Watershed Analysis

Middle Main Coquille
North Coquille Mouth
Catching Creek

Umpqua Resource Area
Coos Bay District
Bureau of Land Management

North Bend, Oregon

September 30, 1997

ver. 1.1

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TABLE OF CONTENTS

LIST OF MAPS

With respect to use of all GIS maps included or referred to in this document: no warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

INTRODUCTION

Watershed analysis is a procedure used to characterize the human, aquatic, riparian, and terrestrial features, conditions, processes, and interactions . . . within the watershed. It provides a systematic way to understand and organize ecosystem information. In so doing, watershed analysis enhances our ability to estimate direct, indirect and cumulative effects of our management activities and guide the general type, location, and sequence of appropriate management activates within a watershed . . . Watershed analysis is not a decision making process. Rather it is a stage-setting process. The results of watershed analyzes establish the context for subsequent decision making processes, including planning, project development and regulatory compliance. From the introduction to Ecosystem Analysis at the Watershed Scale, Federal Guide for Watershed Analysis Aug. 1995, Ver. 2.2.

Within this context, the watershed analysis team went beyond just providing information and recommendations for developing project EAs under the current management plan. This document also includes recommendations that would either require a plan amendment, or need to be deferred until the next planning cycle before they could be considered through the NEPA process. This approach reflects the fact that ecosystem management is a young management philosophy, and an ongoing discussion on how to approach ecosystem management is necessary if we are to refine and improve our practices over time. Those recommendations that we cannot act on during this decade can serve to stimulate internal discussion on what should be in a second generation ecosystem management plan.

The Analysis Area

The analysis area includes 3 subwatersheds: North Coquille Mouth, Middle Main Coquille, and Catching Creek. North Coquille Mouth Subwatershed is part of the North Fork Coquille 5th field watershed. Middle Main Coquille, and Catching Creek Subwatersheds together make up the Middle Main Coquille 5th field watershed. See Map Intro-1: Watershed Hierarchy. The 3 subwatersheds are analyzed together because they are all directly connected to each other, and have many characteristics in common. The towns of Coquille, Myrtle Point and Arago are inside the assessment area. Highway 42 and the Southern Pacific Rail Road right-of-way pass through the assessment area.

Table Intro-1: Acres by Subwatershed and Drainage (all ownerships)

Acres by drainage in the Middle Main Coquille Subwatershed	Main Coquille River Drainage	41,208 ac.	Total acres in the Middle Main Coquille 5th field watershed:
	Cunningham Creek Drainage	9,190 ac.	
Total for Middle Main Subwatershed		**50,399 ac.**	
Acres by drainage in the Catching Creek Subwatershed	Catching Creek Drainage	20,255 ac.	
Total for Catching Creek Main Subwatershed	**(drainage = subwatershed)**	**20,255 ac.**	**70,657 ac.**
Acres by drainage in the North Coquille Mouth Subwatershed	Echo Valley Drainage	15,449 ac.	
	Llewellyn Creek Drainage	1,697 ac.	
	Johns Creek Drainage	1,788 ac.	
Total for North Coquille Mouth Subwatershed		**18,933 ac.**	
Total for the assessment area covered in this analysis			**89,590 ac.**

Table Intro-2: BLM Acres by Subwatershed and Drainage

Acres by drainage in the Middle Main Coquille Subwatershed	Main Coquille River Drainage	258 ac.	Total acres in the Middle Main Coquille 5th field watershed:
	Cunningham Creek Drainage	2,045 ac.	
Total for Middle Main Subwatershed		**2,303 ac.**	
Acres by drainage in the Catching Creek Subwatershed	Catching Creek Drainage	224 ac.	
Total for Catching Creek Main Subwatershed	**(drainage = subwatershed)**	**224 ac.**	**2,527 ac.**
Acres by drainage in the North Coquille Mouth Subwatershed	Echo Valley Drainage	1,829 ac.	
	Llewellyn Creek Drainage	364 ac.	
	Johns Creek Drainage	1,008 ac.	
Total for North Coquille Mouth Subwatershed		**3,201 ac.**	
Total for the assessment area covered in this analysis			**5,728 ac.**

See Map Intro-2: Drainages and Total Acres per Drainage. For the remainder of this document, the terms "assessment area" and "the area" refer to the 3 subwatersheds.

Coos Bay District-BLM administers 6.4% of the assessment area. The assessment area contains neither Late-Successional Reserve nor Marble Murrelet Reserves. See Map Intro-3: Land Use Allocation.

Table Intro-3: Private and Federal Ownership

Ownership		Acres	% of Watershed
Federal	CBWR	4,136	
	O & C	1,122	
	PD	471	
Subtotal		5,729	6%
Private		83,588	94%
Total		89,588	100%

Table Intro-4: BLM Land Use Allocations (before Riparian Reserves are subtracted)

Land Use Allocation	Acres (From GIS Data)	Percent of BLM land
Connectivity	113 acres	2%
General Forest Management Area	5,615 acres	98%
Total	5,728 acres	100%

All acre figures in this document are from GIS data. Minor acre discrepancies in the document, and the differences between GIS and traversed acres are attributable to query sequence, rounding, the method used to resolve artifacts and slivers, and digitizing inconsistences. The BLM data base does not cover the entire assessment area. BLM administered land is covered. As a result, we cannot generate many statistics found in previous watershed analyzes like total miles of road, miles of road on private, road densities on land other than BLM, total stream miles *etc*.

Additional Reading
The following documents will help place the assessment area into the landscape/ basin scale context:

Interrain Pacific. 1996. *Coquille Subbasin Working Atlas: an Introduction to Available Geographic Information*, prepared for the Coquille Watershed Assoc. With grant from Oregon Watershed Health Program. Portland, OR. 33 p.
Proctor, C.M., *et al.* 1980. *An Ecological Characterization of the Pacific Northwest Coastal Region*. 5 vol. U.S. Fish and Wildlife Service, Biological Service Program. FWS/OBS-79/11 through 79/15.
USDI. 1978. *Burnt Mountain Area Unit Resource Analysis*. On file Coos Bay Dist.-BLM, North Bend OR.

ISSUES AND KEY QUESTIONS

Which specific road segments should be closed to meet the District's maximum density goal of 2.9 mile/square mile, and the 1.1 mile/ square mile goal set for the Tioga Game Management Unit?

Road segment specific recommendations will be delayed until the supporting data set for the Transportation Management Objectives (TMO) is completed. BLM has control on only a few roads inside this assessment area. Other watersheds (with LSRs, more Riparian Reserves and less stable ground) are a higher priority for completing TMO's and closing roads. Therefore, recommend completing TMO's and starting road closure work in the higher priority watersheds before starting inside this assessment area.

What types of restoration efforts can BLM implement to improve fisheries/riparian habitats in both the long and short terms?

*See **SPECIES and HABITAT: AQUATIC**, and **STREAM CHANNELS** sections. The **EROSION** section covers sedimentation.*

Given that public lands administered by BLM contain few fish-bearing stream reaches, what areas would provide the greatest opportunities for restoration efforts in cooperation with private landowners (timber and agriculture) or the Coquille Watershed Association?

*See **SPECIES and HABITAT: AQUATIC**.*

In what order should we harvest units in the Matrix to keep fragmentation to a minimum?

*Most remaining 80-year old and older stands in the assessment area are in a reserve or administratively withdrawn. Most opportunities to meet the RMP/ROD economic objectives on Matrix lands are hardwood conversions and thinnings. See **VEGETATION**, and **SPECIES and HABITAT: WILDLIFE** sections.*

Middle Main Coquille 5th Field Watershed: The percent of BLM forest lands in stands 80-years old and older is too small to allow additional regeneration harvest before 2017. Treatments favoring the development of late-successional attributes (that are compatible with the Aquatic Conservation Strategy) inside the Riparian Reserve are recommended.

North Fork Coquille 5th Field Watershed[1]: We exceed the 15% rule objectives in this 5th field watershed based on the acres of 80-year old stands contained in the reserves. The remaining late-successional stands, in Matrix portion of this 5th field watershed, are few, small, and scattered. These conditions offered few options for planning a meaningful order to selling timber.

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[1] specific to North Coquille Mouth Subwatershed and generally supplements previous watershed analysis work

Which areas are the highest priorities for noxious weed treatment?

*See **SPECIES AND HABITATS: NOXIOUS WEEDS**.*

Which road segments should be closed, repaired, or modified to minimize management caused fine sediment delivery to the streams?

*See the **EROSION** section and supporting appendices. Recommendations specifying road segments for closing are delayed until the supporting data set for the TMO's is completed.*

Which specific culverts should be replaced because they are either failing or undersized?

*See **SPECIES and HABITAT: AQUATIC**. Additional culverts may be identified after the culvert survey for this subwatershed is completed.*

Which culverts presently block fish passage within the subwatershed?

*See **SPECIES and HABITAT: AQUATIC**. Additional culverts may be identified after the culvert survey for this subwatershed is completed.*

Where are the candidate areas for modifying the Riparian Reserve widths?

*See **EROSION PROCESSES** for identification of candidate areas based on slope stability. The J2 species to survey for before modifying Interim Riparian Reserve widths were identified in the **Riparian Reserve Appendix**, and are listed in the recommendations. Final recommendations await site specific evaluation at the project scale.*

CHAPTER 1: EROSION PROCESSES

Characterization

Environmental Geology of Western Coos and Douglas Counties by Beaulieu & Hughes (1975) is a fundamental reference on the geologic hazards found in the assessment area. Maps in that publication show past earthflows and slumps, and slide hazard areas. *Slope Stability in Road Construction,* by Burroughs *et al.* (1976) discusses the erosion processes in detail. Map Erod-1 shows major geological features inside the assessment area. However, the reader should use the geology maps by Baldwin *et al.* (1973), and Bealieu & Hughes (1975) for critical work.

Table Erod-1: Dominant Erosion Processes and their Locations Within the Subwatershed

Erosion Processes	Location
Very large persistent deep-seated slumps	Areas mapped as Quaternary landslide debris by Beaulieu & Hughes (1975). These features are most common on 15% to 30% slopes within the Roseburg (sedimentary member) Coaledo, and Otter Point Formations. Within these large features, small debris avalanches on the scarp, and small deep-seated failures elsewhere (particularly on the slump's toe) occasionally occur.
Chronic Erosion	Soil creep is the dominant erosion process outside of the alluvial and terrace deposit areas. Fine sediment bleeding into streams occurs where streams pass through deep-seated failures. Surface erosion is associated with unvegetated cuts, fills, ditches, dirt road surfaces, and where activities expose bare soil.
Stream bank erosion	Occurs most commonly along poorly vegetated reaches on the outside bends. Stream bank erosion is the dominant naturally occurring erosion process on alluvial deposit and terrace areas.

Map Erod-2 shows predicted landslide potential based on soil mapping units. The 1992 aerial photos show recent landslides are not common. Most slides are small or very small, and occur on steeper ground. The upper member of the Coaledo Formation is the area most prone to debris avalanches and sporadic small slumps with 0.6 slides/100 acres showing on the 1992 photos.

Table Erod-2: Soil Mapping Units Classified as Moderate to High Landslide Potential When Preparing Map Erod-2: Landslide Potential Based on Soil Mapping Units.

Soil mapping units with potential for debris avalanche. Slides from these soils may deliver sandy sediment and gravel to streams.		Soils with potential for slumping/debris flow. Sediment derived from these soils are high in silt and clay.	
Digger-Preacher-Umpcoos assoc. 50-90%	2,536 ac	Etelka-Remote 50-70%	704 ac
Digger-Umpcoos-rockland assoc. 50-80%	562 ac	Etelka-Whobrey-Remote complex 30-60%	6162 ac
Harrington very gravelly loam 50-70%	508 ac	Rinearson silt loam 50-70%	1,362 ac
		Remote loam 50-70%	828 ac
		Preacher-Bohannon 60-90%	1,593 ac

Current Conditions

The winter 1996-97 storms caused very little damage to BLM roads inside this assessment area. Only 2 sites were proposed as ERFO projects. Long time observers have seen few road failures on the BLM

roads in this assessment area. Most failures are related to bank slough, plugged culverts and other maintenance problems, or occurred on old roads built to lower standards than those used today. The most notable exceptions are roads built on Etelka and Whobrey soils, which are particularly prone to slumps and earth flows (see Map Erod-3). Very large slump features characterize landscapes containing those two soils. Sites with these soils are mapped in the Coos County Soil Survey (Haagen 1989) and are described in the Erosion Processes Appendix under Local Observations on Soils and Geology. The Lower South Fork Watershed Analysis (USDI 1996), to the east of the assessment area, noted Whobrey and Etelka soils exhibiting severe shrink-swell characteristics. This characteristic can cause culvert failures by either crushing the culverts or causing the culverts to shift out of the alignment with the stream. Other soils found in the assessment area also exhibit severe shrink-swell and low strength characteristics (Haagen 1989).

Excluding very large persistent deep-seated slumps, only 182 slides (0.2 slides/100 acres) were found inside the assessment area through examining the 1992 aerial photos. Of these, 91% were smaller than 0.10 acre. Sixty-three percent of the slides are associated with recent yarding, and 16% with roads. About a third of the landslides delivered sediment to streams, of which over half originated in recently cut units. In absolute terms, current forest land management related landsliding is probably a minor sediment source inside this assessment area (Erosion Processes Appendix).

The Timber Production Capability Classification (TPCC) fragility component for BLM lands shows:

- 123 acres are unsuitable for timber management due to steep unstable slopes (FGNW).
- 1,380 acres are suitable for timber management with restrictions due to slope gradient (FGR1, FGR2, and FPGR1).
- 214 acres suitable for timber management with restrictions due to other site conditions.
- 21 acres are nonforest because of power line right-of-way (NU).
- 3,983 acres are nonproblem with respect to site fragility.

Fragile gradient BLM lands are shown on Map Erod-4. See also the Erosion Processes Appendix.

Table Erod-3: Road Miles and Densities by Drainage (table does not include non-road features [TRZ])

Drainage	BLM administered lands		non-BLM lands		subwatershed totals		
	road miles	road density (mi/sq. mi.)	road miles	road density (mi/sq. mi.)	road miles	road density (mi/sq. mi.)	notes
Cunningham Ck.	9.1	2.86	>65.1	----	>74.3	----	*
Echo Valley	12.0	4.19	>101.6	----	>113.6	----	**
Llewellyn Ck.	2.9	5.04	>4.1	----	>7.0	----	***
Johns Ck.	8.3	5.30	5.4	4.40	13.7	4.89	
Main Coquille R.	1.4	3.50	----	----		----	****
Catching Ck.	0.4	1.23	>72.6	----	>73.1	----	*****
totals	**34.1**	**3.82**	**----**	**----**		**----**	****

* Underestimated values for non-BLM & totals. No road data for approximately 2.25 square miles in this drainage
** Underestimated values for non-BLM & totals. No road data for approximately 2.5 square miles in this drainage
*** Underestimated values for non-BLM & totals. No road data for approximately 0.25 square miles in this drainage
**** Underestimated values for non-BLM & totals. No road data for approximately 7 square miles in this drainage
***** Insufficient road data to estimate either road miles or densities on non-BLM land in this drainage

Table Erod-4: Road Miles and Densities by Surface Type Inside the Assessment Area

		BLM administered lands		non-BLM lands		assessment area totals	
		road miles	road density (mi/sq. mi.)	road miles	road density (mi/sq. mi.)	road miles	road density (mi/sq. mi.)
BLM	BST	0.4	0.05	0.0	0.00	0.4	<0.01
	Rock	19.9	2.22	3.1	0.02	23.0	0.16
	Natural	2.9	0.32	0.4	<0.01	3.2	0.02
	Unknown	0.0	0.00	0.0	0.00	0.0	0.00
Private/other	BST	0.0	0.00	----	----	----	----
	Rock	0.0	0.00	----	----	----	----
	Natural	1.2	0.14	----	----	----	----
	Unknown	0.0	0.00	----	----	----	----
BLM, PVT, Other	No Data*	10.7	1.19	----	----	----	----
totals **		**35.1**	**3.92**	**----**	**----**	**----**	**----**

--- Insufficient data for roads on private land to estimate miles of road accurately or calculate road densities by surface type.
* This will include county and state paved roads. GIS data base does not include surface type for most non-BLM roads.
** totals here differ from totals in Table Erod-3 due to differences in query sequence and the affect of breaking out data by drainage.

Reference Conditions

The historical erosion processes are earth flows, rotational slumps, soil creep, and chronic bleeding of fine sediments into streams that pass through deep-seated slumps. Debris avalanches or debris torrents were generally not common, but were probably locally important in steep headwalls near contacts between geologic formations (Erosion Process Appendix). Peak erosion periods were associated with high intensity storms. These historical erosion processes occurred in the same locations noted in the erosion characterization section. Under undisturbed conditions, overland flow is rare in the Coast Range. The vegetation canopy, duff and litter layers, and the topsoil's naturally high infiltration rates all reduce surface runoff (Craig Garland per. com.)

Extremely large, but infrequent erosional episodes were associated with major earthquakes, causing large deep-seated slumps (Lloyd Fritz per. com.), and large stand-replacing fires. Surface erosion peaks in the first winter following the fire. The risk for earthflows, and debris avalanches peaks 3 to 5 years after the fire before tapering off. The mass failure pattern corresponds to root strength loss and recovery following vegetation mortality and subsequent reoccupation of the site by regeneration (Burroughs *et al.*. 1976; Swanson *et al.* 1982; Swanston and Swanson 1976).

Synthesis and Interpretation

Affects of logging practices: Tractor logging without designated skid trails was common before the 1970's, which resulted in exposed mineral soil and compacted soils. Soil compaction reduced water infiltration rates, which in turn, resulted in overland flow causing surface and gully erosion. A greater reliance on cable systems, and the shift to bull-lining logs to designated tractor skid trails during the 1970s and 1980s resulted in less surface disturbance. The trend on gentle and some moderate sloped sites is now to use low ground pressure, ground-based logging equipment, designed to log with a minimum of passes and to travel over slash, rather than exposed cat trails. With the current emphasis on late seral habitat issues and ecosystem management, researchers have put little time into independently verifying claims that the new ground-based equipment causes little soil damage. The Oregon State University Forest Engineering Department only recently begun studies on the effect of highly mechanized ground-based logging systems on soils. Preliminary results show compaction from

historical logging operations on the study site remains significant, but there is no current erosion, and growth effects are unknown[2]. Compaction added to those sites by recent mechanized thinnings varies from negligible to moderate, with no resulting erosion (Adams 1997).

Affects of agricultural practices: Agricultural trend data are not available specific to the assessment area, but trends for Coos County are likely to be representative. Pioneer families grew potatoes as a cash crop, and the best growing sites were along stream banks. Muddy roads were the major impediment to getting potatoes to market. In the 1890's, farmers switched to livestock because the soils no longer supported potato production (Peterson; Powers 1977). About 70 years ago, willow and cottonwood occupied much of the Coquille River flood plain. Landowners could contract with one of several companies that specialized in clearing bottom lands for conversion to agriculture[3]. In 1950, farm land use was 50,000 acres of tillable land and 240,000 of grazing land. Much of the grazing was on cut-over land (Peterson; Powers 1977) and the 1978 Census of Agriculture showed 100,000 acres of permanent pasture. Of that, 40,000 acres are on flood plains and the rest upland. In 1980, 688 acres of cranberries (all outside the assessment area), and 200 acres of horticultural and related crops were grown in Coos County (Haagen 1989). The potential for sediment delivery increased with land clearing and row cropping, but declined with the reduction of tilled acres and conversion of land from grazing to forestry.

Impediments to reducing sediment yields from agriculture lands are over-grazing on hobby farms, economic pressures that discourage leaving stream buffers that take land "out of production," and a reluctance to leave trees on stream banks because of the belief that stream bank erosion is increased when trees fall over.

