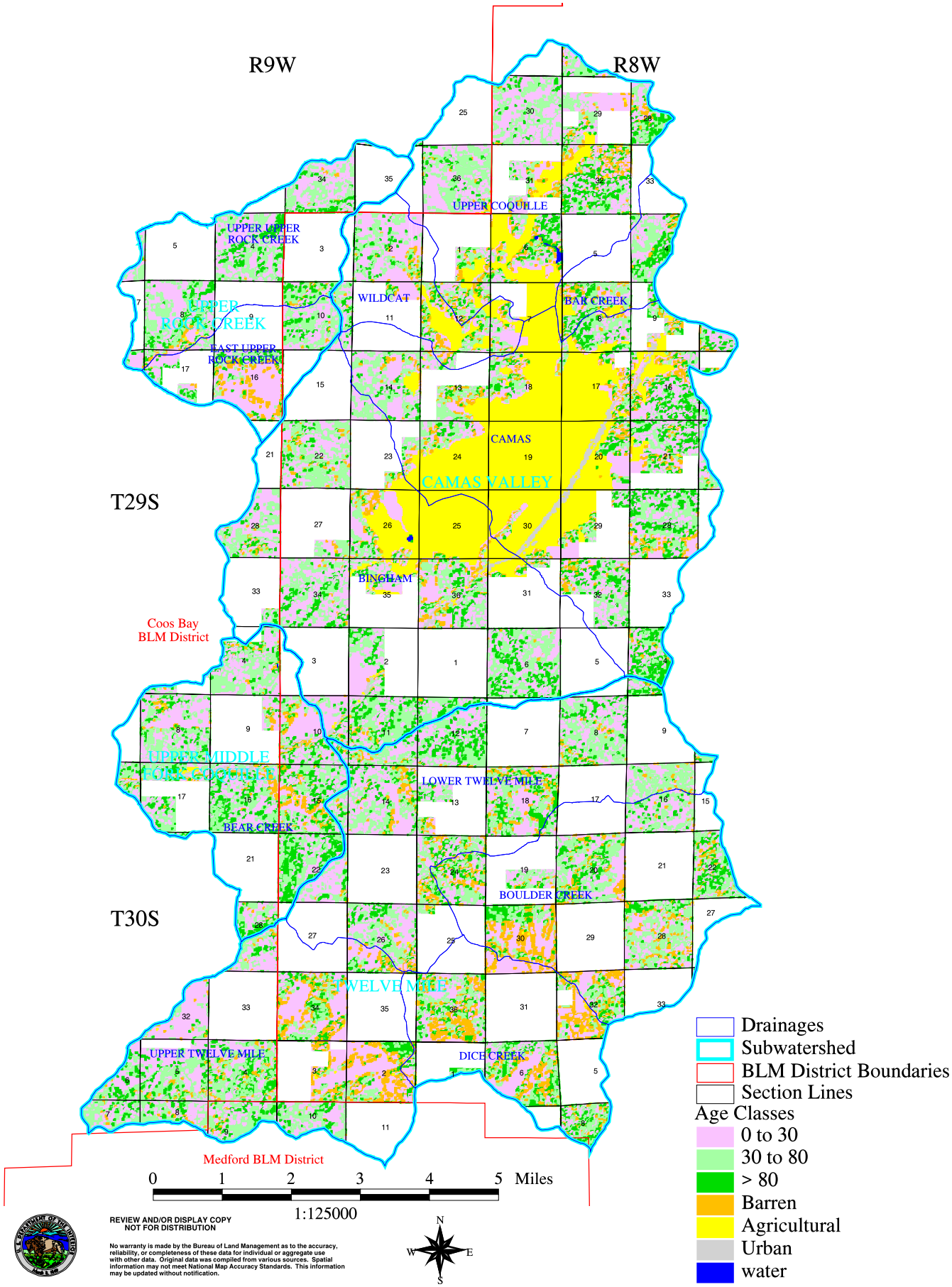
Private lands account for approximately 61 percent (41,247 acres) of the Upper Middle Fork Coquille WAU (see Table 8 and Map 11). Private ownership in the Camas Valley area consists mainly of agricultural and urban lands (3,917 acres). The rest of the private lands are mainly forested lands intermingled with BLM-administered lands. Satellite imagery from 1993 was the most current data available to characterize private lands. Approximately 44 percent of the private lands have been harvested in the past 30 years.

Although private lands are a major component of this Watershed Analysis Unit (61%), the focus of this analysis is on BLM-administered lands. Private forested lands are in a constant state of change and would continue to be harvested when growth and economic factors provide a satisfactory return to the landowner. The BLM cannot predict the timing or amount of harvesting which may occur on private lands in this WAU.

Table 8. 1993 Private Age Class Distribution in the Upper Middle Fork Coquille WAU. (Using Satellite Imagery Data).

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bar Creek	69	9	241	33	349	47	78	11	737
Bingham	1,185	20	2,094	35	2,373	40	348	6	6,000
Camas	3,903	46	1,783	21	2,231	26	582	7	8,499
Upper Coquille	655	17	1,625	41	1,334	34	319	8	3,933
Wildcat	250	17	882	61	250	17	68	5	1,450
Camas Valley	6,062	29	6,625	32	6,537	32	1,395	7	20,619
Boulder Creek	1	0	1,952	60	888	28	387	12	3,228
Dice Creek	2	0	1,250	67	332	18	293	16	1,877
Lower Twelve Mile	1	0	2,146	51	1,641	39	460	11	4,248
Upper Twelve Mile	3	0	2,699	62	1,247	29	394	9	4,343
Twelve Mile	7	0	8,047	59	4,108	30	1,534	11	13,696
Bear Creek	62	2	1,586	41	1,716	45	489	13	3,853
Upper Middle Fork Coquille	62	2	1,586	41	1,716	45	489	13	3,853
East Upper Rock Creek	0	0	708	66	309	29	60	6	1,077
Upper Upper Rock Creek	1	0	1,056	53	795	40	152	8	2,004
Upper Rock Creek	1	0	1,764	57	1,104	36	212	7	3,081
Upper Middle Fork Coquille WAU	6,132	15	18,022	44	13,465	33	3,630	9	41,249

Map 11. Upper Middle Fork Coquille Watershed Analysis Unit 1993 Private Age Class Distribution (From Satellite Imagery)



C. Geology, Soils, and Erosion Processes

1. Geology

The Upper Middle Fork Coquille WAU lies within the Coast Range physiographic province. The lithologies are composed primarily of marine sedimentary rocks. The geology in the Camas Valley Subwatershed consists primarily of middle Eocene sandstones and mudstones (Tmss). The Upper Middle Fork Coquille and Twelve Mile Subwatersheds, which are in the more mountainous southern portion of the WAU, consist primarily of lower Eocene conglomerates, sandstones, and mudstones (Tmsc). The geology in the Upper Rock Creek Subwatershed is composed primarily of micaceous sandstones and mudstones (Tt, the Tyee Formation). Geology is shown on Map 12.

The mountains in the WAU have been deeply dissected by the streams. The Canyonville Fault Zone lies along the southern boundary of the WAU, possibly weakening the bedrock of the Quaternary landslide (Qls) area in the upper part of the Dice Creek Drainage.

Unit descriptions are taken primarily from the Geologic Map of Oregon by George W. Walker and Norman S. MacLeod (1991). Additional description of Tmsc was from the Compilation Geologic Map of Southern Tyee Basin, Southern Coast Range, Oregon by Alan and Wendy Niem (1990). Quaternary alluvium is present in Camas Valley, as well as in many of the smaller valleys, but is not broken out due to the small scale (1:500,000) of the map. One Quaternary landslide is shown on the geologic map. However, there are smaller, more active areas of mass movement and are shown on Map 13.

Qls

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

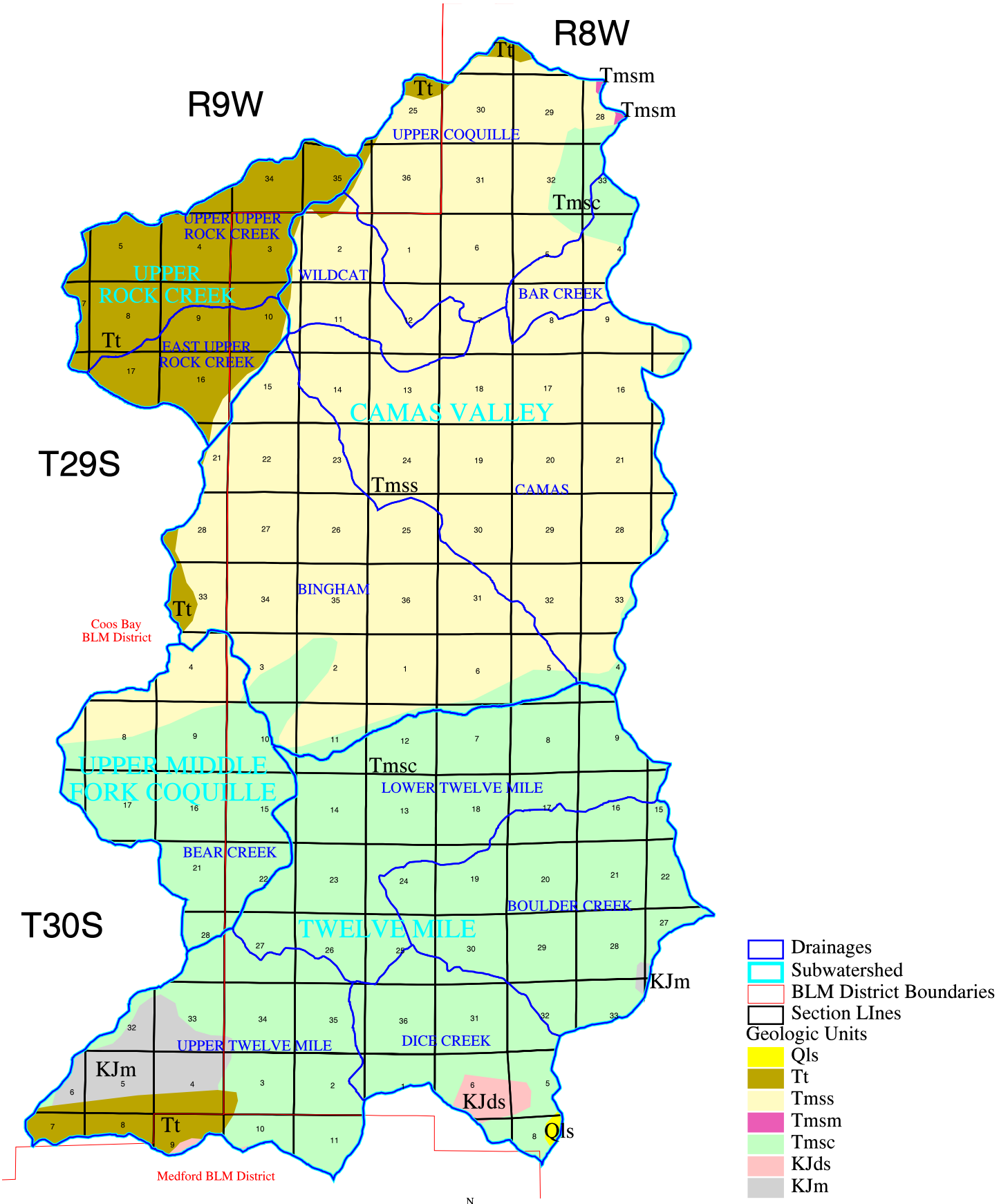
Tt

Tyee Formation (middle Eocene) - Thick sequence of rhythmically bedded, medium to fine-grained micaceous, feldspathic, lithic, or arkosic marine sandstone and micaceous carbonaceous siltstone. Contains minor beds of dacite tuff in upper part of unit. Groove and flute casts indicate deposition by north flowing turbidity currents.

Tmss

Marine sandstone and siltstone (middle Eocene) - Thin to thick bedded, crossbedded, well-sorted fine to medium grained sandstone, siltstone, and mudstone characterized by sparse white mica. Shallow marine depositional setting partly of deltaic origin.

Map 12. Upper Middle Fork Coquille Watershed Analysis Unit Geology



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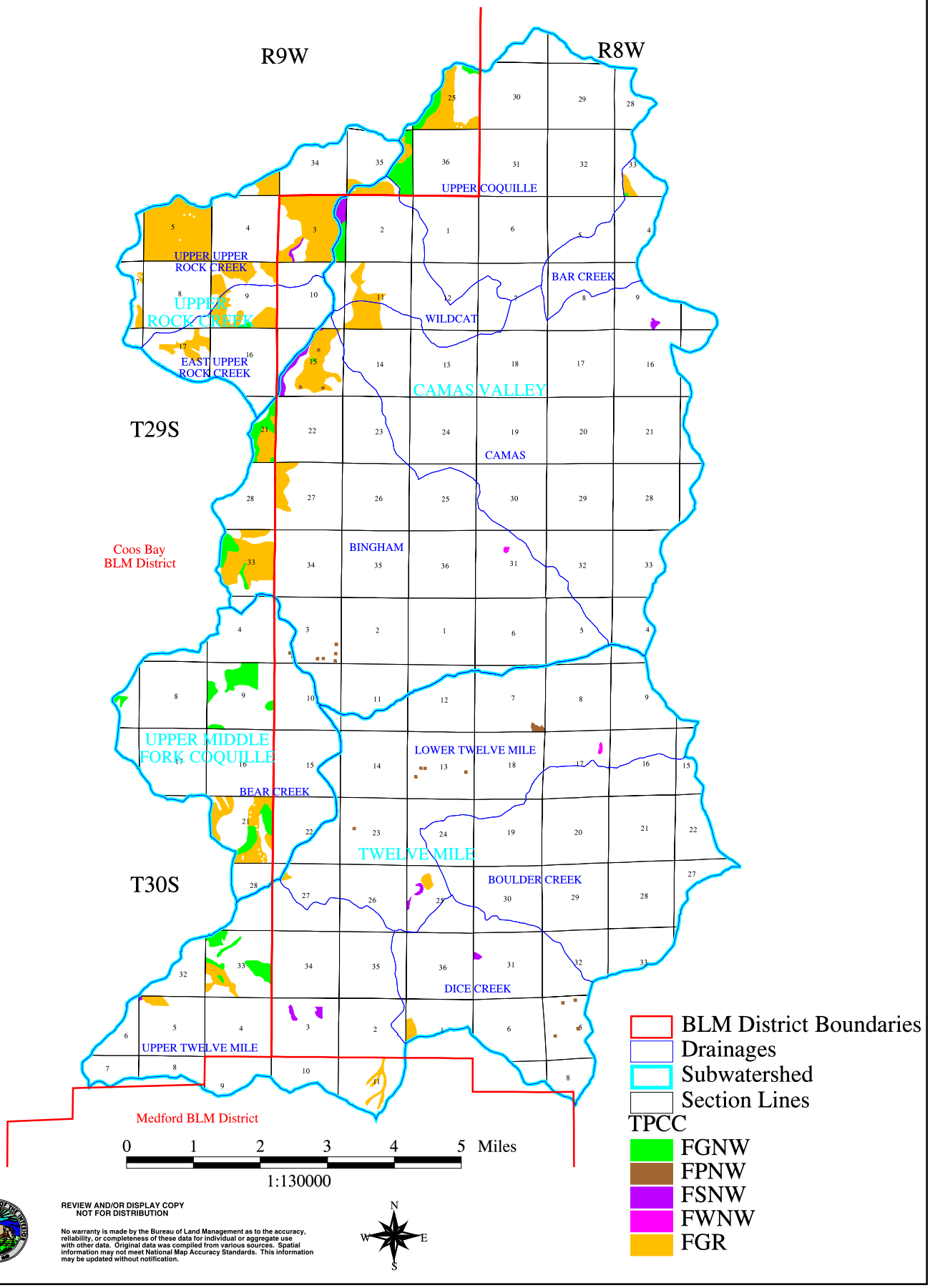
Map 13. Upper Middle Fork Coquille Watershed Analysis Unit Fragile Soil Classifications From the Timber Productivity Capability Classification (TPCC)



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Tmsm

Marine siltstone, sandstone, and conglomerate (lower Eocene) - Cobble and pebble conglomerate pebbly sandstone, lithic sandstone, siltstone, and mudstone. Massive to thin bedded. Shelf and slope depositional setting.

Tmsc

Marine siltstone, sandstone, and conglomerate (lower Eocene) - Massive to thin-bedded cobble and pebble conglomerate, pebbly sandstone, lithic sandstone, siltstone, and mudstone. Shelf and slope depositional setting. The mudstones are exposed primarily along Boulder and Dice Creeks with pebbly conglomerate, sandstones, and minor amounts of subbituminous coal, thin beds of fine-grained sandstone, and carbonaceous siltstone covering the majority of the southern part of the WAU.

KJds

Dothan Formation and related rocks (lower Cretaceous and Upper Jurassic) - Sedimentary rocks - Sandstone, conglomerate, graywacke, and rhythmically bedded cherts.

KJm

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

2. Soils

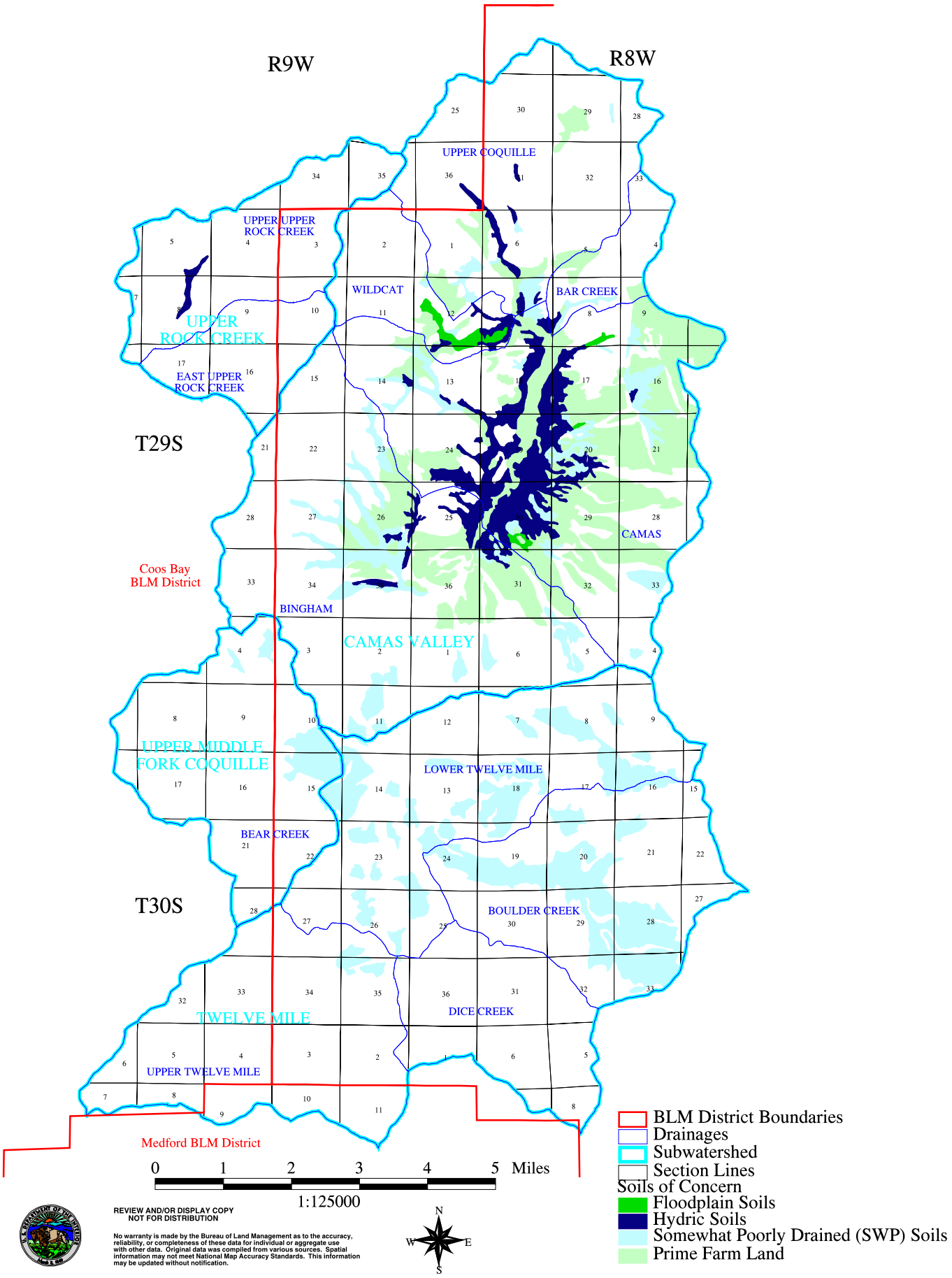
The National Cooperative Soil Survey (NCSS), Douglas County Area, conducted by the Natural Resources Conservation Service (NRCS) and the Timber Production Capability Classification (TPCC) conducted by the Bureau of Land Management are the main sources of information for the soils section. The NCSS Douglas County Area soil survey was mapped at an order 2 to order 3 level of detail. Not all of the soil boundaries were checked in the field. Tables and maps built from NCSS data include private as well as BLM-administered lands. Tables and maps built from TPCC data only includes information from BLM-administered lands.

Soils in the Upper Middle Fork Coquille Watershed Analysis Unit have developed dominantly from sedimentary parent materials within the Coast Range geologic province. The main soils related properties considered to be significant for planning and analysis are hydric soils, floodplain soils, and somewhat poorly drained soils (see Table 9 and Map 14). Additional properties determined to be significant, using the TPCC, are the nonsuitable woodlands due to mass movement or slope gradient, and soils with droughtiness or wetness characteristics.

Table 9. Soil Management Concerns Within the Upper Middle Fork Coquille WAU.

Drainage	Acres of Hydric Soils		Acres of Floodplain Soils		Acres of Somewhat Poorly Drained Soils (SWP)		Acres of Prime Farm Land	
	BLM	Private	BLM	Private	BLM	Private	BLM	Private
Bar Creek	0	14	0	0	0	36	83	68
Bingham	13	254	0	0	399	621	435	959
Camas	0	1,404	0	47	144	536	782	3,175
Upper Coquille	7	115	0	0	6	145	145	363
Wildcat	0	94	7	116	0	14	17	210
Camas Valley Subwatershed	20	1,881	7	163	549	1,352	1,462	4,775
Boulder Creek	0	0	0	0	755	940	0	0
Dice Creek	0	0	0	0	1	1	0	0
Lower Twelve Mile	0	0	0	0	457	1,167	0	0
Upper Twelve Mile	0	0	0	17	68	34	0	0
Twelve Mile Subwatershed	0	0	0	17	1,281	2,142	0	0
Bear Creek	0	0	0	0	0	369	0	0
Upper Middle Fork Coquille Subwatershed	0	0	0	0	0	369	0	0
East Upper Rock Creek	0	0	0	0	0	0	0	0
Upper Upper Rock Creek	19	33	0	0	0	0	0	0
Upper Rock Creek Subwatershed	19	33	0	0	0	0	0	0
Upper Middle Fork Coquille WAU	39	1,914	7	180	1,830	3,863	1,462	4,775

Map 14. Upper Middle Fork Coquille Watershed Analysis Unit
Soils of Management Concern



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a. The National Cooperative Soil Survey (NCSS) Douglas County Information

(1) Floodplain Soils

There are 180 acres of floodplain soils on private land and seven acres on BLM-administered land. The floodplain soils occur mostly on non timber industry private lands in the Wildcat Drainage. Floodplain management objectives on BLM-administered land include A) Reduce the risk of flood loss or damage to property. B) Minimize the impact of flood loss on human safety, health, and welfare. C) Restore, maintain, and preserve the natural and beneficial functions of floodplains.

(2) Somewhat Poorly Drained (SWP) Soils

There are 3,863 acres of somewhat poorly drained soils on private land and 1,830 acres on BLM-administered land. Most of these soil types on BLM-administered land occur in the Boulder Creek and Lower Twelve Mile Drainages. Somewhat poorly drained soils may include riparian areas and have slope stability problems. Windthrow hazards can occur more often on these soils. Hydric or wet soil areas too small for mapping (NCSS standards <5 acres) exist as minor components within areas mapped as somewhat poorly drained.

(3) Hydric Soils

There are 1,914 acres of hydric soils occurring on private land and 39 acres on BLM-administered land. Most of these soil types occur on BLM-administered lands in the Upper Upper Rock Creek, Bingham, and Upper Coquille Drainages. Hydric soils generally have a watertable within ten inches of the soil surface for at least five percent of the growing season. The current definition of a hydric soil from the NRCS is "a soil that is sufficiently wet in the upper part to develop anaerobic conditions during the growing season." These areas have the greatest potential to be classified as wetlands.

(4) Prime Farm Land

There are 4,775 acres of prime farmland soils occurring on private land and 1,462 acres on BLM-administered land. Most of these soil types on BLM-administered land occur in the Camas, Bingham, and Upper Coquille Drainages. Prime Farm Land has the combination of soil properties, low slope gradient, growing season, and moisture supply to produce sustained high yield crops. The Farmland Protection Policy Act, published in the Federal Register, Vol. 43, No. 21, January 31, 1978, directs federal agencies to identify and take into account the adverse effects of federal programs on the preservation of farmland.

b. Timber Production Capability Classification - Fragile Soil Classifications

Timber Production Capability Classification Fragile soil sites refer to those areas where the timber growing potential is reduced due to inherent soil properties and landform characteristics. The TPCC groups sites into Fragile Suitable and Fragile Not Suitable for timber production classifications.

Fragile Suitable sites have the potential for unacceptable soil productivity losses as a result of forest management activities unless mitigating measures are applied to protect the soil/site productivity (see Best Management Practices, Appendix D, Roseburg District Resource Management Plan, USDI 1995). Fragile Not Suitable sites are considered to be unsuitable for timber production and are withdrawn from the timber base. Table 10 lists the number of acres in each classification on BLM-administered land within the WAU.

Table 10. Fragile Soil Classifications on BLM-administered Lands from the Timber Production Capability Classification System.

Drainage	FGR	FGNW	FPNW	FSNW	FWNW
Bar Creek	24	1	0	0	0
Bingham	860	123	8	40	3
Camas	117	0	0	7	0
Upper Coquille	210	171	0	0	0
Wildcat	134	45	0	35	0
Camas Valley Subwatershed	1345	340	8	82	3
Boulder Creek	0	0	0	0	0
Dice Creek	28	0	4	6	0
Lower Twelve Mile	25	0	16	9	4
Upper Twelve Mile	126	105	0	17	0
Twelve Mile Subwatershed	179	105	20	32	4
Bear Creek	237	217	0	0	0
Upper Middle Fork Coquille Subwatershed	237	217	0	0	0
East Upper Rock Creek	217	7	0	5	0
Upper Upper Rock Creek	1,216	2	0	7	0
Upper Rock Creek Subwatershed	1,433	9	0	12	0
Upper Middle Fork Coquille WAU	3,194	671	28	126	7

(1) Fragile Suitable

Slope Gradient (FGR)

The areas classified as fragile slope gradient are characterized by slopes ranging from 60 to over 100 percent. Unacceptable soil and organic matter loses can occur on these sites as a result of forest

management activities unless mitigating measures are applied to protect the soil/site productivity (see Best Management Practices, Appendix D, Roseburg District Resource Management Plan, USDI 1995). Secondary concerns within the fragile slope gradient classification may include low available soil moisture or competing vegetation, which reduces conifer seedling growth. There are 3,194 acres classified as Fragile Slope Gradient in this WAU, occurring mostly in the Upper Upper Rock Creek, Bingham, Bear Creek, Upper Coquille, East Upper Rock Creek, Wildcat, Upper Twelve Mile, and Camas Drainages.

(2) Fragile Nonsuitable

(a) Landslides

Landslides can affect water quality, erosion, and sedimentation. Landslides occur naturally or may be triggered by human activities such as road building or logging. Map 13 shows the potential stability problem areas.

1) Slope Gradient (FGNW)

Shallow translational debris type landslides can occur on steep slopes (60 to over 100 percent). These slides are generally fast acting and produce short duration sediment effects. The areas in this classification have a high potential for shallow translational debris type landslides and are not suitable for forest management activities. The 671 acres in this classification occur mostly in the Bear Creek, Upper Coquille, Bingham, and Upper Twelve Mile Drainages.

2) Mass Movement Potential (FPNW)

These sites contain active deep-seated, slump-earthflow types of mass movements. The rotational effects of these slides are generally greater than 25 feet deep. These slide types have the potential to produce long duration sediment effects. The areas in this classification are not suitable for forest management activities and have been withdrawn from the timber base. The 28 acres in this classification occur in the Lower Twelve Mile, Bingham, and Camas Drainages.

(b) Soil Moisture and Productivity

1) Groundwater (FWNW)

These sites contain water at or near the soil surface for sufficient periods of time that vegetation survival and growth are affected. Trees and understory species tolerant of waterlogged soils grow on these sites. Soils typically have dark colored surface horizons and low chroma mottles at or near the surface. Commercial conifer survival and productivity are severely limited due to excessive groundwater. Seven acres with this type of classification occur in the Lower Twelve Mile and Bingham Drainages.

2) Soil Moisture (FSNW)

These sites are determined to be unsuitable for forest practices due to moisture deficiencies based on soil physical characteristics. Moisture deficient soils in the WAU are dominantly loamy textured soils with less than 20 inches to bedrock, have a low organic matter content, and have 50 to 80 percent rock fragments throughout the soil profile. There is less than 1 inch of available water holding capacity in the top 12 inches of the soil surface for these soils. Soils with an available water holding capacity between 0.5 and 1.5 inches per inch of soil are difficult to reforest. Moisture availability decreases even more on southerly aspects. There are 126 acres of nonsuitable soils due to low soil moisture in the WAU, occurring mostly in the Bingham, Wildcat, and Upper Twelve Mile Drainages.

D. Hydrology

1. Climate

The Upper Middle Fork Coquille Watershed Analysis Unit has a Mediterranean type of climate characterized by cool, wet winters and hot, dry summers. There are no weather stations within this WAU. Weather stations closest to the WAU were used to characterize the climate (see Table 11).

Table 11. Weather Station Data Used to Characterize Climate in the Upper Middle Fork Coquille WAU.

Weather Station Name	Station Number	Elevation (feet)	Period of Record	Mean Water Year Precipitation (inches)
Flournoy Valley	352974	700	1978-1998	45.24
Reston	357112	890	1955-1998	50.85
Sitkum	357866	600	1948-1969	79.73
Upper Olalla	358788	760	1978-1997	41.41

The Sitkum weather station, located west of the WAU, would be expected to receive more precipitation than most of the WAU because of its proximity to the coast. The other three stations are located east of the WAU. The Reston and Flournoy Valley stations would be the most representative of the amount of precipitation the WAU receives at a similar elevation. Because of orographic effects, precipitation differences could be expected to occur throughout the WAU with the most precipitation occurring at the highest elevations. Most of the precipitation occurs as rainfall. However, the higher elevations could receive significant snowfall.

2. Streamflow

There are no gaging stations within the Upper Middle Fork Coquille WAU. In general, streamflows follow the precipitation pattern. Large seasonal variations in precipitation produce high winter and low summer streamflows.

Most upland streams are not impacted by irrigation water withdrawals. Although, water is withdrawn for road maintenance and fire protection. Water withdrawals for irrigation and domestic uses in the Camas Valley can lead to higher stream temperatures, which can impact aquatic habitat. Approximately 15 cubic feet per second (cfs) of streamflow has been appropriated to water users within the WAU. The appropriated water is used for a variety of purposes including domestic water use, irrigation, livestock, and fire management. Approximately 562 acre feet of water is stored in the WAU. Approximately 395 acre feet of water is stored in a reservoir behind a dam on the Middle Fork of the Coquille River that creates Kinnan Lake. The other 167 acre feet of water is stored in ponds and pump chances.

The United States Geological Survey (USGS) method of estimating floods can be used for ungaged streams in the WAU. The information could be used to determine the size of culverts to install on a particular stream. The area of lakes and ponds, precipitation intensity, and drainage area are information required to be able to use the USGS method (Harris et al. 1979). The area of lakes and ponds can be determined from information in GIS. Precipitation intensity can be determined using a map prepared by the National Oceanic and Atmospheric Administration (NOAA 1973). The precipitation intensity map indicates the maximum 24-hour rainfall intensity with a recurrence interval of two years ranges from three inches at the lower elevations to five inches at the higher elevations in the WAU. The drainage area outflow (actual drainage area) information, which is necessary to estimate magnitude and frequency of floods for streams within the WAU is presented in Table D-1 in Appendix D.

3. Roads

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

Roads have the potential to extend the stream network and increase peak flows by delivering water to the stream channel faster than in a non-roaded landscape. Roads can also increase the stream drainage network by routing water into culverts, which if not properly located can cause gullying, effectively acting as another stream channel (Wemple et al. 1996). Sedimentation can also be increased by accelerated erosion due to culverts draining onto unstable or erosive slopes or when having too few culverts causes downcutting of the ditchline. A number of Drainages in the WAU have high road densities, as well as high stream crossing densities (see Table 12). Increased peak flows may occur in Drainages with high road and stream crossing densities and a large amount of land in the Transient Snow Zone (which is defined as occurring between 2,000 and 5,000 feet in elevation).

Culverts can influence the stream channel by limiting stream meandering, changing stream gradient, limiting bedload movement, and increasing sediment due to culvert failures. Areas with the highest number of roads crossing streams have the greatest risk of culverts failing or becoming blocked during storm events and causing increased erosion, road failures, or debris slides. A limited number of the culverts in this WAU have been inspected and/or maintained. The Resource Management Plan (RMP) states new culverts should accommodate a 100-year flood event.

All of the Drainages in the WAU have high road densities over four miles per square mile. Road densities range from 4.03 to 6.86 miles per square mile. The average road density for the WAU is 5.42 miles per square mile (see Table 12). There are approximately 1,148 stream crossings in the WAU. Approximately 418 of the stream crossings occur on BLM-administered land. Stream crossing densities range from 0.75 crossings per stream mile in the Wildcat Drainage to 3.03

crossings per stream mile in the Dice Creek Drainage. The average number of stream crossings per stream mile in the WAU is 1.97 (see Table 12).

Table 12. Mile of Roads and Streams, Stream Crossings, and Densities in the Upper Middle Fork Coquille WAU.

Drainage **Subwatershed**	Area (Square Miles)	Road Miles	Road Density (Miles per Square Mile)	Stream Miles	Stream Density (Miles per Square Mile)	Number of Road and Stream Crossing Points	Stream Crossings per Stream Mile
Bar Creek	1.89	11.56	6.12	9.56	5.06	19	1.99
Bingham	17.23	95.28	5.53	82.69	4.8	149	1.80
Camas	16.92	80.3	4.75	72.19	4.27	99	1.37
Upper Coquille	10.1	51.38	5.09	42.7	4.23	69	1.62
Wildcat	3.29	13.27	4.03	14.75	4.48	11	0.75
Camas Valley Subwatershed	49.43	251.8	5.09	221.89	4.49	347	1.56
Boulder Creek	9.46	53.23	5.63	50.1	5.3	119	2.38
Dice Creek	5.74	27.56	4.8	49.45	8.61	150	3.03
Lower Twelve Mile	11.93	81.79	6.86	53.89	4.52	119	2.21
Upper Twelve Mile	10.42	61.97	5.95	80.73	7.75	194	2.40
Twelve Mile Subwatershed	37.55	224.6	5.98	234.17	6.24	582	2.49
Bear Creek	8.84	47.94	5.42	59.13	6.69	135	2.28
Upper Middle Fork Coquille Subwatershed	8.84	47.94	5.42	59.13	6.69	135	2.28
East Upper Rock Creek	3.01	17.53	5.82	20.85	6.93	31	1.49
Upper Upper Rock Creek	6.18	27.62	4.47	46.03	7.45	53	1.15
Upper Rock Creek Subwatershed	9.19	45.15	4.91	66.88	7.28	84	1.26
Upper Middle Fork Coquille WAU	105.01	569.4	5.42	582.07	5.54	1148	1.97

Table 13 shows the number of miles and densities of roads within Riparian Reserves and within 100 feet of streams. Over 82 miles of roads are located within Riparian Reserves and almost 32 miles of road are within 100 feet of a stream in the WAU. Roads within 100 feet of the stream are more likely to add sediment to the stream. Sediment from roads is probably impacting water quality in these areas.

Table 13. Miles of Roads and Road Densities Within Riparian Reserves and Within 100 Feet of a Stream.

Area	Riparian Reserves				Within 100 Feet of a Stream			
	Acres	Square Miles	Miles of Roads	Road Density (Miles per Square Mile)	Acres	Square Miles	Miles of Roads	Road Density (Miles per Square Mile)
Bar Creek	143	0.22	1.74	7.92	61	0.09	0.58	6.41
Bingham	1,883	2.94	18.87	6.42	809	1.26	6.22	4.93
Camas	688	1.08	6.09	5.64	318	0.50	2.78	5.56
Upper Coquille	909	1.42	7.00	4.93	425	0.66	2.63	3.98
Wildcat	224	0.35	0.56	1.61	92	0.14	0.09	0.64
Camas Valley	3,847	6.01	34.26	5.70	1,705	2.65	12.30	4.64
Boulder Creek	1,034	1.62	9.80	6.05	491	0.77	3.37	4.38
Dice Creek	944	1.48	7.92	5.35	492	0.77	3.55	4.61
Lower Twelve Mile	1,150	1.80	10.44	5.80	543	0.85	4.18	4.92
Upper Twelve Mile	1,264	1.97	7.34	3.73	629	0.98	3.18	3.24
Twelve Mile	4,392	6.87	35.50	5.17	2,155	3.37	14.28	4.24
Bear Creek	967	1.51	7.01	4.64	457	0.71	3.34	4.70
Upper Middle Fork Coquille	967	1.51	7.01	4.64	457	0.71	3.34	4.70
East Upper Rock Creek	428	0.67	1.32	1.98	217	0.34	0.56	1.63
Upper Upper Rock Creek	909	1.42	4.50	3.17	472	0.74	1.40	1.90
Upper Rock Creek	1,337	2.09	5.82	2.78	689	1.08	1.96	1.81
Upper Middle Fork Coquille WAU	10,543	16.48	82.59	5.01	5,006	7.81	31.88	4.08

Many roads are currently in need of some routine maintenance. Maintenance that needs to be performed includes removing slides blocking the ditchline or culverts and adding additional culverts and/or waterbars to the road, which would reduce the amount of runoff reaching a stream channel and increase infiltration of the intercepted flow. Maintenance needs may also include shaping the road surface by either outsloping or insloping the road to reduce the amount of water flowing on the road surface. Water in the ruts can flow for long distances carrying the sediment eroded from the road surface directly into a stream. Mulching bare cutbanks and fill slopes and limiting access to unsurfaced roads in the wet season could also minimize the amount of sediment flowing into streams due to the roads.

Roads within the WAU causing water quality problems could be improved or decommissioned. Unsurfaced roads, spur roads, and jeep roads exist in almost every section of BLM-administered land within this WAU that need maintenance, improvements, or could be fully decommissioned. Table 14 lists the areas within the WAU where roads could be fully decommissioned, if possible, or improved to reduce water quality problems. The main water quality problems observed in the WAU were erosion and sedimentation, culverts restricting the stream or causing excessive downcutting in the stream, and roads restricting the natural meandering of streams.

Table 14. Location of Roads Contributing to Water Quality Problems in the Upper Middle Fork Coquille WAU.

Township	Range	Section
28 S	8 W	19, 29, 31, and 33
29 S	8 W	5, 9, 21, 29, 31, and 33
29 S	9 W	1, 5, 9, 11, 13, 15, 23, 25, and 35
30 S	8 W	5, 7, 9, 17, 19, 21, 29, and 33
30 S	9 W	1, 2, 13, 23, 25, 27, and 35
31 S	8 W	5
31 S	9 W	1

4. Peak Flows

The Transient Snow Zone (TSZ) is defined as land between 2,000 and 5,000 feet in elevation. Timber harvesting and road building within the TSZ can result in increased peak flows during warm rain-on-snow events. Harr and Coffin (1992) noted that snow stored under a forest canopy of at least 70 percent crown closure was less susceptible to rapid snowmelt than snow accumulation in openings. A procedure developed by the Umpqua National Forest (USDA 1990) for estimating cumulative effects in the TSZ is called the Hydrologic Recovery Procedure (HRP). The HRP has been used in previous watershed analyses. However, the HRP was not used for this watershed analysis, since the procedure was developed for use in the Cascade Mountains. Other models would

need to be used to estimate cumulative effects on land outside of the TSZ. Increased peak flows following timber harvesting in the TSZ could lead to an increase in landslides and erosion (Harr 1981).

Table 15 shows the percentage of acres in the TSZ by Drainage and Subwatershed. Upper Twelve Mile, East Upper Rock Creek, and Upper Upper Rock Creek Drainages have the largest percentage of BLM-administered land in the WAU.

Table 15. Percent of Drainages in the Transient Snow Zone (TSZ).

Drainage Name **Subwatershed Name**	Acres of BLM Land in TSZ	Percent of Total BLM Land in WAU	Total Acres in TSZ	Percent of Total Acres in WAU
Bar Creek	17	4	17	1
Bingham	1,316	26	2,051	19
Camas	348	15	637	6
Upper Coquille	850	34	1,335	21
Wildcat	289	44	597	28
Camas Valley	2,820	26	4,637	15
Boulder Creek	1,065	38	2,407	40
Dice Creek	686	38	1,657	45
Lower Twelve Mile	1,177	35	2,108	28
Upper Twelve Mile	1,462	63	4,443	67
Twelve Mile	4,390	42	10,615	44
Bear Creek	562	31	1,791	32
Upper Middle Fork Coquille	562	31	1,791	32
East Upper Rock Creek	750	89	1,726	90
Upper Upper Rock Creek	1,769	91	3,247	82
Upper Rock Creek	2,519	90	4,973	85
Upper Middle Fork Coquille WAU	10,291	40	22,016	33

Table 16 shows the percentage of each Drainage in age classes less than 30 years old. Some Drainages in the WAU have had intense levels of timber harvesting within the last 30 years on both

private and BLM-administered land. Approximately 34 percent of the BLM-administered land in the WAU has been harvested in the past 30 years.

Table 16. Number of Acres and Percent of Drainages Less Than 30 Years Old.

Drainage	Total Acres BLM	Percent of BLM-administered Land Less Than 30 Years Old	Total Acres Private	Percent of Private Land Less Than 30 Years Old	Total Acres	Percent of Total Acres Less Than 30 Years Old
Bar Creek	475	34	736	14	1,211	22
Bingham	5,029	25	5,999	42*	11,028	33
Camas	2,330	35	8,499	35*	10,829	35
Upper Coquille	2,533	28	3,934	47*	6,467	38
Wildcat	658	24	1,450	72*	2,108	55
Camas Valley Subwatershed	11,025	28	20,618		31,643	
Boulder Creek	2,823	41	3,228	71	6,052	57
Dice Creek	1,795	31	1,877	71	3,672	51
Lower Twelve Mile	3,391	45	4,247	45	7,638	45
Upper Twelve Mile	2,328	47	4,343	53	6,671	51
Twelve Mile Subwatershed	10,337	42	13,696		24,033	
Bear Creek	1,803	29	3,853	29	5,656	29
Upper Middle Fork Coquille Subwatershed	1,803	29	3,853	29	5,656	29
East Upper Rock Creek	846	18	1,077	65*	1,923	44
Upper Upper Rock Creek	1,949	30	2,003	52*	3,952	41
Upper Rock Creek Subwatershed	2,795	27	3,080		5,875	
Upper Middle Fork Coquille WAU	25,960	34	41,247		67,207	

*Satellite Imagery Data. All other data is from the FOI and POI.

Drainages with high road densities, high stream crossing densities, a large portion within the TSZ, and a large percentage harvested within the last 30 years may be susceptible to increased peak flows. The intercepted water is routed to the streams faster because snow accumulation is greater in recently

harvested units. Management activities, such as regeneration harvests and road building, may magnify the effects of increased peak flows in Drainages with these conditions.

5. Stream Channel

There are approximately 582 miles of streams in the Upper Middle Fork Coquille WAU. Drainage density is about 5.54 miles of streams per square mile (see Table 12). Many tributaries of the Middle Fork Coquille River in the Camas Valley area have been straightened and/or have had their flow patterns altered. Most of the valley is cover with low vegetation, such as grasses. Some of the riparian areas have a thin line of deciduous trees along the streambank.

The Rosgen stream classification method was used to characterize channel morphology for different stream reaches in the WAU (Rosgen 1996). The Level I characterization used topographic maps and aerial photographs to delineate stream types based on gradient and sinuosity. Channels tend to be steeper in the upper reaches and flatter in the lower reaches. This is not true in some portions of the WAU. The western portion of the WAU has extremely steep tributaries on the north side of the Middle Fork of the Coquille River and Upper Rock Creek has a long, fairly flat reach near the headwaters. Results of the Rosgen Level I classification are presented in Table D-2 in Appendix D.

The Rosgen Classification can be used as an indicator to determine stability, sensitivity to disturbance, recovery potential, sediment supply, streambank erosion potential, and the influence of the vegetation on the stream channel (Rosgen 1994). Level I classification is a first look at determining stream types. Level II through IV classifications need to be done in the field to determine priorities for restoration, potential for changes in stream morphology due to management activities, and design restoration projects. Development of regional curves under the Level II classification can be used to predict streamflow, depth, width, and cross-sectional area of ungaged streams.

6. Proper Functioning Condition Surveys

Proper Functioning Condition (PFC) surveys were conducted within the WAU in 1996 and 1997. Approximately 1.6 miles of stream were surveyed in 1996 and 12.26 miles of stream were surveyed in 1997. Table 17 shows the number of stream miles in each of the four survey categories.

Table 17. Proper Functioning Condition Survey Results.

	Properly Functioning	Functioning-at-risk Upward Trend	Functioning-at-risk Downward Trend	Non-functioning
Stream miles	1.36	5.2	3.64	3.66

The Proper Functioning Survey notes mentioned problems associated with a lack of large woody debris (LWD), lack of future LWD recruitment potential because the riparian areas had been harvested, sediment from roads, and roads encroaching on the stream channel. Restoration activities could be conducted in areas where PFC surveys had noted problems. Large woody debris is important for capturing and holding substrate in place, as well as helping to protect stream banks.

Adding large wood to stream reaches may contribute short-term improvements to the stream channel until riparian areas have regenerated and started producing large trees, which would contribute large woody debris to the stream system in the future.

7. Water Quality

The Federal Clean Water Act of 1972, Section 303(d), directs each State to identify streams which do not meet water quality standards. Water Quality Standards are typically designed to protect the most sensitive beneficial use within a water body. The Oregon Department of Environmental Quality (DEQ) monitors water quality conditions of the streams in Oregon. The water quality parameters and their affected beneficial uses are listed in Table 18. The criteria used to list a stream as water quality limited are in Listing Criteria for Oregon's 1998 303(d) List of Water Quality Limited Water Bodies (Oregon Department of Environmental Quality 1998).

Table 18. Water Quality Parameters and Beneficial Uses.

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

Water quality samples were collected in the Upper Middle Fork Coquille WAU in the fall of 1996 and 1998. The water type in the WAU was determined to be sodium bicarbonate, which is

commonly associated with sedimentary rocks of the Coast Range. The water quality samples did not exceed the drinking water standards set by the Environmental Protection Agency (EPA). Table 19 summarizes the water quality data.

Table 19. Water Quality Data for the Upper Middle Fork Coquille WAU.

Stream Name	Boulder Creek	Twelve Mile Creek	Twelve Mile Creek	Battle Creek	Battle Creek
Location	T30S, R8W, Section 19	T30S, R9W, Section 25	T30S, R9W, Section 25	T30S, R9W, Section 13	T30S, R9W, Section 13
Sample Date	8/19/96	8/19/96	11/12/98	11/12/98	12/12/98
Time	1200	1315	1300	1130	1130
Flow (cfs)	0.2	0.66	5.4	0.53	5.44^
Specific Cond. (lab/field) (*u*S/cm)	73	90	76	89/88.1	54/54
pH (lab/field)	7.6	7.8	7.3	7.2/7.3	7.0/7.4
Alkalinity (mg/L)	34	37	29	35	25
Temperature (°C)	14.5	16	6.5	5.4	5.4
Barometric Pressure (mm)	727	732	740	740	
DO (mg/L)	8.6	8.5	10.8	11.8	11.8
Turbidity (NTU)			17.1	19.1	21.3
$N\text{-}NO_2$ (mg/L)	<.01	<.01			ND @ 0.1
$N\text{-}NO_3$ (mg/L)	<.02	0.03	ND @ 0.1	ND @ 0.1	ND @ 0.1
$N\text{-}NH_3$ (mg/L)	<0.5	<0.5	0.12	0.18	ND @ 0.05
Total Kjeldahl Nitrogen			0.55	0.1	0.97
F (mg/L)	<0.2	<0.2			ND @ 0.1
Cl (mg/L)	2.8	4.2			2.59
Br (mg/L)	0.6	0.4			
$P\text{-}PO_4$ (mg/L)	<0.2	<0.2			ND @ 0.1
SO_4 (mg/L)	18.9	3.5			ND @ 0.1
Li (mg/L)	<0.5	<0.5			
Na (mg/L)	5.8	4.8			
K (mg/L)	0.8	0.5			
Mg (mg/L)	0.8	0.8			
Ca (mg/L)	2.5	0.9			
Sr (mg/L)	<1.0	<1.0			
Ba (mg/L)	<0.5	<0.5			

^ Flow was measured on 12/3/98. ND = None detected at the level indicated.

a. Stream Temperature

Stream temperature is one of the most important water quality parameters monitored in the WAU. Stream temperature affects resident fish, aquatic life, and salmonid fish spawning and rearing. Currently, streams with salmonids meet Oregon DEQ water quality stream temperature criteria when they are maintained at or below 64 degrees Fahrenheit (17.8 degrees Celsius). The Middle Fork of the Coquille River, from the mouth to the headwaters, is on Oregon's Final 1998 Water Quality Limited Streams 303(d) list. The Roseburg BLM District collected stream temperature data on Twelvemile, Boulder, and Dice Creeks in 1998. All three creeks had temperatures above 64 degrees Fahrenheit during part of the summer (see Graph 1).

b. pH

The pH standard set by DEQ in the South Coast Basin is 6.5 to 8.5. A stream may be listed as water quality limited when ten percent of the samples exceed the standard. The samples need to be collected on at least five different days per site or diurnal data collected on two separate days may be used. Although, the pH data listed in Table 19 are within DEQ standards, they are only single data points.

c. Dissolved Oxygen

Higher forms of aquatic life require Dissolved Oxygen (DO) for survival. Table 19 presents single point DO data for three streams in the southeastern part of the WAU.

The Oregon Department of Environmental Quality set minimum DO standards at 6.5 mg/l for cool-water aquatic resources, which became effective July 1, 1996. The minimum DO standards for salmonid spawning streams were set at 11 mg/l, except where barometric pressure, altitude, and naturally occurring temperatures preclude attainment of the standard, then DO levels should not be less than 95 percent saturation. The minimum DO standards for cold water aquatic resources were set at 8 mg/l, unless the same conditions as mentioned for salmonid spawning streams are present, then the DO levels should not be less than 90 percent saturation. The DEQ standards state greater than ten percent of the samples need to exceed the standard with at least two samples per season to meet water quality limited criteria.

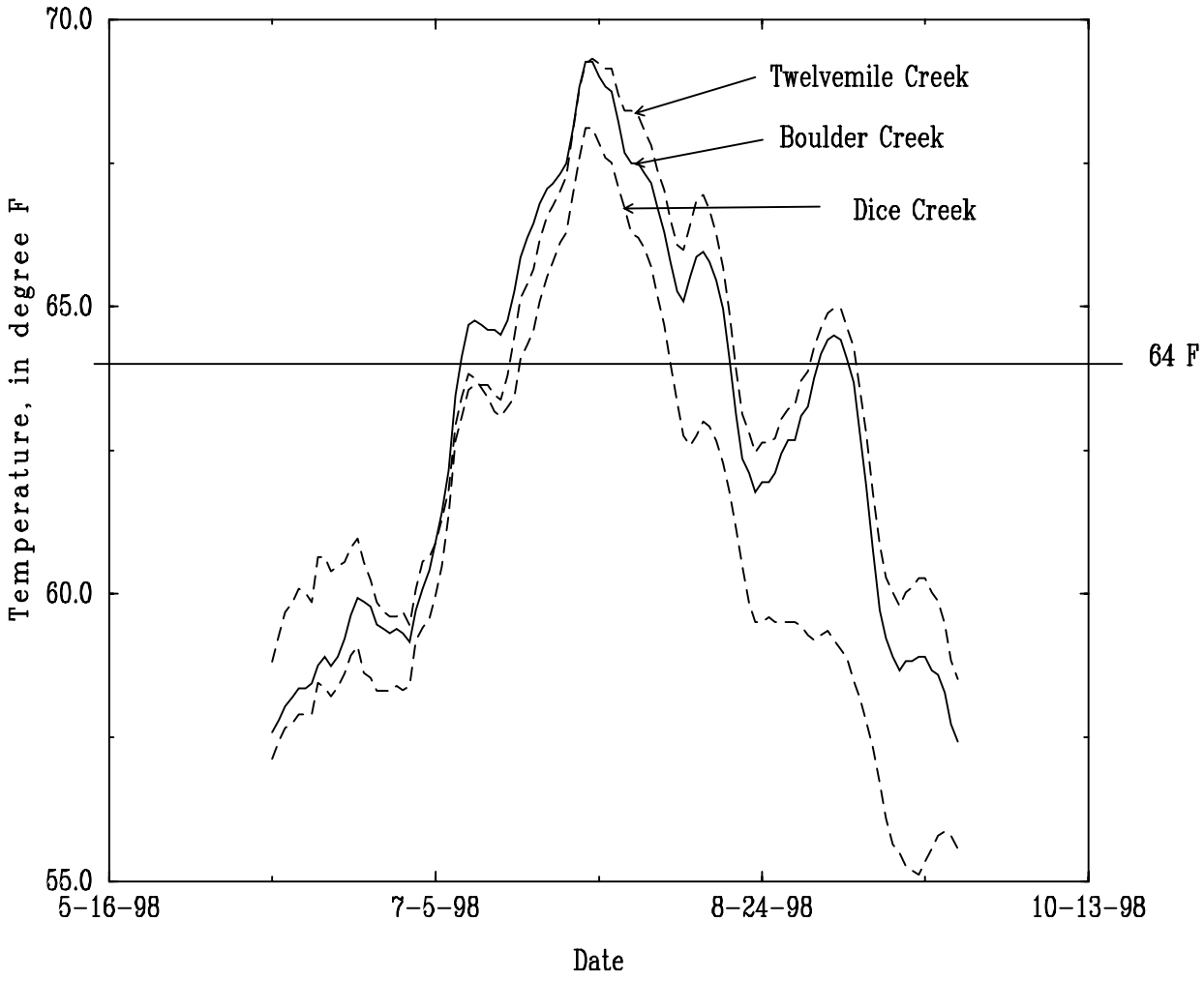
d. Turbidity and Sedimentation

Turbidity is a function of suspended sediments and algal growth in a stream. Turbidity varies naturally from stream to stream, depending on geology, slope stability, rainfall, and temperature. No more than a ten percent cumulative increase in stream turbidities is allowed, as measured relative to a control point immediately upstream of the turbidity causing activity. Turbidity samples were collected on two streams within the WAU (see Table 19).

e. Trace Metals

Trace metals are not a large concern in the WAU. The sedimentary rocks found in the WAU contain low amounts of metals. A mercury deposit was located three miles north of Camas Valley (Brooks

Graph 1. Comparison of Seven-day Maximum Stream Temperatures



1963). No mining occurred at this location and there is no indication that mercury has impacted any streams in the WAU. A placer gold mine and some recreational mining have operated within the WAU.

f. Nitrogen

Forest fertilization can impact water quality by increasing nitrogen levels in streams. Nitrogen in streams can lead to an increase in primary productivity, particularly algal blooms. The accumulation of algae in streams may affect pH. Aquatic organisms release carbon dioxide at night causing the stream pH to decrease. During the day aquatic organisms use carbon dioxide and hydrogen during photosynthesis causing the stream pH to increase. The aquatic organisms' respiration can lead to large changes in pH between night and day. Studies have measured less than 0.5 percent of the total nitrogen applied reached streams with adequate buffers, whereas two to three percent of the applied nitrogen was measured in streams with inadequate or no buffers (Moore 1975). Water quality data was collected at two sites in conjunction with a forest fertilization project in the WAU in November and December of 1998. The data presented in Table 19 gives base line nitrogen levels for the sampled streams in the WAU. Nitrogen levels did not increase in the streams after forested stands were fertilized.

8. Groundwater

Most of the wells in the WAU are located in the Camas Valley and are used for domestic purposes. A few irrigation wells are present. Wells in the Camas Valley area generally have flows greater than ten gallons per minute. Water quality data collected by the United States Geological Survey (USGS) from five wells in the Camas Valley determined the water type to be sodium bicarbonate, which is typical for the sedimentary geology of this area (Robison and Collins 1978). Table 20 shows temperature, pH, and conductivities for wells in the Camas Valley. Since the well data is from Camas Valley and the stream data is from the uplands in the southern end of the WAU and these areas are in different geologic units, the groundwater and stream quality data can not be compared directly. The groundwater data would be useful for comparing with stream data collected in the Camas Valley area.

Table 20. Water Quality Data for Wells in the WAU.

Location	Depth to Water Level (Feet)	Sample Date	pH	Specific Conductance (*u*S/cm)	Temperature (°F/°C)	F (mg/l)	Cl (mg/l)	K (mg/l)	Na (mg/l)	Mg (mg/l)	Ca (mg/l)
T29S R8W Section 6	30	-	8	277	57/14	0.3	2.9	1.1	44	5.1	15
T29S R8W Section 17	20	5/23/73	9	462	54/12.5	0.9	4.1	0.4	110	0.1	1.1
T29S R8W Section 20	21	-	7	210	55/13	0.2	2.7	0.8	22	3.4	18
T29S R8W Section 29	24	5/11/76	8	449	53/12	1	3.4	0.6	9.6	5.6	8.6
T29S R9W Section 24	38	-	9	558	54/12.5	0.8	5.3	0.4	130	0.3	1.9

E. Species and Habitats

1. Fisheries

a. Historical Fish Use in the Middle Fork of the Coquille River Basin

The historical condition of the riparian zone along the Middle Fork of the Coquille River favored conditions typical of old-growth forests found in the Pacific Northwest. The river and its tributaries were well shaded by the canopy closure associated with mature trees. Stream banks were protected by the massive root systems of the mature trees. The fish in the Middle Fork of the Coquille River evolved with streams obstructed by fallen trees, beaver dams, and vegetative growth in and alongside the channel (Murphy 1991). Even larger rivers, as large as a seventh order stream, had trees in the channel and were obstructed by drift jams. The main river channel contained abundant gravel and fine sediments. Habitat complexity was enhanced by multiple channels and sloughs and by scour around boulders and snags.

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 clarki) have been documented utilizing the Upper Middle Fork Coquille Watershed Analysis Unit (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 has been altered by European settlement, urban and industrial development, and land management practices.

(1) Historic Human Impacts to the Fisheries Resource

Approximately 48 miles of streams were affected by the seven splash dams built on streams within the Middle Fork Coquille Watershed (USDI 1994c). All of the dams were operated below the Upper Middle Fork Coquille WAU. However, the splash dams had an impact on the fisheries resource within the WAU. Splash dams limited access above the dams to fish and had destructive impacts to fish during operational flows. Stream cleaning activities were conducted to facilitate passage of logs from the splash dams to the estuary. The stream cleaning included cutting streambank vegetation and removing boulders and large woody debris from the stream channel. Splash dam operation affected stream channel characteristics by reducing habitat complexity, destabilizing stream banks, incising and scouring channels, removing large woody debris, and changing stream meandering. The loss of habitat complexity diminished habitat availability for salmonids. Juvenile rearing and spawning escapement of adults was impaired by habitat destruction.

(2) Historic Habitat Surveys

Riparian areas along the lower three miles of Twelvemile Creek and most of the Middle Fork of the Coquille River consisted predominantly of second growth timber, while the upper reaches of Twelvemile Creek consisted of old-growth timber stands in 1949. Aquatic habitat surveys conducted in 1949 indicated there were very few large debris jams, three occurred in Twelvemile Creek and three occurred in the Middle Fork of the Coquille River. Highway 42 followed the river for about

30 miles. The river was visible from the highway approximately 90 percent of the time. Highway 42 was realigned and widened in the early 1990s increasing the number of river crossings and road encroachment of the river.

Aquatic habitat surveys conducted in 1969 observed similar conditions in Twelvemile Creek as the surveys in 1949. The temperature was recorded as 66 degrees Fahrenheit at noon on August 20, 1969. The 1969 survey mentioned only four large debris jams.

Aquatic habitat surveys conducted in 1972 reported the percent of canopy cover along fifteen miles of streams in the Twelvemile Subwatershed. The highest amount of canopy cover was the 6.75 miles surveyed along the mainstem of Twelvemile Creek, which averaged 86 percent canopy cover. The lowest amount of canopy cover was along the five miles surveyed in Boulder Creek with a 25 percent canopy cover. The average of all the surveyed reaches was 59 percent canopy cover.

Low canopy cover was due to extensive timber harvesting along the streams. The lack of canopy cover contributed to elevated temperatures in stream reaches. Temperatures recorded near the mouth of Twelvemile Creek, taken around noon on July 13, 1972 were between 71 and 75 degrees Fahrenheit. The 1972 surveys reported there were 30 large debris jams over three feet in diameter and thirteen water falls over three feet tall (see Map 15).