Policy and regulation changes: The most significant changes between historical and current human-caused erosion are not unique to this subwatershed. The 1971 Oregon Forest Practices Act and subsequent revisions have resulted in incremental improvements in road construction methods and stream/riparian vegetation protection on private land. Federal land management practices have also changed over the years, resulting in reduced soil erosion and subsequent sediment delivery to streams. See the Erosion Appendix for a list of changes since 1969 affecting the Coos Bay District.

Naturally occurring soil-creep and stream bank erosion, and management related surface erosion are probably the most important sediment sources today. Based on what is readily visible on 1:12,000 scale aerial photographs taken in 1992, the greatest potential for sediment delivery are:

- Cat logging near streams without designated skid trails.
- New construction near streams.
- Industrial sites where heavy equipment expose bare soil in sorting/storage yards next to streams.
- Cat trails, dirt roads and poorly maintained roads that intersect or closely parallel streams.
- Aggressive cat site preparation next to streams on moderate slopes.
- Banks denuded of vegetation along the major streams.

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[2] In a study financed by the BLM, Froehlich and Berglund (1976) found 60% of the trees on heavily compacted sites had lower growth rates after thinning than before. On a moderately compacted site, 14% of the trees grew slower after thinning than before. Those sites were tractor logged following conventional practices for the late 1950s and 1960s. Froehlich and Berglund recommended designating skid trails before falling, falling trees to lead, use fewer trails, and winching logs to the trails. Froehlich and Berglund cite other papers documenting growth loss associated with conventional cat logging methods.

[3] Information related to John Fields, BLM employee, by Red Watson, long time resident.

Usually, verifying and quantifying sediment delivery from these potential sources requires entry onto private property. The state, county and local governments regulate these activities, and require protection measures. Consequently, sediment delivery is probably lower today than in the recent past. See the Erosion Processes Appendix for background on forest practices regulation.

Road-associated sediment delivery: Road prism erosion occurs everywhere and, excluding special problem areas, road surface erosion has the greatest potential to enter streams as sediment where roads cross streams or where roads parallel streams within 200 feet (Washington Forest Practices Board 1992). Given the naturally heavy vegetation cover in the assessment area, most sediment deliveries are from sites much closer than 200 feet from streams. The analysis for the Upper Middle Umpqua Subwatershed (USDI 1997) showed that the 3 most important variables affecting sediment delivery from road prisms are the road surface type, the amount of road use, and the timeliness of road maintenance. Map Erod-5, prepared using GIS, shows many of the roads in the assessment area closely parallel streams. This map also shows 984 places, marked with red dots, where roads cross streams. This data set covers only about half of the assessment area. Based on observations, the high traffic county roads are either paved or rocked. The county does have at least one natural surface road accessing the upper end of Catching Creek. Since most of the roads are privately owned and on private land, they were not systematically evaluated for this assessment. The private roads run the range from well-maintained gravel roads to unmaintained dirt tracks. Therefore, some non-BLM road segments within 200 feet of streams and culverts could be significant contributors of sediment to streams. Private land owners interested in controlling sediment delivery from their roads can identify problem road segments and repair/upgrade priorities by using culvert inventories and road surface erosion evaluations. The Coquille Watershed Association is currently inventorying culverts on private land. BLM planned to inventory culverts in the assessment area for FY 97, but reassigned the staff to do emergency storm repair.

Eliminating roads and surfacing roads both reduce sediment at the source. Eliminating roads is practical where roads are not needed, and surfacing is practical when the controlling interest can afford the cost and maintenance. Establishing and maintaining riparian vegetation is a less costly option for the private landowner with limited resources, and may be the best option in those cases where upland soil disturbance is unavoidable or where soil disturbance is unrelated to roads.

The risks of resource damage attributable to BLM controlled roads are lower here than in the other watersheds/subwatersheds evaluated through watershed analysis on the Umpqua Resource Area. Because there are few BLM controlled roads, the overall risk for debris avalanches and earth flows entering streams on BLM is low, as is the risk of sediment delivery from a BLM controlled road due to a catastrophic failure. The most obvious road problems are where roads were built on Whobrey and Etelka soils, but there are few instances where BLM built a road on those soils. Therefore, this area should be a low priority for completing TMOs.

Reciprocal right-of-way agreements will limit options for closing BLM controlled roads accessing private land. In those cases, options are limited to using vegetation to filter runoff, engineering solutions, and maintenance. See the North Coquille Watershed Analysis (USDI 1995), Section VIII. Road Access (Issue #8) for discussion on reciprocal right-of-way agreements.

Influences and interactions between erosion processes and other ecosystem processes: Whobrey soils are very productive, but trees that grow on this soil type are prone to blow down due to a shallow rooting depth. On more exposed areas this can limit options for partial canopy and green tree retention,

and makes careful consideration of thinning prescriptions critical. Streams that pass through Whobrey and Etelka soils or through deep-seated slumps normally have higher suspended sediment levels compared with streams on land underlain by sandstone or basalt.

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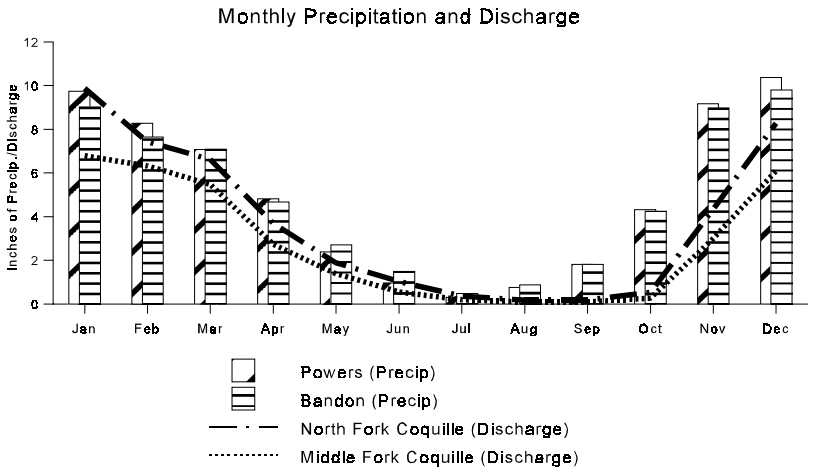
CHAPTER 2 - HYDROLOGY

Characterization

Precipitation in the form of rain dominates the hydrology of the watershed. The watershed does occasionally receive snow, but the quantity and duration does not normally lead to rain-on-snow events. The peak flows, low flows, annual flows, and groundwater levels are all dependent on the amount, intensity and distribution of rainfall as well as the basin geology and geomorphology. The close correlation between precipitation and runoff indicates that this system rapidly translates rainfall into runoff due to a high drainage density, low bedrock permeability, coarse textured, shallow soils, high precipitation, and steep slopes.

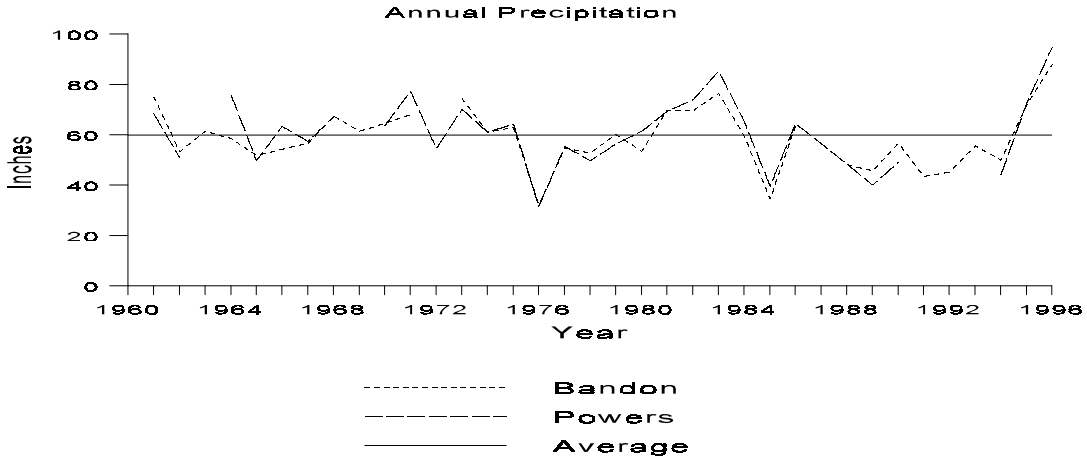
Current Conditions

The average annual precipitation is approximately 68 inches, which results in an average runoff of approximately 40-45 inches annually. Graph Hyd 1 illustrates that the precipitation pattern and the distribution of annual runoff is directly related. Thus, the peak flows are observed during the winter months and low flows in the summer.



Graph Hyd. 1

Flooding is a relatively common occurrence and is particularly severe and widespread downstream from Myrtle Point. High tides and intense storms contribute to the intensity of flood events. The floodplain extends from Bandon to Broadbent on the South Fork and up to Middle Creek on the North Fork and Elk Creek on the East Fork, and nearly all of the floodplain is agricultural land. Since the seasonal rainfall pattern is consistent through time, the major factors controlling runoff/flooding are the amount and timing of annual rainfall. Graph Hyd 2 shows the year to year variation of precipitation. The graph shows that the early 1980's were wetter than average, and the mid-1980's to 1994 were below average. Starting in 1995, this pattern has begun to change with above average precipitation falling throughout 1996 and into 1997. The most recent flooding occurred in November 1996 when an extremely intense storm system dropped 8.87 inches at Bandon and 8.28 inches at Powers between November 18-20.



Graph Hyd. 2

Reference Conditions

The nearest active U.S. Geologic Survey (USGS) gaging station (#14325000) with a long period of

record (1916-1926, 1928-present) is on the South Fork Coquille River at Powers. Stations have been discontinued on the South Fork near Powers (#14324900), the Middle Fork Coquille near Myrtle Point (#14326500), and the North Fork Coquille near Myrtle Point (#14327000). The National Weather Service (NWS) plans to install gaging stations on the North Fork Coquille near Cooper Bridge, on the South Fork Coquille at Myrtle Point and on the Coquille river near Rink Creek in 1997. Precipitation records have been maintained from 1932 to present at Powers, and 1910 to present at Bandon.

Synthesis and Interpretation

Since the total amount and timing of water delivered to the subwatershed are dependent on precipitation and naturally varies significantly, detecting any direct affects on hydrology is difficult. There is an implied assumption that management activities will change the hydrology of the watershed. However, detecting a change in hydrology outside the range of natural variability is difficult and a matter of scale. Effects, even if quite large on a site, become increasingly difficult to detect downstream as small streams join and form increasingly large drainage networks. The ability of individual actions in small drainages to affect hydrology in the larger subwatershed decreases. The magnitude of any affect is generally proportional to the area treated, and the greatest impact man has is on the routing and consumption of water. As development and the demand on water increases, so will the level of damage due to flooding, which is the most apparent and costly to the public. When flooding increases, so does the pressure for flood control, resulting in the interruption or elimination of the natural flooding processes that create most of the land that is suitable for settlement. CH2M conducted a water supply study in 1993, and the Corps of Engineers published a report on the Coquille River and tributaries 1972. Both reports contain a great deal of information and are on file with the Area Hydrologist. The Lower South Fork Coquille Watershed Analysis (USDI 1996) also gives a history of significant floods from 1861 to 1974.

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CHAPTER 3 - VEGETATION

Characterization

Array and Landscape Pattern of Plant Communities and Seral Stages (Riparian/Nonriparian): The plant communities in the assessment area, as described by Franklin and Dyrness (1973), are the *Tsuga heterophylla* zone on the mountain slopes (pg. 70-88), a mix of "interior" valley communities occupying the valley bottom and foothills near the rivers (pg. 110-129), and the *Picea sitchensis* zone in the fog zone close to the coast (pg. 58-63). The interior valley vegetation communities are not normally described as occurring in this area. However, conifer stands along the valley sides of the Coquille River have many characteristics in common with conifer stands along the valley sides of the Willamette River. The interior valley communities include conifer forest (pg. 116), grasslands (pg. 119-123), and riparian communities (pg. 124-126). Vegetation on the valley bottom and valley side hills is highly modified by a long history of human use. Grand fir, Port Orford cedar, tan oak, Oregon myrtle, and poison oak are common. The Douglas-fir/grand fir mix and poison oak indicate a high fire frequency before Euro-American settlement. Blue blossom ceanothus occupies southwest aspects following fire. Willow, myrtle, cottonwood, and Oregon ash were once a major floodplain component

on lands that are now used for pasture.

Processes Affecting Landscape Patterns: The most prevalent stand replacement process occurring today is timber harvest and subsequent reforestation. Most of the vegetation has been altered through agricultural practices or logging, and the majority of all timber lands have been harvested since 1936.

Table Veg-1: Processes that Influence the Current Vegetation Patterns

Process	Influence on Upland Vegetation:		Influence on Riparian Vegetation:	
	Landscape Patterns (Stand Replacing)	Stand Structure (Stand Modifying)	Riparian Stand Replacing	Riparian Stand Structure (Stand Modifying)
Fire (Lightning & Human Caused)	x	x	x	x
Wind	x	x	x	x
Management (Timber Harvest & Agriculture)	x	x	x	x
Disease (Primarily Root Rot)		x		x
Landsliding/ Mass Wasting		x	x	x
Stream Bank Erosion				x
Plant Competition		x		x

For general discussions on processes affecting stand structure and landscape patterns see:

- Franklin and Dyrness (1973), and Hemstrom and Logan (1986) for plant succession.
- Averill et al (1995) for an overview on disturbance.
- Oliver and Larson (1990) for vegetation competition and stand dynamics.
- Agee (1993) for fire as a disturbance process. Especially, fire effects on vegetation (pg. 113-150), fire effects on Sitka spruce (pg. 187-195), and western hemlock forests (pg. 205-225).
- Agee (1993) pg. 9, Smith (1962) pg. 413-414, 422, & 499, and Oliver and Larson (1990) pg. 100-106 for wind as a disturbance process.
- Vegetation Communities and Succession, pg. II-14, II-16. North Coquille Watershed Analysis (USDI 1995d).
- Coquille Subbasin Working Atlas: An Introduction to Available Geographic Information for additional information on land use, vegetative cover types, precipitation zones, and forest cover seral stages (Interrain Pacific 1996).

Current Conditions

Array and Pattern of Upland Vegetation: GIS data describing forest age class, size, and density (Forest Operations Inventory, FOI), is available for BLM land. While age class information for older stands (>80 years) is often inaccurate and one age class may often encompass stands of varying ages and densities, FOI offers the best available picture of forest condition. FOI information for young stands, particularly those <40 years old, is far more accurate. The FOI layer in GIS was last updated in 1992. The next planned update is currently in progress. Data on private lands is interpreted from aerial photographs, and is less accurate. Forest age classes for federal lands in the assessment area are summarized in Table Veg-2. See Maps Veg-1a and Veg- 2b: Potential Thinning and Regeneration Harvest Units for their locations[4].

[4] Please note that Veg-1a and Veg 1b show entire 5th field watersheds, but only those acres in the North Coquille Mouth Subwatershed are included with the acres for the Middle Main Coquille 5th Field in table Veg-2

Table Veg-2: Current Seral Stage Distribution in the Assessment Area (North Coquille Mouth, Middle Main and Catching Creek Subwatersheds)

Seral Stage (From RMP)	BLM Acres (From GIS Data)	% of BLM Ownership	BLM Acres as % of Total Acres
Late Seral (81+)	575	10%	0.6%
Mid- Seral (31-80)	2,729	48%	3.0%
Early Seral (0-30)	1,669	29%	1.9%
Non-Forest	12	<1%	0.01%
Agricultural	1	<1%	0.00%
Unknown	742	13%	0.8%
Total	5,728	100%	6.4%

The majority of the non-Federal forest land is occupied by early or mid-seral forests. The non-forest land private land is mostly agricultural.

There is an abundance of red alder in this landscape that is most likely the result of both natural and human caused soil disturbances. For a more detailed discussion on red alder see Johnson, 1926.

Array and Pattern of Riparian Vegetation: Riparian vegetation was stratified using a modified version of the DNR large woody debris recruitment potential module (Washington Forest Practice Board 1992), and 1950, 1970, and 1992 aerial photos. See the Large Organic Debris Recruitment Potential Appendix for mapped locations of possible project areas, assumptions and supporting data. For discussion of current and reference conditions of riparian vegetation and Oregon myrtle dominated flood plains in the approximate vicinity, see Current and Reference Conditions, Riparian Habitat Condition (Issue #2), Fairview Watershed Analysis (USDI 1995c).

Fifteen Percent Rule: As portrayed in Table Veg-3, only 4% of the Middle Main Coquille 5th Field watershed is occupied by Late-Seral stands, which does not meet the 15% rule. This 5th field watershed will not meet the 15% late-seral habitat objective before the year 2017. Even then the objective may not be met, depending on how much of the late-seral habitat is made up of hardwood stands. Twenty-nine percent of the North Fork Coquille 5th Field watershed is occupied by Late-Seral stands.

Table Veg-3: Percent of BLM Land in Each Seral Stage in the 5th Field Watersheds

Seral Stage	Middle Main Coquille	North Fork Coquille
Late Seral (81+)	4% (over 200 = 0%)	29% (over 200 = 5% or 9,408 acres)
Mid-Seral (31-80)	77%	40%
Early Seral (0-30)	18%	31%
Non-Forest	1%	0%
Total	100%	100%

Table Veg-4: Change in Seral Stage Distribution in the Middle Main 5th Watershed Over Time

Seral Stages	current (1992)		projected in 2007		projected in 2017	
	Acres	% of watershed	Acres	% of watershed	Acres	% of watershed
Early Seral (0-30)	455	18%	278	11%	83	3%
Mid-Seral (31-80)	1,943	77%	2,120	84%	1,867	74%
Late Seral (81+)	110	4%	110	4%	558	22%

Reference Conditions

Current vegetation patterns are a result of past management actions, harvest practices (and associated road building), land ownership, fires, human settlements, agriculture and farming.

Map Veg-2 shows the 1900 vegetation distribution, and Map Veg-3 shows the vegetation distribution in 1914. See figures 3.2.2.2. through 3.2.2.6. in 1800s General Vegetation Maps in Near Coastal Water National Pilot Project "Action Plan for Oregon Coastal Watersheds, Estuary, and Ocean Waters", (ODEQ 1991). See fire history work for near by subwatersheds and see Fire History Appendix for newspaper clippings of 1936 fires, and 1936 Oregon State Board if Forestry Fire Report and Fire Map. Several sections, particularly at the north end of the Middle Main Coquille, were cut under timber patents in the 1920s and grazed for several years. They were not reforested until the 1960s.

Table Veg-5: 1900 Seral Distribution (From GIS Data)

Seral Stage	Acres
Timberless Area	38,352
Woodland	52
0 - 5,000 Board Measures (B.M.*) per Acre	7,749
10,000 - 25,000 Board Measures per Acre	19,114
50,000 Board Measures per Acre	15,824
Burnt	8,497
Total	89,588

* A Board Measure (B.M.) is approximately equivalent to a Board Foot.

Table Veg-6: 1914 Seral Distribution (From GIS Data)

Seral Stage	Acres
Brush	34,963
Burned Areas, not Restocked	4,634
Burned Areas, Restocked	3,892
Cutover Areas, not Restocked	2,945
Merchantable Timber	7,190
Non-Timber Areas	35,964
Total	89,588

Synthesis

Natural Hardwood Stands: Hardwood or mixed hardwood/conifer stands that are over 80 years of age are probably natural stands. These areas more than likely supported hardwood or mixed hardwood/ conifer stands prior to timber harvest.