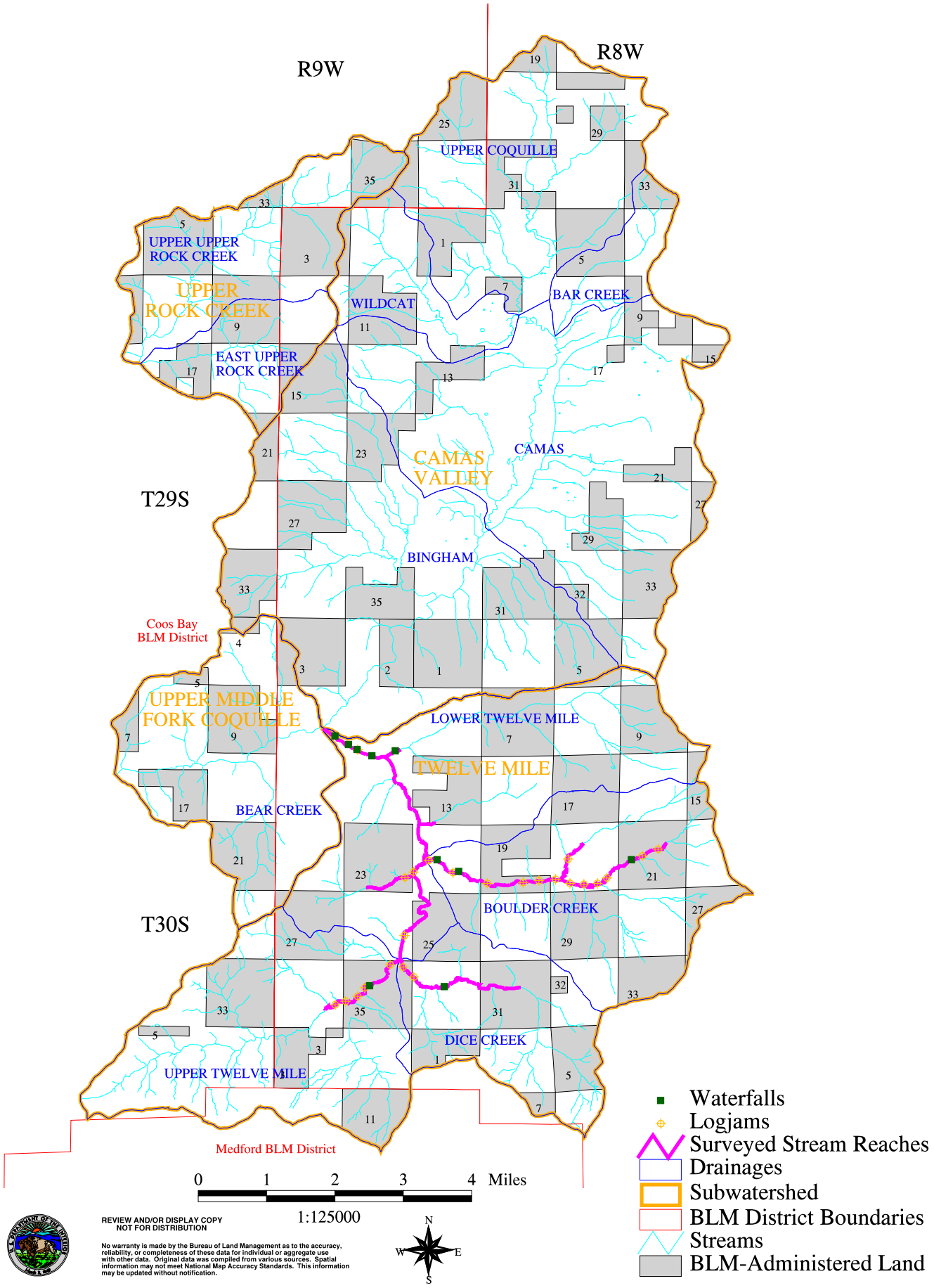
(3) Hatchery Activities in the WAU

The Oregon Fish Commission released 22,981 cutthroat trout in the Middle Fork of the Coquille River, from the mouth to the headwaters, in 1947 (see Table C-4 in Appendix C). From 1947 to 1985, 300,879 coho salmon smolts, 67,625 cutthroat trout, and 47,424 rainbow trout were released in the Middle Fork of the Coquille River. The salmon included stocks from the Alsea, Butte Falls, Coos Station, Rock Creek, and the Bandon hatcheries. Releases from the Bandon hatchery were most likely the only stocks native to the Coquille River system.

The Middle Fork of the Coquille River has an extensive history of hatch box fall chinook salmon, coho salmon, and winter steelhead (see Table C-5 in Appendix C). While most rearing occurred below the WAU, fall chinook unfed fry were reared and released approximately one mile above the confluence of Twelvemile Creek with the Middle Fork of the Coquille River in 1989 and 1990. Coho salmon, in 1989, and winter steelhead, in 1990, unfed fry were released nearest to the WAU at the mouth of Slater Creek on the Middle Fork of the Coquille River. Hatch box activities in the Middle Fork of the Coquille River began in 1980 and continued through 1998. Foreign stocks of Rogue River coho salmon eggs and Alsea River winter steelhead eggs were used for hatch box releases from 1980 through 1985.

Hatchery and or hatch box stocks released into the Middle Fork Coquille River Basin probably interbred with the wild stocks. Introducing foreign hatchery stocks can reduce or eradicate specifically adapted characteristics within wild populations. Potential impacts of interbreeding could include changes in fish productivity, growth rate, egg size, survival, age and size at maturity, disease and pH resistance, and timing of migrations (Moring 1993).

Map 15. Upper Middle Fork Coquille Watershed Analysis Unit 1972 BLM Stream Surveys



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The Oregon State Game Commission released adult coho salmon near the mouth of Dice Creek in 1971. Juvenile coho salmon were observed above the barriers in Twelvemile Creek during stream habitat surveys conducted by the BLM in 1972.

(4) Fish Harvesting in the WAU

There has been a long history of gillnetting and commercial fishing on the Coquille River. Gillnetting was discontinued in 1949, while commercial harvesting of some salmon stocks continued into 1998. The gillnetting and commercial fishery industries probably contributed to the general decline of salmon stocks in the Middle Fork of the Coquille River (USDI 1994c).

Oregon Department of Fish and Wildlife (ODFW) records from 1976 to 1994 show fall chinook salmon, coho salmon, and winter steelhead were harvested from the Middle Fork of the Coquille River (see Table C-6 in Appendix C). The data does not indicate if there is a decreasing or increasing trend of angler success within the watershed.

Currently, ODFW fishing regulations in the Middle Fork of the Coquille River system includes seasonal restrictions for catching and releasing trout and catching two adult salmon per day with a maximum of 20 salmon per year. Some anglers fish in Twelvemile Creek for recreational purposes.

(5) Salmonid Population Trends

Salmonid stocks have been declining throughout the Pacific Northwest. A 1991 status report identified 214 native, naturally spawning stocks were vulnerable or at-risk of extinction (Nehlsen et al. 1991). According to this report, the Coquille spring chinook salmon had a high risk of extinction. Coho salmon and sea-run cutthroat trout in the Coquille River were considered to have a moderate risk of extinction. The spring chinook salmon, coho salmon, and sea-run cutthroat trout are believed to have interbred with hatchery populations. Native stocks are threatened due to the loss of habitat, overfishing, and other natural and human caused factors affecting survival.

In ODFW's 1993 stock review, the Coquille spring chinook salmon was designated as a depressed population with potential genetic problems. The major causes include illegal harvesting, disease, low stream flows, and high temperatures associated with riparian degradation. Spring chinook salmon are not monitored in the Middle Fork of the Coquille River and their presence is very low or non-existent.

Fall chinook salmon spawning surveys have been conducted on the Middle Fork of the Coquille River since 1961 (see Table C-7 in Appendix C). The run has averaged 42 adults and nine jacks in 31 years of surveys. No clear population trends exist in the data. However, populations are assumed to be depressed from historic levels due to habitat loss and human interaction (USDI 1994c).

Coho salmon spawning surveys have not been conducted within the Upper Middle Fork Coquille WAU. Survey data collected from streams within the Middle Fork Coquille Watershed can be used as a population trend reference (see Table C-8 in Appendix C). Coho salmon returns are highly

variable within the basin and between years of survey. The average run sizes on Big Creek declined 74 percent from the 1950s to the 1970s. Similarly, average run sizes on Slater Creek declined 71 percent between the 1960s and the 1980s.

Monitoring of adult winter steelhead spawning in the Middle Fork of the Coquille River has been limited. Winter steelhead in the Middle Fork of the Coquille River is made up almost entirely of wild stock, based on brood stock seining and spot creel checks (ODFW 1993). The rainbow trout found in the lower part of Twelvemile Creek may be residual or juvenile winter steelhead rather than resident rainbow trout if the four falls near the mouth of Twelvemile Creek are not barriers to anadromous fish.

b. Current Conditions

The Oregon Coastal coho salmon has been listed by the National Marine Fisheries Service (NMFS) as a threatened species under the Endangered Species Act (ESA) of 1973, as amended. The West Coast steelhead is designated as a candidate species by NMFS (Federal Register March 19, 1998 vol 63, number 53). The Pacific lamprey (Lampetra tridentata) is on the United States Fish and Wildlife Service (USFWS) list as a Species of Concern and is considered a Bureau Sensitive species by the BLM (Manual 6840).

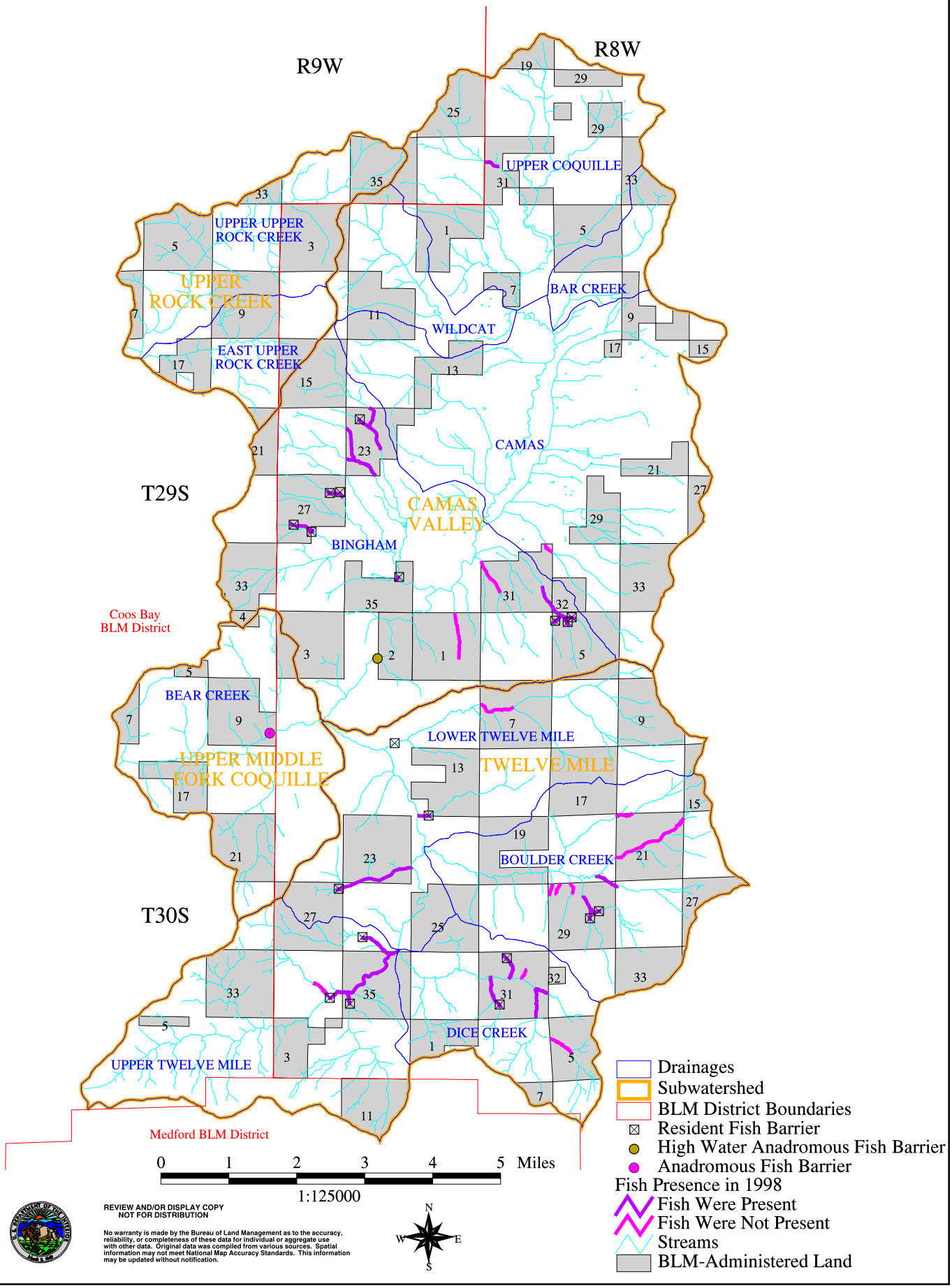
Aquatic habitat data has not been collected since 1972 within the Upper Middle Fork Coquille WAU. Therefore, current habitat conditions information is not available. Information available on habitat conditions and fish species distribution are in the form of past documentation, personal communications, and observations by ODFW and BLM biologists.

Each Drainage in the WAU 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.

Fish distribution limits have been mapped using GIS for streams with documented barriers within the Upper Middle Fork Coquille WAU. Distribution limits of anadromous and resident fish are determined by the extent these fish are able to migrate upstream (see Map 16). Distribution limits of anadromous fish are based upon documented or suspected historic barriers to steelhead trout, sea-run cutthroat trout, or coho salmon. Natural waterfalls, log or debris jams, beaver dams, and road crossings are potential barriers to fish movement and migration.

Anadromous spawning and rearing primarily occurs in the mainstem of Middle Fork of the Coquille River in the Upper Middle Fork Coquille WAU. There is a low water barrier to anadromous fish in the Middle Fork of the Coquille River about 400 feet above the confluence with Bear Creek (see Map 16). Anecdotal information suggests that during high water years the barrier on the Middle Fork of the Coquille River and the four lower falls on Twelvemile Creek are traversable by steelhead (ODFW 1993). Anadromous barriers during high water are located on Boulder and Bridge Creeks

Map 16. Upper Middle Fork Coquille Watershed Analysis Unit 1998 BLM Fish Surveys



near their mouths, Dice and Upper Twelvemile Creeks approximately one mile upstream from their mouths, and the Middle Fork of the Coquille River 1.5 miles above the confluence with Twelvemile Creek (see Maps 15 and 16).

Cutthroat and rainbow trout occur in the Middle Fork Coquille Watershed. Rainbow trout live in the Middle Fork of the Coquille River up to a 22 foot waterfall, which is 1.5 miles above the confluence with Twelvemile Creek. The cutthroat trout above the waterfall in the Middle Fork of the Coquille River are an isolated population. Genetic testing of cutthroat trout in the Coquille River Basin found small populations exhibited a fairly high level of genetic drift and relatively little mixing between populations (ODFW 1993). The isolated cutthroat trout population in the Middle Fork of the Coquille River may exhibit high genetic drift, which would be similar to other isolated populations in the Coquille River Basin. Isolated populations are vulnerable to abundance declines and genetic bottlenecks due to habitat changes and competition from hatchery raised fish.

Road surveys examined 343 road segments affecting the fisheries resource. The road surveys identified 26 (7.5 percent) segments were interacting with fish bearing streams, with seven fish passage barriers. Four pump-chances block upstream migration of salmonids.

The Oregon Department of Environmental Quality has listed the Middle Fork of the Coquille River as a temperature limited stream (Department of Environmental Quality 1998). High stream temperatures can discourage spawning, rearing, and emergence of salmonids.

2. Wildlife

Many wildlife species live in the different plant communities present in the WAU. The various vegetation types provide habitat to over 200 vertebrate species and thousands of invertebrate species. Forty-four terrestrial animal species are of special concern because they are Federally Threatened (FT), Endangered (FE), Bureau Sensitive (BS), Bureau Assessment species (BA), or Oregon State sensitive species (see Table E-1 in Appendix E). In addition to these species, the Standards and Guidelines in 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 (USDA and USDI 1994b), lists seven terrestrial animal species to Survey and Manage (S&M) for in Oregon, Washington, and California (USDA and USDI Appendix J2 1994a).

a. Threatened and Endangered Species

Five terrestrial animal species known to occur in the Roseburg BLM District are legally listed as Federally Threatened (FT), Federally Endangered (FE), or Federally Proposed (FP). 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), the northern goshawk (Accipiter gentilis) (FP), and the Columbian white-tailed deer (Odecoilus virginianus leucurus) (FE). The North American lynx (Lynx canadensis) is being reviewed by the USFWS for listing as a threatened species in the northern region of the United States, which includes Oregon and Washington.

(1) The Northern Spotted Owl

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

Suitable forest habitats where spotted owls have been located are known as spotted owl activity centers or master sites. In the Upper Middle Fork Coquille WAU, there are 17 spotted owl master sites. This number includes current and historically active and inactive master sites. Because owls use different areas during different years, a master site may have alternate sites. Fifteen of the master sites are found on BLM-administered lands and two are on private land. There were 12 active sites in the WAU in 1998. Five of the 12 sites (42 percent) were occupied in 1997 and 1998. Table 21 contains information about the status of use, habitat acres, occupation, and reproduction success of owls for spotted owl sites within the WAU.

Table 21. Spotted Owl Activity Center Ranking Data Within the Upper Middle Fork Coquille WAU in the South River Resource Area (1998).

MSNO	Year Site was Located	Last Year of Known Active Pair (Pair Status + Number of Juveniles)	Last Year Occupied (Pair Status)	Number of Years of Reproduction/ Pair Status Since 1985	Suitable Habitat Acres in Provincial Radius (1.3 or 1.5 Miles)	Suitable Habitat Acres in 0.7 Mile Radius	Land Use Allocation	Occupancy Rank	Acres Rank	History Rank
0368	1983	1996(P+1J)	1996(P)	5/14	993	503	LSR	2	D	2
0368A	1998	1998(P+2J)	1998(P)	1/1	900	480	LSR	1	D	1
0370	1976	1993(P+2J)	1995(U)	3/8	697	224	CONN	3	D	2
0370A	1991	1998(P+2J)	1998(P)	1/1	689	216	Private	1	D	1
0370B	1997	1997(P+0J)	1997(P)	0/1	680	216	CONN	1	D	1
2042	1989	1996(P+0J)	1996(P)	1/5	821	410	LSR	2	D	2
2047	1989	1989(P+0J)	1989(P)	1/1	858	296	LSR	3	D	3
2099	1989	1998(P+0J)	1998(P)	1/5	747*	363	LSR	1	D	2
2186	1987	1990(P+0J)	1991(P)	ND	360*	161	GFMA	3	D	3
2186A	1991	1992(P+1J)	1992(P)	1/1	368	202	LSR	2	D	2
2188	1985	1993(P+0J)	1993(P)	0/1	900*	525	LSR	3	D	3
2190	1977	1987(P+2J)	1987(P)	1/1	1158*	365	GFMA	3	B	3
2190A	1988	1997(P+2J)	1997(P)	4/8	1115*	365	LSR	1	B	1
2321A	1990	1993	1993(P)	1/1	458	117	Private	2	D	2
2383	1990	1990(P+1J)	1996(Z)	1/1	207	97	GFMA	3	D	3
2747	1991	NP	1991(S)	0/0	573	165	LSR	3	D	3
3168	1991	1994(P+0J)	1998(M+F)	1/1	213	91	GFMA	1	D	2

Table 21 Definitions

Last Year of Known Active Pair - Gives the year, pair status and number of young produced; NP = site has not had a pair; ND = No Data.
Pair Status - M = Male; F = Female; J = Juvenile; P = Pair Status; (M+F) = Two Adult Birds, Pair Status Unknown; PU = Pair Status Undetermined, ND = Incomplete or No Data.
Number of Years of Reproduction/Pair Status Since 1985 - The first number represents the number of years with spotted owl reproduction at this site since 1985. The second number refers to the number of years for the entire history of the site since 1985 (including the original and alternate sites i.e. 1090A). ND = No Data.
Suitable Habitat Acres in Provincial Radius - * = 1.5 Miles, for sites in the Coast Range.
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 three years; 2: Sites with this ranking have been occupied in the past, show sporadic occupancy by a single owl or an owl pair, may be currently occupied; 3: Sites with this ranking have not been occupied during the last three years.
Acres Rank - These acres are in regards to suitable spotted owl habitat. A: These sites have more than 1,000 acres in the provincial radius and more than 500 acres within the 0.7 mile radius; B: These sites have more than 1,000 acres in the provincial radius but less than 500 acres within the 0.7 mile radius; C: These sites have less than 1,000 acres in the provincial radius and more than 500 acres in the 0.7 mile radius; D: These sites have less than 1,000 acres in the provincial radius and less than 500 acres in the 0.7 mile radius.
History 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 has been producing young consistently; 2: Site is consistently used by spotted owls but reproduction is sporadic; 3: Spotted owls have had some reproduction, occupation has been sporadic, or has not been occupied. Private = Site is located on private land; OR = Site is located on Oregon State lands.

Habitat on Federally-administered land 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. Four habitat types were described and named Habitat 1 (HB1), Habitat 2 (HB2), Habitat 3 (HB3), and Habitat 4 (HB4). Habitat 1 describes forest stands that provide nesting, foraging, and resting components. Habitat 2 describes forest stands that provide foraging and resting components but lack nesting components. Habitat 3 refers to forest stands that have the potential with time to develop into suitable Habitat 2. Habitat 4 refers to areas that would not develop suitable habitat in the foreseeable future. Tables 22 and 23 shows the number of acres present for each habitat type in the Upper Middle Fork Coquille WAU. Map 17 shows the distribution of the four habitats in the WAU. The Upper Middle Fork Coquille WAU has approximately 15,164 acres of Habitat 3, which may develop into suitable habitat for the spotted owl.

Table 22. Number of Acres and Percentages of Spotted Owl Suitable Habitat Types Within the Upper Middle Fork Coquille WAU.

Species	Habitat 1	Habitat 2	Habitat 3	Habitat 4	Total
Spotted Owl	4373	5518	15164	259	25314
	17%	22%	60%	1%	100%

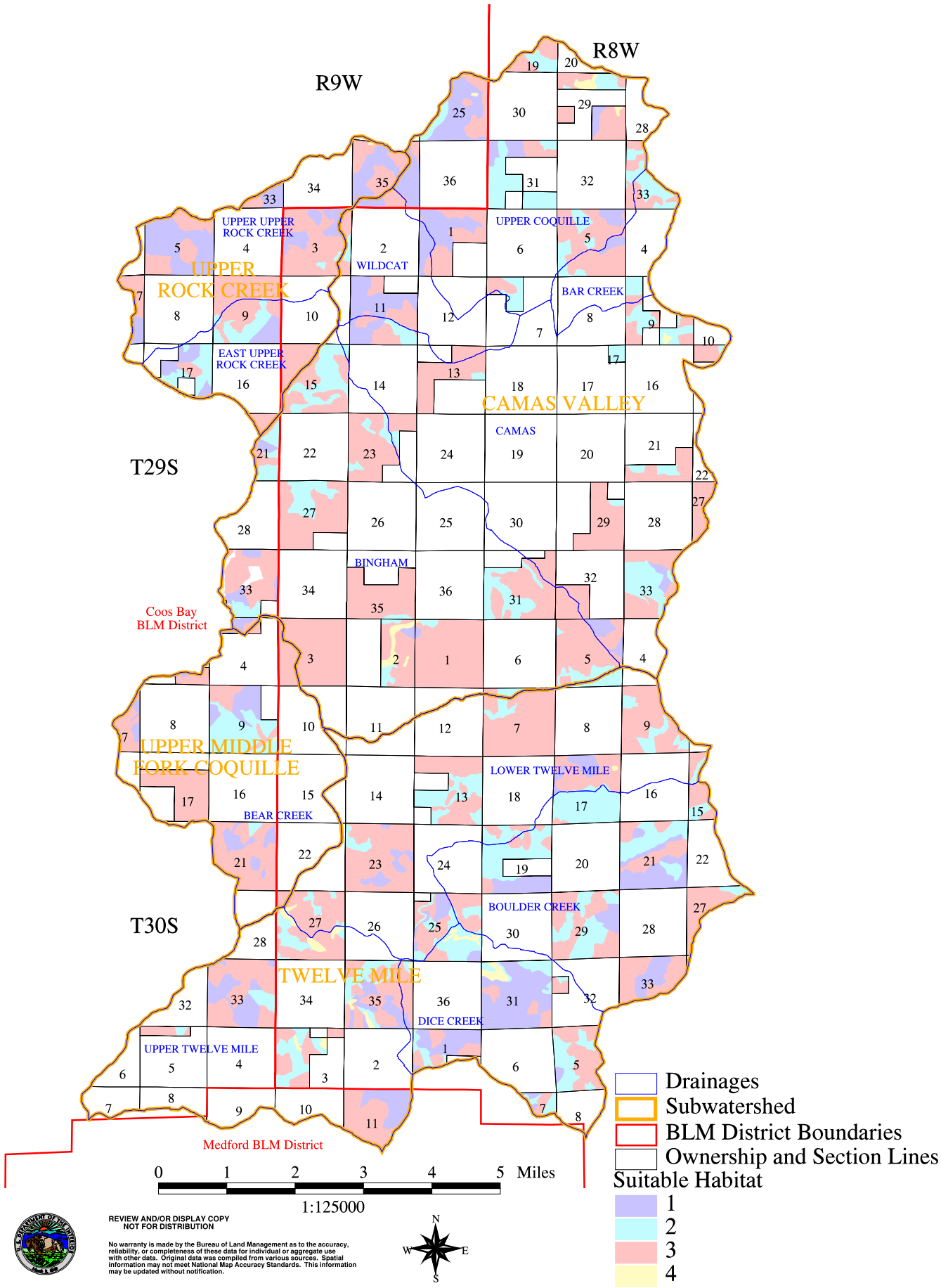
Table 23. Number of Acres and Percent of the Upper Middle Fork Coquille WAU in Habitat 1 and 2 (Federally-administered Land Only).

Habitat 1	Habitat 2	Total Federally-administered Land	Total Area in the Upper Middle Fork Coquille WAU
4,373 Acres	5,518 Acres	25,314 Acres	67,207 Acres
1%	8%	38%	100%

(a) Dispersal Habitat

Dispersal habitat refers to forest stands greater than 40 years old that provide cover, roosting, foraging, and dispersal components spotted owls use while moving from one area to another (Thomas et al. 1990, USDI 1992a, and USDI 1994b). One method used to quantify dispersal habitat on Federally-administered land is the amount of 50-11-40 acres. This number (50-11-40) refers to the condition where 50 percent of forested stands within one quarter township are composed of 11 inch diameter trees with a minimum canopy closure of 40 percent (Thomas et al. 1990). This habitat condition is important as dispersal habitat outside of late-successional forest stands. Other animal species may also use this dispersal habitat while moving from one area to another. There are approximately 8,281 acres of dispersal habitat in the Upper Middle Fork Coquille WAU.

Map 17. Northern Spotted Owl Suitable and Dispersal Habitat Within the Upper Middle Fork Coquille Watershed Analysis Unit



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

The southwest portion of the WAU overlaps one Critical Habitat Unit (CHU-OR-62) designated by the USFWS (see Map 18). There are approximately 49,503 acres of Federally-administered land in CHU-OR-62. Approximately 8,466 acres (17%) of CHU-OR-62 are inside the Upper Middle Fork Coquille WAU. The portion of the WAU overlapping CHU-OR-62 has approximately 3,677 acres of suitable spotted owl habitat (HB1 and HB2). Forest habitat with the potential to become suitable habitat (Habitat 3) in CHU-OR-63 is approximately 3,888 acres.

Critical Habitat Unit OR-62 was indirectly evaluated in the South Coast-Northern Klamath Late-Successional Reserve Assessment (USDI and USDA 1998). Late-Successional Reserve #259 and CHU-OR-62 boundaries match to a large degree. The management direction set for LSR #259 would have an impact on the future condition of CHU-OR-62.

(2) The American Bald Eagle

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

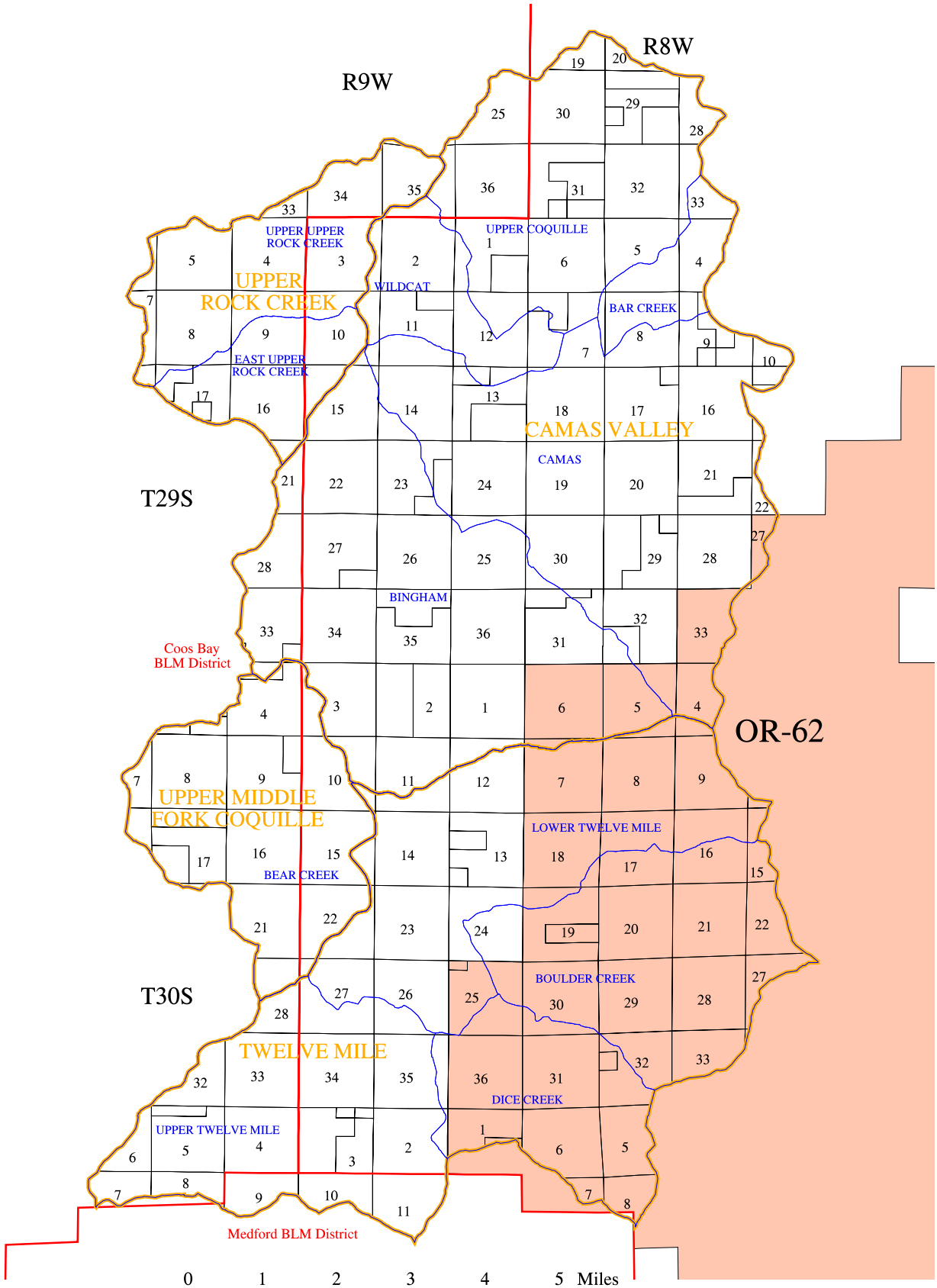
Throughout the North American range, drastic declines in bald eagle numbers and reproduction occurred between 1947 and the 1970s. In many places, the bald eagle disappeared from the known breeding range. The reason for this decline was the impact organochloride pesticide (DDT) use had on the quality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

Information collected from yearly inventories (1971 to 1995) by Isaacs and Anthony (1995) of known bald eagle sites in Douglas County do not list any sites, nests, or territories within or near the Upper Middle Fork Coquille WAU. Midwinter bald eagle surveys have not detected bald eagles in the Middle Fork Coquille WAU (Isaacs 1998). Approximately 40 acres of forested stands greater than 200 years old are within one mile of the Middle Fork of the Coquille River and may contain habitat characteristics used for nesting by bald eagles.

(3) The Peregrine Falcon

In Oregon, peregrine falcons were a "common breeding resident" along the Pacific coastline and were present in many areas including southwestern Oregon (Haight 1991). Peregrine falcon populations in the Pacific Northwest declined because of organochloride pesticide use, shooting, other chemicals (avicides, such as organophosphates) used to kill bird species considered to be pests,

Map 18. Northern Spotted Owl Critical Habitat Units Within the Upper Middle Fork Coquille Watershed Analysis Unit



0 1 2 3 4 5 Miles

1:125000

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N W E S

- Drainages
- Subwatershed
- BLM District Boundaries
- Ownership and Section Lines
- Critical Habitat Units

and habitat disturbance (loss of wetlands, loss of fresh water marsh environments in interior valleys, and increased rural development) (Aulman 1991).

Although there have been reported sightings of peregrine falcons in the South River Resource Area, there is no record of an occupied site within the Upper Middle Fork Coquille WAU, as of 1995. Several areas in the Upper Middle Fork Coquille WAU are at higher elevations and have exposed bedrock due to erosion and other geological processes. These areas are mostly located on private land. However, an evaluation using aerial photographs and on-the-ground reviews determined the WAU has some of the typical cliff habitats or large rock outcrops on Federally-administered land, which would be classified as medium or high potential peregrine falcon habitat.

(4) The Marbled Murrelet

The marbled murrelet was listed as a threatened species in 1992 (USDI 1992c). Critical habitat for the recovery of the marbled murrelet was designated in 1996 (Federal Register 61(102):26256-26278). A Recovery Plan for the Marbled Murrelet was completed in 1997 (USDI 1997).

The marbled murrelet is found in the Roseburg BLM District. The Upper Middle Fork Coquille WAU is inside the 35 and 50 mile zones from the coast where potential marbled murrelet habitat is found (USDA and USDI 1994b, and USDI 1992c). Information about the biology and known inland marbled murrelet nest sites indicates forest stands in the WAU may be potential nesting habitat (USDI 1995, USDA and USDI 1994b, USDI 1992c). About 7,863 acres of suitable marbled murrelet habitat in the WAU occurs on BLM managed lands (see Map 19). Approximately 1,986 acres occur in the Coos Bay BLM District, approximately 158 acres occur in the Medford BLM District, and approximately 5,719 acres occur in the Roseburg BLM District.

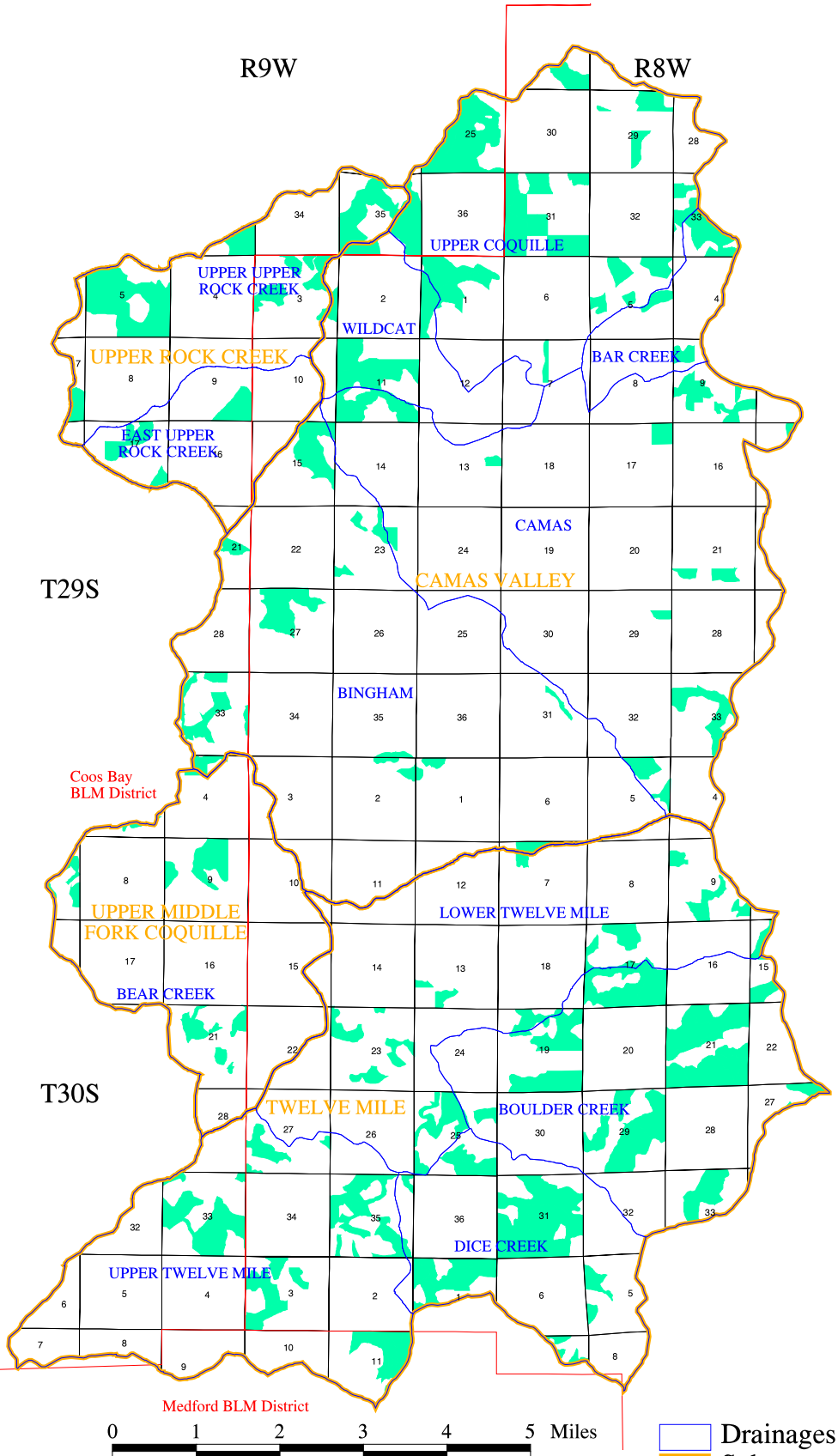
The WAU includes a Critical Habitat Unit, CHU-OR-06-d, which was designated for the recovery of the marbled murrelet (Federal Register (61)102:26256-26320). The Critical Habitat Unit includes the northwest portion of the WAU and extends north into the Coos Bay BLM District. This Critical Habitat Unit was included as part of LSR #261 in the South Coast-Northern Klamath Late-Successional Reserve Assessment (USDI and USDA 1998). This Critical Habitat Unit includes approximately 1,986 acres of marbled murrelet habitat.

The Recovery Plan for the Marbled Murrelet established goals to maintain a well-dispersed population for the long-term survival and recovery of the marbled murrelet (USDI 1997). The Recovery Plan goals included dividing the known marbled murrelet range into conservation zones. The Oregon Coast Range Zone (Zone 3) extends from the Columbia River south to North Bend, Oregon and up to 35 miles inland from the coast line. The 35 mile zone cuts across the western portion of the WAU.

(5) The Columbian White-tailed Deer

The Columbian white-tailed deer is not expected to occur in the WAU. Although, the Upper Middle Fork Coquille WAU is within the historical distribution range of the Columbian white-tailed deer it is outside the current distribution range (USDI 1983). The current known white-tailed deer

Map 19. Upper Middle Fork Coquille WAU Marbled Murrelet Habitat



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population is restricted to an area northeast of Roseburg, which is approximately 35 air miles from the center of the WAU (USDI 1983 and USDI 1995).

(6) The North American Lynx

Historically, resident lynx populations in Oregon were low. Nine counties in Oregon had historical records of lynx populations. Lynx were documented to be present in the Cascade and Blue Mountains in 1994, 1997, and 1998 (USDI 1998). The lynx occurs in areas receiving large amounts of snow. A self-sustaining resident lynx population does not exist in Oregon but individual animals are present (USDI 1998).

b. Remaining Species of Concern

Animal species not threatened or endangered, may belong to the Federal Candidate, Bureau Sensitive, Bureau Assessment, or Survey and Manage category. On the Roseburg BLM District, 22 are Bureau Sensitive and 13 are Bureau Assessment species. Table E-1 in Appendix E lists the species expected to occur in the WAU.

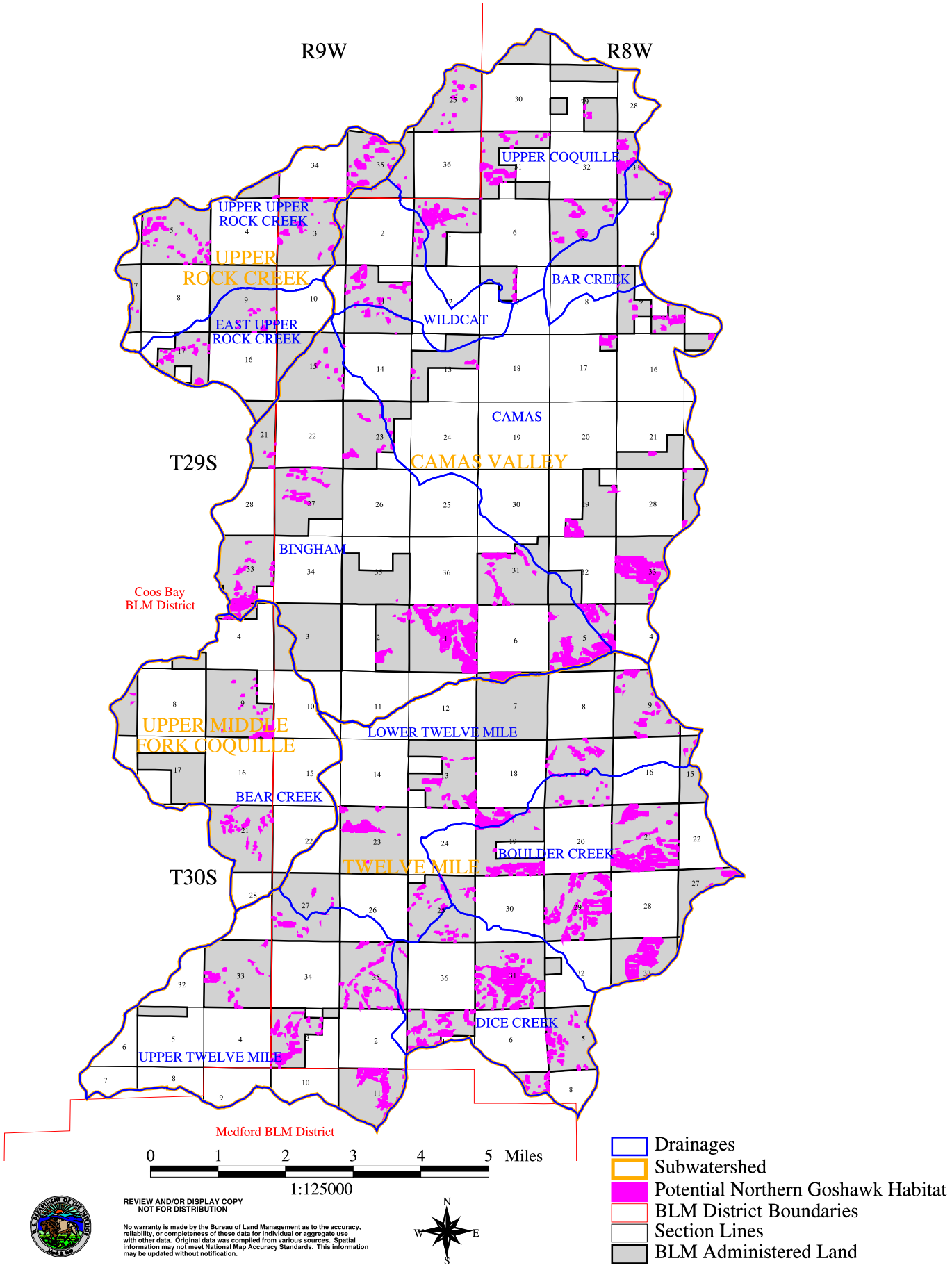
Although there is information about the biology and habitat requirements of the Bureau Sensitive and Bureau Assessment species, population levels and current distributions are not available. Many of these animals use unique features such as ponds, seeps, caves, or talus found throughout the landscape and associated vegetation cover. In the Upper Middle Fork Coquille WAU, the forest inventory of age classes is available, but the distribution patterns and abundance of unique habitats are not available at this time.

(1) Northern Goshawk and Other Raptors

Information about the northern goshawk is readily available (Marshall 1991). However, most of the work with this species was done east of the Cascade Mountains. Current geographic distribution suggests the northern goshawk would not be expected to occur in most of the Roseburg BLM District. Observations recorded since 1984 show the northern goshawk is present north of the expected distribution range. All of the northern goshawk nest sites found on the Roseburg BLM District since 1980 have been located outside of the Upper Middle Fork Coquille WAU. The WAU has approximately 13,487 acres of stands at least 80 years old, which could be considered potential northern goshawk habitat. Approximately 2,043 acres of the potential northern goshawk habitat on BLM-administered land have characteristics (such as favored slopes and aspects), which would increase the probability of northern goshawks using these areas (see Map 20).

The Upper Middle Fork Coquille WAU supports bird of prey species, such as the red-tailed hawk, great horned owl, and Cooper's hawk, which are common to the region but estimates of local populations are not available. Raptor species are expected to occur in the WAU where suitable habitat is present.

Map 20. Upper Middle Fork Coquille WAU
Potential Northern Goshawk Habitat



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(2) The Great Gray Owl

The great gray owl species is not common in the South River Resource Area but there have been documented observations. This species has not been observed to occur in the WAU. Generally, this species is found at higher elevations, nesting in forest stands near or adjacent to natural or managed openings. The Northwest Forest Plan (USDA and USDI 1994b) designated this species as a Protection Buffer Species. There are approximately 751 acres of potential great gray owl habitat at or above 3,000 feet in elevation in the WAU. About 50 percent of the potential habitat has meadows or stands less than ten years old and forest stands greater than 80 years old within 1,000 feet of each other. Approximately 170 acres of potential great gray owl habitat is on BLM-administered land (see Map 21). The distance potential nesting sites are to an open meadow or stands less than ten years old is an important component of great gray owl nest sites.

(3) Mollusks

In western Oregon and Washington, over 150 species of land snails and slugs have been identified. Mollusks can be found at any elevation and in a variety of habitat types. Generally, snails and slugs avoid disturbed areas where habitat modification leads to loss of moisture and increased exposure to solar radiation (Frest and Johannes 1993).

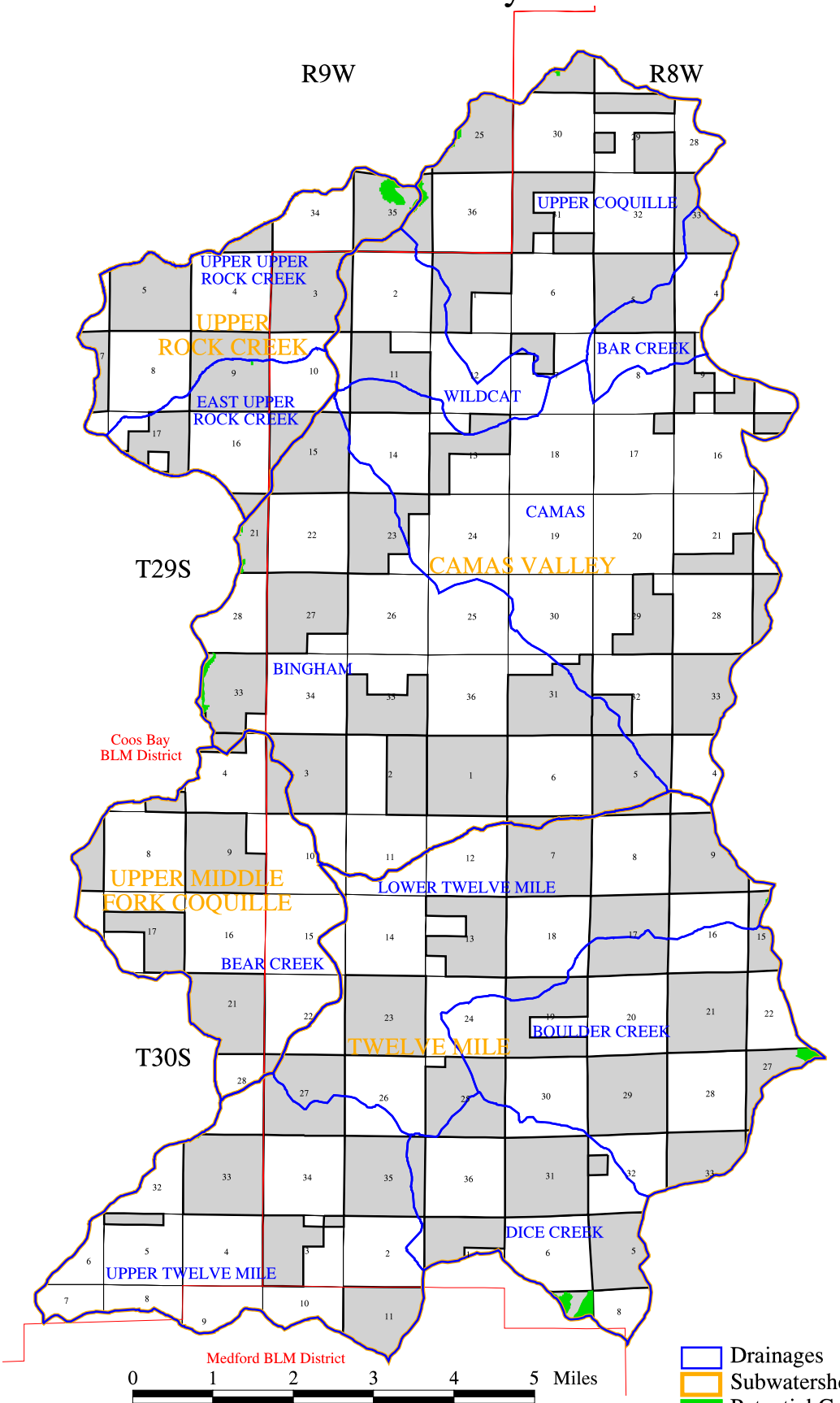
Managing for late seral characteristics tends to increase the moisture retention of an area. Increased tree species diversity (especially hardwood species), down woody debris, and soil depth in late seral stands produce a more favorable moisture regime at a given site and increases the abundance and diversity of mollusks present. Mollusks increase the available nutrients at a site and increase growth rates and moisture retention.

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

In 1997, Frest and Johannes reported 46 mollusk species (17 land and 29 aquatic species) were known to occur in Douglas County, Oregon. An additional 75 species may be present. Thirty-one of these species were analyzed in the SEIS ROD as sensitive taxons. Only four species of land snails and slugs present in Douglas County, Oregon are listed in Table C-3 of the SEIS ROD as requiring surveys prior to ground disturbing activities.

Two mollusk survey plots were located in the Upper Middle Fork Coquille WAU in 1997. Several species were common on most plots, including Ancotrema sportella, Haplotrema vancouverense, and undescribed species of Vespericola and Monadenia. One Survey and Manage mollusk species, Prophysaon coeruluem, the blue-grey taildropper slug, was identified. The preferred habitat elements for the blue-grey taildropper slug are canopy closure greater than 70 percent, hardwoods and deep leaf litter, down logs and ground vegetation such as sword fern and salal.

Map 21. Upper Middle Fork Coquille WAU
Potential Great Gray Owl Habitat



Drainages
Subwatershed
Potential Great Gray Owl Habitat
BLM District Boundaries
Section Lines
BLM Administered Land

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One Survey and Manage species thought to be present in the southern portion of the Roseburg BLM District is Helminthoglypta hertleini, a medium-sized land snail frequently found in rocky talus habitats. The habitat type and range is similar to that of the Del Norte salamander, which is a Survey and Manage species also. Surveys for these two species could be conducted simultaneously. No sites of Helminthoglypta hertleini have been found on the Roseburg BLM District, as of March 1998.

(4) The Del Norte Salamander and Other Amphibians

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

Amphibian species like the northern red-legged frog, foothill yellow-legged frog, and clouded salamander use unique habitats often found within many vegetation types. Features like large down woody material, talus slopes, creeks, seeps, ponds, and wetlands are often used by amphibian species in southwestern Oregon. Because these features are found in the Upper Middle Fork Coquille WAU, these amphibian species are expected to occur in the WAU.

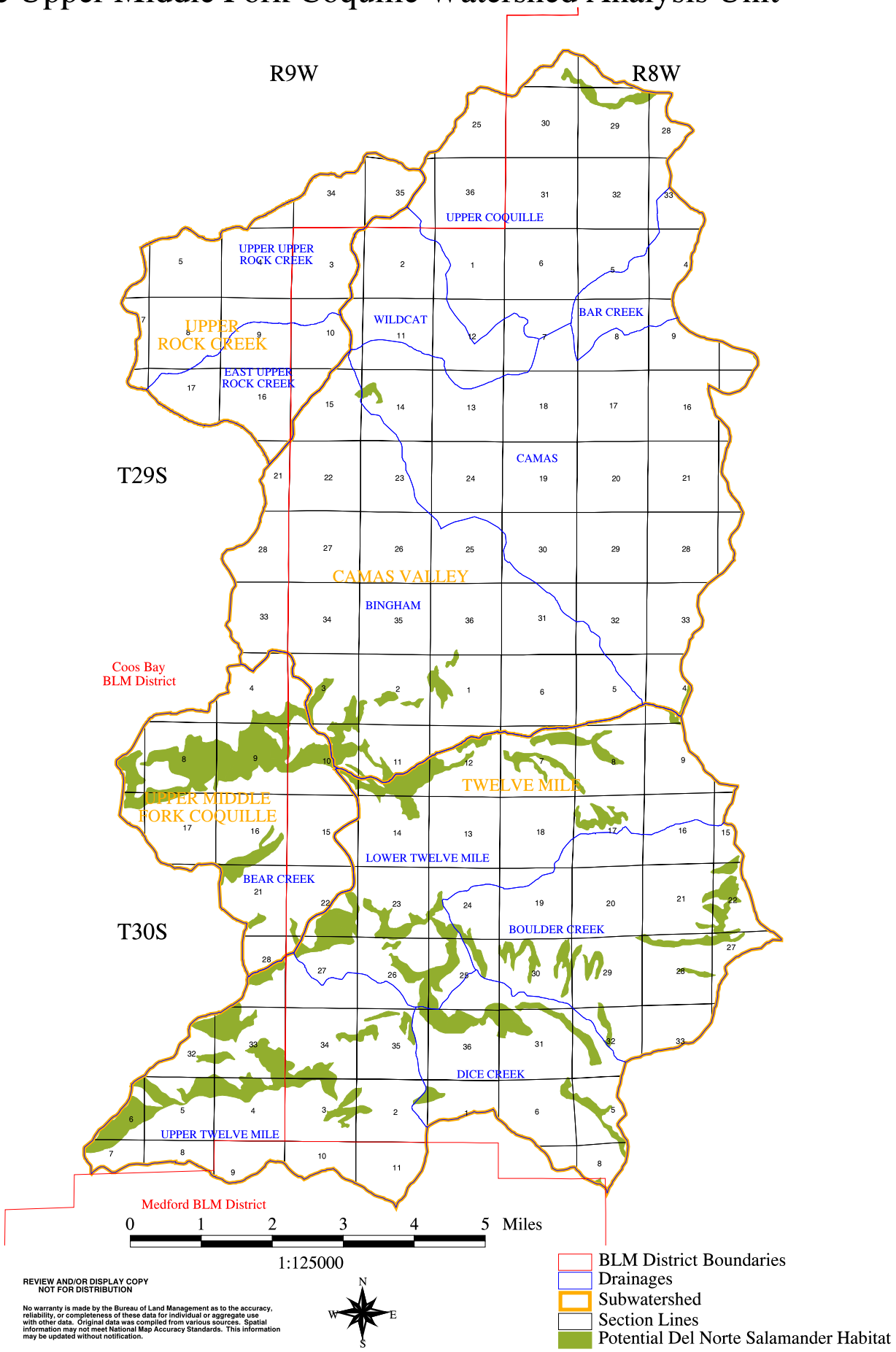
The Del Norte salamander (Plethodon elongatus), a Survey and Manage species, was located north of the Medford BLM District boundary line in 1997. The Del Norte salamander was not located within the WAU during the 1997 inventory. The Del Norte salamander uses forested talus habitat, rocky substrates in hardwood forests, and riparian areas. Other habitat features include cool moist conditions with moss and fern ground cover, lichen downfall, deep litter, and cobble dominated rocky substrates (IB-OR-96-161 Protocols for Survey and Manage Amphibians).

Evaluation of potential Del Norte salamander habitat in the WAU indicates about 3,019 acres (4%) of the total 67,207 acres in the WAU have some type of talus material (see Map 22). There are approximately 1,204 acres of potential talus habitat on Federally-administered land. Approximately 358 acres (30%) of the potential talus habitat are associated with forest stands at least 80 years old. This evaluation only gives the potential talus habitat, which may contain suitable habitat for the Del Norte salamander and does not mean that all areas shown on Map 22 are suitable or occupied habitat.

(5) Mammals

During the summer of 1994, a survey to identify the bat species present in the South River Resource Area was conducted by Dr. Steve Cross of Southern Oregon College in Ashland, Oregon. Bat species use unique habitats like caves, talus, cliffs, snags, and tree bark for roosting, hibernating, and maternity sites. These components may be near or within vegetated areas such as young or old forest stands. Bats also use other unique habitats (ponds, creeks, and streams) for food and water. Special

Map 22. Potential Del Norte Salamander Habitat in the Upper Middle Fork Coquille Watershed Analysis Unit



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status bat species are present on the Roseburg BLM District and are expected to occur in the Upper Middle Fork Coquille WAU.

Mammals like the white-footed vole and the red tree vole, which have geographic ranges including the Roseburg BLM District, are expected to be present in the Upper Middle Fork Coquille 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 suggests the white-footed vole is associated with mature forests (Marshall 1991).

The red tree vole is an arboreal rodent, which lives inside the canopy of Douglas-fir forests in Oregon and Northern California. Its primary food is Douglas-fir needles. However, needles from Sitka spruce, western hemlock, and grand fir are also eaten by red tree voles (Huff et al. 1992). Reports from evaluating spotted owl pellets indicate the red tree vole is present in the WAU.

The Middle Fork Coquille Watershed (a fifth field watershed) was evaluated to determine the amount of red tree vole habitat available through the year 2000 (using interim guidance BLM-IM-OR-97-009). This evaluation showed approximately 64 percent of the Federally-administered land in the Middle Fork Coquille Watershed has a crown closure of 60 percent and an average tree diameter of 10 inches or greater. Red tree vole surveys would not be conducted on lands meeting the threshold mentioned in the interim guidance.

c. Neotropical Bird Species

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

Oregon has over 169 bird species considered to be neotropical migrants. Population trends of neotropical migrants in Oregon show declines and increases. Over 25 species have been documented to be declining in numbers (Sharp 1990). Oregon populations of 19 bird species show statistically significant declining trends while nine other species show significant increasing trends (Sharp 1990). Including all species that show declines, increases, or almost statistically significant trends as a proportion of routes, there are 33 species decreasing and 12 species increasing in numbers in Oregon (Sharp 1990).

During 1993, 1994, 1995, 1996, 1997, and 1998, neotropical birds were captured, banded, and counted in the Boulder Creek area of the WAU. Results from the banding station and point count data showed over 50 neotropical bird species use the available habitat during the breeding season.

The WAU may provide habitat for more neotropical species than those located at the banding station. The unique and diverse habitats found in the Camas Valley area have hardwoods, shrubs, and conifers not found at the banding station that function as breeding, feeding, and resting habitat for many neotropical birds.

d. Big Game Species (Elk and Deer)

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

The Upper Middle Fork Coquille WAU includes two elk management areas identified in the Roseburg District Proposed Resource Management Plan (PRMP) (USDI 1994b). However, management direction for these elk management areas were not discussed in the Roseburg District ROD/RMP (USDI 1995).

The black-tailed deer range is throughout Oregon. The timber harvesting that occurred after WWII created young seral age stands (less than 20 years old), which allowed black-tailed deer populations to increase to the point that liberal hunting seasons were established. Black-tailed deer numbers remained stable through the late 1970s (South Umpqua Planning Unit 1979). Early seral stands created by timber harvesting benefit deer and elk.

The number of Roosevelt Elk and black-tailed deer in the Upper Middle Fork Coquille WAU are not available (Personal communication from ODFW). Elk and deer forage for food in open areas where the vegetation includes grass-forb, shrub, 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).

3. Plants

a. Special Status Plants

Field surveys have been conducted for Special Status Plants on portions of the Upper Middle Fork Coquille WAU. However, many Survey and Manage and Protection Buffer species do not have survey protocols developed. Current information on fungi, lichens, and bryophytes and their habitats suspected to occur in the WAU was taken primarily from Appendix J2 of the Final Supplemental Environmental Impact Statement (FSEIS). At the watershed analysis level, identifying locations of species suspected to occur in the WAU would be based on habitat. Four Special Status Plant Species have been documented to occur in the Upper Middle Fork Coquille WAU.

Allium bolanderi (Bolander's Onion); Bureau Assessment Species
Allium bolanderi grows on stony slopes and gravelly flats on serpentine soils below 3,000 feet in elevation. Distribution ranges from Douglas County, Oregon to Lake County, California.

Bensoniella oregona (Bensoniella); Bureau Sensitive Species
Bensoniella oregona grows along the margins of bogs, meadows, and springs in mixed conifer forests. It grows in partial and full sun between 2,400 and 4,500 feet in elevation.

Horkelia congesta ssp. congesta (Dense-flowered horkelia); Bureau Sensitive Species
Horkelia congesta ssp. congesta grows in meadows and open woods at low elevations.

Limnanthes gracilis var. gracilis (Slender meadow-foam); Bureau Sensitive Species
Limnanthes gracilis var. gracilis grows on moist to wet rocky slopes and meadows on various substrates including serpentine soils at elevations ranging from 1,500 to 5,500 feet.

Other plant species to consider include Protection Buffer and Survey and Manage species that are suspected to occur in the WAU. Protection Buffer species suspected to occur in the WAU include the Bryophytes Brotherella roellii, Buxbaumia viridis, Rhizomnium nudum, Schistostega pennata, and Tetraphis geniculata, and the Fungus Sarcosoma mexicana. Survey and Manage plant species suspected to occur in the Upper Middle Fork Coquille WAU are listed in Table F-1 in Appendix F.

b. Noxious Weeds

Noxious weeds have been identified to occur in the Upper Middle Fork Coquille WAU. The encroachment of noxious weeds have been steadily reducing natural resource values. Noxious weed invasions dramatically affect native plant communities by reducing the abundance and distribution of native plants (Bedunah 1992).

The intent of an integrated weed management program is to implement a strategy that will facilitate maintenance and restoration of desirable plant communities and healthy ecosystems. The Bureau of Land Management has an agreement with the Oregon Department of Agriculture (ODA) where

locations of noxious weed invasions are identified and monitored by the BLM and control measures are administered by the ODA.

The following goals are important in the implementation of integrated weed management:

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

Yellow Starthistle and Rush Skeletonweed are noxious weeds that have been documented as occurring in the Upper Middle Fork Coquille WAU. These noxious weeds have been designated as Target weed species by the ODA.