Fire: No fire history based on ring counts has been done for the analysis area. The fire history work done in North Coquille and Middle Creek Subwatersheds (USDI 1995b,d) show stand replacement fires occurring before 1540 and 1740. For more information concerning fire history in the vicinity, see 1) North Coquille Watershed Analysis, Interpretation-Fire History, Management implications based on fire histories for North Coquille and Middle Creek, and Wild fire, logging and the range of variability, pg. VI-11 and VI-12, and see 2) Appendix C-2.1: Fire History of the Middle Creek and Management Implications, Middle Creek Watershed Analysis (USDI 1995b,d).

Wild fire as a natural or prehistoric aboriginal disturbance process is now restricted by fire control efforts. Prescribed use of fire is limited to site preparation.

The forests that were salvage logged after the 1936 fire are now reaching a harvestable age. This benchmark could aid estimating stand ages on some private land.

Landslides: Landslides set back plant succession and favor pioneer species. Red alder is particularly successful at occupying slide tracks and deposits because of long distance seed dispersal, rapid juvenile growth, and ability to fix nitrogen. Landslides that reach creeks can deliver structural material.

Regulation Changes: By the 1980s, state regulations required private companies to leave buffers and remove logging debris from streams. Simultaneously, BLM required 80 foot buffers and debris removal on third order and larger streams.

Regulations for BLM required 100 foot no-treatment buffers on all streams carrying water at the time units were sprayed with herbicides. This prevented water contamination but also eliminated efforts to control vegetation that compete with conifers along streams inside plantations. The result was that many riparian areas were unintentionally converted from conifer to mixed conifer/hardwood, or alder, or brush. Effective methods for manually releasing conifer plantations from vegetation competition became commonly understood and applied after 1989 (DeBell; Turpin 1989).

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CHAPTER 4 - STREAM CHANNEL

Characterization

The analysis area is composed of 6 drainages that all flow directly into the North Fork or mainstem Coquille River. These drainages can be divided primarily into 3 channel types based on the Rosgen classification system (Rosgen 1994). Table CHAN-1 list the characteristics of these channel types. There may be other channel types in the analysis area, but due to the scale of this analysis, those would have to be addressed on a project basis.

Table Chan-1: Rosgen Stream Types

A Type Channels	B Type Channels	C Type Channels
Low order headwater reaches characterized by high gradient (>4%), cascade, step-pool channel development.	Mid-order, moderate relief reaches characterized by 2-4% gradients.	Higher order, alluvial, broader valley reaches characterized by low gradient (<2%), meandering, point-bar, riffle/pool channel development.
Entrenched, with low width/depth ratios, low sinuosity, and have little flood plain development.	Rapid-dominated, pool limited systems that are moderately entrenched, have a moderate width/depth ratio, moderate sinuosity, and limited flood plain development.	Not entrenched, have high width/depth ratios, high sinuosity, and have extensive flood plain development.
High energy (high sheer stress), dissipate energy through turbulent flow provided by the step/pool mechanism. Prone to debris torrents triggered by debris avalanches; can transport and deliver large volumes of sediment and debris.	Dissipate stream energy by maintaining stream velocities in the form of turbulent flow and overcoming resistance to flow provided by roughness.	Lower energy systems that dissipate stream energy through the channel geometry and the meander pattern.
Stable when controlled by bedrock, boulders or large cobble.	Stable throughout the range of substrates.	Stable in bedrock/boulder controlled channels. Unstable in the other substrate size classes.

Current Conditions

The lower ends of each of the drainages are low gradient, entrenched, meandering reaches that flow across the Coquille River floodplain. Most of the assessment area has a dendritic drainage pattern and is steep, water-cut, deeply dissected, and forested. All of the drainages start as A type channels, evolve into B type, and finally into C type channels.

- The A type channels are generally associated with slump/earthflow and debris torrents/debris

avalanche erosional processes and are critical to delivering sediment and woody debris.

- Both the A and especially the B type channels depend heavily on large woody debris to dissipate stream energy by creating turbulent flow. A turbulent flow pattern is essential to maintain channel stability and to provide important instream habitats such as low velocity, depositional areas and backwater pools.
- The C type channels are meandering, low gradient, riffle/pool systems with well-developed flood plains. These channels are susceptible to accelerated bank erosion and the rate of lateral adjustment is influenced by the presence and condition of riparian vegetation.

These channel types have different dimensions, patterns, and profiles, and will respond differently to disturbance as well as restoration efforts. The goal of any instream work should be to assist the stream toward a point of natural stability, and each project has to be evaluated on site to determine suitability. The following table lists some structures that may be appropriate for instream work by channel type:

Appropriate Instream Structures by Channel Type (Rosgen 1996)

Type A Channel	Type B Channel	Type C Channel
Channel Edge Boulders (not rip-rap)	Very Few Limitations	Channel Edge Boulders (not rip-rap)
Vortex Rock Weir		Channel Edge Root Wads
Channel Edge Root Wads		"W" Weir or Vortex Rock Weir
		Bank Cover

Reference Conditions

Due to the influence of bedrock and streambank vegetation, the A and B channel types have not changed drastically from historic conditions. However, the substrate composition and the processes through which these channels dissipate stream energy have changed in response to man's activities. The A and B type channels have less large woody debris and shallower substrates due to the simplified velocity profile. The C type channels have decreased bank stability and increase lateral migration due to the removal or disturbance of stream-side vegetation. A historic reconstruction by Benner shows that willows historically dominated the floodplains, the area was much wetter throughout the year, and many more channels flowed across the floodplain than there are now (ODEQ 1991).

Synthesis and Interpretation

Channel complexity, which involves energy dissipation through turbulent flow and channel roughness, has been simplified in most of the streams on both private and public lands. Removal of vegetation, ditching and draining, and construction of flood control structures has also significantly altered the channels and their interaction with the floodplain. The following list describes some of the channel and floodplain conditions observed in the subwatershed:

- The floodplains have been cleared and drained for development resulting in the loss or simplification of habitat; especially aquatic habitat that is critical during high flows.
- Vegetation removal has decreased the floodplain roughness and the associated sediment storage.
- Much of the channel roughness provided by LWD has been removed, which changed the flow from a turbulent or varied-velocity profile, to a laminar or consistent-velocity profile. As a result, the amount of backwater or low velocity, depositional areas provided by turbulent flow have been reduced considerably.
- A decrease in velocity breaks has caused the channels to down-cut and decreased the sinuosity that acts to dissipate stream energy through the turbulent flow pattern.
- Many larger channels have scoured to bedrock or migrated laterally, and have difficulty retaining

substrate. The systems that could retain substrate may have difficulty recruiting it because stream-side and mid-slope roads function as terraces that trap material that would otherwise proceed downhill to the channel.

- Improperly sized culverts limit substrate recruitment by not transporting bedload down through the channel network. Undersized or blocked culverts can impound water and cause road failures that lead to large inputs of sediment.

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CHAPTER 5 - WATER QUALITY

Characterization

The beneficial uses that are dependent on aquatic resources in the analysis area include public and private domestic water supply, industrial water supply, irrigation, livestock watering, spawning and rearing habitat for several fish species and other aquatic organisms, wildlife, hunting, water-contact recreation, aesthetic quality, and hydro-power (USDI 1995). The water quality parameters that are critical to the beneficial uses are, turbidity, dissolved oxygen, water temperature, nutrients, pH, total dissolved gases, pesticides/toxics, bacteria/viruses, sedimentation, low flow, and instream structure.

Current Conditions

The water quality parameters identified as potential problems that may be due to past land management practices are:

- Low dissolved oxygen, fecal coliform, and temperature in the South Fork, North Fork, Middle Fork and mainstem Coquille River.
- Dissolved oxygen and fecal coliform was listed on Cunningham Creek.
- Temperature was identified on the Little North Fork Coquille and Catching Creek (303d list).

Oregon Department of Environmental Quality (DEQ) identified the Coquille River as potentially water quality limited as early as 1973, and confirmed it as a “Waterbody of Concern” in the 1986 Water Quality Report and other subsequent reports. Specific concerns listed by DEQ in a 1991 report are the Myrtle Point and Coquille wastewater treatment plants, excessive sediment, nutrient and coliform bacteria, toxic substances, and habitat modification. The only other water quality data specific to the analysis area are obtained through habitat surveys conducted on Johns Creek in 1993, and primarily relates to instream habitat conditions. See the Fisheries section for the results of these habitat surveys.

Reference Conditions

Historic water quality conditions are difficult to determine since no specific data was collected. However, it is safe to assume that water quality was excellent before large-scale timber harvest operations, extensive road building activities, farming and ranching operations, and irrigation. The major impacts to water quality before man's activities were precipitation events, hill slope processes, and the fire regime. However, since this assessment area evolved through these processes, there is no reason to suspect the water quality would not recover in a short time following any of these events.

Synthesis and Interpretation

Because little historical water quality data are available, some professional judgement must be exercised to determine what changes in water quality would be expected and reasonable. The water quality parameters that can be evaluated easily, at a relatively low cost, and are likely to indicate the effects of both natural and man's activities specific to the assessment area, are water temperature, sedimentation and habitat modification.

The primary concern with water temperature increases is the potential for detrimental effects on fish and other aquatic organisms. Many natural factors including climate, solar intensity, shade, channel orientation, elevation and ground water influence affect water temperature. These factors are generally static and unaffected by human activity. However, management activities can affect water temperature by exposing the streams to solar radiation following streamside vegetation removal. Stream temperature increases of 10^0 F or more have been recorded following removal of streamside vegetation by clearcutting and burning in both the Oregon Cascades and Coast Range (Brown & Krygier 1970; Levno & Rothacher 1969). Because downstream shading does not significantly lower temperatures of streams warmed by upstream exposure (Brown 1970), water temperatures of larger streams can also increase when small tributaries are exposed by clearcutting.

Sedimentation, or more specifically the sediment cycle, is affected by factors like gravity, geology, topography, climate, soils, vegetation and land use activities. The three closely related processes of erosion, transportation and deposition define the sediment cycle. Deposition is the process most directly related to impacts to water quality. Sediments can cloud water, choke fish gills, blanket fish spawning areas, and smother bottom-dwelling aquatic organisms.

Aquatic habitat is the parameter that has probably been impacted most severely by large-scale timber harvest operations, extensive road building activities, farming and ranching operations, irrigation, and stream cleaning activities. Removing large woody debris, eliminating or limiting LWD recruitment, confining stream systems, and modifying the existing floodplains has simplified the aquatic ecosystems and altered channel characteristics. For more discussion on the effects of these activities, see the Stream Channel section.

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CHAPTER 6 - SPECIES and HABITAT: AQUATIC

Characterization

BLM land, in the analysis area (Area), consists primarily of ridge-top parcels near agricultural lands along the broad floodplain of the lower North Fork Coquille, with scattered parcels near the main stem Coquille and Catching Creek. Some perennial stream sections on and adjacent to BLM lands provide habitat for several species of fish and other aquatic life. Map FISH-I portrays the known distribution of anadromous and resident fish populations in the Area.

Fall and spring chinook salmon, coho salmon, steelhead trout, and both anadromous and resident forms of cutthroat trout inhabit the main-stem and North Fork Coquille. However, most of the fish-bearing stream sections on BLM contain only resident cutthroat trout. The relative abundance of fish populations is a data gap, but the following sections in this chapter contain information regarding the known status of salmonid stocks as a whole in the Coquille River system.

Other fish species in the Area include four sculpin species, the largescale sucker, speckled dace, and three-spine stickleback. Pacific lamprey, listed as a vulnerable species in Oregon, and western brook lamprey, are also present. The endemic salmonid species are in the following streams and stream types:

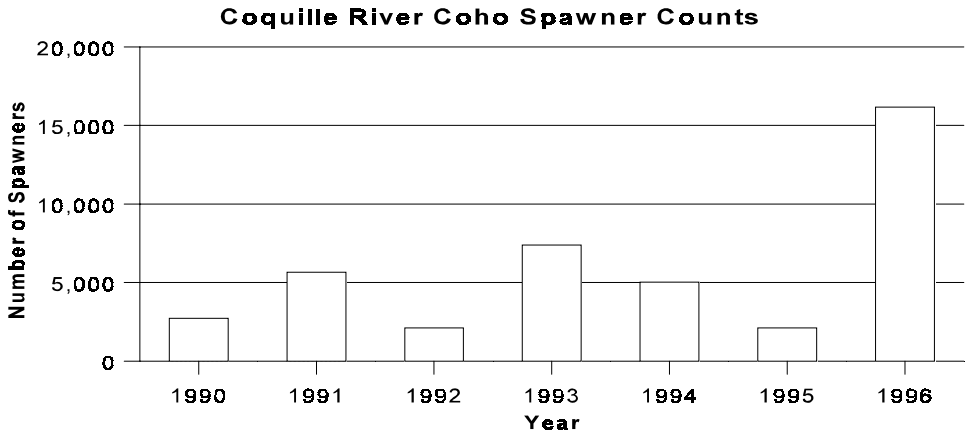
- The District hydro-theme shows the chinook salmon range in the Area limited to the main-stem North Fork Coquille and the lower reaches of Catching Creek. Chinook spawned and reared in the lower reaches of Wimer Creek in the past, but none have been observed for several decades (Don Rowlan, pers. com.) The reasons for their current absence are unknown.
- Coho salmon and steelhead trout use the main-stem North Fork Coquille, Wimer Creek, Catching Creek, John's Creek and Cunningham Creek. These species also likely inhabit the lower reaches of several 3rd and 4th order streams on private lands within the area. Until recently, the range of anadromous fish in Johns Creek was believed to be limited to the lower reaches of Johns Creek below the falls approximately ¾ mile upstream of the confluence with the North Fork Coquille. However, steelhead trout were observed above the falls in recent years, which indicates that their actual range is limited to the impassable culverts on BLM lands identified below.
- Cutthroat trout are found in essentially all stream types, but their presence has not been verified in many smaller streams on private lands in the Area. Recent surveys show resident cutthroat ranging farther up stream on BLM land than previous thought, and this is reflected on Map Fish-1, fish distribution. The precise range of searun cutthroat trout is unknown, but it does include the main-stem and North Fork Coquille, and the lower reaches of tributaries used by other anadromous salmonid species.

Current Conditions

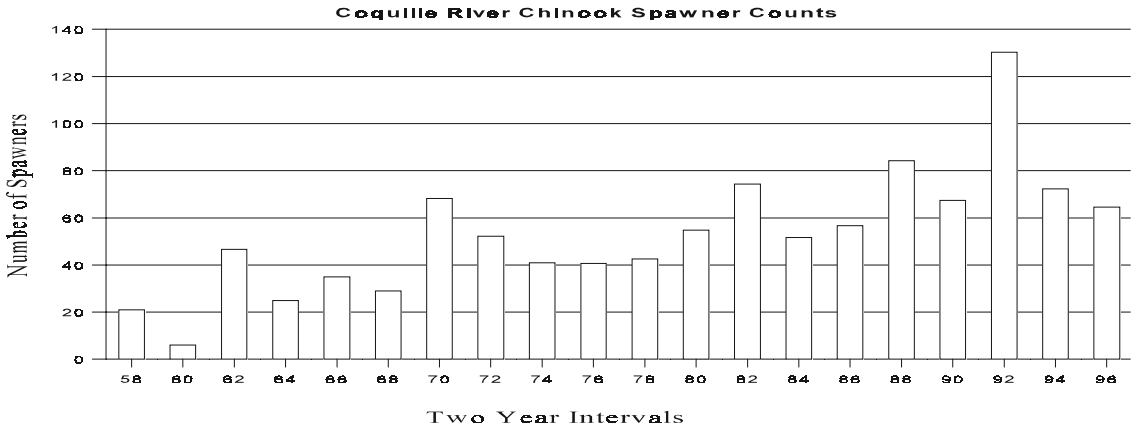
Special Status Species: On April 25, 1997, the National Marine Fisheries Service (NMFS) designated coho salmon north of Cape Blanco, which includes the Area, as a Candidate species under the Endangered Species Act. Steelhead trout are proposed and NMFS's decision on this species is pending with a determination expected in July 1997.

NMFS determined that compliance with the Standards and Guidelines of the Northwest Forest Plan (NFP) is adequate to ensure that BLM's land management practices will not threaten the continued existence of coho salmon on public lands. However, BLM will probably comply with the more restrictive *Biological Opinion and Conference Opinion on the Coos Bay District RMP* (March 18, 1997). No conference with NMFS is required for Candidate species, but BLM will likely submit project proposals to the agency for their review.

Salmonid Populations: Little information is available concerning the populations of salmonid stocks in the Area, but counts from coho spawning surveys conducted in the Coquille River by Oregon Department of Fish and Wildlife (ODFW) since 1958 have varied considerably, and a decline is evident over the long term. The following graph depicts the variability of spawner escapement since 1990, with a sharp increase occurring in 1996 (estimates for 1996 are preliminary).



According to ODFW, there are two spring chinook populations in the Coquille Basin that are very small, with breeding populations probably smaller than 200 fish each. Fall chinook salmon numbers, like coho, have been variable over the long term, but with an increasing trend, as portrayed in the following chart:



Relative to historical levels, the current status of the cutthroat trout population is unknown. ODFW believes the numbers are presently lower based on anecdotal accounts. Genetic analysis, conducted by ODFW during 1991, indicates that there are several populations in the Coquille basin with an exceptionally high level of genetic divergence, even without physical barriers.

Except for the Umpqua River, winter steelhead populations in all mid-coast streams appear to have experienced a mild decline from historical levels, but all steelhead populations are thought to be smaller than they were historically. The recent down trend, observed in coastal steelhead populations, is probably influenced by the current low ocean productivity (ODFW, 1995a).

In-stream Habitat Conditions: The only recent stream habitat inventory within the Area was completed on John's Creek in 1993. Copies of the inventory are on file at the Coos Bay District Office. The confidence level for these data, is unknown because the stream habitat conditions documented in the survey probably were altered by the floods and landslides since late 1995. Table FISH-1 in the appendix summarizes the inventory results and compares the observed conditions with benchmark levels formulated by ODFW. Key findings from the inventory are given below.

- Within the 2 stream miles inventoried, there were only 2 pools with a maximum depth 3 feet. The percent of pool area is rated fair for the 4th order reaches, and poor in the .2 miles of third order channel.
- The width/depth ratio of riffles was fair for all stream reaches. The amount of silt, sand and organics on riffles was fair over approximately half the inventory area, and poor in the remainder.
- The amount of gravel on riffles rated as good and was close to 50% over most of John's Creek.
- The total number of LWD pieces is rated as fair to good. When only conifer pieces are considered, approximately half the total stream lengths inventoried rated as poor.

The high percent silt, sand and organics on riffles probably reflects the fact that gravel derived from the sandstone/siltstone parent material is not very competent and breaks down fast in streams. The inventory data showed only minor amounts of silt, with sand being the primary substrate type in this category.

Stream habitat conditions were also evaluated using the Matrix of Factors and Indicators for the Southwest Province Tyee Sandstone Physiographic Area as described in Table FISH-2 in the appendix. NMFS published the original matrix early in 1996. It was modified at the regional level mid-1996. Table FISH-3 in the appendix evaluates the results of the 1993 John's Creek stream habitat inventory using this matrix.

The combined impacts of agricultural practices, past timber harvest practices, and the associated land management activities have degraded stream habitat conditions in the Area. These impacts are common throughout much of the Oregon coast and the following lists some of the general effects:

- Harvest of large conifers next to streams and from up-slope areas that could have fed large wood and gravel to the stream network has reduced the potential LWD recruitment in the future.
- The removal of large wood through stream cleaning, salvage, and to facilitate road construction has greatly reduced the amount of wood currently in the streams.
- Many culverts in the subwatershed partially or entirely block fish and amphibian passage.
- Roads paralleling streams and crossing tributaries restrict interactions between the aquatic and riparian areas, and can be barriers to woody debris and gravel recruitment to streams from up-slope areas.
- Road construction along streams has resulted in the establishment of alders next to the stream channels, thus reducing the future recruitment of large, durable conifers.