Yellow Starthistle (Century solstitialis) has been designated by the ODA as a Target weed species. Because of the economic threat to the state of Oregon, action against these weeds would be a priority. Yellow Starthistle is native to dry open habitats in Southern Europe. A single Yellow Starthistle plant can produce up to 150,000 seeds under optimum conditions. The ODA would control documented invasions of Yellow Starthistle. The area would be monitored by the BLM for resurgence.

Rush Skeletonweed (Chondrilla juncea) has been designated by the ODA as a Target weed species. Because of the economic threat to the state of Oregon, action against these weeds would be a priority. Rush Skeletonweed grows in rangelands and along roadsides. The ODA would control documented invasions of Rush Skeletonweed.

V. Interpretation

A. Vegetation

The main causes for the difference between the conditions in 1936 and 1998 are land ownership, fire suppression, timber harvesting, and to a lesser degree, natural disturbances. Recorded timber harvests began in the late 1940s and was a major factor in providing the early seral vegetative structure and pattern that currently exists. Historically, the early seral stage component was achieved through natural disturbance, primarily stand replacing fires that occurred on small portions of the landscape.

Although private lands are a major component of this Watershed Analysis Unit (61 percent), the focus of the interpretation is on BLM-administered land. Private lands are constantly changing and although stands greater than 30 years old may be harvested, the timing or amount of harvest can not be predicted.

Bureau of Land Management administered lands available for intensive forest management are those lands outside of Late-Successional Reserves (including Marbled Murrelet Reserves), Riparian Reserves, and other areas reserved or withdrawn from timber harvesting. The WAU contains approximately 8,090 acres (31 percent) of BLM-administered lands that are available for intensive forest management (see Table 24). Silvicultural practices including prescribed fire could be used to obtain desired vegetation conditions in special habitat areas.

Management direction from the Northwest Forest Plan and the Roseburg, Coos Bay, and Medford BLM District RMPs states that 15 percent of all Federal lands, considering all Land Use Allocations, within fifth field watersheds should remain in late-successional forest stands. The Upper Middle Fork Coquille WAU is within the Middle Fork Coquille fifth field watershed. Approximately 43 percent (26,139 acres out of 60,941) of the BLM-administered land within the Middle Fork Coquille Watershed (the fifth field watershed) is in forest stands at least 80 years old (late-successional). The Middle Fork Coquille Watershed meets the Standard and Guideline to retain 15 percent of all Federal lands within fifth field watersheds in late-successional forest stands.

Silviculture actions would vary based on Land Use Allocations. Intensive forest management would be expected to occur on Matrix lands. Silviculture actions within Late-Successional Reserves and Riparian Reserves would tend to focus on stands regenerated following timber harvesting or stands that were thinned. Management actions within LSRs 259 and 261 would be expected to follow the guidelines contained in the South Coast - Northern Klamath Late-Successional Reserve Assessment. Silvicultural practices applied within Riparian Reserves would be to control stocking, reestablish and manage stands, establish and maintain desired non-conifer vegetation, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

Table 24. Acres of BLM Administered Land by Land Use Allocation.

	Reserved or Withdrawn		Connectivity		GFMA		
Area	Acres	%	Acres	%	Acres	%	Total Acres
Bar Creek	433	91	0	0	42	9	475
Bingham	2,868	57	224	4	1,937	39	5,029
Camas	1,025	44	149	6	1,155	50	2,329
Upper Coquille	1,879	74	0	0	653	26	2,532
Wildcat	616	94	0	0	42	6	658
Camas Valley Subwatershed	6,821	62	373	3	3,829	35	11,023
Boulder Creek	2,749	97	74	3	0	0	2,823
Dice Creek	1,574	88	222	12	0	0	1,796
Lower Twelve Mile	2,002	59	7	0	1,382	41	3,391
Upper Twelve Mile	1,345	58	255	11	729	31	2,329
Twelve Mile Subwatershed	7,670	74	558	5	2,111	20	10,339
Bear Creek	1,050	58	245	14	508	28	1,803
Upper Middle Fork Coquille Subwatershed	1,050	58	245	14	508	28	1,803
East Upper Rock Creek	546	64	0	0	301	36	847
Upper Upper Rock Creek	1,782	91	0	0	166	9	1,948
Upper Rock Creek Subwatershed	2,328	83	0	0	467	17	2,795
Upper Middle Fork Coquille WAU	17,869	69	1,176	5	6,915	27	25,960

Matrix lands in the Upper Middle Fork Coquille WAU are to be managed for timber production to help meet the Probable Sale Quantity (PSQ) established in the Roseburg, Coos Bay, and Medford BLM District RMPs. Table 25 shows acre estimates of GFMA and Connectivity/Diversity Block Land Use Allocations to be harvested per decade in the Roseburg BLM District. The Upper Middle Fork Coquille and Upper Rock Creek Subwatersheds do not have an estimated amount of regeneration harvest since the number of Matrix acres on the Roseburg BLM District is small.

Approximately 274 acres per decade are estimated to be harvested on the Roseburg BLM District administered lands within the Upper Middle Fork Coquille WAU. This would be about four percent of the 6,244 acres considered available for regeneration harvests on Roseburg BLM District administered lands within the Upper Middle Fork Coquille WAU.

Table 25. Estimated Acres of Regeneration Harvest (per decade) in Matrix on Roseburg BLM District Administered Lands Within the Upper Middle Fork Coquille WAU.

Subwatershed	GFMA (Acres per Decade)	Connectivity/Diversity Block (Acres per Decade)	Total Acres
Camas Valley	133	3	136
Twelve Mile	105	33	138
Upper Middle Fork Coquille	0	0	0
Upper Rock Creek	0	0	0
Total on Roseburg BLM in WAU	238	36	274

1. Silviculture Actions in the Matrix

Providing early-successional habitat is one objective of the Matrix Land Use Allocation. The early seral stage consists of approximately 4,473 acres (30 percent) of the Matrix lands. Approximately 3,544 acres are in GFMA and 929 acres in Connectivity/Diversity Blocks.

a. Site Preparation, Reforestation, and Maintenance

Regeneration on new harvest units is usually achieved by planting seedlings following site preparation. Genetically selected stock would be planted, when available. A mixture of species appropriate to the site would be planted, monitored, and maintained to ensure adequate stocking levels. Vegetation treatments may be necessary to allow seedlings to become established. Mulching to reduce competition from grass may be necessary at lower elevations where grass can affect seedling survival. Higher elevation sites may not need mulching but brush competition could affect seedling survival.

b. Precommercial thinning

Precommercial thinning maintains stand vigor and controls species composition and stand density. Stands with high tree densities and between five and 15 years old are typically precommercially thinned. There are approximately 1,614 acres that could be precommercially thinned within the next ten years. On the Roseburg BLM District, approximately 200 acres have been recommended for precommercial thinning at this time. Approximately 2,936 acres of Matrix lands have been precommercial thinned since the 1960s.

c. Fertilization

Thinned stands could be fertilized to increase diameter and height growth, improve tree vigor, and maintain the live crown ratio. Fertilization actions would be designed to apply 200 pounds of available nitrogen per acre in the form of urea based prill by helicopter.

d. Pruning

Pruning young stands increases wood quality through the production of clear wood in a shorter time than would be required without the action. Pruning could be conducted on higher quality sites following precommercial thinning. Pruning young sugar pine trees to a height of 10 feet may reduce the risk of mortality caused by white pine blister rust.

e. Commercial Thinning/Density Management

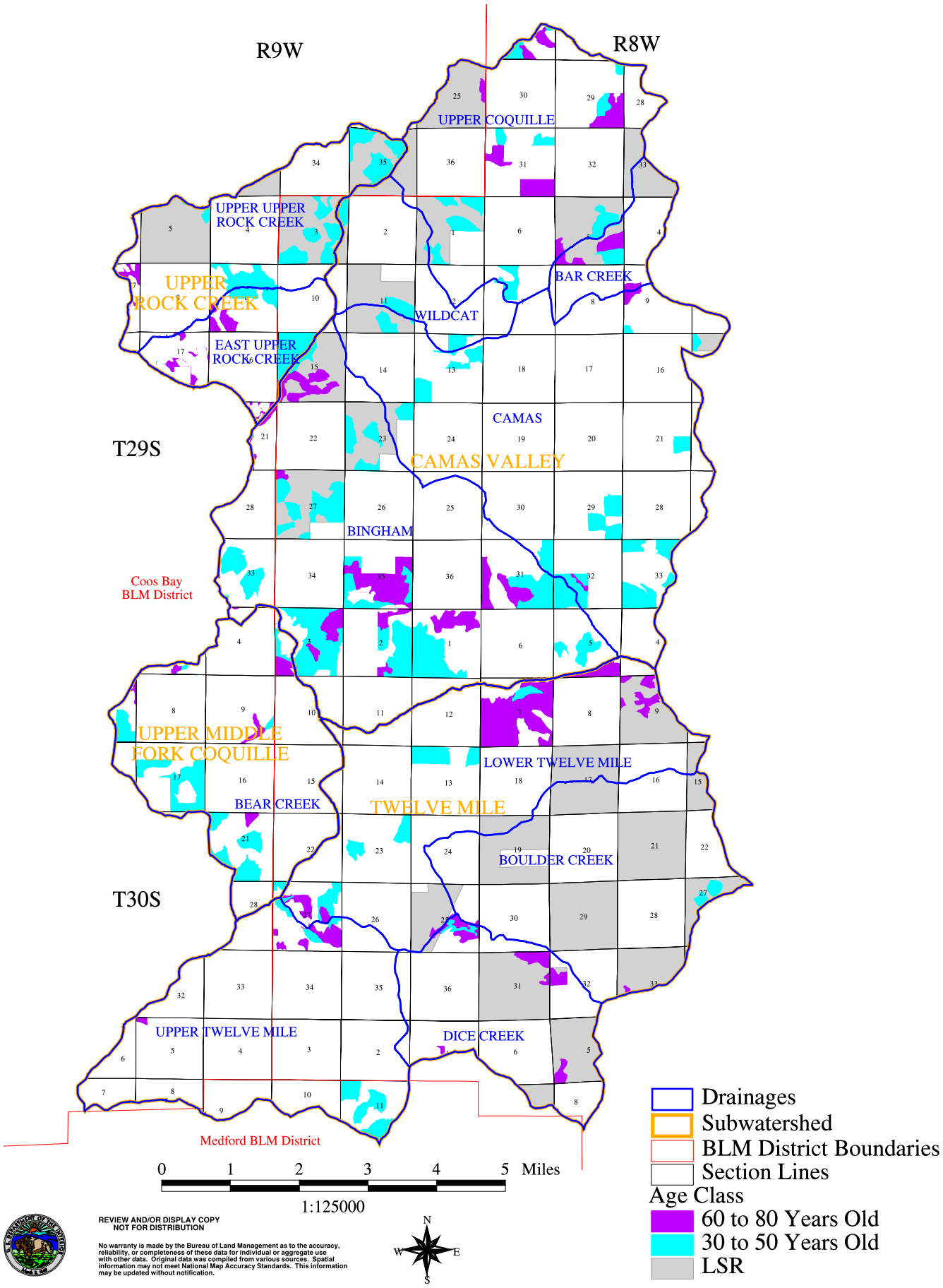
The mid seral stage consists of approximately 5,509 acres (37 percent) of the Matrix lands. Approximately 5,064 acres occur in GFMA and 445 acres in Connectivity/Diversity Blocks. Most of the acres are in the 30-60 year age class, with only 455 acres in the 60-80 class. One objective of the Matrix is to provide a sustainable supply of timber and other forest commodities. Commercial thinning in GFMA or density management in Connectivity/Diversity Blocks would be carried out where practical and where increased gains in timber production are likely. Thinning intervals may vary by site class with poor sites having longer intervals. Thinning intervals may range from ten to 30 years. The locations of potential commercial thinning stands are shown on Map 23.

Stands considered suitable for commercial thinning generally have a closed canopy, dead lower limbs, dead standing and down trees, and slowed tree growth. These conditions indicate mortality is occurring in the suppressed and intermediate crown positions. Suppression mortality occurs in stands with a relative density index greater than 55 percent. Relative density index (RDI) is the ratio of actual stand density to the maximum stand density attainable in a stand with the same mean tree volume (Drew and Flewelling 1979). Thinning should maintain the stand with a relative density index between 35 and 50 percent. Stand exam information, such as species composition, size, density, and standing and downed dead material, could be used to help prioritize commercial thinnings. A commercial thinning is proposed in T30S, R9W, Section 27.

Commercial thinning highly stocked Riparian Reserves would promote tree survival and growth. Commercial thinning in the Riparian Reserves would maintain or restore tree growth and vigor, reduce the probability of an insect infestation, maintain or enhance the existing diversity, and attain larger trees in a shorter time period. Excluding Riparian Reserves from commercial thinning would result in smaller diameter trees and snags. Snags and down logs would continue to be created from small diameter trees. Activities within the Riparian Reserves would be to acquire the desired vegetative characteristics and to achieve Aquatic Conservation Strategy objectives.

Commercial thinning prescriptions would vary based on the Land Use Allocation. On GFMA lands, commercial thinnings would be designed to produce high volume levels. Potential commercial

Map 23. Potential Commercial Thinning/Density Management Stands in the Upper Middle Fork Coquille Watershed Analysis Unit



thinning stands would be between 40 and 70 years old and could support a commercial harvest operation under average market conditions.

In Connectivity/Diversity Blocks, density management would provide habitat for a variety of organisms associated with both late-successional and younger forests. Commercial thinning would be designed to produce high volume levels. Density management would accelerate development of the stand into a multilayered stand with large trees, canopy gaps for spatial diversity and understory development, snags, and large down wood. Unthinned patches could be retained to provide wildlife habitat. Density management could occur in stands under 120 years of age.

f. Regeneration Harvests

The late seral stage consists of approximately 4,578 acres (31 percent) of the Matrix lands. Most regeneration harvest would occur in the late seral stands. These stands would help provide a sustainable supply of timber and other forest commodities.

The GFMA Land Use Allocation contains approximately 3,487 acres in late seral stands. Regeneration harvests would be programmed for stands at least 60 years old. Long term rotation age would be planned for culmination of mean annual increment (CMAI), which generally occurs between 80 and 110 years old in this area. The modified reserve seed-tree method of harvest removes the majority of a stand in a single entry except for six to eight conifer trees per acre. Coarse woody debris and snags would also be retained to achieve the desired management objectives.

Connectivity/Diversity Blocks contain approximately 1,091 acres in late seral stands. Connectivity /Diversity Blocks provide important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees. Connectivity/Diversity Blocks would be managed using a 150 year area control rotation. Between 12 and 18 green conifer trees per acre and 120 linear feet of viable down logs per acre would be left within regeneration harvest units. At least 25 percent of the Connectivity/Diversity Block would be maintained in late-successional habitat.

There are six Connectivity/Diversity Blocks in the Upper Middle Fork Coquille WAU. Five Connectivity/Diversity Blocks are in the Roseburg BLM District and one is in the Coos Bay BLM District. One Connectivity/Diversity Block has less than 25 percent in late-successional forests (see Table 26).

Table 26. Acres of Late Seral Stands in Connectivity/Diversity Blocks in the Upper Middle Fork Coquille WAU.

Connectivity/Diversity Blocks	Total Acres in Block	Acres Reserved or Withdrawn 80 Years Old or Older	Percent	Total Acres 80 Years Old or Older	Percent
Block 63	405	189	47	219	54
Block 64	618	132	21	249	40
Block 65	275	60	22	113	41
Block 66	564	53	9	66	12
Block 67	631	148	23	269	43
T29S, R9W, Section 9 (in Coos Bay BLM District)	560	244	44	445	79

2. Silviculture Actions in Late-Successional Reserves

The South Coast - Northern Klamath Late-Successional Reserve Assessment (LSRA) presents management strategies for LSR 259, which is in the southeastern portion of the Upper Middle Fork Coquille WAU and LSR 261, which includes the LSR and Marbled Murrelet Reserves north of Highway 42 in the WAU. There are approximately 11,190 acres (43 percent of the BLM-administered land in the WAU) in LSR and Marbled Murrelet Reserves (MMR) in the WAU.

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

Stand management in LSRs would generally focus on stands regenerated following timber harvesting or stands that have been thinned. The overall criteria for silviculture treatments is that they are beneficial to the creation of late-successional forest conditions. There are approximately 5,878 acres (53 percent) in the LSR that are currently not in a late-successional or old-growth condition but are capable of developing those conditions. Silvicultural manipulation of younger stands can accelerate the development of desired stand characteristics. The South Coast - Northern Klamath LSRA details the benefits, stand selection criteria, and desired conditions of various silviculture treatments.

Silvicultural activities to reduce risk would focus primarily on younger stands within the LSRs. Treatment objectives would be to develop late-successional conditions while making stands less susceptible to natural disturbances. Risk reduction activities may include thinning, underburning, or establishing fuel breaks. Silvicultural actions within the Matrix Land Use Allocation can

contribute to reducing risks in the LSRs. Fire and fuels management in the Matrix may reduce the risk of fire entering LSRs from adjacent managed lands.

Late-Successional Reserves 259 and 261 are large, key links in the LSR network and were identified as being high priorities for management actions in the South Coast - Northern Klamath LSRA. Young intensively managed stands could benefit the most from treatments in these LSRs. Late-Successional Reserve 259 has limited opportunities to develop contiguous habitat blocks larger than 640 acres, because of the checkerboard ownership pattern. Late-Successional Reserve 259 is located in an area of concern for owl movement between provinces. The management priority for the portion of LSR 259 within the Upper Middle Fork Coquille WAU is to create additional blocks of late-successional habitat. The management priority for a portion of LSR 261 within the Upper Middle Fork Coquille WAU is to improve habitat connections between LSRs and to maintain and improve connectivity habitat (stands greater than 40 years old) within the LSR.

a. LSR Treatment Recommendations

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

Stands less than 30 years old would be the highest priorities for treatment due to their high growth rates. Most of the early seral stands were regenerated following timber harvesting. The SEIS ROD encourages the use of silvicultural practices to accelerate the development of overstocked young plantations into stands with late-successional and old-growth characteristics. There are approximately 4,141 acres of early seral stands in LSRs or MMRs. The LSRA details the benefits, stand selection criteria, and desired conditions of various silviculture treatments. Reforestation, maintenance, release, precommercial thinning, pruning, and fertilization are possible activities in the early seral stands. Approximately 600 acres could be precommercially thinned on the Roseburg BLM District within the WAU. Approximately 1,982 acres have been precommercially thinned on the Roseburg BLM District within the WAU since the 1960s. Pruning in the LSRs could reduce the risk of blister rust infection on sugar pine. Fertilization would be a low priority and is not planned to be conducted within the next three years in the LSRs on the Roseburg BLM District.

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

The LSRA considers these stands to be a medium priority for treatment. Some of these stands are beginning to provide connectivity functions and may be on an acceptable developmental trajectory. Opportunities exist for treatments which maintain or accelerate stand development toward achieving late-seral characteristics, especially diversity of canopy structure. There are approximately 1,301 acres in this mid seral age class in the LSRs or MMRs. Density management, fertilization, and tree culturing are possible activities in mid seral stands.

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

The LSRA considers these stands to be a low priority for treatment. There are approximately 436 acres in this mid seral age class within the LSRs or MMRs. Most of these stands were not

regenerated following timber harvesting and only a few have been thinned. Most of these stands are currently functioning as connectivity habitat and may be on an acceptable trajectory toward achieving late-successional habitat. Opportunities exist to maintain or accelerate stand development of late seral habitat or reduce the risk of large-scale disturbance and loss of habitat.

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

There are approximately 5,268 acres (47 percent) of late seral stands in the LSRs or MMRs. Stands older than 80 years would be retained, except for risk reduction efforts or salvage as outlined in the South Coast - Northern Klamath LSRA. Risk reduction treatments would be designed to protect more acres than are treated.

B. Fire and Fuels Management

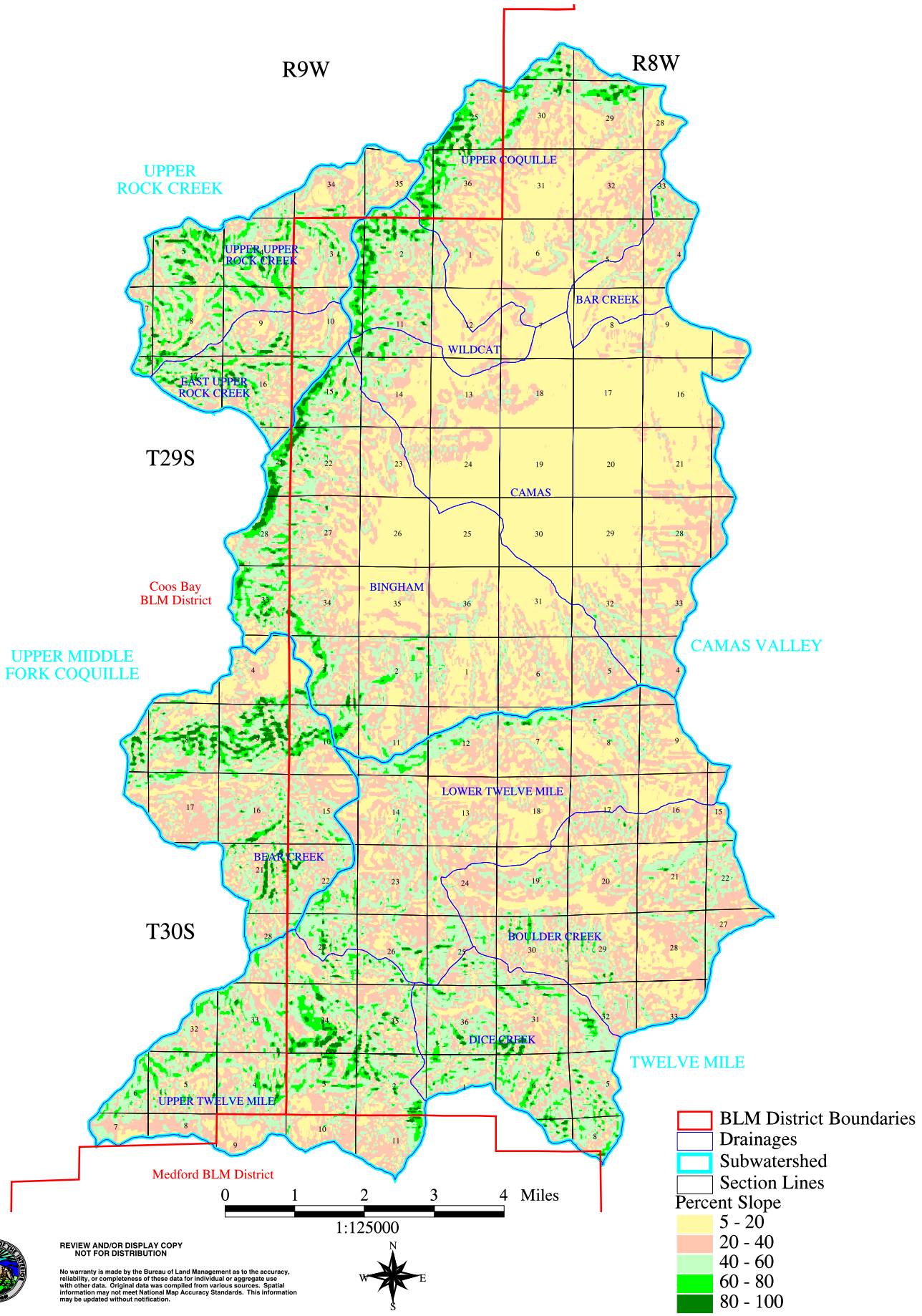
Treatments of natural fuels may be planned around areas of high recreation use, along heavily traveled road corridors, or in forest stands to reduce the risks of a wildfire, improve habitat of special status plants, or improve forest health. Prescribed underburning, pile burning, and manual or mechanical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

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

C. Soils

Soils on slopes exceeding 70 percent are classified as highly sensitive for fire management purposes (see Map 24). Floodplains, hydric soils, TPCC nonsuitable wet soil areas (FWNW), and most of the prime farmland are located on slopes less than 20 percent. The landslide slope gradient (FGNW) and slope gradient (FGR) areas in the TPCC are mostly on slopes greater than 40 percent. Marine siltstones and fine sandstones in the Tmss geologic formation tend to produce highly to moderately erodible bare soils. The Upper Coquille, western part of the Camas, and central part of the Bingham Drainages have the most erodible soil surfaces. Protecting the soil surface with a good vegetative

Map 24. Upper Middle Fork Coquille Watershed Analysis Unit Percent Slope



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cover and surfacing and maintaining roads according to the BMPs in Appendix D of the Resource Management Plan would help control sediment input into streams.

D. Hydrology

Many Drainages within the WAU have been impacted from human activities. Agricultural use can have a negative impact on streams. Removing water for irrigation and riparian vegetation can lead to decreased flows and increased stream temperatures in the summer. Water quality can be negatively impacted by fertilizers increasing nutrients and livestock in the riparian areas causing increased sediment in streams.

The studies mentioned previously indicate road building and timber harvesting can have an effect on stream channels and the hydrology of a watershed. Roads can intercept water that would normally infiltrate into the ground and route it to stream channels faster. This causes streamflow to peak quicker and the watershed to store less water for release when fish and other aquatic organisms need it most.

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

Many roads within the WAU have not been maintained on a regular basis. The lack of routine road maintenance may lead to increased sedimentation from the road surface, increased risk of culvert problems, and landslides from road failures.

Limited water quality, stream temperature, and summer base flow data are available for this WAU. Water quality data was collected in the southeastern portion of the WAU. Collecting data in the north and west portions of the WAU would provide additional information. Multi-parameter instruments used to collect diurnal data would be useful to quantify changes in DO and pH throughout the day of streams in the WAU.

Rosgen Level II classification surveys would be useful to characterize stream channel morphology and to identify potential stream restoration sites. Development of regional curves under the Level II classification can be used to predict streamflow, depth, width, and cross-sectional area of ungaged streams. This information would be useful for analyzing potential changes in stream morphology due to management activities, as well as designing restoration projects.

Riparian areas would recover naturally over time. However, Large Woody Debris could be placed in stream channels to increase complexity and aid in the recovery of areas impacted by timber

harvesting and road building. Thinning in Riparian Reserves would allow trees adjacent to the stream channels to grow and natural recruitment of LWD faster than without management.

E. Fisheries

Many stream channels in the Middle Fork Coquille Watershed are deeply incised, disconnected from the floodplain, and dominated by bedrock (USDI 1994c). Most of the Middle Fork of the Coquille River and many tributaries are constrained by roads. Instream structure (large woody debris) and channel complexity are lacking throughout the Middle Fork of the Coquille River Basin. Harvesting of conifers from riparian areas allowed potential increases in stream temperatures and created a lack of large woody debris. Stream cleaning practices conducted in the 1960s and 1970s and salvage logging, which still occurs today contributed to habitat degradation. The loss of habitat complexity resulted in increased sediment transport and reduced nutrient/organic cycling in the stream channels, which lead to reduced salmonid productivity.

A rating system was developed to evaluate Drainages in the WAU where restoration activities would succeed and provide the most benefits. The following criteria were used to evaluate Drainages from the fisheries resource perspective. The ratings are presented in Table 27.

Aquatic habitat condition - This rating relied heavily on professional judgement, current aquatic habitat data, and partly on personal observations by fisheries biologists. Current habitat conditions were determined by combining separate condition ratings for road density, percentage of late seral age stands in the Riparian Reserves, and stream crossing density (see Table C-1). Habitat conditions were considered good if a particular Drainage had a road density of less than five miles of roads per square mile, greater than 50 percent of the Riparian Reserves are in late seral age stands, and a stream crossing density of less than one stream crossing per square mile. Habitat conditions were considered poor if a particular Drainage had a high road density greater than six miles of roads per square mile, less than 30 percent of the Riparian Reserves in late seral age stands, and a stream crossing density of greater than two stream crossings per square mile. Habitat conditions were given a medium rating when the road density was between five and six miles per square mile, Riparian Reserves contained between 30 percent and 50 percent late seral stands, and the stream crossing density was between one and two stream crossings per square mile.

Species diversity - Drainages with a high degree of diversity (larger number of salmonid species) received the higher the rating. Drainages containing resident, fluvial, and sea-run cutthroat trout, coho salmon, rainbow trout, winter steelhead, spring and fall chinook salmon were rated the highest. There are eight potential species and life histories within the Upper Middle Fork Coquille WAU. The highest rating would be an eight.

Table 27. Restoration Ratings for Drainages Within the Upper Middle Fork Coquille WAU.

Drainage	Habitat Condition	Diversity	Accessibility	Percent of the Federally-administered	
				Land	Streams
Upper Middle Fork Coquille Subwatershed					
Bear Creek	poor	8	low water anadromous	31	33
Twelve Mile Subwatershed					
Lower Twelve Mile	poor	5?	high water anadromous	44	42
Boulder Creek	medium	5?	high water anadromous?	46	41
Dice Creek	good	5?	high water anadromous?	48	42
Upper Twelve Mile	poor	5?	high water anadromous?	34	33
Camas Valley Subwatershed					
Bingham	poor	5	high water anadromous	45	41
Camas	medium	2	fluvial	21	18
Bar Creek	poor	2?	fluvial?	39	26
Wildcat	good	2?	fluvial?	31	26
Upper Coquille	medium	2?	fluvial?	39	43
Upper Rock Creek Subwatershed					
Upper Upper Rock Creek	medium	x	x	49	44
East Upper Rock Creek	medium	x	x	43	43

x = lack of data to determine a rating. ? = best professional judgement was used since data is lacking. In cases with data lacking the highest rating was selected.

Access for migratory fish - Drainages with anadromous fish present during normal or low water years would be rated highest. Drainages with anadromous fish present during high water years and/or fluvial fish populations would be rated as moderate. Drainages where only resident fish populations exist would be rated low. Streams with no fish present would be rated the lowest. Although, restoration opportunities in nonfish bearing streams would help protect water quality in the Drainage.

Ownership pattern - This considers how much influence BLM actions would have on cumulative impacts and if the BLM administers enough land to affect aquatic conditions within the Drainage. Ownership could be ranked on the percentage of Federally-administered lands and/or the percentage of streams that are on Federally-administered land within the Drainage.

The BLM manages less than 25 percent of the available anadromous fish-bearing stream reaches in the Middle Fork Coquille fifth field watershed. The BLM has limited opportunities to positively influence riparian areas adjacent to fish-bearing streams due to the land ownership pattern in this watershed. The BLM may improve water quality conditions (temperature, turbidity, and peak flow) and large wood recruitment by following Standards and Guidelines, maintaining Riparian Reserves, and implementing BMPs in the WAU.

The Boulder Creek, Lower Twelvemile, and Dice Creek Drainages would benefit the most from watershed restoration activities. The Bingham Drainage has the potential to be a high priority but habitat condition data are not available to determine the benefit or success of activities. The rankings are to be used as a guide and do not represent a clearance as needed or may effect determination as required by section 7 of the Endangered Species Act (ESA) of 1973, as amended.

The Bear Creek Drainage was ranked the highest in species diversity and has the best access for anadromous fish. However, ownership patterns in the Bear Creek Drainage could affect the success of restoration activities on areas BLM-administered land. Most of the BLM-administered land in the Upper Middle Fork Coquille Subwatershed occurs in the Coos Bay BLM District. Management activities on Roseburg District BLM-administered land would have limited impacts in this Subwatershed. However, from the fisheries resource perspective the Bear Creek Drainage in the Upper Middle Fork Coquille Subwatershed is an important area for anadromous fish. Management activities on land administered by the Coos Bay BLM District would have the best opportunity for protecting the diverse fisheries resource in the Bear Creek Drainage.

F. Wildlife

1. Northern Spotted Owl

Based on management direction in the Northwest Forest Plan and the RMPs, activity centers on Matrix lands located before January 1, 1994, must be protected by maintaining the best 100 acres of suitable habitat near known owl sites (USDA and USDI 1994b, and USDI 1995). Five spotted owl sites on BLM-administered land in the Upper Middle Fork Coquille WAU are protected with 100 acre activity centers (core areas). Nine spotted owl sites, on BLM-administered lands, occur within the LSR portions of the WAU.

All of the spotted owl territories on BLM-administered land within the Upper Middle Fork Coquille WAU have less than 40 percent (1,336 acres) of suitable habitat within 1.3 miles of an owl site. Mean values of suitable habitat within 1.3 or 1.5 miles and 0.7 mile of sites in the LSR are 839 acres and 364 acres, respectively. Sites in Matrix have mean values of suitable habitat within 1.3 or 1.5 miles and 0.7 mile of a site are 520 acres and 188 acres, respectively. Sites on private land, which

include BLM-administered land within the spotted owl territory, have mean values of 578 acres and 166 acres in the 1.3 or 1.5 miles and 0.7 mile radius around the sites. The amount of suitable habitat within 0.7 mile is below 500 acres around all but two owl sites in the Upper Middle Fork Coquille WAU (see Table 28).

Table 28. Amount of Suitable Spotted Owl Habitat Within 0.7 Mile and 1.3 Miles of Master Sites and Number of Sites in Each Habitat Category in the Upper Middle Fork Coquille WAU.

Owl Site Designation by Land Use Allocation	Number of Sites With More Than 500 Acres of Suitable Habitat Within 0.7 Mile and Less Than 1,000 Acres Within 1.3 Miles	Number of Sites With Less Than 500 Acres of Suitable Habitat Within 0.7 Mile and Less Than 1,000 Acres Within 1.3 Miles	Number of Sites With Less Than 500 Acres of Suitable Habitat Within 0.7 Mile and More Than 1,000 Acres Within 1.3 Miles
Master Sites[1] and Alternate Sites in Matrix	0	4	1
Master Sites and Alternate Sites in LSR	0	8	1
Sites on Private Lands Adjacent to BLM-Administered Land	0	3	0
Sites in Matrix Active in 1997 and 1998	0	1	0
Sites in LSR Active in 1997 and 1998	0	2	1
Potential Sites in Matrix	0	4	0
Potential Sites in LSR	0	6	1
Potential Sites on Private	0	1	0

1. Master site refers to the first number given to a spotted owl activity center. Other activity centers identified in the vicinity of the original site are called alternate sites.

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 such as timber harvest, roads, or recreation sites are located, a ranking of the owl master sites using the provincial radius (1.3 miles) and the 0.7 mile radius around each owl site is presented in Table 29. Table 21 provides information used to evaluate spotted owl sites in the Upper Middle Fork Coquille WAU based on number of years occupied, years unoccupied, general history, reproduction history, habitat present, and professional judgement about the function of a site based on field experience. The goal was to evaluate the habitat, connectivity and fragmentation of the habitat, and owl site history to create a guide. This guide could be used to locate project areas while

taking into account the location of active spotted owl sites. The owl site rankings were used to guide where projects could be planned to maintain the greatest amount of suitable habitat around the most productive owl sites. The ranking is to provide management with a guide and does not represent a clearance as needed or a may affect determination as required by section 7 of the Endangered Species Act (ESA) of 1973, as amended. The steps used to rank the owl sites are presented in Appendix E.

The results of the owl site rankings for the Upper Middle Fork Coquille WAU are listed in Table 29. Following the guide, activities in the Matrix that modify or remove suitable owl habitat would be considered first in areas outside of known spotted owl territories. When it is not possible to avoid modifying or removing suitable habitat within an owl territory, then sites with a "go to" rank of "one" would be first, "two" would be second, and "three" would be last.

Table 29. Go to Ranking of Spotted Owl Master Sites in the Upper Middle Fork Coquille WAU.

MATRIX LANDS		LSR	
MSNO[1]	Go To Rank For Timber Harvest	MSNO[1]	Go To Rank For Habitat Evaluation[2]
0370	2	0368	1
0370B	3	2042	1
2383	1	2047	1
3168	3	2099	1
		2186A	2
		2188	2
2321A	On Private Land	2190A	1
		2747	1

For owl sites in the LSR, the guide ranks where habitat evaluation would be considered first, before manipulating stands to improve habitat. Sites in the LSR with a rank of "one" would be considered first for habitat evaluation, "two" would be second, and "three" would be last. Habitat evaluation would determine which LSR objectives, such as increasing late seral age forests, increasing physical connectivity of late-successional forests, reducing fragmentation, or connectivity of habitat would apply to a particular area.

a. Dispersal Habitat

Dispersal habitat in the WAU lies between two LSRs, LSR 259 in the southern part and LSR 261, including the Marbled Murrelet Reserves in the northern portion of the WAU. Camas Valley, in the center, presents a geographic barrier separating the north and south portions of the WAU. The forest

stands along the eastern boundary between these two LSRs currently provides the best habitat. The area west of Camas Valley is expected to provide better dispersal habitat after the next ten years.

b. Critical Habitat

About two sections within CHU-OR-62 are designated Connectivity/Diversity Blocks.

Critical habitat objectives are to provide suitable habitat for a recovering population. The checkerboard ownership in the Critical Habitat Unit would maintain a fragmented pattern in the future. Managing for well connected habitat in CHU-OR-62 would aid to keep this Critical Habitat Unit functioning.

2. The American Bald Eagle

There is no information about bald eagles using habitat along the Middle Fork of the Coquille River.

3. The Peregrine Falcon

The WAU has potential peregrine falcon habitat.

4. The Marbled Murrelet

The entire Upper Middle Fork Coquille WAU is inside the 50 mile Marbled Murrelet zone. The western portion of the WAU is inside the 35 mile Marbled Murrelet zone.

5. The North American Lynx

The North American Lynx is not expected to occur in the WAU. The closest documented occurrence was in the Cascade Mountains.

6. Other Species of Concern

a. Northern Goshawk

There is no data on nest territories or locations within the Upper Middle Fork Coquille WAU.

b. Del Norte Salamander

The Upper Middle Fork Coquille WAU lies within 25 miles of current Del Norte salamander sites. A small amount of potential suitable talus habitat occurs mostly in the southern portion of the WAU.

c. Mollusks

Surveys are needed to determine the extent of mollusk ranges, species abundance, and species diversity within the WAU. One land snail species (Helminthoglypta hertleini) inhabits habitat similar to the Del Norte salamander.

d. Red Tree Vole

The Upper Middle Fork Coquille WAU meets the minimum threshold for red tree vole habitat. Surveys are not required in areas that meet this threshold.

VI. Recommendations

A. Issue 1 - Late-Successional Reserves

1. Vegetation Patterns

Silviculture actions within Late-Successional Reserves would tend to focus on stands regenerated following timber harvesting or stands that were thinned. Management actions within the LSRs would need to consider the guidelines presented in the South Coast - Northern Klamath Late-Successional Reserve Assessment.

2. Risk Reduction Activities

Wildfire presents the greatest risk of late-successional habitat loss within the LSRs in the WAU. Most of the risk reducing activities would be aimed at managing fuels and sources of ignition. Risk reduction activities may include thinning, underburning, pruning, or establishing fuel breaks. Fuels along roads and in strategic positions, such as along ridges that would be used as fire control lines, need to be treated to reduce the rate of spread and resistance to control. Silvicultural actions within the Matrix Land Use Allocation can contribute to reducing risks in the LSRs. Fire and fuels management in the Matrix may reduce the risk of fire entering LSRs from adjacent managed lands. Risk reduction treatments to consider in the LSRs include burning hand piled debris during the wet season, chipping debris along roads, control lines, and property lines, underburning, pruning, thinning, and creating fuel breaks. Consider following the guidelines presented in the South Coast - Northern Klamath Late-Successional Reserve Assessment.

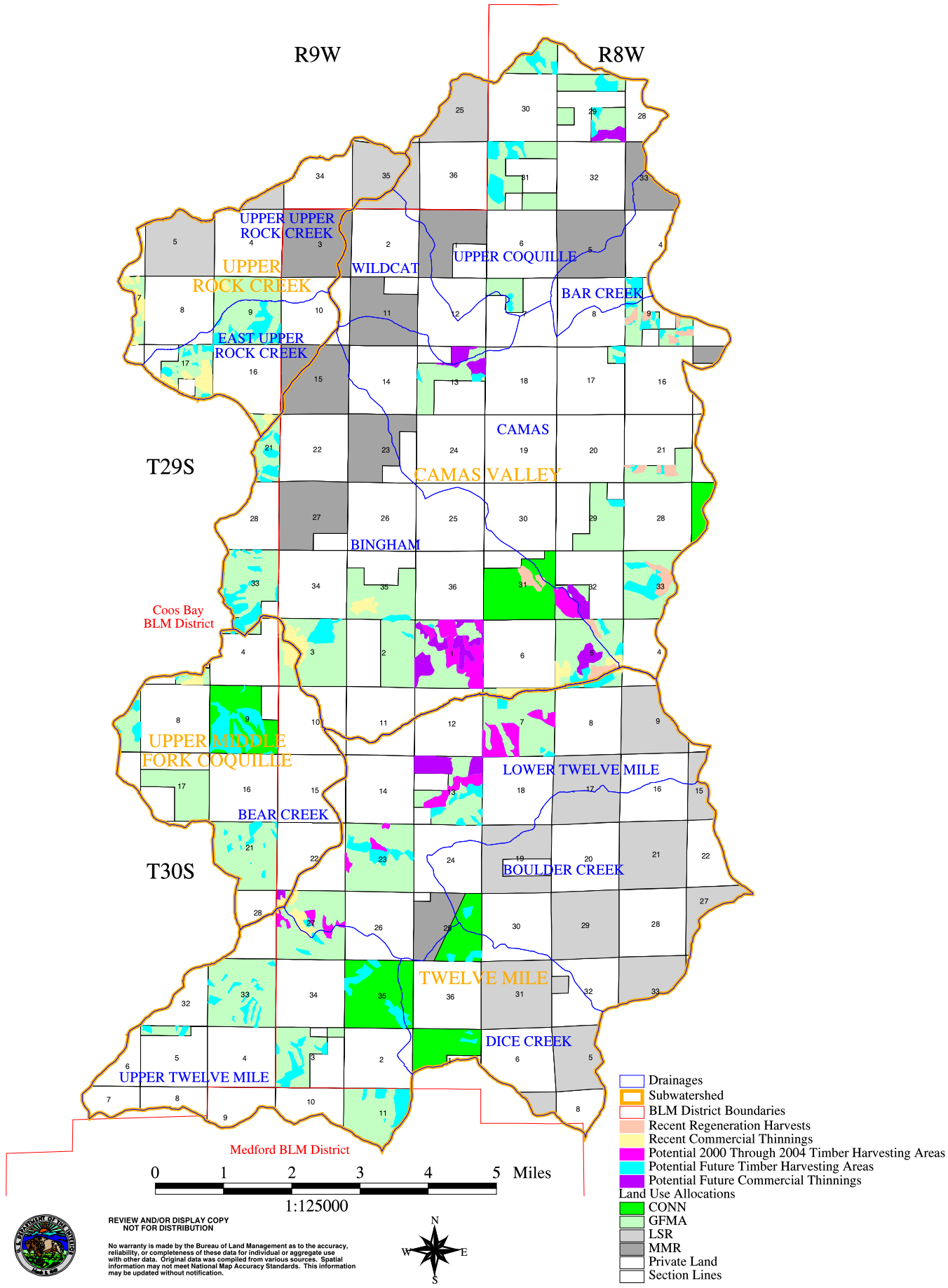
B. Issue 2 - Harvest Potential

Vegetation Patterns

Objectives for Matrix lands are to produce a sustainable supply of timber and other forest commodities and provide early-successional habitat. Approximately 4,578 acres of late seral stands on BLM-administered land in Matrix are available to help provide a sustainable supply of timber and other forest commodities.

A long range timber harvesting plan was initiated for the South River Resource Area. The most recent results evaluated all available timber harvesting units where harvesting could occur with acceptable impacts to the wildlife, hydrology, and fisheries resources. Potential priority (estimated to be harvested between the years 2000 and 2004) timber harvesting units were areas that did not have obvious conflicts with wildlife, hydrology, or fisheries and were considered to be physically harvestable (see Map 25). Changes to unit size and shape would be anticipated after extensive field review. Other areas having some concern from wildlife, hydrology, or fisheries, generally, would be considered for timber harvesting after the priority areas. Although, lower priority areas may be harvested before a higher priority area.

Map 25. Upper Middle Fork Coquille WAU Potential Harvest Areas on Matrix Land



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C. Issue 3 - Watershed Health and Restoration

1. Vegetation Patterns

Silvicultural practices within Riparian Reserves would generally be to control stocking, reestablish and manage stands, establish and maintain desired nonconifer vegetation, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

Rust resistant stock should be use to reforest sugar pine.

Prescribed wildland fire should continue to be used to treat activity fuels. Broadcast and pile burning should be used for site preparation, to reduce vegetative competition, and to reduce hazardous fuel accumulations. Site preparation could include broadcast burning regeneration harvest units, burning hand or machine piled logging slash, or burning landing decks. Burning activity fuels would reduce the wildfire hazards. When other resource concerns eliminate using prescribed fire, mechanical or manual fuels treatments may be required to achieve fuels management objectives. Hazard reduction should be accomplished whenever forest management activities create fuels considered to pose a high risk for wildfire.

To avoid increasing the risk of unplanned wildland fire, forest management treatments should be staggered over time. Treating large areas the same should be avoided. Some areas should not be treated and fuel reduction or manipulation treatments not historically done on PCT units may be justified. Providing breaks in fuel continuity, creating varied fuel types, and allowing some stands to thin themselves naturally would improve the chances of suppressing wildfires at a smaller size.

2. Port-Orford Cedar

Management activities within the WAU should conform to the BLM Port-Orford Cedar Management Guidelines to mitigate damage caused by Phytophthora lateralis.

3. Soils / Erosion

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

Actions that lessen adverse impacts to prime farm lands should be considered.

4. Hydrology / Channel Processes

Use bioengineering techniques with stream restoration opportunities.

Do not construct check dams in stream channels.

5. Water Quality

Consider monitoring stream temperature, turbidity and sediment, and channel morphology changes on restoration projects.

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

Almost every section in the WAU has roads causing water quality problems. Refer to the TMO file or contact the Area Hydrologist for a list of roads observed to be causing water quality problems. Some roads to decommission or improve are listed in Appendix G. Roads could be fully decommissioned without limiting future management activities in the WAU. Roads within Riparian Reserves, Late-Successional Reserves, identified as causing water quality problems, and in Drainages with the highest road densities would be the considered first for full decommissioning.

Consider determining where culverts block fish passage, need to be repaired or replaced, culverts are inadequate to accommodate a 100-year flood, and where additional culverts, waterbars, or water dips would reduce the stream network extension.

When fertilizing in the WAU, provide adequate buffers on streams, and monitor fertilization activities. Where streams or other water bodies have a pH above 8.0 or in municipal watersheds, apply the fertilizer so it would not lead to an increase in pH and/or primary productivity in the stream.

Consider planning regeneration harvests in Drainages with the least number of acres in the TSZ less than 30 years old. Consider planning regeneration harvests and commercial thinnings to use existing roads and minimize the amount of new road construction.

Reducing road densities and conducting stream restoration projects would probably be the most effective restoration activities in the WAU. Thinning in the Riparian Reserves should be considered where opportunities exist.

6. Roads

Roads in the Upper Middle Fork Coquille WAU have been evaluated using the Transportation Management Objectives (TMOs) as a guide. A preliminary list of roads to consider for decommissioning or improving is in Appendix G. The roads are also shown on Map G-1. There may be other roads within the WAU not identified in Appendix G that could be considered for decommissioning or improving.

Table G-1 identifies road segments that could be considered for decommissioning. Roads considered for decommissioning would be those that were rated as having a low value for future access needs. Roads accessing private lands would not be decommissioned without the adjacent landowners concurrence.

Natural surfaced roads on BLM-administered land would be the top priority for decommissioning. Decommissioning, also referred to as hydrologic recovery, could be accomplished by removing those elements of a road that concentrate hillslope drainage and cause slope stability, erosion, and sedimentation problems. Decommissioning can include removal of culverts, decompaction of the road surface (tilling), outsloping, waterbarring, and removal of unstable or potentially unstable fills. With decommissioning, most of the road bed may be left in place, facilitating inexpensive reconstruction should the need arise but hydrologic risks are greatly reduced (USDA et al. 1993 (FEMAT) Appendix V-J).

Table G-2 lists roads which could be considered for either decommissioning or improving. Table G-3 identifies road segments which could be considered for improving. Roads to be improved were identified as being important for access but are in need of some treatment. Improving a road could include rocking the road or replacing or adding culverts.

7. Fisheries

a. General Recommendations

Consider concentrating restoration on reestablishing vegetation where it is needed and upgrading or decommissioning roads.

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

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

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

Consider describing how projects meet Aquatic Conservation Strategy objectives for activities in Riparian Reserves.

Consider the amount of soil disturbance, timber falling, and yarding within existing late-successional or old-growth timber stands in Riparian Reserves necessary. Salvage activities in Riparian Reserves in late seral age stands should not retard or prevent attainment of ACS objectives.

b. Recommendations Specific to the WAU

Confirming fish passage over the multiple falls on lower Twelvemile Creek and determining the genetic similarity between the resident rainbow and winter steelhead populations would help when assessing potential impacts from proposed management activities.

Consider monitoring two culverts in T29S, R8W, Section 31 that were replaced in the fall of 1998 to prevent future problems.

The outlet side of one culvert in T29S, R9W, Section 26 washed out and is considered to be impassable to fish. Consider repairing this culvert to allow fish access.

Pump chances located along roads in T29S, R8W, Sections 9 and 29, T29S, R9W, Section 23, and T31S, R7W, Section 19 block resident fish passage. Consider assessing the feasibility of constructing fish passage at these pump chances.

Consider surveying roads and culverts to identify those at risk of failing during a high water event.

Possible roads to consider for decommissioning include the 29-9-27.1 road, 29-9-26.1 road, 30-9-24.1 road, 30-8-11.1 road, 28-8-31.5 road, 28-8-31.4 road past the junction with the 32.0 road an unnamed spur in T30S, R9W, Section 23 in the SW quarter, an unnamed spur in T30S, R9W, Section 23 in the SE quarter, and an unnamed road in T30S, R8W, Section 19 on the south side of Boulder Creek. These roads are located in Riparian Reserves and are causing sedimentation problems. There may be other roads within Riparian Reserves causing sedimentation problems that have not been identified and could be considered for decommissioning.

Consider continuing surveys to identify fish bearing streams and barriers to fish passage within the Upper Middle Fork Coquille WAU.

The Riparian Reserve along Bingham/Holmes Creek was impacted from trespass cattle grazing in 1998. This area should be monitored to prevent further trespassing and insure recovery.

Consider conducting stream habitat inventories in the Upper Middle Fork Coquille WAU.

D. Issue 4 - Special Status Species

Wildlife

a. The Northern Spotted Owl

Consider using the guide ranking spotted owl sites presented in Appendix E and Table 29. Consider evaluating the timing, spacing, and location of timber harvesting to determine the effects on dispersal and suitable habitat in the WAU.

Consider the effects of timber harvesting on critical habitat. Using the management guidelines presented in Appendix E and Table 29 may help maintain connected and functional habitat within CHU-OR-62 and the WAU.

Consider following the objectives outlined in the South Coast - Northern Klamath Late-Successional Reserve Assessment.

b. The Peregrine Falcon

The inventory of potential peregrine falcon habitat is not completed but any high potential habitat that is found should consider the following specific management guides. Management guides include locating a not activity buffer around an active peregrine falcon site, seasonal restrictions during the peregrine falcon breeding season from March 1 to July 15, or maintaining the integrity of medium to high potential sites (USDI 1995). The buffer should include a no activity area of ½ to 1½ mile radius around known occupied sites. A secondary zone (½ to 1½ mile radius reflecting the shape of the primary zone) should be established where no management activities, such as timber harvesting, road construction, or helicopters are allowed during the peregrine falcon breeding season. Activities may resume in the secondary zone 14 days after fledgling or nest failure is confirmed. To maintain the integrity of a medium to high potential peregrine falcon nesting site, it should be managed as if it was occupied by including a no activity buffer and seasonal restrictions (March 1 to July 15). Projects that require a disturbance, such as blasting, near any medium to high potential habitat, located in the future, should be surveyed before project initiation. Blasting should be restricted if it occurs within three miles of an active site or potentially occupied site.

A resource area wildlife biologist should be consulted to evaluate how close a project is to peregrine falcon habitat. Consider continuing peregrine falcon habitat evaluation in the WAU.

c. The Marbled Murrelet

Two years of protocol surveys are required prior to implementing projects that modify suitable marbled murrelet habitat. Consider evaluating and surveying marbled murrelet habitat in the northwest portion of the WAU.

d. The North American Lynx

The North American Lynx is not expected to occur in the WAU.

e. Other Species of Concern

(1) Northern Goshawk

Consider conducting surveys to determine if northern goshawks are present in the WAU. Consider gathering information about other raptor species in the WAU.

(2) Amphibians

Protocol (IB-OR-96-161) guides for Del Norte salamander state that projects should be evaluated to determine if clearance is required prior to ground disturbing activities. If suitable habitat is present and the project area is within 25 miles of a known site, then surveys and appropriate protection measures are required prior to project implementation. The entire Upper Middle Fork Coquille WAU falls within 25 miles of a known site. All ground disturbing projects should be evaluated using protocol guides prior to implementation.

Consider conducting surveys in the southern portion of the WAU where talus habitat is associated with forest stands. Survey data may help determine where the Del Norte salamander range is in the South River Resource Area.

(3) Mollusks

Consider conducting general surveys in the WAU. Surveys for Survey and Manage mollusk species should be conducted according to established protocol guides before ground disturbing activities are implemented, including commercial thinning and herbicide use. Surveys would be conducted according to the following priorities 1) clearance surveys of Fiscal Year 1999 and later projects, 2) survey LSRs and Riparian Reserves to document species presence/absence in these areas, and 3) survey managed habitats and adjacent Riparian Reserves to evaluate impacts of timber harvesting and other habitat disturbance on specific mollusk sites.

f. Neotropical Birds

Impacts to neotropical birds come from actions that modify habitat. This usually changes the bird species composition using a particular area. Brushing, precommercial and commercial activities impact neotropical birds by removing habitat and physically displacing birds. Displacement includes removing occupied habitat during the breeding season.

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

Another way to reduce impacts is to consider the goals of Riparian Reserves when brushing, precommercial thinning, or broadcast burning areas. Consider including different prescriptions when conducting brushing or PCT activities. The different prescriptions may exclude the Riparian Reserves from the activity or increasing the number of shrub and non-commercial trees that are retained. Matrix lands outside of the Riparian Reserves also provide brush and non-commercial tree

species used by neotropical birds. Consider retaining brush and non-commercial trees that are not competing with the desired conifer species. Some brushing and PCT projects using these recommendations have been completed. The results should be reviewed and evaluated.

Consider continuing the Monitoring Avian Productivity and Survival (MAPS) station in the Boulder Creek Drainage. Four more years are needed to complete ten years of data collection.

g. Red Tree Vole

Consider conducting general surveys for red tree voles in the WAU.

E. Summary of Recommendations

Table 30 summarizes the recommendations, based on the main concerns of current conditions in the Upper Middle Fork Coquille WAU, and identifies the planning objectives to be met by implementing the management strategies and potential activities. The intent of Table 30 was to show the connection between the resource management concerns and the management strategies and recommended activities. The planning objectives are based on legally mandated management direction and policy addressed in the RMP (USDI 1995) and SEIS ROD (USDA and USDI 1994b). The management strategy is intended to describe general methods for meeting the objectives. The management activities are more specific opportunities that may be implemented in order to achieve the management strategy. The data presented in Table 30 is discussed in more detail throughout the watershed analysis.

Table 30. Summary Table of Resource Management Concerns in the Upper Middle Fork Coquille WAU.
Vegetation/Silviculture

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
What opportunities exist to manage overstocked stands, which have slower growth rates, are more susceptible to insects and diseases, and have an increased risk of loss due to wind and fire? How can stand density and species composition be influenced to achieve desired late-successional characteristics in the Riparian Reserves and LSR?	Approximately 7,123 acres of well stocked or overstocked stands on BLM-administered land could be treated during the next ten years to maintain growth and healthy stands.	RMP (Appendix E pp.145-154) - LSR - Plan and implement silvicultural treatments that are beneficial to the creation of late-successional habitat. This can be accomplished by precommercial thinning and commercial thinning in stands up to 80 years old. Riparian Reserves - Apply silvicultural practices for Riparian Reserves to control stocking and acquire desired vegetation characteristics needed to attain ACS objectives. Matrix - Precommercial and commercial thinning would be designed to control stand density, influence species dominance, maintain stand vigor, and place stands on developmental paths.	Manage young stands to maintain or improve growth and vigor, and to improve stand structure and composition to meet LSR and ACS objectives.	Precommercial thinning and density management in the Riparian Reserves and LSR. Precommercial and commercial thinning in Matrix. Consider precommercially thinning approximately 1,614 acres in the next ten years. Consider commercial thinning of approximately 740 acres in Matrix within the next ten years. Fertilization of stands precommercially or commercially thinned in the Matrix. Manipulate PCT slash in all Land Use Allocations. Provide breaks in continuous stand types.
Are there opportunities for Matrix lands within this WAU to provide a sustainable supply of timber and other forest commodities?	Approximately 4,578 acres of late seral stands on BLM-administered land in Matrix are available to help provide a sustainable supply of timber and other forest commodities.	RMP (p. 33) - Objectives for Matrix lands are to produce a sustainable supply of timber and other forest commodities and provide early-successional habitat.	Harvest timber and other forest products on Matrix lands.	Conduct regeneration harvest on Matrix lands in conformance with the RMP. Retain six to eight green trees on GFMA lands and 12 to 14 green trees in Connectivity/Diversity Blocks.

Table 30. Summary Table of Resource Management Concerns in the Upper Middle Fork Coquille WAU.
Hydrology

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
Are BLM administered lands contributing to increased stream temperatures?	DEQ identified the Middle Fork of the Coquille River as water quality limited for stream temperature. Twelvemile, Boulder, and Dice Creeks had temperatures above 64 degrees Fahrenheit during part of the summer in 1998, which is higher than the maximum stream temperature water quality standard. Data Gaps - Limited amount of water quality data on BLM-administered lands.	RMP (pp. 19-20, ACS) - Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities. RMP (p. 35) - As directed by the Clean Water Act, comply with state water quality requirements to restore and maintain water quality to protect the recognized beneficial uses for the South Coast and Umpqua Basins.	Control stocking, reestablish and manage stands, and acquire desired vegetation characteristics to attain Aquatic Conservation Strategy objectives. Address Data Gaps regarding water quality information on BLM-administered lands, over time and as funding allows.	Consider thinning in Riparian Reserves. Plant conifers and maintain vegetation in Riparian Reserves to allow trees to grow and provide shade in a shorter amount of time. Consider collecting water quality data (such as pH, temperature, or dissolved oxygen) on BLM-administered lands to determine if they are contributing to water quality concerns.

Table 30. Summary Table of Resource Management Concerns in the Upper Middle Fork Coquille WAU.
Fisheries

Issue	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
What opportunities exist to enhance the fisheries resource and/or the habitat?	Oregon Coast coho salmon is listed as a threatened species, under the ESA. This species has been documented to occur in this WAU.	RMP (p. 40) - Promote the rehabilitation and protection of fish stocks at risk and their habitat. RMP (p. 41) - Protect, manage, and conserve Federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and Bureau special status species.	a. Protect existing stream habitat conditions, water quality, and water quantity. b. Focus restoration on: 1. providing fish passage at failed or failing stream crossing sites, especially those sites located in anadromous fish-bearing stream reaches, 2. maintaining, upgrading, or decommissioning roads identified in the TMOs (see Appendix G), 3. conducting in-stream restoration, which may include in-stream structures and riparian improvement projects.	a. Consider using timing and spatial arrangement of timber harvesting and other major land disturbance activities (i.e. road construction) within this WAU to reduce adverse effects on fish species. b. Possible restoration activities could include, but may not be limited to, fish passage improvements, stabilizing roads and road fills, sidecast pullback, adding cross drains on roads with poor drainage, resurfacing existing rock roads, surfacing natural surfaced roads, blocking and subsoiling roads to reduce road density and road related sediment production, placing logs and boulders in streams to create spawning and rearing habitat, placing fine and coarse materials for over-wintering habitat, and establishing or releasing existing conifers in riparian areas.

Table 30. Summary Table of Resource Management Concerns in the Upper Middle Fork Coquille WAU.
Roads

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
Are some BLM managed roads eroding and delivering excess sediment to stream channels and adversely affecting water quality and fish? Are BLM managed roads changing peak flows, impacting stream morphology, or adding to the drainage network in the WAU?	Some BLM roads have been identified to be eroding or having slope stability concerns. Average road density of 5.42 miles per square mile and stream crossing density of 1.97 crossings per stream mile in the WAU may increase sediment in streams that is outside the range of natural variability. Data Gap - No information regarding if BLM managed roads are causing increased sediment in streams, peak flows, or the drainage network.	RMP (pp. 72-74) - Develop and maintain a transportation system to meet the needs of users in an environmentally sound manner. RMP (p. 72) - Correct problems associated with high road density by emphasizing the reduction of minor collector and local road densities where those problems exist. RMP (pp. 19-20, ACS) - Maintain and restore the sediment regime... - The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.	Minimize new road construction in areas with fragile soils (granitic, schist, and pyroclastic soils) to reduce impacts to soils, water quality, and fisheries. Stabilize existing roads where they contribute to significant adverse affects on these resources. Locate, design, construct, and maintain roads to standards that meet management objectives in accordance with the district road management plan. Prioritize and address erosion or slope stability concerns caused by roads based on current and potential impacts to riparian resources and the ecological value of the riparian resources affected. Minimize sediment delivery to streams.	Consider conducting road and stream surveys, which would include looking at downcutting of stream channels, road encroachment, and culvert surveys. Possible restoration activities could include road treatments mentioned in the Fisheries section of this table. Prioritize and schedule maintenance on roads identified to be eroding or having slope stability problems. Consider closing, stabilizing, or decommissioning roads identified to be eroding or having slope stability problems, including roads in Riparian Reserves, as determined by short-term and long-term transportation and resource management needs.

Table 30. Summary Table of Resource Management Concerns in the Upper Middle Fork Coquille WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning	Management Strategy	Management Activity
How can suitable habitat around spotted owl sites be managed following the Standards and Guidelines to minimize effects on the spotted owl?	Twelve spotted owl sites are located in the WAU. All of the spotted owl sites are below threshold levels of 40% suitable habitat within a 1.3 mile radius around the owl activity center.	RMP (p. 41) - Protect, manage, and conserve Federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and Bureau special status species.	RMP (p.48) - Retain 100 acres of the best northern spotted owl habitat as close to the nest site or owl activity center as possible for all known (as of January 1, 1994) spotted owl activity centers. Human activity within 1/4 mile of nest sites which could disturb owl nesting activities will be restricted, especially the use of large power equipment and falling of trees. Restrictions will apply from March 1 to September 30 or until non-nesting status is confirmed using protocol procedures. The retention of adequate habitat conditions for dispersal of the northern spotted owl will be taken into account during watershed analysis that addresses the issue of adjusting Riparian Reserve widths.	Consider using timing and location of habitat removal or modification on the landscape to reduce effects within known territories. Plan timber harvesting activities that consider owl site condition, connection to other habitat, and the ranking of the owl sites in this analysis. Consider conducting near future timber harvesting activities outside of known 1.3 mile territories or in the periphery of the territory and outside of the 0.7 mile radius of known activity centers, when possible.