Agricultural practices in the lower reaches of the tributary streams and along the North Fork Coquille have also impacted the quality of aquatic habitats. Some of the primary reasons for the degraded conditions are stream-bank damage from livestock, down-cutting of streams due to the removal of stream-side vegetation and in-stream structure, the confinement of stream channels, and a decrease in future recruitment potential of durable large woody debris.

Barriers: Improperly placed and under-sized culverts can be barriers to fish and other aquatic-dependant organisms such as macroinvertebrates, crustaceans, and salamanders. Barriers greatly limit

these organisms' access to areas within their historical range that once served as important rearing and breeding habitat, as well as refuge areas during flood events or when water temperatures increase to critical levels in other portions of a drainage. Barriers also isolate gene pools and reduce the range of unique populations. Although downstream migration is possible, no genetic interchange can occur with populations below barriers.

There are several natural and unnatural barriers to fish passage within John's Creek and Wimer Creek. The management-caused barrier locations, all are culverts, are listed in the fisheries recommendations section. The following list summarizes the barriers and some of their effects:

- There is a series of waterfalls on BLM land approximately ¾ mile from the mouth of John's Creek. These falls were once believed to be barriers to all fish passage, but steelhead were observed above them in the recent past, and resident cutthroat trout are found throughout the drainage upstream. The 10' diameter culvert on the east fork of John's Creek in section 7 is probably a barrier to fish passage because the outlet of the pipe spills approximately 3 feet. Although adult steelhead could possibly pass through at some flow stages (several small boulders are present in the pipe), no other aquatic species can migrate upstream of this location.
- The culvert on the west fork of John's Creek in section 7 is not a barrier to fish passage, but retrofitting the pipe with baffles would allow passage of other aquatic species.
- In the NW corner of section 19, T. 28 S., R. 11 W., an abandoned road crosses 3 small tributaries to Wimer Creek. One of the culverts under the road is a barrier to upstream movement of resident cutthroat trout and all other aquatic species. The other two culverts are not on fish-bearing reaches, but prevent the upstream migration of all other aquatic organisms.

Reference Conditions

Salmonid populations: The 1995 Wild Fish Biennial Report (ODFW 1995a) contains historical information on the salmonid populations in the Coquille River. Although the information is not specific to the analysis area, the overall population trends are probably similar.

The Coquille Basin historically supported a large and healthy wild population of coho salmon, but their abundance has declined significantly since 1950, with most of the decrease occurring in the 1950's and 1960's. Historically high harvest rates, particularly in the 1970's, probably impacted the wild populations. Harvest rates declined after adoption of the Oregon Coho Management Plan in 1982. The coho catch dropped to incidental harvest in the chinook fishery in 1994.

Instream Habitat Conditions: There are no undisturbed drainages near the Area that are usable as reference sites, but the Matrix of Factors and Indicators for the Southwest Province Tyee Sandstone Physiographic Area does provide a reference standard for the region. The 1993 John's Creek stream habitat inventory does not contain sufficient data to evaluate all factors contained in the Matrix, but, where possible, indicators for watershed and instream conditions were analyzed and listed in table FISH-3 in the appendix.

The 1993 stream habitat inventory shows most of the large wood pieces in John's Creek are in the upper portions of the 4th order reaches where there has been less human encroachment. Chart FISH-II in the appendix illustrates the approximate locations and total length of conifer pieces for each of the three stream reaches surveyed.

Beaver ponds provide pool habitat for fish and other aquatic life. Beaver populations were probably much higher and more widely distributed in the Area before Euro-American settlement. Cadastral

surveyors frequently noted beaver activity in the broad valley areas now used extensively for agriculture (Flint 1871 cited in ODEQ 1991). Although surveys documenting beaver activity have not been conducted, recent dams were observed in lower John's Creek on BLM lands and on lower Wimer Creek on private lands. None were observed in the more narrow valleys in upper Cunningham Creek.

Synthesis and Interpretation

Because BLM manages a relatively small portion of the total acreage in the Area, federal land management activities that degraded aquatic habitats constitute a relatively minor impact when considering the entire analysis area. However, because most of the stream miles on private lands are in marginal condition at best, stream segments on BLM lands are extremely important components of the aquatic ecosystems.

On BLM lands in the Area, Wimer Creek, John's Creek and upper Cunningham Creek are important streams for ensuring long-term protection of water quality and aquatic habitats for anadromous and resident fish. Resident cutthroat trout populations occur above natural barriers in the headwater areas of these 3 drainages. The small numbers of trout observed during surveys conducted in the spring of 1997 represent the keystone for these isolated populations. Whether it is through habitat degradation or natural processes, the loss of these fish would be permanent and the important role they play in seeding downstream populations would cease.

Other than the culvert modifications or removal mentioned in the recommendations section, there are few opportunities for in-stream restoration projects on BLM lands. To have the greatest affect, BLM aquatic restoration efforts should compliment work on private land, and be done in cooperation with private landowners and/or through the Coquille Watershed Association. At the time of the writing of this document, there are tentative in-stream projects planned for Wimer Creek through cooperation with BLM staff, a private agricultural landowner, and the Menasha Corporation. The planned projects include fence construction along each side of the stream where cattle are now grazing, the replacement of two culverts that impair fish passage, and the placement of logs and root-wads within the stream channel to provide rearing habitat for anadromous and resident fish species.

Based on ground and aerial photo reviews, riparian buffers were retained and are still intact along almost all fish-bearing stream reaches on BLM lands in the Area. The 40-50 year-old stands regenerated on sites cut before logging practices included the retention of protection buffers, but can contribute some moderate size debris to streams. The future recruitment potential for large woody debris appears to be good, and maintaining riparian reserves in accordance with the ROD should ensure long-term protection of all aquatic resources.

Habitat trends for the fish species of concern are expected to improve considerably through time for the following reasons:

- On BLM managed lands, riparian reserves required by the ROD-RMP (USDI 1995) should ensure the long-term protection of all aquatic resources. BLM is also required to incorporate Best Management Practices for Maintaining Water Quality and Soil Productivity, which are listed in Appendix D for that document.
- Conifers dominate many stream-side and headwall sites and will become future sources of LWD.
- On private lands, the Oregon State Forest Practices Act requirements for riparian buffers will aid in the recovery of in-stream and riparian habitat conditions. At present, agricultural practices are not regulated to ensure the protection or recovery of aquatic habitats. However, private landowner cooperation with the Coquille Watershed Association is increasing with positive benefits to

riparian areas, fish passage culverts, and stream channel restoration.

- The Coos Bay District is carrying out a program to replace culverts that are undersized or block fish passage, as required by the ROD-RMP (USDI 1995). Based on field surveys, the number of culverts in the Area that restrict fish passage is relatively small. See Map EROD-6 for the location of culverts on both public and private lands. The recommendations section identifies the precise locations of these culverts on BLM lands.

Culverts are the most common type of human-caused barrier that limits fish and other aquatic animal distribution. In both the short- and long-term, the number of barrier culverts should decrease considerably because of the pro-active approach of BLM and private landowners in the Area. Although private landowners are not required to replace barrier culverts until they fail, the long-term trend should be toward reestablishing historical aquatic migration routes. The BLM has no jurisdiction over these factors on private lands, but can assist watershed associations in the identification of barriers and make recommendations for corrective measures.

References

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CHAPTER 7 - SPECIES AND HABITAT: WILDLIFE

Characterization

Species of Concern[5]: Table WL-1 lists the species of concern in this analysis area and their relative abundance and distribution. The species of concern for this analysis area rely on late-successional forests and/or riparian habitat for all or part of their life histories. For detailed discussions on wildlife species associated with late-successional habitat, refer to FEMAT (1993), ROD (USDA; USDI 1994), and RMP/ROD (USDI 1995).

With the exception of a few of the listed Threatened/Endangered species (northern spotted owl, marbled murrelet, and bald eagle) there have been few species-specific inventories for wildlife in the Umpqua Resource Area. Inventories on vegetation associations also have not been conducted, and thus information on wildlife/habitat relationships is also lacking. Included in the appendices is a list of amphibian, reptile, bird, and mammal species, and their associated primary habitats, which could be found within the area or in adjacent subwatersheds.

Forty-eight special status animal species (7 amphibians, 4 reptiles, 11 mammals, and 26 birds) could

[5] The phrase "species of concern" is used to refer to the group of species for which special management concern exists in the analysis area (consistent with the use in WA Guide Ver. 2.2) and is not to be confused with the species of concern list maintained by the U.S. Fish and Wildlife Service which is roughly analogous to the former Federal Candidate 2 species list.

occur in the analysis area, however there are no known sites. There is approximately 440 acres of suitable habitat for the northern spotted owl that would provide nesting, resting and foraging habitat. An additional 108 acres provide resting and foraging habitat. There are no known occupied sites of the marbled murrelet in the 440 acres of suitable habitat in the analysis area. Northern spotted owl and marble murrelet suitable habitat maps are in the map section. There is a golden eagle nest site east of the analysis area. Osprey is a species of concern for this area due to the potential habitat in the Coquille River system, however there are no known nest sites on BLM administered land.

Survey and Manage animal species that are highly likely to occur in the analysis area include the red tree vole, fringed myotis, silver-haired bat, long-eared myotis and long-legged myotis. The fringed myotis, long-eared myotis and long-legged myotis also require protection buffers. The Pacific Western big-eared bat is also a protection buffer species that may occur in the analysis area. The Del Norte salamander, another Survey and Manage species, could occur in the area as its historical range extends into the southern edge of Coos County. None of the Survey and Manage mollusk species are known to occur in the analysis area.

It would seem unlikely to discover the American marten or fisher in the analysis area as most stands are below 80 years of age, and the few late-seral stands are highly fragmented and small. However, martens were sighted in the 1980s in John's Creek drainage just east of the area (USDI 1997a).

Other Wildlife Species: Approximately 68 species of neotropical migratory birds are suspected to occur in the analysis area (WL Appendix). These species are highly correlated with riparian and forested habitats. It is believed that populations of these species are experiencing a decline throughout North America. Habitat loss, competition for habitat components, and increased predation may be causing the population decline of bird species closely associated with late-successional forest. Though they are not addressed in this document, neotropical migratory birds should be considered when forming management alternatives.

The 1997 winter waterfowl survey (Lowe 1997) stated that the Coquille Valley continues to serve as one of the largest wintering duck concentration areas in the coastal region of the Pacific Northwest. As this habitat is on private land, waterfowl management will not be addressed in this analysis.

The stream system and plant communities should provide good habitat for beavers. Beaver dams were recently observed on the lower reaches of John’s Creek and Wimer Creek. Beavers are commonly found in areas with relatively constant water levels that have an adequate flow for damming. Other wildlife species benefit from the standing water, edge, and riparian plant diversity associated with beaver dams. The pools behind the dams also provide summer and winter rearing habitat for numerous fish species. Increases in water storage, streamflow stabilization, and elevated water tables are also a benefit of beaver dams.

Habitat: Table WL-1 lists the habitat characteristics by species, and how these are distributed. Only 6.4% of the analysis area is BLM-administered land. This area has a high degree of rural interface with small farms, housing and agricultural settlement. Key issues for this analysis area include: riparian areas, snags, downed wood, and late-successional forest. The main disturbances to these characteristics include rural interface, timber harvest, and road densities.

Species						Habitat Characteristics											Current Conditions	
							Special Habitats			Seral Stages								
Common/Latin Name	**Presence[1]**	**Status Federal[2]**	**Status State[3]**	**Relative Abundance**	**Distribution[4]**	**Cliff(C) Talus (T)**	**Snags/ CWM**	**Riparian/ Wetland**	**Hardwood Forest**	**Early**	**Mid**	**Late**	**Mature**	**Old-Growth**	**Habitat Distribution**	**Habitat Condition[5]**	**Long-Term Trend[6]**
AMPHIBIANS & REPTILES																	
Southern Torrent Salamander *Rhyacotriton Variegatus*	S	J2 BT	SSC	Rare	L		CWM	X							Cold Streams Aquatic	F	I
Clouded Salamander *Aneides Ferreus*	S	BT	SSU	Rare	W		CWM		X	X	X	X			CWM Patchy	P	I
Del Norte Salamander *Plethodon elongatus*	S	S/M BS	SSV	Rare	L	C,T									Patchy	U	U
Tailed Frog *Ascaphus Truei*	K	J2 BA	SSV	Rare	W		CWM	X			X	X	X	X	Cold Streams Aquatic	F	I
Red-Legged Frog *Rana Aurora*	S	BS	SSU	Uncommon	W			X	X						Riparian Patchy	F	I
Western Pond Turtle *Clemmys marmorata*	S	BS	SSC	Rare	W		CWM	X	X	X	X				Riparian	F	I
BIRDS																	
Bald Eagle *Haliaeetus Leucocephalus*	K	FT	ST	Uncommon	W		S	X						X	Nest Tree Patchy	F	I
Golden Eagle *Aquila Chrysaetos*	S			Uncommon	W				X	X					Nest Tree Patchy	F	I
Northern Goshawk *Accipiter Gentilis*	S	BS	SSC	Rare	W								X	X	OG Patchy	P	I
Marbled Murrelet *Brachyramphus Marmoratus Marmoratus*	S	FT	ST	Rare	W									X	OG Patchy	F	I
Northern Pygmy-Owl *Glaucidium Gnoma*	K	BT	SSU	Uncommon	W		S						X	X	Snags Patchy	F	I
Northern Spotted Owl *Strix Occidentalis Caurina*	S	FT	ST	Rare	W		S						X	X	OG Patchy	F	I
Pileated Woodpecker *Dryocopus Pileatus*	S	BA	SSV	Uncommon	W		S	X						X	Snag/OG Patchy	P	I
MAMMALS																	
Big Brown Bat *Eptesicus Fuscus*	S			Common	W	Cave C	S	X	X	X				X	Widespread	P	I
Silver-Haired Bat *Lasionycteris Noctivagans*	S	J2, S/M BT	SSU	Common	W		S		X		X	X	X	X	Patchy	P	I
Hoary Bat *Lasiurus Cinereus*	S	J2		Uncommon	W			X	X	X	X		X	X	Patchy	P	I
California Myotis *Myotis Californicus*	S			Common	W	Cave C	S	X	X	X	X	X	X	X	Widespread	P	I
Long-Eared Myotis *Myotis Evotis*	S	J2, S/M BT	SSU	Common	W		S	X	X			X	X	X	Patchy	P	I

Species						Habitat Characteristics										Current Conditions	
							Special Habitats				Seral Stages						
Common/Latin Name	**Presence**	**Status Federal**	**Status State**	**Relative Abundance**	**Distribution**	**Cliff(C) Talus (T)**	**Snags/ CWM**	**Riparian/ Wetland**	**Hardwood Forest**	**Early**	**Mid**	**Late**	**Mature**	**Old-Growth**	**Habitat Distribution**	**Habitat Condition**	**Habitat Trend**
MAMMALS (CONT.)																	
Little Brown Myotis *Myotis Lucifugus*	S			Common	W	Cave C	S	X	X	X	X		X	X	Widespread	P	I
Fringed Myotis *Myotis Thysanodes*	S	J2, S/M BS	SSV	Rare	W	Cave C	S	X	X	X	X	X	X	X	Patchy	P	I
Long-Legged Myotis *Myotis Volans*	S	J2 S/M BT	SSU	Common	W	Cave C	S	X	X		X	X		X	Patchy	P	I
Yuma Myotis *Myotis Yumanensis*	S	BT	SSU	Common	W	Cave C	S	X	X	X			X	X	Widespread	P	I
Pacific Western Big-Eared Bat *Corynorhinus Townsendii Townsendii*[5]	S	PB BS	SSC	Rare	W	Cave		X	X	X	X	X	X	X	Patchy	P	N/A
American Marten *Martes Americana*	S	J2 BA	SSV	Rare	W		S CWM						X	X	Patchy	P	I
Fisher *Martes Pennanti*	S	J2 BS	SSC	Rare	W	T	S CWM						X	X	Patchy	P	I
White-Footed Vole *Arborimus Albipes*	S	BS	SSU	Rare	L		CWM	X					X		Patchy	U	U
Red Tree Vole *Arborimus Longicaudus*	S	S/M J2		Rare	L							X	X	X	Unknown	U	U

[1] Presence in the analysis area: S - Suspected, but has not been documented. K - Known (most sightings documented in Resource Area files).
[2] Status Federal: FE - Federally Endangered. FT - Federally Threatened. FC - Federal Candidate. BS - Bureau Sensitive. BT - Bureau Tracking. BA - Bureau Assessment. S/M - Survey and Manage. PB - Protection Buffer.
[3] Status State: SE - State Endangered. ST - State Threatened. SSC - State Sensitive- Critical. SSV - State Sensitive/Vulnerable. SSP - State Sensitive/Peripheral or Naturally Rare. SSU - State Sensitive/Undetermined.
[4] Distribution: L - Local. W - Wide. [5]Habitat Condition: G - Good. F - Fair. P - Poor. U - Unknown. [6]Habitat Trend: I - Increasing. S - Stable. D - Decreasing. U - Unknown.
Sources: Brown *et al.* (1985), Coos Bay District PRMP (1994), FEMAT (1993), Holthausen *et al.* (1994), Maser *et al.* (1981), Marshall *et al.* (1996), Thomas *et al.* (1983). Distribution, Relative Abundance, and Trend rating for some of the species were from Thomas *et al.* (1983) and Holthausen *et al.* (1994).

Table WL-1. Species of Concern for the South Subwatersheds.

Current Conditions

Species of Concern: Refer to Table WL-1 for ratings of the Current Habitat Condition and Trend for the species of concern. The habitat condition for aquatic amphibians is rated as fair on federal land. The condition is poor on private land as the current riparian buffers are not adequate to protect the riparian habitat (Thomas *et al.* 1983). The trend on federal land is increasing due to the riparian buffers widths of the Northwest Forest Plan. The trend on private is increasing due to efforts of the Coquille Watershed Association, private restoration efforts (i.e., stream side fencing), and increased riparian regulations for timberlands.

Due to past timber harvest practices and salvage, the habitat condition is poor for the clouded salamander. Downed wood levels should increase under the ROD (USDA; USDI 1994) so there is an increasing trend for the habitat of the clouded salamander. The trend could change to stable or decreasing if salvage decreases log levels below the minimum standards in the ROD (USDA; USDI 1994; pg. C-40) for Matrix or salvage continues in the Riparian Reserves above the levels listed in the recommendation section.

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The Del Norte salamander is found most often in talus or rock outcrops within forested areas, although in coastal areas they are also found under litter and downed logs. The salamander has a narrow temperature and moisture range, which gives it a low tolerance to disturbances such as timber harvests (Marshall *et al.* 1996). The habitat condition and trend are unknown for this analysis area. With the exception of the Roseburg Formation volcanic member, most of the rocks weather too rapidly for there to be very many rock outcrops in the analysis area. Most talus slopes are associated with basalt quarries. Consequently, litter and down logs take on a higher importance for the local Del Norte salamander populations. As this is a Category 2 Survey and Manage species, more information should be known as surveys are completed.

Western pond turtles are rare, but can be found in slow moving streams, marshes, natural and human-made ponds, and behind beaver dams. These areas need to have basking sites that are out of the water and exposed to sunlight (i.e., logs, vegetation mats, or rocks). The condition on federal land is fair and the trend is increasing. The factors that favor an increase in the Riparian Reserve trend should also favor turtle habitat including increased buffer widths, and retention of downed logs in riparian areas. The helipond on Shuck Mountain should be suitable habitat for the turtle. Private ponds and reservoirs should provide habitat for the turtle. Marshall *et al.* (1996) reported that inadequate recruitment has caused a decrease in population numbers. Factors causing the decrease include: nest destruction from agricultural practices; hatchling predation by bullfrogs; and habitat destruction.