Table 30. Summary Table of Resource Management Concerns in the Upper Middle Fork Coquille WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning	Management Strategy	Management Activity
Is there marbled murrelet habitat in the WAU?	There are approximately 7,863 acres of suitable marbled murrelet habitat in the WAU.	RMP (p. 41) - Protect, manage, and conserve Federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and Bureau special status species.	Protect contiguous marbled murrelet habitat within a 0.5 mile radius of any occupied site (e.g. active nest, fecal ring, or eggshell fragments, and birds flying below, through, into, or out of the forest canopy within or adjacent to a stand). Restrict human activity within occupied or nesting stands between March 1 and July 15. Protect or enhance suitable or replacement habitat during silvicultural treatments in areas not considered to be marbled murrelet habitat within the 0.5 mile radius.	Conduct two years of surveys before disturbing marbled murrelet habitat within zone 2 (about 50 miles from the coast).
Is there potential Great gray owl habitat within the WAU? The Great gray owl is a Protection Buffer Species.	Great gray owls may occur in coniferous forests adjacent to meadows. There are approximately 170 acres of potential suitable habitat at or above 3,000 feet in elevation on BLM administered land in the WAU.	RMP (p. 41) - Protect SEIS Special Attention Species so as not to elevate their status to any higher level of concern.	RMP (p. 44) - The RMP/NFP established Late-Successional Reserves for the Protection Buffers of the Great gray owl. Specific mitigation measures for the great gray owl, within the range of the northern spotted owl, include the following: provide a no harvest buffer of 300 feet around meadows and natural openings and establish 1/4 mile protection zones around known nest sites. Survey for nest location using the established protocols. Protect all future discovered nest sites.	Conduct surveys using established protocols to clear potential project areas. A two year survey protocol is required if the habitat meets all of the protocol criteria.

Table 30. Summary Table of Resource Management Concerns in the Upper Middle Fork Coquille WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning	Management Strategy	Management Activity
Are there survey and manage mollusk species present in the WAU?	Four survey and manage mollusk species are present in Douglas County. One mollusk, the blue-grey taildropper was documented to occur in the WAU.	RMP (p. 41) - Protect SEIS Special Attention Species so as not to elevate their status to any higher level of concern.	Collect information on survey and manage mollusk species present in the WAU. Identify what type of or how much habitat is necessary.	Consider conducting general surveys in all LUAs using established protocols to identify population distribution across the landscape. Consider conducting pre- and postharvest surveys to monitor effects on mollusks. Conduct clearance surveys prior to implementing ground disturbing activities.
Is there potential Del Norte salamander habitat within the WAU? Is the WAU within 25 miles of a known site? Is the Del Norte salamander present in the WAU?	There are approximately 358 acres of talus habitat associated with stands that are at least 80 years old on BLM administered land. The entire WAU is within 25 miles of a known site. This salamander may be in the WAU but has not been documented to occur in the WAU.	The Del Norte salamander is a Protection Buffer and a Survey and Manage Survey Strategy 2 Species. RMP (p.41) - Protect SEIS Special Attention Species so as not to elevate their status to any higher level of concern.	RMP (p.45) - Survey prior to activities and manage sites within the known or suspected ranges and within the habitat types of vegetation communities associated with the Del Norte salamander.	Consider conducting surveys using protocol methods to determine if suitable habitat occurs in the WAU. Conduct surveys for the Del Norte salamander prior to ground disturbing activities in the WAU.

Table 30. Summary Table of Resource Management Concerns in the Upper Middle Fork Coquille WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning	Management Strategy	Management Activity
The northern goshawk is a Bureau Sensitive species. Is there northern goshawk habitat within the WAU?	The northern goshawk is not common in the Roseburg District but is within the geographic range. There are approximately 8,764 acres of potential habitat on all lands within the WAU, based on GIS. On BLM administered land in the WAU, about 2,043 acres have the best potential for being habitat.	RMP (p. 41) - Manage for the conservation of Federal Candidate and Bureau Sensitive species and their habitats so as not to contribute to the need to list and to recover the species.	RMP (p. 49) - Retain 30 acre buffers of undisturbed habitat around active and alternative nest sites. Restrict human activity and disturbance within 1/4 mile of active sites between March and August or until such time as young have dispersed. Consider this species when planning or implementing ground disturbing projects.	Consider conducting field reviews to verify and evaluate potential habitat. Use standard protocol survey methods to clear areas where projects may remove or modify suitable habitat. Consider identifying and managing a post fledgling area around an activity center.
Are there neotropical bird species present in the WAU?	Over 50 neotropical bird species use the WAU for breeding, feeding, or foraging.	RMP (p. 37) - Enhance and maintain biological diversity and ecosystem health to contribute to healthy wildlife populations.	Use the watershed analysis process to address wildlife habitat issues for individual watersheds.	Consider continuing the Monitoring Avian Productivity and Survival (MAPS) station in the Boulder Creek Drainage. Four more years are needed to complete ten years of data collection. For projects in the WAU impacting neotropical habitat consider using seasonal restrictions, timing, different prescriptions, and other vegetation manipulation activities to mitigate impacts, when possible.

VIII. Monitoring

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

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

Some key resource elements that may be monitored in the Upper Middle Fork Coquille WAU are as follows:

A. All Land Use Allocations

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

B. Riparian Reserves

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

C. Matrix

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

D. Late-Successional Reserves

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

IX. Revisions to the Watershed Analysis and Data Gaps

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

Appendix A

Glossary

Appendix A

Glossary

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Endemic - Native or confined to a certain locality.

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

Ephemeral Stream - Streams that contain running water only sporadically, such as during and following storm events.

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.

Fluvial - Migratory behavior of fish moving away from the natal stream to feed, grow, and mature then returning to the natal stream to spawn.

General Forest Management Area (GFMA) - Forest land managed on a regeneration harvest cycle of 70-110 years. A biological legacy of six to eight green trees per acre would be retained to assure forest health. Commercial thinning would be applied where practicable and where research indicates there would be gains in timber production.

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.

Late-Successional Reserve (LSR) - A forest in its mature and/or old-growth stages that has been reserved.

Matrix Lands - Federal land outside of reserves and special management areas that will be available for timber harvest at varying levels.

Mitigating Measures - Modifications of actions which (a) avoid impacts by not taking a certain action or parts of an action; (b) minimize impacts by limiting the degree or magnitude of the action and its implementation; (c) rectify impacts by repairing, rehabilitating or restoring the affected environment; (d) reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or (e) compensate for impacts by replacing or providing substitute resources or environments.

Monitoring - The process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

Nonpoint Source Pollution - Water pollution that does not result from a discharge at a specific, single location (such as a single pipe) but generally results from land runoff, precipitation, atmospheric deposition or percolation, and normally is associated with agricultural, silvicultural and urban runoff, runoff from construction activities, etc. Such pollution results in the human-made or human-induced alteration of the chemical, physical, biological, radiological integrity of water.

Orographic - Of or pertaining to the physical geography of mountains and mountain ranges.

Peak Flow - The highest amount of stream or river flow occurring in a year or from a single storm event.

Perennial Stream - A stream that has running water on a year round basis.

Phenotypic - Of or pertaining to the environmentally and genetically determined observable appearance of an organism.

Precommercial Thinning (PCT) - The practice of removing some of the trees less than merchantable size from a stand so that remaining trees will grow faster.

Probable Sale Quantity (PSQ) - Probable sale quantity estimates the allowable harvest levels for the various alternatives that could be maintained without decline over the long term if the schedule of harvests and regeneration were followed. "Allowable" was changed to "probable" to reflect uncertainty in the calculations for some alternatives. Probable sale quantity is otherwise comparable to allowable sale quantity (ASQ). However, probable sale quantity does not reflect a commitment to a specific cut level. Probable sale quantity includes only scheduled or regulated yields and does not include "other wood" or volume of cull and other products that are not normally part of allowable sale quantity calculations.

Proposed Threatened or Endangered Species - Plant or animal species proposed by the U.S. Fish & Wildlife Service or National Marine Fisheries Service to be biologically appropriate for listing as threatened or endangered, and published in the Federal Register. It is not a final designation.

Resident Fish - Fish that are born, reared, and reproduce in freshwater.

Resource Management Plan (RMP) - A land use plan prepared by the BLM under current regulations in accordance with the Federal Land Policy and Management Act.

Riparian Reserves - Designated riparian areas found outside Late-Successional Reserves.

Riparian Zone - Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables and soils which exhibit some wetness characteristics. Normally used to refer to the zone within which plants grow rooted in the water table of these rivers, streams, lakes, ponds, reservoirs, springs, marshes, seeps, bogs and wet meadows.

Stream Order - A hydrologic system of stream classification. Each small unbranched tributary is a first order stream. Two first order streams join to form a second order stream. A third order stream has only first and second order tributaries, and so on.

Stream Reach - An individual first order stream or a segment of another stream that has beginning and ending points at a stream confluence. Reach end points are normally designated where a tributary confluence changes the channel character or order. Although reaches identified by BLM are variable in length, they normally have a range of 1/2 to 1-1/2 miles in length unless channel character, confluence distribution, or management considerations require variance.

Survey and Manage - Those species that are listed in Table C-3 of the Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl for which four survey strategies are defined.

Tillage - Breaking up the compacted soil mass to promote the free movement of water and air using a self drafting individual tripping winged subsoiler.

Transportation Management Objectives (TMO) - An evaluation of the current BLM transportation system to assess future need for roads, and identify road problem areas which need attention, and address future maintenance needs.

Watershed - The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake.

Watershed Analysis - A systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives. Watershed analysis is a stratum of ecosystem management planning applied to watersheds of approximately 20 to 200 square miles.

Appendix B
References

Appendix B - References

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Appendix C
Fisheries

Table C-1. Summary Table of Current Conditions in the Upper Middle Fork Coquille WAU.

Drainage Name **Subwatershed Name**	Road Density	Stream Density	Percent BLM-administered Land	Stream Crossing Density	Percent Less Than 30 Years Old (BLM)	Percent of Riparian Reserves at Least 80 Years Old
Bar Creek	6.12	5.06	39	1.99	34	28
Bingham	5.53	4.80	46	1.80	25	22
Camas	4.75	4.27	22	1.37	35	23
Upper Coquille	5.09	4.23	39	1.62	28	47
Wildcat	4.03	4.48	31	0.75	24	54
Camas Valley Subwatershed	5.09	4.49	35	1.56	28	30
Boulder Creek	5.63	5.30	47	2.38	41	50
Dice Creek	4.80	8.61	49	3.03	31	56
Lower Twelve Mile	6.86	4.52	44	2.21	45	17
Upper Twelve Mile	5.95	7.75	35	2.40	47	38
Twelve Mile Subwatershed	5.98	6.24	43	2.49	42	39
Bear Creek	5.42	6.69	32	2.28	29	29
Upper Middle Fork Coquille Subwatershed	5.42	6.69	32	2.28	29	29
East Upper Rock Creek	5.82	6.93	44	1.49	18	37
Upper Upper Rock Creek	4.47	7.45	49	1.15	30	39
Upper Rock Creek Subwatershed	4.91	7.28	48	1.26	27	38
Upper Middle Fork Coquille WAU	5.42	5.54	39	1.97	34	35

Table C-2. Habitat Bench Marks Related to Category Types

Pools	Bench Mark Weighing Scale 1-5	4-Excellent	3-Good	2-Fair	1-Poor	Row Totals
a) Pool Area %	2	≥ 45	30-44	16-29	≤ 15	
b) Residual Pool						
Small (1-3 ordered)	4	≥ 0.55	0.35 - 0.54	0.15 - 0.34	0 - 0.14	
Large (4th order and greater)	4	≥ 0.95	0.76 - 0.94	0.46 - 0.75	≤ 0.45	
Riffles						
a) Width/Depth (wetted) (ODFW)	3	≤ 10.4	10.5 - 20.4	20.5 - 29.4	≥ 29.5	
b) Width/Depth (bank full) (USFS)	3	≤ 10	11 - 15	16 - 19	≥ 20	
c) Silt/Sand/Organics (% area) (ODFW)	2	≤ 1	2 - 7	8 - 14	≥ 15	
d) Embeddedness (% by unit) (USFS)	2	0	1 - 25	26 - 49	≥ 50	
e) Gravel % (Riffles)	3	≥ 80	30 - 79	16 - 29	≤ 15	
f) Substrate dominant	3	Gravel	Cobble	Cobble	Bedrock	
subdominant (USFS)	2	Cobble	Large Boulder	Small Boulder	Anything	
Reach Average						
a) Riparian condition Species dom/subdom. (> 15 cm)	2	conifer/hdwd* Klam - hdwd*	conifer/hdwd* Klam - hdwd*	hdwd*/conifer	alder/anything	
Size (Conifers)	3	≥ 36" Klam - ≥ 24"	24 - 35" Klam - 12 - 23"	7 - 23"	≤ 6"	
b) Shade (%) (ODFW)						
Stream Width < 12 M	1	≥ 80	71 - 79	61 - 70	≤ 60	
Stream Width > 12 M	1	≥ 70	61 - 69	51 - 60	≤ 50	
LWD						
a) Pieces (lg/sm) 100 M Stream	3	≥ 29.5	19.5 - 29.4	10.5 - 19.4	≤ 10.4	
b) Vol/100 M Stream	2	≥ 39.5	29.5 - 39.4	20.5 - 29.4	≤ 10.4	
USFS - Pieces 50' or more long and 24" dbh per mile	5	≥ 70	45 - 69	31 - 44	≤ 30	
Temperatures	1	≤ 55	56 - 60	61 - 69	≥ 70	
Macroinvertebrates						
Totals for Category						

* Hardwood category does not include alder.
*Where USFS designations appear, either USFS or ODFW measurements may be used but not both.

HABITAT BENCHMARK RATING SYSTEM

100 - 82 EXCELLENT
81 - 63 GOOD
62 - 44 FAIR
43 - 25 POOR

Table C-3. 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 degrees F.	2nd - 3rd order: 59 - 65 degrees F. 4th + order: 66 - 72 degrees F.	2nd - 3rd order basins: > 65 degrees F. 4th and larger basins: > 72 degrees F.
	Sediment/Turbidity *	< 12% fines (< 0.85 mm) in gravel, turbidity low, or cobble embeddedness < 35%.	12 - 17% fines (< 0.85 mm) in gravel.	> 17% fines (< 0.85 mm) 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.		Moderate 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 subdominant, 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 feet in length or lacks potential sources of LWD sufficient to maintain or achieve the fully functioning standard.	< 30 pieces/mile, > 24" and > 50 feet 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.
	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.

FACTORS	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
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, streambanks 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 function, riparian vegetation and succession.		Obvious reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetland extent noticeably reduced and riparian vegetation/succession altered significantly.
Flow/Hydrology	Drainage Network	Little increase in drainage network due to roads.		Substantial increase in drainage network density due to roads (e.g. 20 - 25%)
Watershed Conditions	Road Density and Location	< 2 miles/square mile, with no valley bottom roads.	2 - 3 miles/square mile, with some valley bottom roads.	> 3 miles/square mile 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.		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.

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

* Numeric values will be determined by measurements or estimates taken in low-gradient (< 2%) adjustable segments. These elements are not applicable if none are present.

Table C-4. Hatchery releases of chinook salmon, coho salmon, winter steelhead, rainbow trout, and cutthroat trout with in the Middle Fork Coquille watershed, 1941 to 1985.

	Middle Fork			Myrtle			Sandy		Big
Year	Coho	Rainbow	Cutthroat	Chinook	Coho	Steelhead	Coho	Cutthroat	Coho
1941					75,072[c]				
1942									
1943									
1944									
1945									
1946									
1947			22,981[n/a]						
1948							12,407[c]		5,885[n/a]
1949									49,600[n/a]
1950			3,600[n/a]					7,500[c]	7,500[c]
1951		2,000[n/a]	6,040[n/a]		75,072[c]				
1952		1,988[b]	3,943[b]						
1953		1,900[b]	2,070[b]			20,920[c]			
1954		2,999[b]	2,502[b]						
1955		2,600[b]	2,512[b]						
1956		3,503[b]	2,003[b]						
1957		1,940[b]	4,000[b]						
1958		2,501[r]	2,499[b]						
1959		2,502[r]	1,940[b]						
1960		2,000[r]	1,528[b]						
1961		3,497[r]							
1962		1,999[r]							
1963		1,994[r]							
1964		1,500[r]							

	Middle Fork			Myrtle			Sandy		Big
Year	Coho	Rainbow	Cutthroat	Chinook	Coho	Steelhead	Coho	Cutthroat	Coho
1965	245,805[a]	1,501[r]							
1966		1,495[bf]							
1967			1,500[b]						
1968		2,002[r]	1,999[b]			254,617[a]			
1969		2,000[r]	2,002[b]						
1970		2,002[r]	2,002[b]						
1971		1,500[r]	1,001[b]						
1972		3,000[r]	2,001[b]						
1973		1,001[r]	1,502[b]						
1974									
1975									
1976									
1977									
1978									
1979									
1980									
1981									
1982									
1983									
1984									
1985	55,074[bf]								

Release locations were from the mouth to the headwaters of the stream. Hatchery origins were a=Alsea, b=Bandon, bf=Butte Falls, c=Coos Station, r=Rock Creek, and n/a=Not available.

Table C-5. Number of Unfed Fall Chinook Salmon, Coho Salmon, and Winter Steelhead Released as Hatchbox Fry in the Middle Fork Coquille Watershed by Stream and Brood Year From 1980 to 1992.

Species	Stream	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Chinook	Axe								6,500	12,638				
	Big										9,883	49,688	92,162	
	Cove									23,146			14,247	
	Endicott		3,332	13,800	16,975			15,193		25,121	9,491	12,204		
	Indian										9,183			
	Mainstem										4,683	56,524		
	Myrtle							23,635	55,261		16,278	19,452		
	Rassler		9,800	5,000	9,980									
	tributary			4,900	8,950									
	Salmon								19,674	12,719		10,050		
	Sandy										9,863			
	tributary to Sandy										9,323			
	Subtotal	0	13,132	23,700	35,905	0	0	48,255	95,562	83,109	78,402	158,085	106,409	0

Table C-5. Number of Unfed Fall Chinook Salmon, Coho Salmon, and Winter Steelhead Released as Hatchbox Fry in the Middle Fork Coquille Watershed by Stream and Brood Year From 1980 to 1992.

Species	Stream	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Coho	Big										16,761		29,946	
	Cole						15,640							
	Cove							10,810		12,873				
	Endicott	50,000[r]				29,750	29,118	6,990		13,217	30,733	22,869		
	Mainstem										14,398			
	Myrtle						20,880	11,243			16,500			
	Rassler					22,742	14,902			12,925	14,550			
	Rock									14,079	14,580			
	Salmon					10				28,615	14,580			
	Simpson					33,953	14,878							
	Wooden Rock						14,800							
	Subtotal	50,000	0	0	0	86,455	110,218	29,043	0	81,709	141,957	22,869	29,946	0

Table C-5. Number of Unfed Fall Chinook Salmon, Coho Salmon, and Winter Steelhead Released as Hatchbox Fry in the Middle Fork Coquille Watershed by Stream and Brood Year From 1980 to 1992.

Species	Stream	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Steelhead	Axe										9,705			
	Big									8,486		2,454	22,272	
	Cove										7,184			
	Endicott			20,000[a]	9,500[a]	9,990[a]		2,933		24,146	20,584	30,930	55,874	
	Mainstem											29,085		
	Myrtle			3,400[a]	9,800[a]	9,800[a]	31,221[h]	15,094		29,491				
	Rassler			10,000[a]	9,900[a]	9,900[a]		10,224		8,521	16,700			
	Rock										7,082			
	tributary to Rock			10,000[a]	9,900[a]	9,950[a]								
	Salmon										1,735			
	Sandy													17,714
	Subtotal	0	0	43,400	39,100	39,640	31,221	28,251	0	70,644	62,990	62,469	78,146	17,714

Numbers represent the total egg allocation minus any egg mortality from the hatchboxes. Numbers rounded off to the nearest hundred are estimated release numbers with no count of egg mortality. Foreign stocks are noted as r=Rogue, a=Alsea, and h=Hybrid between local and foreign stocks.

Table C-6. Harvest Data From Sport Fishing Punch Cards in the Middle Fork Coquille Watershed for Fall Chinook Salmon, Coho Salmon, and Winter Steelhead From 1976 to 1994.

Year	Chinook	Coho	Steelhead
1976	5	6	0
1977	32	20	173
1978	65	19	155
1979	99	6	206
1980	98	9	354
1981	16	0	103
1982	29	3	51
1983	12	0	170
1984	31	3	150
1985	44	24	66
1986	47	22	102
1987	52	0	113
1988	24	4	79
1989	43	12	118
1990	23	0	93
1991	53	0	258
1992	23	0	134
1993	27	8	14
1994	12	0	0

Harvest area is defined as from the mouth to the headwaters.

Table C-7. Fall Chinook Salmon Spawning Peak Counts in the Middle Fork Coquille Watershed From 1961 to 1996.

	Middle Fork		King		Myrtle		Rock		Slater	
Year	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack
1961	70	15								
1962										
1963										
1964	40	5								
1965	49	3								
1966	35	4								
1967	28	3								
1968	14	16								
1969										
1970	77	7								
1971	27	23								
1972	59	16								
1973										
1974	24	12								
1975	40	13								
1976	7	21								
1977	23	7								
1978	47	10								
1979	19	3								
1980	41	18								
1981	55	9								
1982	63	17								
1983										

Table C-7. Fall Chinook Salmon Spawning Peak Counts in the Middle Fork Coquille Watershed From 1961 to 1996.

1984	38	5								
1985	39	6								
1986	51	16								
1987	48	8								
1988	39	4								
1989	29	8								
1990	31	5								
1991	49	7								
1992	108	5								
1993	11	1								
1994	27	1								
1995	52	1								
1996	58	4	0	0	12	1	2	0	46	4

Table C-8. Coho Salmon Spawning Peak Counts in the Middle Fork Coquille Watershed From 1950 to 1996.

	Slater		King		Myrtle		Rock		Big		Sandy	
Year	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack	Adult	Jack
1950									77			
1951									145			
1952									191			
1953									59			
1954									56			
1955									14			
1956									96			
1957									63			
1958	23	5			24		11		17		0	
1959	110	8			30		24		55			
1960	9	6			18		17		11			
1961	35	10			20		36		38			
1962					13		55		73			
1963					13		2		11			
1964	56	16			18		19		95		43	
1965	48	3			29		0		77		54	
1966	36	1			15		13		60		8	
1967					19		2		50		15	
1968	28	2					1		32		8	
1969	9	5			0		3		9		14	
1970	35	4			5		8		7		2	
1971	33	11			0		5		22			
1972	33	4			0		5		3			

Table C-8. Coho Salmon Spawning Peak Counts in the Middle Fork Coquille Watershed From 1950 to 1996.

1973	28	5			0		0		0			
1974	19	16			3		10		49			
1975	24	7			0		5		29			
1976												
1977												
1978	6	1			0				10			
1979												
1980												
1981	6	1										
1982	3	3										
1983	15	8										
1984	24	8										
1985	7	5										
1986	20	4										
1987	11	0										
1988	5	1										
1989	5	1										
1990	9	3										
1991	17	1										
1992	9	9										
1993	14	1										
1994	15	1										
1995	5	1										
1996	30	2	2	0	0	0	0	0				

Appendix D

Hydrology

Table D-1. Drainage Area and Area Above the Outflow of Each Drainage in the Upper Middle Fork Coquille WAU.

Drainage Name	Drainage Area (Square Miles)	Area Above Outflow (Square Miles)
Camas Valley Subwatershed		
Bar Creek^	1.89	1.89
Bingham	17.23	49.43
Camas	16.92	32.20
Upper Coquille^	10.10	10.10
Wildcat^	3.29	3.29
Twelve Mile Subwatershed		
Boulder Creek^	9.46	9.46
Dice Creek^	5.74	5.74
Lower Twelve Mile	11.93	37.55
Upper Twelve Mile^	10.42	10.42
Upper Middle Fork Coquille Subwatershed		
Bear Creek	8.84	95.82
Upper Rock Creek Subwatershed		
East Upper Rock Creek^	3.01	3.01
Upper Upper Rock Creek^	6.18	6.18

^ Denotes individual or headwater watershed.

Table D-2. Rosgen Level I Stream Classification of Selected Streams within the Upper Middle Fork Coquille WAU.

Stream	Stream Reach	Gradient	Level 1 Classification
Boulder Creek	headwaters	>0.10	Aa+
	2nd reach	0.04-0.099	A
	3rd reach	0.001-0.02	C
	at Twelvemile Creek	0.02-0.039	B
Tributary to Boulder Creek	headwaters	0.04-0.099	A
	at Boulder Creek	0.02-0.039	B
Battle Creek	headwaters	0.04-0.099	A
	at the sample point	0.04-0.099	A2
	below the sample point	>0.10	Aa+
Bridge Creek	headwaters	0.04-0.099	A
	middle reach	0.001-0.02	C
	at Twelvemile Creek	>0.10	Aa+
Dice Creek	headwaters	>0.10	Aa+
	at Twelvemile Creek	0.001-0.02	C3
Twelvemile Creek	headwaters	>0.10	Aa+
	2nd reach	0.001-0.02	C or F
	above Dice	0.04-0.099	A3
	Dice to Bridge Creek	0.001-0.02	C or F
	below Bridge Creek	0.02-0.039	B
Slater Creek	headwaters	>0.10	Aa+
	middle reach	0.04-0.099	A
	at the mouth	0.02-0.039	B
Bear Creek	headwaters	0.02-0.039	B
	middle reach	>0.10	Aa+
	at the mouth	>0.10	Aa+

Stream	Stream Reach	Gradient	Level 1 Classification
Panther Creek	headwaters	0.04-0.099	A
	at the mouth	>0.10	Aa+
Noah Creek	headwaters	0.04-0.099	A
	2nd reach	0.02-0.039	B
	3rd reach	0.04-0.099	A
	at the mouth	0.02-0.039	B
Bar Creek	headwaters	0.04-0.099	A
	2nd reach	0.02-0.039	B
	3rd reach	0.04-0.099	A
	at the mouth	0.001-0.02	C or F
Thompson Creek	headwaters	>0.10	Aa+
	2nd reach	0.04-0.099	A
	at the mouth	0.02-0.039	B
Lang Creek	headwaters	>0.10	Aa+
	2nd reach	0.04-0.099	A
	at the mouth	0.02-0.039	B or G
Upper Rock Creek	headwaters	0.04-0.099	A
	2nd reach	>0.10	Aa+
	3rd reach	0.001-0.02	C or F
	4th reach	0.02-0.039	B
	5th reach	0.04-0.099	A
	at the mouth	0.001-0.02	C or F
Middle Fork of the Coquille River	headwaters	0.02-0.039	B
	below Kinnan Lake	0.006	C or F
	Camas Valley	0.006	C or F
	below Camas Valley	0.02-0.039	B
	at the west end of the WAU	0.001-0.02	C or F

Appendix E
Wildlife

APPENDIX E

These steps were followed to reach the guides given in Table 29. It uses information gathered at the Resource Area level. Spotted owl site ranking and general suitable habitat evaluation are the two topics to consider when planning management activities affecting spotted owl suitable habitat.

A. Spotted Owl Site Ranking

1. Gathered information to create Table 21. Values given in Table 21 were from owl survey data and suitable habitat inventory data.

2. Table 21 contains information on historic and current owl sites. The owl sites best representing the territory locations were selected. Usually the number of potential sites is lower than the total number of historic and current sites. The reason is that any one activity center can have more than one alternate location. Usually the area of these different alternate numbers overlap. Some have alternate numbers that are physically in a differed drainage, subwatershed, ownership, or section.

3. Criteria steps **a** through **m**, listed below, were used to group the selected owl sites to determine the rankings.

Criteria list:

a. Areas where owl sites are **not** present would be considered first.

b. If sites cannot be avoided, then sites that have more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with occupancy and history rankings of "3" would be **second**.

c. Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with occupancy and history rankings of "3" would be considered **third**.

d. Sites with an occupancy ranking of "2" and history ranking of "3" would be considered **fourth**.

e. Sites with an occupancy ranking of "3" and history ranking of "2" would be considered **fifth**.

f. Sites with more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with occupancy and history rankings of "2" would be considered **sixth**.

g. Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with occupancy and history rankings of "2" would be considered **seventh**.

h. Sites with more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with an occupancy ranking of "1" and a history value of "2" would be considered **eighth**.

I. Sites with more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with an occupancy ranking of "2" and a history ranking of "1" would be considered **ninth**.

j. Sites with more than 1,000 acres suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with an occupancy ranking of "1" and a history ranking of "2" would be considered **tenth**.

k. Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with an occupancy ranking of "1" and a history ranking of "2" would be considered **eleventh**.

l. Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with an occupancy ranking of "2" and a history ranking of "1" would be considered **twelfth**.

m. Sites with occupancy and history rankings of "1" would be considered **last**.

4. Projects meeting criteria **a**, which is removing or modifying suitable spotted owl habitat outside of known provincial territories would be considered first.

5. Owl territories meeting criteria **b** through **g** were grouped and given a ranking of **one**.

6. Owl territories meeting criteria **h** through **j** were grouped and given a ranking of **two**.

7. Owl territories meeting criteria **k** through **m** were grouped and given a ranking of **three**.

8. The following conditions apply to the individual rankings.

When it is not possible to avoid modifying or removing suitable habitat within a known territory, then sites with "go to" rank of "one" would be first, "two" would be second, and "three" would be last. The ranking in Table 21 for any given owl site number has a different purpose based on Land Use Allocation (LSR or Matrix). For example, a site with a final rank of "1" in Matrix would be considered as a potential area where timber harvesting may occur first. Details of timing, location, and distance from core area would be determined by an ID Team and other staff evaluations. Sites with a rank of "1" in the LSR portion of the WAU would be considered first for habitat evaluation. Details of timing, location, distance from core area, objectives, and treatment would be determined by an ID Team or other staff evaluations.

B. Habitat Evaluation

The concept of habitat evaluation would be applied to the landscape while maintaining objectives for the various Land Use Allocations. Habitat evaluation would describe the timing, location, and spatial distribution of habitat removal or modification on Matrix lands in the WAU. Habitat evaluation may include topics like connectivity of mature and late-successional blocks to other similar blocks and their relationship to topography, the amount of suitable habitat present around spotted owl sites, where the suitable habitat is located, the connectivity of suitable habitat, and the status of dispersal habitat. The function and objectives of critical habitat would be considered in areas where Critical Habitat Units overlap Matrix lands.

In the LSR portion of the WAU, the habitat evaluation would consider current and future forest age classes, location, and connection to similar habitat within or between spotted owl territories across the landscape. This evaluation could locate LSR project areas and actions where manipulation of forest stands could aid reaching old-growth characteristics sooner than if left in the current condition.

Evaluation of the connectivity of suitable habitat would be conducted using aerial photographs of the WAU, seral age class maps, and ground inspections. This way the connection of late-successional blocks and the relationship to topography could be examined. Topography is important because knowing where connectivity is present or lacking and the relationship to riparian systems or uplands may make a difference on its success. Because of the checkerboard ownership, connectivity of the remaining older forest stands is very important. Even avian species capable of flight require connectivity of habitat for moving from one place to another. The ability to move within the forest from one place to another becomes more important to species that require or have dependency on the older age classes, have small territories, or move by crawling or walking across the ground.