Eagles use snags and old remnant trees for nesting and roosting. The condition is fair on Federal land and poor on private, as most of the timbered stands within the bird's nesting range have been harvested. The trend is stable due to the Bald Eagle Recovery Plan.

Management for late-successional habitat is not an objective for this analysis area as it is classified as Matrix, and no northern spotted owls or marbled murrelets have been observed within the area. Full implementation of the Northwest Forest Plan, and the Recovery Plan for the northern spotted owl should ensure that even in this analysis area, the trend will increase on federal land for birds that rely on late-successional habitat (northern goshawk, marbled murrelet, and northern spotted owl). Only 4% of the Middle Main Coquille 5th Field Watershed contains late-successional stands as defined by the RMP/ROD (USDI 1995). This does not meet the 15% requirement for late-successional stands within a watershed before harvest activities can take place (USDI 1995, pg. 27). The trend will increase as the

area reaches the 15% level, and forests within the Riparian Reserves mature. The acreage of regeneration harvests should not be high enough to impact the long term trend.

The habitat condition for snag dependent species is poor due to past harvest practices. Potential snags have also been removed from the managed stands through silvicultural practices. Wildlife tree retention was not required until 1983 on BLM and 1991 on private. Most of BLM land in the analysis area had been harvested before this policy was implemented. In general, the Matrix would not meet the requirement for retaining snags sufficient to support species of cavity-nesting birds at 40% of potential population levels (2 snags/acres) (USDI 1995; pg. 27). The 100% population level is 6 snags/acre (Marcot 1991). There have been no snag inventories for the analysis area. Snag surveys were conducted in the Fairview Subwatershed, which has comparable vegetation and management activities. Snag abundance surveys in the Fairview Subwatershed showed that 0.7% of lands contained snags and 1.2% of the lands contained 2 wildlife trees/acre (USDI 1996).

Snag retention on federal land will increase slowly as the Riparian Reserves mature. There will be losses of snags during harvest and site preparation in the Matrix. If we look at BLM lands only, and assume 50% of the land is Matrix (managed for 40% level of cavity nesting species) and 50% is Riparian Reserve (managed for 100% level of cavity nesting species) that averages out to managing for 70% population levels of cavity nesting species. Snag retention will be very patchy in the analysis area due to the ownership pattern and the small amount of BLM land (6%). The sizes (d.b.h. and height), species, decay class, and spatial arrangement of snags will determine which populations of cavity dependent species will be present (Neitro *et al.* 1985). For more discussion on snags see the Upper Middle Umpqua Subwatershed Analysis: Wildlife Appendix (USDI 1997b), and the Tioga Creek Subwatershed Analysis: Snags and Down Logs (USDI 1996)

The above factors also account for the poor habitat condition for bat species that use snags as primary habitat. The hoary bat however, only uses large, live trees for roosting. Habitat for the hoary bat will decline in the short term as harvest activities removes large trees; it will slowly increase as trees in the Riparian Reserve mature. The Pacific Western big-eared bat's habitat condition is in decline throughout its range mainly due to human harassment and destruction to caves and other structures used for roosting, hibernaculum, and nursery sites. In this analysis area, buildings serve as primary habitat for the Pacific Western big-eared bat as there are no known caves.

The pileated woodpecker requires late-successional forest habitat that contain hard snags greater than 25" d.b.h. (Brown *et al.* 1985). This species is sensitive to timber harvests that remove large trees and snags that would have been sources for cavities (Marshall *et al.* 1996). Even with wildlife tree retention, the small tree size, location, and lack of overstory canopy in these stands will decrease the availability of large snags for this species in the Matrix. For this reason, Riparian Reserves will be critical for the pileated woodpecker. The long term habitat trend will improve as Riparian Reserves mature.

Pileated woodpecker cavities are used by a host of secondary nesting species. The northern pygmy owl is one of those species listed as sensitive due to its dependence upon woodpeckers to create secondary nesting cavities (Marshall *et al.* 1996). We know little about northern pygmy owl ecology beyond its dependence on cavities. We need to learn more about its habitat needs before we can effectively manage for the species.

The habitat condition is poor for the American marten and fisher. There is doubt that the amount and

distribution of late-successional forests would be sufficient to maintain populations (the species populations have been extirpated from significant portions of their historic range) (Holthausen *et al.* 1994). Fragmentation of late-successional forests, the loss of large downed wood, and human disturbance all contribute to the decline in trend of the habitat condition. Maturing Riparian Reserves will provide a ribbon of habitat for these species.

White footed voles are strongly associated with riparian alder/small stream habitat (Maser *et al.* 1981). More specific information is lacking on the species habitat requirements (Marshall *et al.* 1996) and so the habitat condition and trend are unknown. One action that will reduce the species habitat is the removal of historic hardwood-dominated riparian areas.

Red tree vole habitat condition and trend are unknown. As this is a Category 2 Survey and Manage species, we will have more information when surveys are completed on federal land.

Connectivity/Diversity Blocks and Dispersal Habitat: Parts of 3 different Connectivity/Diversity Blocks, totaling 113 acres, are within the analysis area. Of that area, 32 acres support late-seral stands. The RMP/ROD (USDI 1995) direction is to maintain 25-30% of each block in late-successional forest (pg. 28). The block in section 35, T.27S., R.12W. does not meet this criterion as only 5% of it is in late-successional forest (Table WL-2). The other 2 blocks meet this requirement, but it is doubtful that they are key for dispersal. It is more likely that northern spotted owls would be dispersing to the LSR and the older-aged habitat blocks east of the area. The capability of the blocks to function as a sink habitat for most wildlife species is lessened as the areas are surrounded by younger-aged plantations and fragmented by roads.

Dispersal habitat on BLM land was estimated from FOI data, by totaling the acres of stands 40 years of age or older. The analysis area contains approximately 2,604 acres of dispersal habitat on BLM lands. This represents about 46% of the BLM land inside the area, and is located on the fringes of the analysis area. Dispersal habitat also occurs on private land. However, this data is unavailable at this time.

Table WL-2. Acres of Late-Seral Stage in the Connectivity/Diversity Blocks.

Location	Late-Seral Ac. inside the Analysis Area only	Late-Seral Ac. in the Conn/Diversity Block (total inside + outside Analysis Area)	Total Ac. (inside + outside Analysis Area) In the Conn/Div. Block	Percent of each Block in Late-Seral Stage
Sect. 35, T.27S., R.12W.	13	13	274	5%
Sect. 5, T.29S., R.11W.	9	244	640	38%
Sect. 20, T.30S., R.13W.	9	355	422	84%

Road Densities: BLM lands in this analysis area are within Oregon Department of Fish and Wildlife's Tioga big game unit. The District's goal for road density within the Tioga big game unit is to maintain 1.1 miles of road per section per watershed with a maximum density of 2.9 miles per section per watershed (USDI 1995: pg. 29). Road density on BLM administered lands in the analysis area is 3.92 miles/ square mile (Table Erod-4).

Confidence Level for the Ratings of Habitat Condition and Trend: The ratings were based mainly on professional judgement, and the confidence level is fair. Trends for some species were based on reports in Thomas *et al.* (1993) and Holthausen *et al.* (1994). The assumptions for all non-federal land

are private forest land owners will meet the minimum requirements under the Forestry Practices Act, and late-successional habitat restoration will not be a part of their management strategy. It was also assumed that the bottomlands and gentle slopes would continue to be managed for agriculture and rural housing.

Reference Condition

(Also refer to the Vegetation Section for Reference Conditions.) Information on the historical distribution of individual wildlife species can be found in identification guides (Burt and Grossenheider 1980, National Geographic Society 1983, and Leonard 1993). These maps and accounts show the geographic distribution at a large scale, but suitable habitat must be present within the range in order for the species to be present.

Historically, the area was a mosaic of wetland and riparian habitats along the river's floodplain with a mixture of seral stages in the forested uplands. The key disturbance processes would have been flooding along the valley bottoms, and fire, landslides, and wind-throw events in the forested areas.

There would have been a higher abundance of riparian-associated species. The Coquille River and its tributaries provided floodplains, wetlands, and forested riparian areas that wildlife would have used. For example, the willow communities and broad valley areas supported more beaver families than exist currently. The beaver ponds in combination with a higher abundance of downed logs provided habitat for the western pond turtle.

Late-successional forest associated species of concern would have had a greater distribution and abundance. Raptor nesting and perching sites would have been more common due to the presence of scattered, large Douglas-firs created by the fire history. The fire history in the late-successional stands would also have produced a greater number of snags in various decay classes, which would have increased the habitat availability and abundance of cavity and snag-related species (18 of the species of concern). The large Douglas-fir would have provided a high volume of downed wood. This would have provided abundant habitat for terrestrial amphibians, furbearers, and the white-footed vole. Fire charring of the downed wood would have been variable, depending on the microclimate and topography near the downed wood, and the fire pattern and intensity. Late-successional forests would have provided optimal cover for big game. The forest structure would have provided quality foraging and dispersal areas for the northern spotted owl.

Synthesis and Interpretation

Table WL-3 lists the causes of change between historic and current species distribution and habitat quality for species of concern in the analysis area. The natural disturbances have been replaced by timber harvest, agricultural/rural housing activities (converting forest/wetland to pastures, and ditching/diking). The closeness to population centers like Coos Bay, Coquille, and Myrtle Point increases human presence (including harassment, back road driving, poaching, and garbage dumping) and wildlife disturbance. This may cause the absence of many wildlife species that would have normally occupied various seral stages. Agricultural lands provide habitat for edge-associated, early-seral, and mid-seral wildlife species, which has increased predation and competition with late-seral species. Management activities have also increased the presence of introduced wildlife species (i.e., bullfrogs, European starlings) and noxious weeds. Bullfrogs in the lower stream systems prey on many native birds (i.e., wood duck ducklings) reptiles, amphibians, and fish (VanDyke 1997).

Beaver numbers have decreased due to agricultural activities. Beavers were trapped for their pelts, and

also to decrease the problem of their dams flooding agricultural areas. Loss of willow communities by channeling and diking the waterways has also decreased a major food source for the beaver.

Early, mid, and late-seral associated species need a variety of seral stages for habitat, and those seral stages need different management Due to the small percentage of BLM ownership, land management actions of the adjacent landowners are important to consider. Most of BLM land in the analysis area is designated as Matrix. The wildlife management objectives for the Matrix include providing connectivity, providing habitat for a variety of species (both late-successional and younger forest), providing for important ecological functions, and providing early-successional habitat (USDI 1995 pg. 22). Riparian Reserves with late-successional characteristics will be extremely important as refuge areas and travel corridors for many wildlife Species of Concern for the analysis area.

Most of the BLM stands are in second growth, which lack the structural and vegetative characteristics of natural stands due to the even-aged, single-species, uniform plantings, and reduction of large residual trees, snags and downed wood. Salvage and timber sale contracts that included snag falling simplified stand structure.

As only 2% (575 acres) of BLM stands are more than 81-years old, the existing older-aged stands and riparian reserves are critical habitat areas. Currently, there are three areas that are older than 81 years of age which could provide a link to adjacent older forests (NW ¼, NW ¼, Sect. 8, T.29S., R.11W.; SW ¼, SW ¼, Sect. 8, T.29S., R.11W., and SE ¼, SE ¼, Sect. 36, T.28S., R.12W., Will. Mer.) However, the small acreage and the presence of roads through the stands will decrease the amount of interior habitat. Four blocks of BLM land in T.30S., R.13W. are between 81-120 years old. The small size of the stands, and their "island" characteristics within the private land cause the current condition of these older aged stands to be poor for most species. The stands may provide habitat for less mobile species like amphibians, reptiles and small mammals. However, the high degree of edge, and the isolation of the stands create an inhospitable habitat for most of the species of concern.

In the analysis area, Riparian Reserves will provide late-successional wildlife habitat as the area contains no LSRs, and is composed of Matrix, private timber, and private agriculture/rural housing. The riparian areas should be reserves for habitat components that may be missing in the adjacent stands (i.e., large downed wood, snags, hardwoods, layered understory, etc.). Without these components, riparian-associated species will not be present (i.e., marten, cavity nesters, neotropical migratory birds, etc.).

Due to land management activities, the Riparian Reserves may be the only contiguous links between stands for many wildlife species. Riparian areas that lack structural components are reduced in viability as travel corridors. Many small animals (i.e., amphibians and rodents) require downed wood or understory vegetation (i.e., salmonberry, thimbleberry, salal and huckleberry) to effectively disperse throughout a drainage (McComb *et al.* 1993). Without these components either dispersal may not occur, or predation on the dispersing animals will increase.

Table Wl- 3. Causes of Change Between Historic and Current Species Distribution and Habitat Quality.

Species of Concern	Change	Major Cause
Aquatic amphibians	Loss of cold clear stream habitat	Timber harvest and agricultural practices
	Increased sedimentation	"
	Higher stream temperature	"
	Loss of cover and breeding habitat	"
	Increase in dispersal barriers	Culverts, road construction
Terrestrial amphibians	Loss of large downed wood	Timber harvest practices
		Salvage
Northern Spotted Owl, Marbled Murrelet, and Northern Goshawk	Loss of late-successional habitat	Timber harvest of late-successional habitats
Northern Spotted Owl	Loss/fragmentation of dispersal habitat	Timber harvest
Cavity Nesting Species and Bats	Loss of snags	Timber harvest
	Loss of older seral stages	Conversion of land to agriculture/urbanization
	Interruption of snag legacy	Thinning from below, timber harvest
Eagles	Loss of nest trees	Timber harvest/ road construction
	Interruption of nesting	Man-made disturbances in line of sight of the nest
	Unsuccessful nesting	Pesticides
American Marten and Fisher	Loss of late-successional habitat	Timber harvest
	Degradation of riparian habitat	"
	Loss of CWM & snags used for hiding/resting/denning	"
	Road construction	Increased human disturbance
White-Footed Vole	Loss of natural alder riparian areas	Timber harvest methods
		Inadequate riparian buffers
Big Game	Human harassment and poaching	Construction of roads and spurs
	Loss of thermal and hiding cover	Timber harvest
	Loss of calving areas	"
All species	Loss of vegetative and structural diversity	Planting monocultures of Douglas-fir
		PCT, brush/hardwood removal

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CHAPTER 8 - SPECIES AND HABITAT: BOTANY

Characterization

Habitat types in the analysis area are somewhat varied. The north end of the analysis area is mostly forested hills, cultivated bottom lands, and population centers. The south end is generally drier, with forests and hillside pastures. Most of the BLM land in the analysis area has been previously surveyed for special status plants, and there are no known occurrences of special status plants, survey and manage strategy 1 & 2 species, or protection buffer species. See Table BOT-1 in the Botany Appendix for a list of special status plants that may occur in this area.

Current Conditions

There is very little special habitat in this subwatershed. Most of the special habitats are due to rocks and shallow soils. There are a few rock outcrops on private ground near Catching Creek and Bennett Butte. No special status plants were noticed on the portions of the outcrops near the road.

Two small oak prairies are on BLM land in Sect. 35, T.27S., R.12W. This parcel is allocated as connectivity. The northern prairie is on a rock outcrop. The southern prairie, which is shown on a 1910 map and referred to as a "glade," is probably the result of shallow soil. Based on aerial photo interpretation, these prairies have not changed in size since 1950. Although they were not surveyed for special status plants due to a difficult river crossing, there is a high probability that a tracking species, Cusick's checker mallow (*Sidalcea cusickii)* grows there. These prairies are adjacent to forests with birth dates of 1890 and 1780, which leads to the conclusion that this area is in a stable condition.

A hillside prairie in Sect. 17, T.28S., R.12W. was described by 1910 cruise records as "open patches that never had any timber." Aerial photos of this private ground indicate that it still exists in this condition, although it is unknown if it is maintained by grazing.

There are a few small forested areas older than 120 years in other parts of the analysis area. These fragmented blocks may provide habitat for old growth dependent species.

Reference Conditions

Benner's 1857-1871 vegetation maps for the Coquille River bottom and surrounding uplands, based on cadastral survey notes, provides the most detailed picture of what the assessment area looked like before land clearing got fully underway (ODEQ 1991). Those maps and supporting discussions are

incorporated into this analysis by reference. The reader is strongly encouraged to refer to Benner's work. It is unknown where special status plants may have occurred historically in the analysis area or what their locations were. Although there are large natural prairies in adjacent subwatersheds (Rowland Prairie, Enchanted Prairie, Burton's Prairie, and Dement Creek), it does not appear there are any extensive natural prairies in the analysis area. In addition to the prairie in Sect. 17, Benner's vegetation maps show prairies ranging from 20 to 60 acres in Sect.29, 30 and 32, T.28S., R.12.W.[6]; Sect. 25 and 36, T.28S., R.13W., and Sect. 17, T.29S., R.12W. The prairies and forests in Sect. 35, T.27S., R12W. provide a reference for natural conditions of these habitat types.

Synthesis and Interpretation

The two main processes which have affected the vegetation composition in the analysis area are fire and settlement. Historically, the Coquille Valley was a mix of forests, marshes, swamps, and prairies. For the past several decades, most of the valley has been used for farming and grazing.

Many large and small fires have affected the analysis area south of Myrtle Point and west of Highway 42. Survey notes from 1877-80 indicate that a large fire killed the timber, resulting in heavy brush growth. This was very likely the fire of 1868, which burned much of the Oregon Coast Range (Dodge, 1969). Several hundred acres on Lampa Mtn. and south along the ridge line were burned, as well as a large area east of Catching Creek. Some sections of timber remained east of Bennett Butte.

Cruise notes from 1910 and GIS vegetation maps indicate some re-burning and other burns in the rest of the analysis area. Homesteaders may have set some of the later fires, as many fires occurred close to settlements. These sources, along with the 1877-80 survey notes, show no indication that Native Americans routinely burned land in the analysis area. According to cadastral survey notes and timber cruise notes, burned areas tended to have many dead trees and were re-colonized with grass, brush or trees, or replaced by grazing land. Many 1910 cruise maps indicated grass fields with stumps.

Fires north of Myrtle point and east of Highway 42 were mostly near the city of Coquille and on Hungry Mountain. A 20-acre fire was mapped during the 1910 cruise in the southeast corner of Sect. 19, T.27S., R.12W. in what appears to be an unsettled area.

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CHAPTER 9 - SPECIES AND HABITAT: NOXIOUS WEEDS

Characterization

The analysis area has not been invaded with noxious weeds as extensively as the northern part of the Resource Area. Scotch broom (*Cytisus scoparius*) and French broom (*Cytisus monspessulanas*) are established in patches along some of roads. Highway 42 is heavily infected with broom and other

[6] Grazing lease information from the 1950's, and the 1943 aerial photos suggest there was a small prairie on the south slope in Sect. 13, T.28S., R.12W. However, it is also possible that area was opened sometime after 1871.

noxious weeds that are common in the District are also present in the analysis area, usually in small patches or along some road segments.

Current Conditions
Most of Highway 42 has roadside populations of either Scotch or French broom. Other public roads with broom include the Myrtle Point - Sitkum County Road, Lampa Mtn.-Fat Elk Loop Road, and the Lee Valley Road.

Much of the BLM land is devoid of broom infestations. Broom growing along the powerline right-of-way has spread into the eastern third of the Golf Course timber sale unit (Sect. 19, T.28S., R.12W.) Broom is established on BLM land at Shuck Mountain and John's Creek. (see MAP Nox-1).

Milk thistle (*Silybum marianum*) is not a common noxious weed in the Coos Bay District, but is gaining a foothold in the Catching Creek area. The source of the outbreak appears to be a barnyard near Horse Hollow Creek. The thistle has spread to adjacent fields and occurs sporadically along Catching Creek Road. Other known locations are near Humbug Mtn.

Other noxious weeds occurring in the analysis area include Canadian thistle (*Circium arvense*), bull thistle (*Circium vulgare*), St. John's wort (*Hypericum perforatum*), tansy ragwort (*Senecio jacobea*), and poison hemlock (*Conium maculatum*). Some pastures along North Fork Coquille have had problem areas of Canadian thistle in the past. Gorse grows along Highway 42, south of Coquille. Although there are currently only a few plants, these can propagate into large colonies in a short amount of time.

Cinnabar moth (*Tyria jacobaeae*), a biological control agent effective against tansy ragwort, is present in the analysis area. It is unknown if biological control agents are present for the control of the other noxious weeds.

Reference Conditions
The forest and prairies in Sect. 35, T.27S., R.12W. (connectivity), and forest in Sect. 23, T.30S., R.11W. (GFMA), probably represent natural conditions. These areas have not been field checked to determine with certainty the absence of noxious weeds. All the known noxious weeds in the analysis are introduced species. Therefore, their occurrences are not consistent with reference conditions.

Synthesis and Interpretation
Highway 42 is a major vector of broom invasion into the watershed. Many activities, including road building, timber harvest, and agricultural practices, contribute to the invasion of noxious weeds in the watershed. For a discussion of these factors refer to the Noxious Weed Synthesis section of the Upper Middle Umpqua watershed analysis.

The milk thistle invasion in the Catching Creek area holds no immediate threat to BLM lands. There is no suitable habitat for milk thistle on BLM land in this area, with the possible exception of Bennett Butte. The recent blow-down of timber in the portion of the butte within the watershed has opened the area to considerably more light than was in this forested area previously. Milk thistle seeds could be transported by vehicle to the communications site and become established in this area.

CHAPTER 10 - HUMAN USE

Characterization

The Coquille River has been an important focus of human activity and use since prehistoric times. Many human uses can be related to landform and vegetational patterns. The subwatersheds in this analysis consist of steep-sided mountain slopes with the wide, broad and flat-terraced Coquille River valley bisecting the analysis area in a generally NW/SE direction. The extent of alluvial terraces in this analysis area is roughly coincident with the "none" class on the Map Erod-2: Landslide Hazard Potential. The Coquille Valley is more than two miles wide near Coquille in the NW part of the analysis area. The valley narrows as the river branches into several forks near Myrtle Point (the SE part of this analysis area). Examination of this map also shows that very little of the Coquille Valley alluvial terraces are included in BLM lands in this analysis area.

Today, primary human uses of the analysis area are related to forest products, agriculture, and recreation. Coquille and Myrtle Point are population centers in the analysis area, and the city of Coquille, with a 1996 population of 4,295 is the county seat of Coos County. Myrtle Point lies south of Coquille and has a population of approximately 2,740. Most rural people live in the relatively wide river valley. Small farms and homes can be found along the Coquille River and main tributaries. Several smaller communities are also within the analysis area, including Arago, Gravelford, Johnson and Norway. Myrtle Point Forest Products, the government, and schools are the largest employers there, while the largest employers in the city of Coquille are Roseburg Forest Products and city, county and state governments.

Regional recreation can be found along the Pacific coast to the west and the Coast Mountain Range to the east. Several county and state parks are within a short drive of the area. There are three city parks in Coquille provide recreation, including a 15-acre riverside park with camping spaces, fishing, boat ramp and moorage. Other facilities for recreational opportunities include tennis courts, a swimming pool, a large community center, library, bowling, baseball and soccer fields.

Reference and Current Conditions

The stretch of the river within the analysis area was prehistorically a "core area" for Native Americans, with important villages and camps, as well as resource use locations. During late prehistoric times, a primary village was located near current-day Myrtle Point (Coquille Indian Tribe, n.d.).

Three prehistoric archeological sites documented within this analysis area include a possible village along the main stem, and two hunting stations in upland areas. Two other known sites on private land are as yet undocumented. These sites represent only a small fraction of the localities used during prehistoric activities. Many prehistoric village and camp sites along river terraces have been destroyed through erosion and historic farming/ranching practices. For example, although only one site has been documented, ethnographies report at least five village sites along this stretch of the Coquille River.

Historic sites in this analysis area also reflect many of the regional trends and date from the earliest exploration by Euro-Americans in the region. The first land-based Euro-American fur trapping expedition for the Hudson's Bay Company was lead by Alexander McLeod in 1824. They traveled through this analysis area, camping around Broadbent.

Other recorded historic sites related to the development of transportation routes include:

- Portions of the Frank Ross Trail.

- The wagon road from Myrtle Point to Dairyville (Langlois).
- The Smith/Powers and Evans logging railroad routes.

Historic sites relating to settlement include:
- Four homestead cabins whose history is not known.
- The Leason Harmon House.
- The Webb Mast farm.
- Bald Hill School.

Recorded historic features related to logging include at least two early splash dam sites along the North Fork Coquille River (one built by the Aasen Bros. in 1912, and the other by Dennis & Richard McCarthy during the 1920s) and the railroad routes mentioned above.

The following is a brief overview of historic human occupation and use within the analysis area:
- Mid 1800's: By the early 1850's, the discovery of gold at Whiskey Run Beach brought many newcomers to the region and settlers began farming and ranching to support the miners. Lumber mills and logging camps also sprouted up to support the mining efforts and shipbuilding. Transport by water to the port of San Francisco increased both import and export ability. The gold mining played out, but it was obvious to the settlers there was much value to the lumber itself, and more logging camps arose along this part of the Coast Range. Trails were established for access and transport across land, although the river remained a primary connection for travel throughout the area (Peterson & Powers, 1977).

- Early 1850's: The city of Coquille was founded, and incorporated in 1885. Myersville had a school in the 1860's, a post office in 1872, and was renamed Myrtle Point in 1876. Myrtle Point was surveyed in 1861, and was incorporated as a city in 1887 (Peterson and Powers, 1977).

- 1870's: The growing demand for commercial fish products exceeded the supply and diminished the quantity of the river fish so much that a state run fish hatchery was established in 1897 (Beckham 1973). It operated until 1964.

- 1890's: Coal mining was active south of Coquille, near Riverton. Railroad companies attempted to accommodate the need for transport, but only with great difficulty because of steep slopes and narrow stream channels in many areas. Soil depletion caused farmers to switch from potatoes to grazing in the 1890's, and cranberries were introduced as a commercial crop (Petersen and Powers, 1977).

- Early 1900's: Many homesteads and logging camps were established. Timber cruising records from 1910 show a cheese factory was located in the NE¼ of Sect. 35, in T.28S., R.12W. (just outside the current BLM boundary). As demand increased, timber production continued to grow. Before extensive road access and motorized equipment, logging was limited to the trees most accessible by river. Splash damming was a way that logging could be extended farther into the forests and several splash dams built and operated between 1905 and 1935. These were used for moving logs from their yarding locations along the upper reaches of the creeks downstream to mills using the navigable waters of the Coquille River. Splash dams impounded water in otherwise shallow streams, allowing logs to float on the resulting pond. The sudden release of the water carried most of the logs down stream in the resulting flood. However, splash dam operations also resulted in substantial bank erosion and stream scouring. These negative effects caused landowner

concerns, and when railroad and logging road building permitted alternative methods for moving logs, the practice was stopped.

- 1920's: The first modern road was opened which linked together coastal towns. Then called the Roosevelt Highway, it now is known as US Highway 101. Improvements to existing operations, commercial endeavors, and expanding populations continued through WW II. Along with increasing population and commercial trade came increasing County, State and Federal Government controls, regulations and overall management.

- 1940's through 1960's: The region exploited more remote timber with motorized equipment not available earlier. Road systems multiplied within the region, including forest roads. Nationwide, the new Interstate Highway system was built and used for commercial and recreational purposes.

- 1960's and 1970's: Natural resource management intensified. Interest in public lands grew as Americans toured the country on the interstate highways. Environmental awareness nationwide began to influence legislation affecting local natural resource management.

- 1980's to the present: Special interest groups utilized the courts extensively. Regionally, protestors target federal agencies managing the Coast Range to ensure compliance with environmental legislation. Changes in the way federal agencies manage the public's natural resources began to be mandated through court battles.

- Today and beyond - Partnerships among affected parties are beginning to work towards resolving problems and improving the health of the water and land. It is expected these cooperative efforts will produce more comprehensive results than did confrontation.

Currently, commercial fishing remains profitable, with a cannery in nearby Bandon. Recreational fishing and seasonal hunting continue to bring out-of-state visitors into the area. Agricultural products primarily are dairy related and include cattle, milk, sheep and hay. Many families grow vegetable gardens and some sell their products locally. Since the mid-1980s, social and political pressures have resulted in a decrease in timber production.

Social trends indicate a growing interest in improving water quality. There is concern over the decline of coho salmon both because of an interest in long-term survival for the species, and a concern about impacts on landowners that might occur from listing the species for protection under the Endangered Species Act. The Coquille Watershed Association, one outcome of this dual concern, has several long-term projects underway with public and private cooperation to improve water quality and fish habitat throughout the watershed. The timber industry is supportive of Watershed Association efforts.

The overall population in this analysis area has remained about 4,000 for some time, and is not expected to change significantly in the near future. Although the population has remained relatively constant, there has been a significant change in types of jobs and ages of the population during the last 15 years. The significant declines in logging and fishing jobs slowly are being offset with additional health care and service jobs catering to the growing number of retirees living in the area.

Native American Interests and Treaty Rights

Official representatives of the United States signed two treaties with Indians from the Coquille River area (in 1851 and 1855), but neither was ratified by the U.S. Senate. Therefore, specific Native

American treaty rights do not exist on public lands in this analysis area. Of course, Federal law and policy concerning Native American cultural resources still apply, regardless of the status of treaty rights. The Coquille Indian Tribe was restored to federal recognition by Public Law 101-42 on June 28, 1989.

Today, the Coquille Indian Tribe (CIT) continues to maintain an active interest in public land within the Coquille River basin that is the location of prehistoric human presence and historic Native American land use. Knowledge of specific places and locations of tribal interest are based on reported or documented evidence, recorded speculation, and oral history. The following physiographic and/or resource-based descriptions of potentially important areas have been adapted, with permission, from a draft CIT policy statement ("Substance of CIT Cultural Values", dated May 30, 1997).

Physical features of interest to the CIT in riverine/stream locations include the vicinities of:
- The present (and past) head(s) of tidewater.
- Intertidal zones in bays or estuaries.
- The confluences of anadromous fish-bearing tributary streams

Upland localities of interest to the CIT include:
- Meadow, prairie and other open spaces near perennial water sources.
- Rock outcrops/bluffs with the potential for panoramic views.
- Areas with unique physical, floral or faunal attributes, such as places where important plant species thrive (in abundance or size) or important animal/bird species congregate.

The CIT also has expressed interest in preserving and protecting places with certain botanical/faunal conditions connected with traditional collecting, gathering, and hunting/fishing activities, such as:
- Migratory routes and gathering places of important "big game" animals like bear, elk and deer.
- Wetland/woodland raptor (like osprey, hawk and eagle) and/or small game animal (like beaver, otter, raccoon and coyote) habitats
- Woodland bird (like woodpecker, blue jay and owl) habitats.
- Forest environments where important tree (like cedar, spruce, hemlock and yew), berry (like salmonberry and huckleberry) and/or nut producing tree and/or shrub (like myrtle and hazel) species thrive.
- Places where traditionally-used indigenous plants (like camas, iris, beargrass and ferns) prosper.

Recent (1996) federal legislation (H.R. 3610) transferred 5400 acres of BLM-managed public land to the Bureau of Indian Affairs to be held in trust for the Coquille Indian Tribe, forming the "Coquille Forest." The scattered parcels that compose this forest all are in the vicinity of the Middle Fork Coquille River, beginning several miles east of the analysis area and continuing to the vicinity of Remote. The implementing legislation specifies that the Coquille Forest will be managed in compliance with " . . . applicable State and Federal forestry and environmental protection laws, and subject to critical habitat designations under the Endangered Species Act, and subject to the standards and guidelines of Federal forest plans on adjacent or nearby Federal lands . . . " (H.R. 3610, subparagraph 5), which include the Northwest Forest Plan.

Synthesis and Interpretation

Regionally, exploitation of natural resources grew without overall management until the mid-20th century, as populations continued to grow and communities increasingly depended on timber and fishing jobs for economic support. Intensive forest resource management really began after World War

II, as new mechanized equipment and improved transportation systems increased potential harvest localities that could be reached. At the same time, renewed economic conditions provided additional demand for forest products. The American public was also discovering their country via the new interstate highway system. Changes in social and political attitudes collided with increasing demand, resulting in many of the environmental/natural resources laws which are being implemented today.

Major historical human uses in the analysis include fishing and hunting, timber harvesting, canning, and small-scale farming. Despite fundamental changes to the prehistoric natural systems from draining the wetlands, suppressing fires, building roads and cutting large tracts of timber, human uses today in this analysis area are much the same as one hundred years ago. What has changed is that long-term planning for maintaining a sustainable natural resource base for all communities is slowly beginning to replace short-term land use strategies of the past.

As tourism becomes a more important part of SW Oregon's economy, historic and prehistoric sites can play an increasing role in providing a varied suite of resources to interest visitors. However, prehistoric and historic cultural resources are, by their nature, fragile and non-renewable. Unless positive steps are taken to prevent their destruction, current and future human land use and natural disturbance processes are likely to result in the loss of many remaining resources. Application of existing cultural resource law can retard or ameliorate ongoing destruction processes on public land. However, as discussed above, many of the more heavily used and important localities today are in private ownership. Tax credits and other assistance may be available to private citizens who consent to the preservation of important cultural resources on their land.

This analysis area has been the scene of many important human events that mirror many of the region's major historic trends. The potential exists for preservation and future investigation of cultural resource localities through the interest, support and cooperation of both public and private landowners. Results of such investigations can provide a more complete understanding of prehistoric and historic events, and may result in creation of additional interpretive facilities that can stimulate interest in the area's past by presenting cultural information to visitors and residents alike.

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CHAPTER 11 - WATERSHED ANALYSIS RECOMMENDATIONS

Erosion

- Where the Coos County Soil Survey (Haagen 1989) shows Whobrey and Etelka soils on BLM land, review the TPCC and add mass-movement restricted (FPR) to the fragility classification on appropriate sites.
- When proposing soil disturbing projects on Whobrey and Etelka soils, consider the range of problems associated with these soils (severe shrink-swell, low strength, shallow rooting depth, potential for chronic sediment delivery, and propensity to slump).

- When proposing soil disturbing projects (particularly road construction) on gentle and moderate slopes, consult the Bealieu and Hughes (1975) geologic hazard maps. Check the site for landslide debris and the potential for slumping and earth flows. Use appropriate engineering techniques where these features occur.
- Put off doing TMOs for this assessment area until after work in more sensitive subwatersheds is completed. When evaluating roads for closure inside this assessment area, use the recommendations for reducing miles of stream-side and mid-slope roads developed for the Upper Middle Umpqua Subwatershed (USDI in preparation).
- Ridge-top and upper slope road segments that do not cross streams or headwalls generally do not contribute sediment to streams. Therefore, focus sediment control efforts on stream-side roads, and on segments of mid-slope roads that cross streams. Where a stream-side / mid-slope stream intercepting road is essential, use the following techniques to reduce sediment production:
  - Pave roads that will be regularly used to haul more than 4 loads/ day. If paving is not possible, maintain a rock surface > 6 inches in depth.
  - Limit the use of roads with less than 4 inches of rock to light traffic (pickup/ sedan use and short periods of less than 4 log trucks/ day).
  - Have contract administrators and engineers monitor the condition of road surfaces used for hauling during extended wet periods. Discontinue hauling if the running surface is at risk of breaking down, liquefying, or fines are pumping up from the subgrade. Limit hauling on rocked roads during high-intensity storms.
  - Monitor ditch lines during rainy periods to identify the ditch segments that have both standing water and are connected to streams. On those segments, install additional culverts or apply other techniques to improve drainage and reduce ditch water directly entering streams.

- Encourage the Coquille Watershed Association members to evaluate road surface erosion potential on those road segments that can contribute sediment to streams. Target stream-side roads, stream crossings, and road segments connected to streams by ditches particulary in areas with Whobrey and Etelka soils for evaluation.

Vegetation

Potential Harvest Areas in Middle Main Coquille: According to the Coos Bay District's management direction, late-successional forest patches shall be retained in areas where little late-successional forest persists. This management action/direction will be applied in 5th field watersheds in which federal forest lands are currently comprised of 15% or less late-successional forest (the assessment of 15% will include all federal land allocations in a watershed). Within such an area, protect all remaining late-successional forest stands. Protection of these stands could be modified in the future when other portions of the watershed have recovered to the point where they could replace the ecological roles of these stands (USDI 1995a: pg. 23, 53.)

The Middle Main Coquille 5th field watershed does not meet the 15% rule. At this time, all late-successional forest patches should be retained. The 15% rule does not preclude thinnings, density management or hardwood conversions. Regeneration harvests in late-seral habitat will be precluded until at least the year 2017, when the 5th field watershed meets the 15% rule. Limited regeneration harvest, consistent with the retention objective, will be possible there after. See the Potential Harvest Areas Working Map in the Potential Harvest Area Appendix.

There are some potential commercial thinning and hardwood conversion opportunities in the Middle

Main Coquille 5th Field watershed, but there has been no field verification of these areas at this time.

Opportunities in North Coquille 5th Field Watershed: The North Coquille 5th Field Watershed was covered by the Middle Creek Watershed Analysis (BLM, 1995b), the Fairview Watershed Analysis (BLM, 1995c), and the North Coquille Watershed Analysis (BLM, 1995d). Since the watershed analyzes were completed, there has been a concentration of activity in this area. Projects and future projects include:

Project Name	Location		Acreage
Blue Retro Commercial Thinning	Sects. 25, 26, 35,	T.26S., R.12W.	50 ac.
Woodward Creek Commercial Thinning	Sect. 1,	T.27S., R.12W.	241 ac.
Woodward Cr. 1-11 Commercial Thinning	Sects. 1, 11,	T.27S., R.12W.	350 ac.
Hudson 17 Commercial Thinning	Sects. 17, 20,	T.27S., R.11W.	245 ac.
Chicken Deluxe Regeneration Harvest:	Sects. 26, 35,	T.27S., R.11W.	97 ac.

Regeneration harvest opportunities in the North Coquille 5th Field Watershed are limited and there are no plans for any further regeneration harvesting in this area at this time. Small regeneration harvests may be associated with hardwood conversions.

See the Potential Harvest Areas Working Map in the Potential Harvest Areas Appendix.

Sections 17 and 20, T.27S., R.11W. were looked at for the Hudson 17 Commercial Thinning (96-04) project. The areas that were not selected in those sections were unsuitable for commercial thinning at that time. For stand exam data is on file with the Umpqua Resource Area forestry staff.

Sections 19, 29, and 33, T.27S., R.11W. are being surveyed for possible commercial thinning areas.

See the Potential Harvest Area Appendix for total possible acres. These numbers are exaggerated because the previous timber sales have not been entered into the data base, there are some older hardwood stands that were selected out for potential thinning or regeneration harvesting, etc. All projects need to be verified on the ground.

Potential Hardwood Conversion Areas: The Coos Bay RMP has stated that the Coos Bay District will do 120 acres/ year of hardwood/brushfield conversions. There are possibilities for hardwood/brushfield conversions in this area, in the GFMA as well as in the LSR.

In addition to the recommendation to create two snags per acre in commercial thinnings, follow the Objectives and Management Actions/Directions for the Matrix found on pg. 22 of the Coos Bay District ROD-RMP (USDI 1995a).

Wolvery/Etelka Soils: There is a high probability of blowdown after disturbance on Wolvery/Etelka soils. This should be a consideration during the NEPA process when looking at green tree retention, thinning, and snags.