The following is an example of steps to evaluate forest connectivity on the landscape. This example deals with owls but the process can be used for other species. This process would involve wildlife biologists, planning, and silviculture specialists.

1. Consider the ranking system. Keep in mind habitat acre thresholds of maintaining 500 acres within 0.7 miles, 1,335 acres within 1.3 miles, or 1,286 acres within 1.2 miles of a spotted owl site and LSR objectives. This data was presented in Table 21 in this watershed analysis.

2. Owl sites would be evaluated using the spatial arrangement of seral age classes within the provincial radii (1.2 or 1.3 miles) around an owl site. In the LSR, the purpose would be to locate areas where manipulation could increase the rate of stand development toward late-successional characteristics. On Matrix lands, the purpose may be to locate areas where manipulation may provide a functional forest corridor and coordinate the timing and spacing of timber harvesting units.

3. Within the WAU, the connectivity of suitable spotted owl habitat within an owl site to other late-successional habitat in the vicinity would be evaluated. Blocks of older age class stands (80 years old and older) and how they are connected to other similar blocks would be analyzed. The following questions and comments would be reviewed and answered.

a. Does the provincial radii of owl sites contain forest stands suitable for harvest (Matrix) or manipulation (LSR/Matrix)? If the ranking table has been completed this information is already available.

b. Will manipulation of forest stands (LSR/Matrix) speed up attaining older age class characteristics to provide connectivity between owl sites and suitable spotted owl habitat?

c. Will timber harvesting of stands reduce connectivity between suitable owl habitat and adjacent habitat?

d. Will manipulation of the stand increase or decrease connectivity between suitable owl habitat and adjacent habitat, between the LSRs and Matrix, or between Connectivity/Diversity Blocks?

e. Where is connectivity needed? In the upland or in the riparian area of the drainage? Both? Is the Riparian Reserve connection adequate to meet objectives?

f. Evaluate and select forest stands to leave without manipulation and the advantages or disadvantages of such a choice (in Matrix or LSR). This could lead to long-term connection of older forest stands across the landscape.

Table E-1. Special Status Wildlife Species in the Upper Middle Fork Coquille WAU.			
SPECIES	**STATUS**	**PRESENCE**	**MONITORING LEVEL**
VERTEBRATES			
FISH			
Coho Salmon (Oncorhynchus kisutch)	FT, SC	D	3
Pacific Lamprey (Lampetra ayresi)	SoC, SV, BS	D	3
Steelhead Trout (Oncorhynchus mykiss)	FC, SV	D	3
AMPHIBIANS AND REPTILES			
Clouded salamander (Aneides ferrous)	SU, AS	D	3
Del Norte salamander (Plethodon elongatus)	S&M, SoC, SV, BS	D	3
Foothill yellow-legged frog (Rana boylii)	SoC, SV, BS	D	3
Northern Red-legged frog (Rana aurora aurora)	SoC, SU, BS	D	3
Southern Torrent salamander (Rhyacotriton variegatus)	SoC, SC, BS	D	3
Tailed frog (Ascaphus truis)	SoC, SV, BS	U	3
Western toad (Bufo boreas)	SV, BT	S	1
California Mountain kingsnake (Lampropeltis zonata)	SV, AS	S	1
Common kingsnake (Lampropeltis getulus)	SV, AS	S	1
Northwestern pond turtle (Clemmys marmorata marmorata)	SoC, SC, BS	D	3
Sharptail snake (Contia tenuis)	SV, AS	D	3
BIRDS			
Harlequin duck (Histrionicus histrionicus)	SoC, BS	U	1
Marbled murrelet (Brachyramphus marmoratus marmoratus)	FT, ST, CH	S	4
Bald eagle (Haliaeetus leucocephalus)	FT, ST	S	1
Northern goshawk (Accipiter gentilis)	SoC, SC, BS	S	3
Peregrine falcon (Falco peregrinus anatum)	FE, ST	D	5
Great gray owl (Strix nebulosa)	S&M, SV, AS	U	1, 5
Northern spotted owl (Strix occidentalis caurina)	FT, ST, CH	D	4
Flammulated owl (Otus flammeolus)	SC, AS	U	1

SPECIES	STATUS	PRESENCE	MONITORING LEVEL
Pygmy owl (Glaucidium gnoma)	SU	D	3
Northern Saw-whet Owl (Aegolius acadicus)	AS	S	1
Acorn Woodpecker (Melanerpes formicivorous)	SU	U	1
Lewis' woodpecker (Melanerpes lewis)	SC, AS	U	1
Pileated woodpecker (Dryocopus pileatus)	SV, AS	S	3
Little willow flycatcher (Empidonax traillii brewsteri)	SoC, BS	S	1
Purple martin (Progne subis)	SC, AS	D	3
Pygmy nuthatch (Sitta pygmae)	SV	U	1
Western bluebird (Sialia mexicana)	SV, AS	D	3
Oregon vesper sparrow (Pooecetes gramineus)	SC, BT	U	1
MAMMALS			
Fringed myotis (Myotis thysanodes)	SoC, SV, BS	D	1
Long-eared Myotis (Myotis evotis)	SoC, BS	D	1
Long-legged Myotis (Myotis volans)	SoC, BS	D	1
Pacific pallid bat (Antrozous pallidus)	SC, AS	D	1
Silver Haired Bat (Lasionycteris noctivagans)	BT	D	1
Townsend's big-eared bat (Corynorhinus townsendii)	SoC, SC, BS	D	1
Yuma Myotis (Myotis yumanensis)	SoC, BS	D	1
Ringtail (Bassariscus astutus)	SU	S	1
American marten (Martes americana)	SC, AS	S	1
Pacific Fisher (Martes pennanti pacifica)	SoC, SC, BS	U	1
California wolverine (Gulo gulo luteus)	SoC, BS	U	1
North American Lynx (Felis lynx canadensis)	FP	U	1
White-footed vole (Arborimus albipes)	SoC, BS, SP	S	1
Red Tree Vole (Arborimus longicaudus)	S&M	D	1, 5
INVERTEBRATES			
Blue-gray taildropper (Prophysaon coeruleum)	S&M	D	3
Oregon shoulderband (Helminthoglypta hertleini)	S&M	S	3
Oregon megomphix (Megomphix hemphilli)	S&M	D	3

SPECIES	STATUS	PRESENCE	MONITORING LEVEL
Papillose taildropper (Prophysaon dubium)	S&M	D	3
Alsea ochrotichian micro caddisfly (Ochrotrichia alsea)	SoC, BS	U	1
Denning's agapetus caddisfly (Agapetus denningi)	SoC, BS	U	1
Vertree's ochrotichian micro caddisfly (Ochrotrichia vertreesi)	SoC, BS	U	1
Franklin's bumblebee (Bombus franklini)	SoC, BS	U	1

STATUS ABBREVIATIONS:	**PRESENCE ABBREVIATIONS**:		
FE -- Federal Endangered	**D** -- Documented by surveys or identified in the field		
FT -- Federal Threatened	**S** -- Suspected, habitat present		
FP -- Federal Proposed	**U** -- Uncertain		
FC -- Federal Candidate			
SoC -- Federal species of concern		December 11, 1998 R.H.Espinosa	
CH -- Critical habitat designated		**MONITORING LEVELS USED TO DOCUMENT SPECIES:**	
SE -- State Endangered		**N** -- No surveys done or planned	
ST -- State Threatened		**1** -- Literature search only	
SC -- ODFW Critical		**2** -- One field search done	
SV -- ODFW Vulnerable		**3** -- Some surveys completed	
SP -- ODFW Peripheral/Naturally Rare		**4** -- Protocol completed	
SU -- ODFW Undetermined		5 -- Habitat Evaluation, no surveys	
BS -- Bureau Sensitive Species (BLM) - This status reflects interim guidelines for former FC1 and FC2 species as per instruction communication from the Oregon state office (March 7, 1996) and IM-OR-97-118 (April 30, 1997).			
AS -- Bureau Assessment Species (BLM)			
BT -- Bureau Tracking species (BLM)	**S&M** — Survey and Manage (ROD)		

Appendix F
Plants

Appendix F

Table F-1. Survey and Manage Plant Species Suspected to Occur in the Upper Middle Fork Coquille WAU.

Species	Survey Strategy			
	1	2	3	4
Vascular plants				
Allotropa virgata	X	X		
Aster vialis	X	X		
Bensoniella oregana[d]	X	X		
Cypripedium fasciculata	X	X		
Cypripedium montanum	X	X		
Fungi				
Rare False Truffles				
Gautieria otthii	X		X	
False Truffles				
Rhizopogon truncatus			X	
Chanterelles				
Cantharellus cibarius[d]			X	X
Cantharellus subalbidus			X	X
Cantharellus tubaeformis[d]			X	X
Rare Chanterelle				
Chantharellus formosus	X		X	
Chanterelles - Gomphus				
Gomphus clavatus			X	
Gomphus floccosus[d]			X	
Gomphus kauffmannii			X	
Tooth Fungi				
Hydnum repandum[d]			X	
Hydnum umbilicatum[d]			X	

Appendix F

Table F-1. Survey and Manage Plant Species Suspected to Occur in the Upper Middle Fork Coquille WAU.

Species	Survey Strategy			
	1	2	3	4
Rare Resupinates and Polypores				
Gyromitra esculenta[d]			X	X
Gyromitra infula			X	X
Otidea leporina			X	
Otidea onotica			X	
Otidea smithii	X		X	
Sarcosoma mexicana[d]			X	
Sarcosoma eximia			X	
Rare Cup Fungi				
Aleuria rhenana	X		X	
Helvella compressa[d]	X		X	
Helvella maculata	X		X	
Coral Fungi				
Clavicorona avellanea[d]			X	
Jelly Mushroom				
Phlogoitis helvelloides[d]			X	X
Lichens				
Rare Leafy (arboreal) Lichens				
Hypogymnia duplicata	X	X	X	
Rare Nitrogen-Fixing Lichens				
Lobaria hallii	X		X	
Pseudocyphellaria rainierensis	X	X	X	

Appendix F

Table F-1. Survey and Manage Plant Species Suspected to Occur in the Upper Middle Fork Coquille WAU.

Species	Survey Strategy			
	1	2	3	4
Nitrogen-fixing Lichens				
Lobaria oregana[d]				X
Lobaria pulmonaria[d]				X
Lobaria scrobiculata[d]				X
Pseudocyphellaria anomala[d]				X
Pseudocyphellaria anthraspis[d]				X
Pseudocyphellaria crocata				X
Sticta limbata				X
Sticta fuliginosa				X
Pannaria saubinettii				X
Peltigera collina				X
Nephroma resupinatum				X

d = Species documented as occurring in the WAU.

Survey Strategies:
1= Manage Known Sites
2= Conduct Surveys Prior to Activities and Manage Sites
3= Conduct Extensive Surveys and Manage Sites
4= Conduct General Regional Surveys

Appendix G

Roads

Table G-1. Roads in the Upper Middle Fork Coquille WAU to Consider Decommissioning.

Road Number	Miles	Subwatershed
28-8-19.06B	0.27	Camas Valley
28-8-33.00A	0.23	Camas Valley
28-8-33.02A	0.28	Camas Valley
28-8-33.03A	0.15	Camas Valley
29-8-9.02A	0.21	Camas Valley
29-8-27.01B	0.10	Camas Valley
29-9-15.00A	0.16	Camas Valley
29-9-15.02A	0.14	Camas Valley
29-9-23.01A	0.50	Camas Valley
29-9-23.03A2	0.17	Camas Valley
29-9-23.06A	0.08	Camas Valley
29-9-26.01A	0.34	Camas Valley
29-9-26.01C	0.50	Camas Valley
29-9-27.04A	0.20	Camas Valley
30-8-4.00B	0.10	Camas Valley
30-8-15.02A	0.31	Twelve Mile
30-8-17.00A	0.29	Twelve Mile
30-8-17.02A	0.16	Twelve Mile
30-8-18.01A	0.20	Twelve Mile
30-8-19.00A	0.23	Twelve Mile
30-8-19.01A	0.23	Twelve Mile
30-8-19.02A	0.16	Twelve Mile
30-8-19.03A	0.16	Twelve Mile
30-8-21.00A	0.32	Twelve Mile
30-8-21.01A	0.10	Twelve Mile
30-8-21.02A	0.22	Twelve Mile

Road Number	Miles	Subwatershed
30-8-21.03A	0.18	Twelve Mile
30-8-29.00B	0.15	Twelve Mile
30-8-29.01A	0.10	Twelve Mile
30-8-29.03A	0.35	Twelve Mile
30-8-29.03B	0.30	Twelve Mile
30-8-29.04A	0.29	Twelve Mile
30-8-29.05A	0.30	Twelve Mile
30-8-32.02A	0.10	Twelve Mile
30-8-32.03A	0.06	Twelve Mile
30-8-33.01A	0.50	Twelve Mile
30-9-24.03A	0.30	Twelve Mile
30-9-25.00A	0.20	Twelve Mile
30-9-25.02B	0.10	Twelve Mile
30-9-25.03A	0.25	Twelve Mile
30-9-34.00A	0.41	Twelve Mile
30-9-34.01A	0.18	Twelve Mile
30-9-35.01A	0.68	Twelve Mile
30-9-35.01B	0.04	Twelve Mile
30-9-35.02B	0.10	Twelve Mile
30-9-35.06A	0.13	Twelve Mile
31-8-5.01A	0.46	Twelve Mile
31-8-5.04A	0.19	Twelve Mile
31-8-7.00A	0.12	Twelve Mile
31-8-7.00B	0.04	Twelve Mile
31-9-1.01A	0.28	Twelve Mile
Total	11.62	

Table G-2. Roads Which Could Either Be Decommissioned or Improved in the Upper Middle Fork Coquille WAU.

Road Number	Miles	Subwatershed
29-8-31.01A	0.40	Camas Valley
Total	0.40	

Table G-3. Roads to Consider Improving in the Upper Middle Fork Coquille WAU.

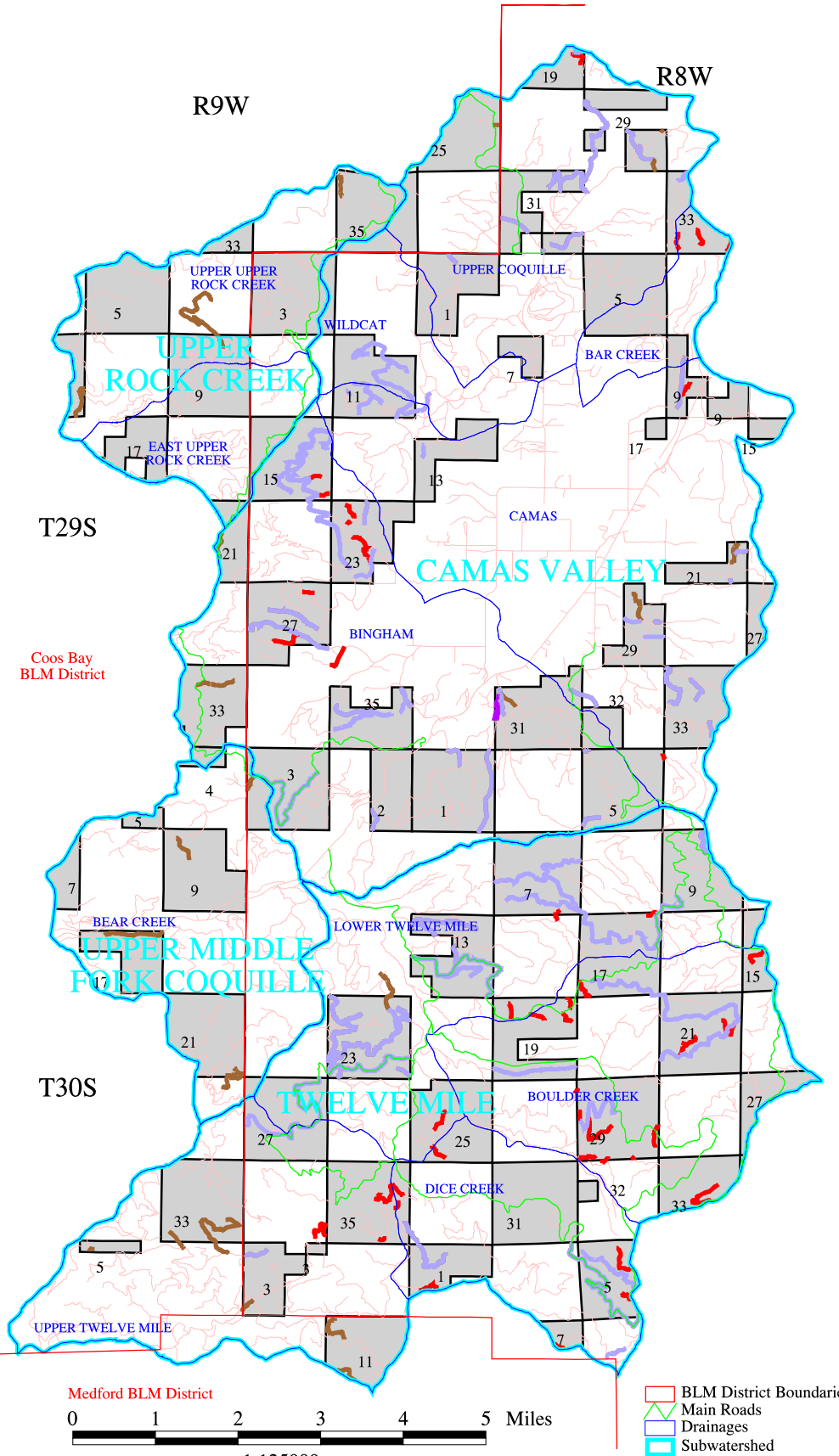
Road Number	Miles	Subwatershed
28-8-19.01A	0.56	Camas Valley
28-8-20.01B3	0.51	Camas Valley
28-8-29.00A	0.27	Camas Valley
28-8-29.02A	0.38	Camas Valley
28-8-31.00A	0.03	Camas Valley
28-8-31.00C	0.16	Camas Valley
28-8-31.01A	0.57	Camas Valley
28-8-31.03B	0.27	Camas Valley
28-8-31.04A	0.84	Camas Valley
28-8-31.05A	0.20	Camas Valley
28-8-32.00A	0.10	Camas Valley
28-8-32.00B	0.60	Camas Valley
28-8-32.00C1	0.40	Camas Valley
28-8-32.00C2	0.33	Camas Valley
28-8-32.00C3	0.22	Camas Valley
29-8-9.00D	0.53	Camas Valley
29-8-9.01A	0.66	Camas Valley
29-8-21.00A	0.10	Camas Valley
29-8-21.02A	0.17	Camas Valley
29-8-29.01C	0.23	Camas Valley
29-8-29.05A	0.24	Camas Valley
29-8-29.05B	0.27	Camas Valley
29-8-30.00B	0.30	Camas Valley
29-8-30.00C	0.30	Camas Valley
29-8-31.00B	0.06	Camas Valley
29-8-31.00C1	0.18	Camas Valley

Road Number	Miles	Subwatershed
29-8-31.00E1	0.28	Camas Valley
29-8-31.01C	1.09	Camas Valley
29-8-33.00A	0.20	Camas Valley
29-8-33.01A	0.30	Camas Valley
29-8-33.02A	0.70	Camas Valley
29-8-33.03A	0.70	Camas Valley
29-8-33.07A	0.40	Camas Valley
29-9-1.00A	0.20	Camas Valley
29-9-11.00A	0.29	Camas Valley
29-9-11.01A	0.38	Camas Valley
29-9-11.02A	0.36	Camas Valley
29-9-12.01C	2.30	Camas Valley
29-9-12.02A	0.00	Camas Valley
29-9-12.02C	1.66	Camas Valley
29-9-13.01A	0.12	Camas Valley
29-9-15.01A	0.84	Camas Valley
29-9-23.00A	0.59	Camas Valley
29-9-23.00C	0.20	Camas Valley
29-9-26.00D	1.60	Camas Valley
29-9-26.00E	2.47	Camas Valley
29-9-27.00A	0.19	Camas Valley
29-9-27.00B	1.00	Camas Valley
29-9-27.01A	0.70	Camas Valley
29-9-35.01B	1.15	Camas Valley
29-9-35.02A	0.70	Camas Valley
29-9-36.00C	2.00	Camas Valley
29-9-36.01B	0.27	Camas Valley

Road Number	Miles	Subwatershed
30-8-5.00A	0.68	Camas Valley
30-9-1.00A	0.30	Camas Valley
30-9-2.02A	0.32	Camas Valley
29-8-29.03E	0.30	Twelve Mile
30-8-8.00A	0.60	Twelve Mile
30-8-9.01B	1.30	Twelve Mile
30-8-9.01C	2.40	Twelve Mile
30-8-29.00A	1.13	Twelve Mile
30-8-29.02B	3.90	Twelve Mile
30-9-11.01B	1.60	Twelve Mile
30-9-11.02B	0.35	Twelve Mile
30-9-13.00A	0.70	Twelve Mile
30-9-13.00B	0.21	Twelve Mile
30-9-13.01A	1.84	Twelve Mile
30-9-13.02A	0.80	Twelve Mile
30-9-13.03A	0.39	Twelve Mile
30-9-13.05A	0.00	Twelve Mile
30-9-23.00A	1.46	Twelve Mile
30-9-23.00B	0.29	Twelve Mile
30-9-23.01A	0.17	Twelve Mile
30-9-23.02A	0.26	Twelve Mile
30-9-23.03B	2.16	Twelve Mile
30-9-23.03C	1.04	Twelve Mile
30-9-23.04B	0.40	Twelve Mile
30-9-23.05A	0.22	Twelve Mile
30-9-23.06A	0.00	Twelve Mile
30-9-24.00B	1.36	Twelve Mile

Road Number	Miles	Subwatershed
30-9-24.00C	1.66	Twelve Mile
30-9-24.00D	0.25	Twelve Mile
30-9-24.02B	1.05	Twelve Mile
30-9-35.03B	1.00	Twelve Mile
31-8-5.00C	0.30	Twelve Mile
31-8-5.02A2	2.48	Twelve Mile
31-8-5.03A	0.68	Twelve Mile
31-9-4.02A	0.49	Twelve Mile
Total	61.26	

Map G-1. Upper Middle Fork Coquille Watershed Analysis Unit Potential Road Treatment Opportunities



0 1 2 3 4 5 Miles

1:125000

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N W E S

- BLM District Boundaries
- Main Roads
- Drainages
- Subwatershed
- Potential Roads for Improving
- Potential Roads for Decommissioning or Improving
- Potential Roads for Decommissioning
- Other BLM Natural Surface Roads
- Roads
- BLM-Administered Land

Appendix H

Aquatic Conservation Strategy and Riparian Reserves

Appendix H
Aquatic Conservation Strategy and Riparian Reserves

The four components of the Aquatic Conservation Strategy are Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems on public lands. The Aquatic Conservation Strategy seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds.

Aquatic Conservation Strategy objectives can be associated or linked with the National Marine Fisheries Service (NMFS) Matrix of Pathways and Indicators. The factors and indicators may relate to one or more of the nine ACS objectives. Including the NMFS factors and indicators in an ACS objective consistency discussion may provide a common link and logic track between the ACS objectives and the effects determination of a proposed project on Federally-listed fish species (i.e. Umpqua River cutthroat trout).

When determining whether activities retard or prevent attainment of Aquatic Conservation Strategy objectives, the scale of analysis typically would be BLM analytical watersheds (Fifth Field Watershed) or similar units (USDI 1995). The time period would be defined as decades to possibly more than a century (USDA and USDI 1994b and USDI 1995).

ACS Objective 1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Pathways/Indicators Used in BA Effects Matrix:

Habitat Elements/Off-Channel Habitat
Habitat Elements/Refugia
Channel Condition/Dynamics/Floodplain Connectivity
Watershed Conditions/Road Density and Location
Watershed Conditions/Disturbance History
Watershed Conditions/Riparian Reserves

ACS Objective 2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Temperature
Water Quality/Chemical Contamination/Nutrients
Habitat Access/Physical Barriers
Habitat Elements/Off-channel Habitat
Habitat Elements/Refugia
Channel Condition/Dynamics/Floodplain Connectivity
Flow/Hydrology/Increase in Drainage Network
Watershed Conditions/Riparian Reserves

ACS Objective 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Pathways/Indicators Used in BA Effects Matrix:

Habitat Elements/Substrate
Habitat Elements/Large Woody Debris
Habitat Elements/Pool Frequency
Habitat Elements/Pool Quality
Habitat Elements/Off-channel Habitat
Channel Condition/Dynamics/Width/Depth Ratio
Channel Condition/Streambank Condition
Channel Condition/Dynamics/Floodplain Connectivity
Watershed Conditions/Road Density and Location
Watershed Conditions/Riparian Reserves

ACS Objective 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Temperature
Water Quality/Sediment/Turbidity
Water Quality/Chemical Contamination/Nutrients
Watershed Conditions/Riparian Reserves

ACS Objective 5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Sediment/Turbidity
Habitat Elements/Substrate
Habitat Elements/Pool Quality
Flow/Hydrology/Change in Peak/Base Flow
Flow/Hydrology/Increase in Drainage Network
Watershed Conditions/Road Density and Location
Watershed Conditions/Disturbance History
Watershed Conditions/Riparian Reserves

ACS Objective 6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Sediment/Turbidity
Habitat Access/Physical Barriers
Habitat Elements/Large Woody Debris
Habitat Elements/Pool Quality
Habitat Elements/Off-channel Habitat
Channel Condition/Dynamics/Floodplain Connectivity
Flow/Hydrology/Change in Peak/Base Flow
Flow/Hydrology/Increase in Drainage Network

ACS Objective 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Pathways/Indicators Used in BA Effects Matrix:

Channel Condition/Dynamics/Floodplain Connectivity
Flow/Hydrology/Change in Peak/Base Flow
Flow/Hydrology/Increase in Drainage Network

ACS Objective 8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Temperature
Water Quality/Sediment/Turbidity
Water Quality/Chemical Contamination/Nutrients
Habitat Elements/Substrate
Habitat Elements/Large Woody Debris
Habitat Elements/Pool Frequency
Habitat Elements/Off-Channel Habitat
Channel Condition/Dynamics/Width/Depth Ratio
Channel Condition/Streambank Condition
Channel Condition/Dynamics/Floodplain Connectivity
Watershed Conditions/Riparian Reserves

ACS Objective 9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

Pathways/Indicators Used in BA Effects Matrix:

Water Quality/Temperature
Water Quality/Sediment/Turbidity
Water Quality/Chemical Contamination/Nutrients
Habitat Access/Physical Barriers
Habitat Elements/Substrate
Habitat Elements/Large Woody Debris
Habitat Elements/Pool Frequency
Habitat Elements/Pool Quality
Habitat Elements/Off-channel Habitat
Habitat Elements/Refugia
Channel Condition/Dynamics/Width/Depth Ratio
Channel Condition/Streambank Condition
Channel Condition/Dynamics/Floodplain Connectivity
Watershed Conditions/Riparian Reserves

Riparian Reserves are associated in the NMFS Matrix of Pathways and Indicators with seven of the nine Aquatic Conservation Strategy objectives. Riparian Reserves generally parallel the stream network, but include other areas necessary for maintaining hydrologic, geomorphic and ecological processes that directly affect streams, stream processes and fish habitats. Riparian Reserves are expected to provide benefits including:

- maintaining streambank integrity (ACS objectives 3, 8 and 9)
- maintaining and recruiting large woody debris and other vegetative debris to provide aquatic habitat and filter suspended sediments. The trapped sediments would absorb and store water. This water would be available during summer months to supplement low summer flows. (ACS objectives 3, 5, 6 and 8)
- the large woody debris would help regulate streamflows by dissipating energy, thus moderating peak streamflows and protecting the morphology of stream channels (ACS objectives 3, 8 and 9)
- providing a nutrient source and water for aquatic and terrestrial species (ACS objectives 2, 4, 8 and 9)
- maintaining shade and riparian climate (ACS objectives 2, 4, 8 and 9)
- providing sediment filtration from upslope activities (ACS objectives 5, 6, 8 and 9)
- enhancing habitat for species dependent on the transition zone between upslope and riparian areas (ACS objectives 1, 2, 4, 8 and 9)
- improving travel and dispersal corridors for terrestrial animals and plants and providing greater connectivity within the watershed (ACS objectives 1, 2, 3, 6 and 8)
- maintaining surface and ground water systems as exchange areas for water, sediment, and nutrients (ACS objectives 2, 4, 6 and 8)
- providing for the creation of and maintenance of pool habitat, both for frequency and quality (ACS objectives 3, 6, 8 and 9)
- providing lateral, longitudinal, and drainage network connections, which include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia (ACS objectives 1, 2, 6, 7, 8 and 9).

Appendix I
Timber Harvesting

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A long range timber harvesting plan has been initiated for the South River Resource Area. The timber harvesting planning went through a rigorous process to determine suitable timber harvesting locations. This process continues to be refined.

The first step in the selection process of potential harvest areas was to identify all available and suitable stands. Information from GIS was used to identify Matrix lands greater than 80 years old and not located in reserved areas, such as Riparian Reserves, LSRs, TPCC Nonsuitable Woodland areas, owl core areas, or other administratively withdrawn areas, which were identified as being potential harvest areas. Birthdates (Dk) in the Forest Operation Inventory (FOI) were used to determine which stands were greater than 80 years old.

Interpretation of aerial photographs and GIS themes were used to identify suitable harvest areas and define logical unit boundaries. Unit boundaries were established within subwatershed (sixth field watershed) boundaries. Small areas (generally less than two acres) were not mapped as harvestable unless they could be harvested from an existing road. Some stands greater than 80 years old did not appear (as determined by aerial photograph interpretation) to have enough merchantable trees to make a viable unit after retention tree requirements were met. Those areas were not identified for harvesting at this time.

The identified harvest units were digitized into a GIS theme. The digitized harvest units were used to develop a timber sale plan through the year 2004 by attempting to balance timber harvesting equally across all watersheds in the South River Resource Area over time. The timber sale plan assumed timber harvesting would occur in each subwatershed at a level proportional to the number of acres currently available for timber harvesting, with one-third of the available acres in GFMA planned to be harvested in each of the first three decades. Timber harvesting of approximately 1,200 acres per decade was planned within Connectivity/Diversity Blocks in the resource area while maintaining 25 to 30 percent of each Connectivity/Diversity Block in late-successional forests.

Another step was to rank each subwatershed's relative importance to the terrestrial wildlife, hydrology, and fisheries resources. The goals were to identify subwatersheds or areas within a subwatershed where delaying timber harvesting would benefit a resource and what subwatersheds would be impacted the least by timber harvests. In general, subwatersheds with the least amount of BLM-administered land and the fewest available acres for timber harvesting were identified as the places to plan timber harvests first.

The latest step was to evaluate all available timber harvesting units previously identified where harvesting could occur with acceptable impacts to the wildlife, hydrology, and fisheries resources. Potential priority timber harvesting units were areas that did not have obvious conflicts with wildlife, fisheries, or hydrology and were considered to be physically harvestable. Changes to unit size and shape would be anticipated after extensive field review. Other areas having some concern from

wildlife, fisheries, or hydrology, generally, would be considered for timber harvesting after the priority areas. Although, occasions may occur where a lower priority area for timber harvesting may be harvested before a higher priority area, such as if including a lower priority unit in a sale would allow decommissioning of a road facilitating recovery of a larger area.