Fire: Blue blossom ceanothus will germinate on the ridgetops and south to west aspects following broadcast burning or wildfire. This should be a consideration during the NEPA process when looking at site preparation activities.

Late Successional Reserves: Follow the Objectives and Management Actions/Directions for this Land

Use Allocation found on pg. 18 of the ROD/RMP (USDI 1995a).

A draft LSR Assessment will be available by Fall 1997. Refer to recommendations made in the LSR assessment after it has been finalized.

Possible treatments include; thinning the overstory to produce large trees, release advanced regeneration, hardwoods or other plants, activities to reduce the risk of fire, insect infestation, forest pathogens, or other environmental variables, underplanting and limiting understory vegetation to begin development of multistory stands, snag and coarse woody material creation, reforestation, and prescribed use of fire.

Riparian Reserves: In addition to the recommendations made in the wildlife section for CWM levels and snag creation in the Riparian Reserves, follow the Objectives and Management Actions Direction for this Land Use Allocation found on pg. 12 of the Coos Bay District ROD/RMP (USDI 1995a).

See the West Fork Smith River Subwatershed Analysis, Vegetation Recommendations, Riparian Vegetation: Conifer Reestablishment Projects, pg. 79.

Some red alder dominated riparian areas have the potential to be converted to conifer or mixed conifer/ hardwood stands. Emphasis will be on releasing established conifer regeneration and in establishing new conifer seedlings. Areas of frequent disturbance would be identified as improbable targets for project location. Long term management would be aimed at developing late successional/ old-growth forest characteristics. Possible treatment areas along fish bearing streams include:

- Cunningham Creek: Sect. 9, T.27S., R.12 W.
- Wimer Creek: Sect. 19, T.28S., R.11 W.
- Llewellyn Creek Tributary: Sect. 35, T.28S., R.12 W.
- John's Creek: Sect. 7, T.29S., R.11 W.

See the maps in the Large Organic Debris Recruitment Potential Appendix for more exact locations and supporting information. Also, see Coquille Watershed Association Action Plan, Coquille Watershed Association, July 1995.

Scarce Habitats: For a discussion on scarce habitat management, see West Fork Smith River Subwatershed Analysis, Vegetation Recommendations, Land Use Allocations, pg. 78. Also, see the Botany section of this document.

Disposal of lands: See Land Tenure Adjustments, pg. 62, Appendix H: Zone III-Lands, pg. H-1, and Appendix I: Land Ownership Adjustment Criteria, pg. I-1 (USDI 1995a). BLM land in section 19, T.28S., R.12W., and section 21, T.30S., R.13W. are identified for disposal or exchange. Section 1 T.30S., R.13W. may be a good candidate for exchange and is in Zone II - Lands.

Forego any activities planned in locations that are identified as high priority for disposal or exchange for other areas.

Water Quality

The BLM manages only 6% of the watershed, but has the opportunity to greatly assist The Coquille Watershed Association on activities on private land. This support is especially critical when the association is working on low-gradient floodplains that are extremely sensitive systems, but provide

critical aquatic habitat.

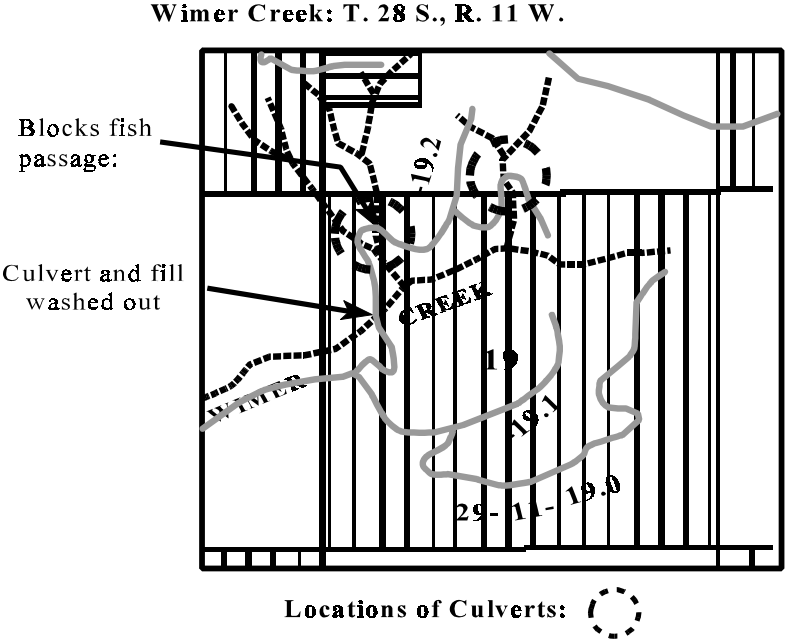
Species and Habitat - Aquatic

Wimer Creek: Road No. 29-11-19.2 in the NW corner of section 19 does not appear to have been used for at least 10 to 20 years, and is accessible only on foot. There are 2 small slides that block the road before it crosses Wimer Creek, where the road fill and culvert have washed out. The culverts identified on the figure below are under a considerable amount of fill, and block the passage of all aquatic-dependant wildlife. The only culvert that affects fish passage is on the tributary that flows from the north as indicated below.

If the culverts become blocked during a high flow event, there is a potential that a considerable amount of sediment would be released when the road-fill is washed downstream, as has already occurred on BLM lands on the main-stem of Wimer Creek. Culverts and fills potentially can block the passage of large wood and gravel from the headwater areas. The effects of barrier culverts on fish and wildlife are discussed in the Aquatic section of this Analysis.

Recommendations for Wimer Creek:

- Remove the culverts identified on the figure below, and the drainage culverts in order to comply with ACS objectives to "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" and to "provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependant species."
- Access for equipment to remove the culverts would be difficult because of the failed culvert and fill as indicated on the figure below. The use of a temporary bridge or removing the obstructions with dynamite may be feasible alternatives.
- Stabilize and block the road. Consider dropping this road from the transportation system.



Johns Creek: The culvert identified on the figure below is a complete barrier to the passage of all aquatic-dependant wildlife, resident cutthroat trout, and probably adult steelhead. The approximately 10' diameter culvert does retain some bed-load in the form of small boulders, but the plunge from the outlet prevents passage. Resident cutthroat that pass down through the culvert or originate from below this location are not able to migrate upstream where the habitat is more favorable for spawning and rearing.

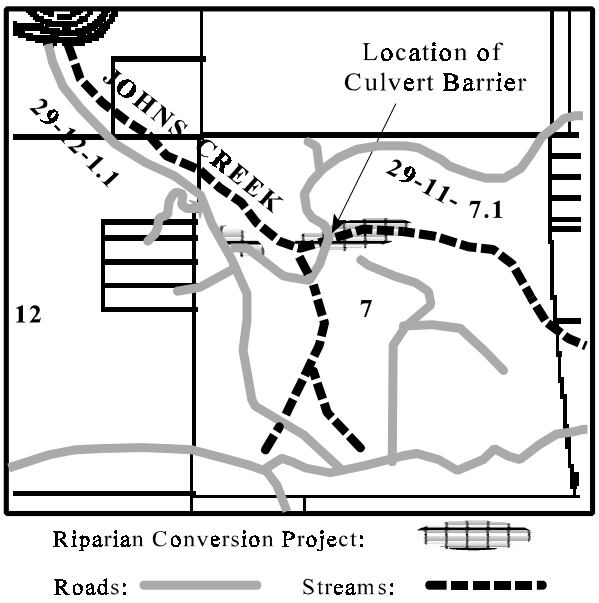
A riparian conversion project initiated on John's Creek in 1992 is located in the general areas indicated

on the following figure. Based on a site evaluation, it appears that the conifer seedling density is extremely low and brush species have flourished.

Recommendations for Johns Creek:

- Remove or modify the 10' diameter culvert so it is no longer a passage barrier to any aquatic species likely to occur in the drainage. The pipe is large enough and sound enough that lowering it to less than 1% grade may be sufficient.
- A silviculturist should evaluate the riparian study sites to determine the present stocking level and prescribe measures to ensure that conifer species would remain well-established in the riparian area. Alternately, assign a project lead to this and possibly other riparian reforestation projects.

John's Creek: T. 29 S., R. 11 W.



Species and Habitat - Wildlife

General Wildlife Habitat:

- Provide bat roosting structures by installing bat boxes under BLM bridges and in large culverts (>6' high) such as on John's Creek. Pursue a partnership with the Coquille Watershed Association to install bat roosting structures under suitable bridges in the analysis area.
- To protect habitat for the white-footed vole, riparian areas that were historically dominated by red alder should not be considered for riparian conversion projects.
- Allocate buffers and management strategies for special habitat areas. Inventories will need to be conducted to locate the special habitats (i.e., wetland, pond, meadow, cliff, talus, cave)

Threatened and Endangered Wildlife Species:

No action should be taken that will jeopardize populations of federally listed or proposed species. Management should avoid contributing to the need to list species, and all actions need to be consistent with those recovery plans now in effect or those being developed. In order to understand better which wildlife species and their primary habitats are in the area - and within the District as a whole - inventories on vegetation composition and presence of wildlife species is critical. Once this knowledge is attained, land management within the area could then be designed to protect or enhance suitable habitat for special status wildlife species, with the goals of delisting and population stabilization.

Snags: Most of the GFMA is in a younger seral stage that is deficient in hard and soft snags. These GFMA areas do not meet the minimum 40% of potential population levels across adjacent 40-acre parcels for cavity-nesting birds that are listed in the S&Gs (USDA; USDI 1994 pg. C-42) and RMP (USDI 1995 pg. 27).

- Manage future GFMA sale units to help alleviate this snag deficit by leaving more than the minimum 6 - 8 green trees per acre (USDA; USDI 1994 pg. C-42). Snag surveys are needed so that the actual deficit for the 40-acre areas can be calculated and the appropriate number of green trees reserved. See Brown *et al.* (1985) for snag composition and distribution recommendations.
- Recommend managing the Connectivity/Diversity Blocks for 100% population levels of cavity

dependent species (6 hard snags/acre).

- Create 2 conifer snags per acre (average of 16" d.b.h. if possible) during commercial thinnings to provide foraging opportunities, nest sites for species using cavities in small d.b.h. trees (Brown *et al.* 1985), and future CWM.

Riparian Reserves:

- Best Management Practices (USDI 1995, Appendix D) state that naturally occurring down logs will not be removed from Riparian Reserves except for the benefit of the stream or Riparian Reserve. Where an entry must be made to benefit the Riparian Reserve (for example re-establish conifers on a conifer site, or improve plantability following a catastrophic event) leave log and snag amounts that are within the levels reported by Spies *et al.* (1988) for old-growth stands.
- There should be no salvage activity in Riparian Reserves within the zone of riparian influence, or on FGNW or FGR2 ground unless an ID Team determines that the CWM must be removed to meet Aquatic Conservation Strategy Objectives.
- Create snags within Riparian Reserves to help restore structural complexity in snag deficient areas. The initial target would be 3 snags/ acre averaged over the Reserve. Areas that would be suitable for this are: reserves greater than 40 years of age, or that contain conifer trees greater than 16" d.b.h.; and areas that are not in a "high risk of theft" location (flat benches next to managed roads where theft of the future CWM could occur). Snag surveys would be required to identify site-specific locations, and the numbers of snags needed.

Culverts: When replacing culverts and/or fish passage barriers, install natural surface bottom structures that will aid in dispersal of amphibians and aquatic species.

Roads: Road density on BLM administered lands in the analysis area is 3.92 miles/ square mile (Table Erod-4). The Transportation Management Objective process should be used to identify roads to close to meet the Tioga Big Game Management Unit target of 1.1 miles/mile^2. Secondary roads within Riparian Reserves and roads that are contributing fine sediment to the stream should be targets for closure. Closure techniques that actually limit vehicle traffic (i.e., tank traps) would decrease wildlife harassment and poaching.

Timber Harvest Activities:

- Silvicultural treatments such as thinning could be used to restore complexity to early and mid-seral stands in the Matrix and Riparian Reserves. These types of habitat enhancement projects in the Matrix would have a lower priority for implementation than in Riparian Reserves and other reserved/withdrawn land. Retaining or under-planting shade tolerant conifer species and hardwoods would help to reestablish the natural species mix. Variable spaced thinnings would release small trees and provide openings for multilayered stands. Prescribed burning and under-planting could also be used in Douglas-fir dominated to increase habitat diversity for wildlife. Not all stands however should be thinned. The dense, unthinned patches provide habitat to species such as Coopers' and sharp-shinned hawks who nest in dense, unthinned mid and late-seral stands. Certain songbirds also use dense forests during the nesting season and these stands provide hiding and thermal cover to big game and other wildlife species.
- In the GFMA, exceed the minimum retention levels for downed logs. Due to past harvest practices on both federal and private timberland, the level of downed logs in the Area is assumed to be low. To alleviate the deficit, consider retention of all existing down logs within harvest units. The Allowable Sale Quantity (ASQ) for the District did not appear to have included the volume of downed logs (USDI 1996). This would provide an opportunity to leave this material on the ground

to benefit wildlife, while not violating the assumptions of the ROD/RMP in meeting our ASQ levels and its associated economic goals.

- Close access roads after planting is completed on regeneration harvest units.
- In pile and burn units, leave 1 brush pile per acre for small mammal species to use as hiding and nesting cover.

Silviculture:

- When precommercial thinning units which contain shade tolerant conifer species and hardwoods greater than 8 "diameter, girdle rather than cut approximately 4-6 trees/ acre (except for trees within 40' of a road). This would develop a short-term small snag component. Although these snags will have a short life span, and will provide habitat for only the smaller snag and cavity associated species, snags and down logs of all sizes are limited across the analysis area.
- When controlling hardwoods other than red alder in units greater than 5 years of age, hardwoods should not be completely removed, but trimmed to retain 1-3 live stems. This is to allow conifer to regenerate successfully, while retaining species diversity and allowing these hardwood species to grow before canopy closure by the conifers. These hardwoods provide nesting habitat, forage production, and security cover.

Critical Data Gaps/Inventory/and Monitoring Needs

- Wildlife inventories for special status species and general wildlife species presence, distribution, and habitat availability/use (with emphasis on: (amphibians, reptiles, raptors, neotropical migratory birds, bats, forest carnivores)
- Surveys for Survey and Manage Species after protocols are established (S&Gs C4-6, C49-61).
- Vegetation inventory.
- Inventories for snags and coarse woody material for density, distribution, size, and decay class.
- Monitor wildlife tree and CWM retention after regeneration harvests (RMP L-10).
- Continue monitoring for Northern spotted owls, marbled murrelets, and bald eagles.
- Implement a District Wildlife Monitoring program.

Species and Habitat - Noxious Weeds

Eradicate broom from BLM administered lands within the analysis area before the infestation intensifies. The following priority rating reflects the number of plants at each site. Sites with the fewest plants should be treated first.

1. Shuck Mountain.
2. John's Creek
3. Sect. 19, T.28S., R.12W. (Golf Course Timber Sale)

For general recommendations, see the Tioga Creek watershed analysis (USDI 1996).

Riparian Reserves

When considering altering Riparian Reserve widths or managing inside the Riparian Reserve, work within the assumptions and follow the procedures for Level 1 site evaluation outlined in Riparian Reserve Module (RIEC 1997). The total area that potentially could be involved in modifying riparian reserves is expected to be less than 10% of the Interim Riparian Reserve acreage. The Riparian Reserve Module (RIEC 1997) recommends additional analysis if we are to exceed that 10% level.

Modifications to the interim Riparian Reserve widths on intermittent streams proposed at the project scale are to be based on field evaluation, be consistent with the Aquatic Conservation Strategy, meet the assumptions for viability of J-2 species, and meet or exceed the "ecological protection widths needs" shown on figure B6-1 page B-89 in Appendix B for the FSEIS (USDA; USDI 1994).

For planning purposes, potential locations for altering the interim Riparian Reserves widths based on slope stability considerations, can be identified using TPC classification (Map Erod-4), and Map Erod-2, Predicted Landside Potential. Of the two, the TPCC will be the more reliable predictor. However, neither map is accurate enough to substitute for field evaluation at the project scale. See also the following table for starting point recommendations.

Summary of Recommendations for Riparian Reserves on Intermittent Streams

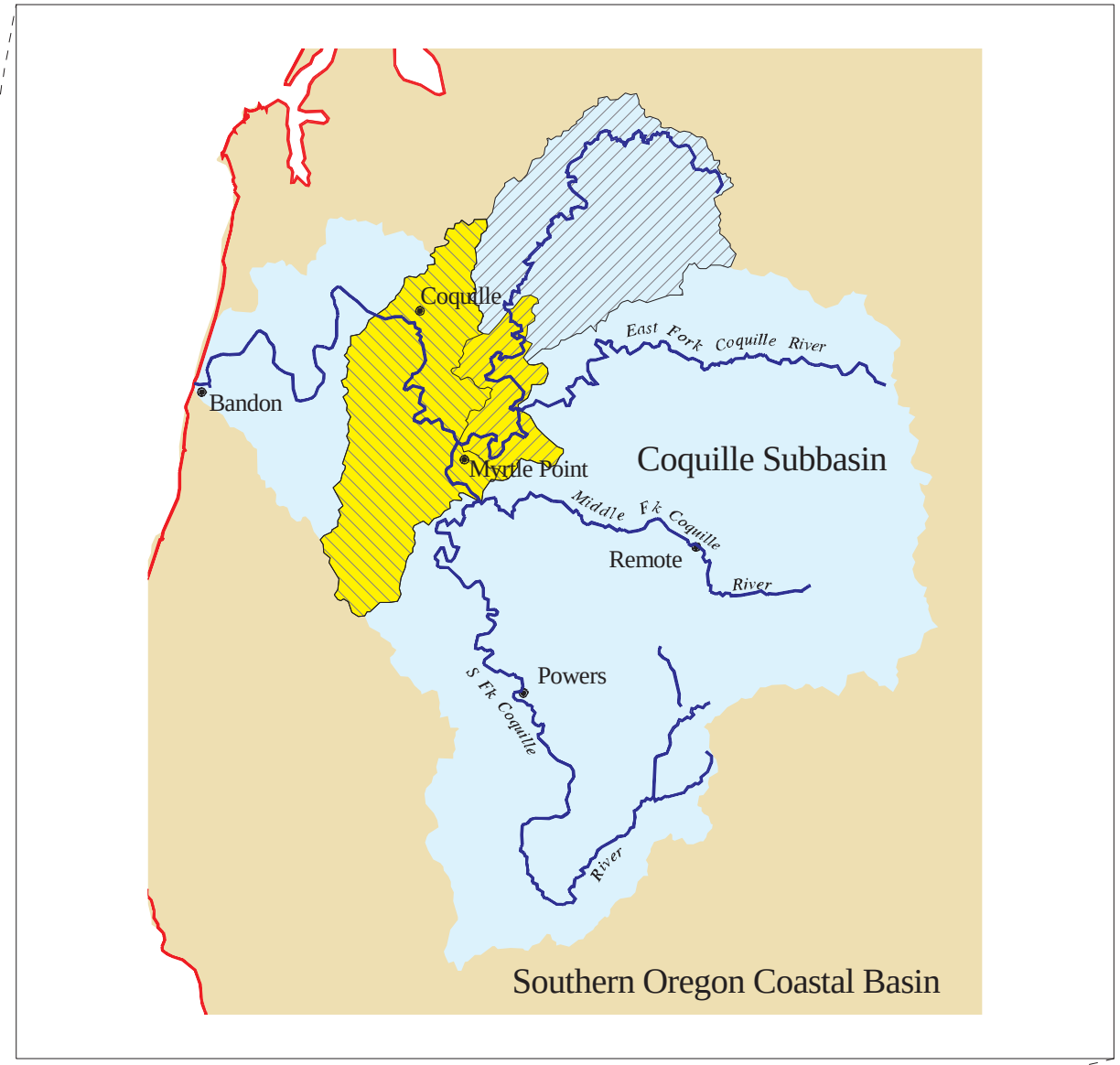
Site conditions			Generalized recommendations to meet ACS and ROD-RMP objectives. ID teams may identify different recommendations following site evaluation on a project by project basis.
J2 sp. & sp. of local concern	TPC Classification	Landslide Potential Map	
present or absent	FGNW, FGR2	high	Attaining ACS objectives may require Riparian Reserve (RR) widths = or > 1 site potential tree. These widths will satisfy ROD assumptions for those J2 species that benefit from a 1-site potential wide RR.
absent	FGR1	moderate to high	Attaining ACS objectives may require RR widths = 1 site potential tree on some sites. On sites that are inclusions of non-fragile/ low hazard ground, ACS objectives may be obtained with a RR width between a ½ site potential tree and 1 site potential tree.
absent	not classified as fragile	moderate to low	Objectives on some sites may be obtained with a width between a ½ site potential tree and 1 site potential tree, depending on site specific conditions.
absent	not classified as fragile	low or none	Objectives may be obtained with a ½ site potential tree width.
present	any classification	any classification	Satisfying ROD assumptions for species benefitting from a RR width = to 1 site potential tree will attain or exceed ACS objectives on most sites.

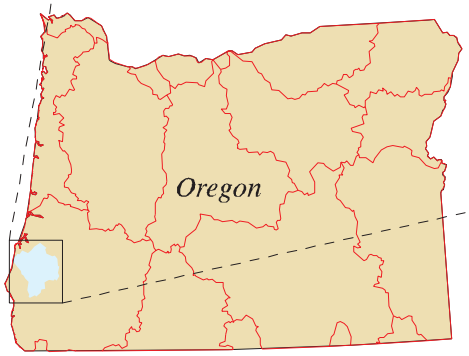
Wildlife Recommendations: (based on Table RR-Apdx-6 FEMAT ratings contained in the Riparian Reserve Appendix..) Reducing interim Riparian Reserve widths on intermittent streams to a half-site potential tree could reduce the likelihood below 80% of having a well-distributed stable population over the next 100 years for 9 of the J2 species (southern torrent salamander, tailed frog, fringed myotis, long-eared myotis, long-legged myotis, silver-haired bat, hoary bat, red tree vole, and American marten). Refer to FEMAT (1993) and Holthausen *et al.* (1994) for an explanation of the ratings and mitigation measures for the above species. No modification of Riparian Reserves can be made until field evaluations are completed. Those evaluations must include a site specific determination on the presence of those species and their habitat. If any of those species (or suitable habitat for those species that is likely to be used) are found present inside the interim Riparian Reserve, then the Riparian Reserve width on intermittent streams in that area will remain at the 1-site potential tree width. Management activity inside that area of the Riparian Reserve should be either neutral or beneficial for those J2 species, and it should always be consistent with the Aquatic Conservation Strategy objectives.

Retain natural hardwood-dominated riparian areas as part of the Riparian Reserves to provide white-footed vole habitat.

Botany Recommendations: (based on Table B6 and habitat information contained in the Riparian Reserve Appendix..) Where reducing interim Riparian Reserve widths is considered, survey for: *Leptogium saturnium, Helvella compressa, and Ricknella setipes*. Refer to FEMAT(1993) and Holthausen *et al.* (1994) for an explanation of the ratings and mitigation measures for the above species. If any of those species are found present inside the interim Riparian Reserve, then the Riparian Reserve width on intermittent streams in that area will remain at the 1-site potential tree width.

Map Intro-1
Watershed Hierarchy
Catching Cr Middle Main Coquille N Coquille Mouth
Subwatersheds





Scale 1:605307
2 0 2 4 6 miles
5 0 5 10 km

MAP FEATURES

Basins (REO 3rd field)

Subbasins (REO 4th field)

Watershed (5th field, N F Coq)

Watershed (5th field, M Main Coq,)

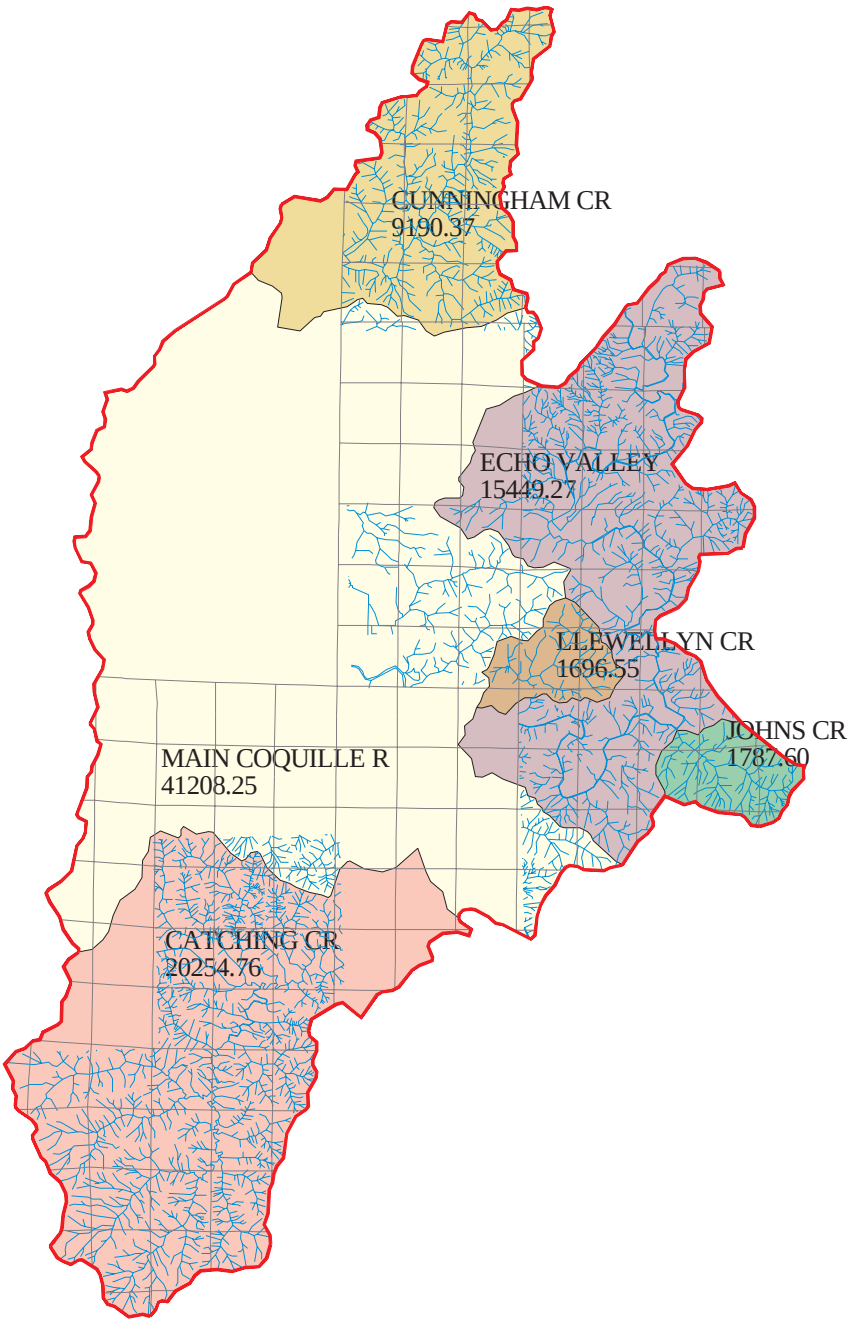
Wshed Analysis Area (M M Coq, N Coq Mouth, Catching Cr Subwsheds)

N

award 07/28/97 /usr3/wsa/coq_catch/wshed_hier_cc.aml

Map Intro-2 Drainage Names and Total Acres per Drainage

CATCHING CR M MAIN COQ N COQ MOUTH



1 0 1 2 miles

1 0 1 2 3 4 km

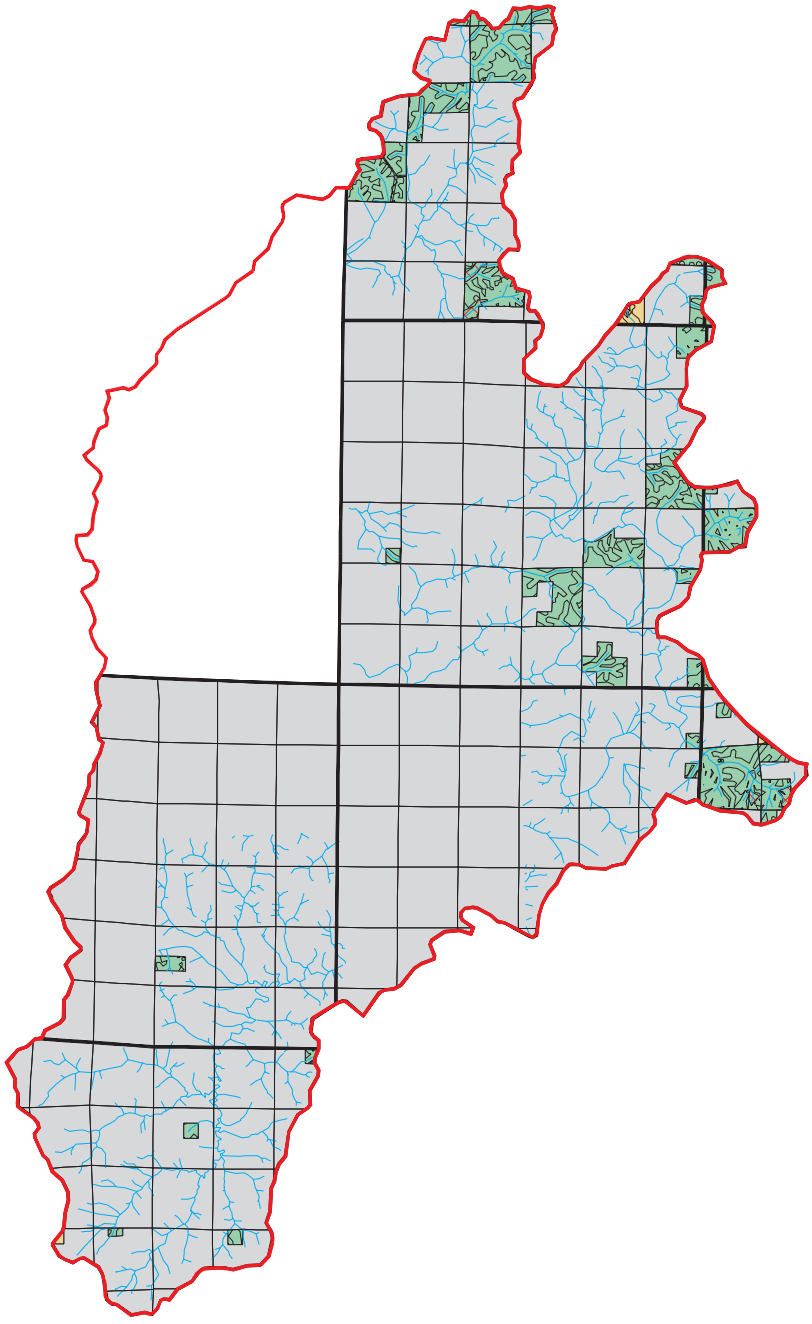
N

Scale 1: 200950

award 05/29/97 /usr3/wsa/coq_catch/fnl_drainages.aml

Map Intro-3 Land Use Allocation Map

CATCHING CR M MAIN COQ N COQ MOUTH



MAP FEATURES

- *GFMA Lands*
- *LSR Lands*
- *Connectivity Lands*
- *Marbled Murrelet Reserve*
- *State, Private or Other Lands*
- *Riparian Reserves*
- *Nonsuitable Woodland*
- *Nonforest or Utility*
- *USDA Forest Service Lands*

Note: Some map features shown in the legend may not appear in the mapped area.

Scale 1:200950

1 0 1 2 miles

1 0 1 2 3 4 km

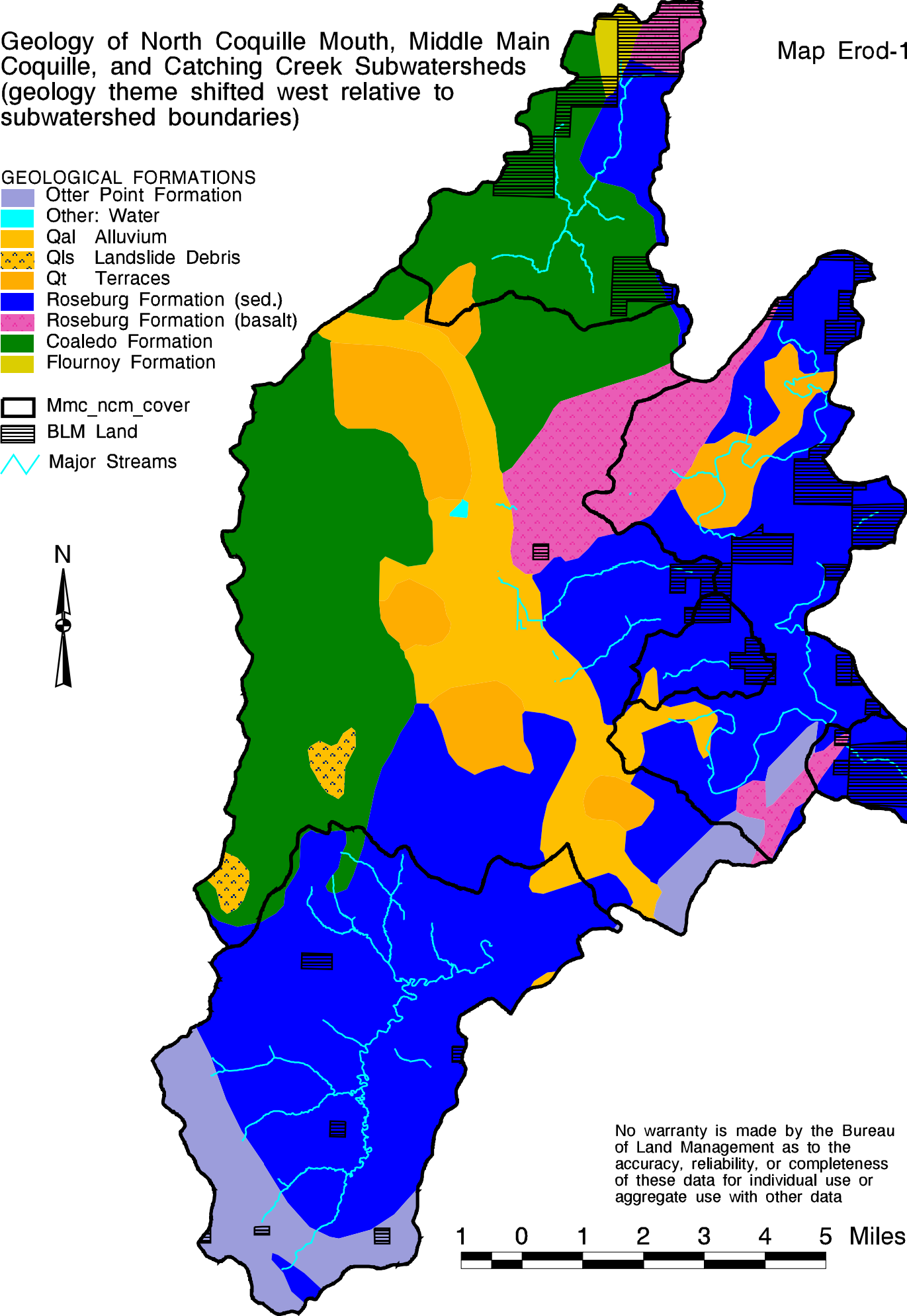
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

N

award 06/13/97 /usr3/wsa/coq_catch/fnl_lua.aml

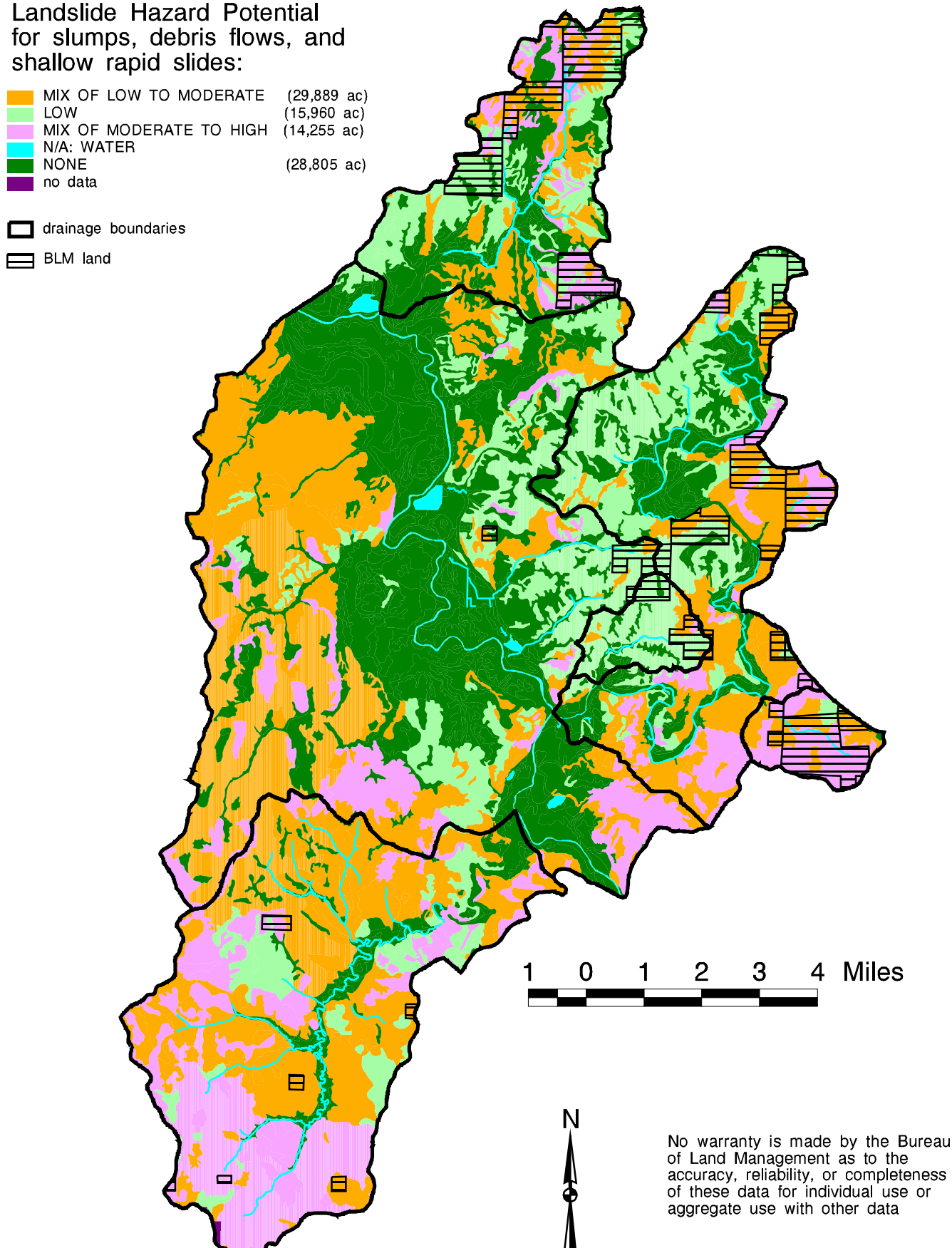
Geology of North Coquille Mouth, Middle Main Coquille, and Catching Creek Subwatersheds (geology theme shifted west relative to subwatershed boundaries)

Map Erod-1



North Coquille Mouth, Middle Main Coquille, and Catching Creek Subwatersheds: Landslide potential based on soil mapping units

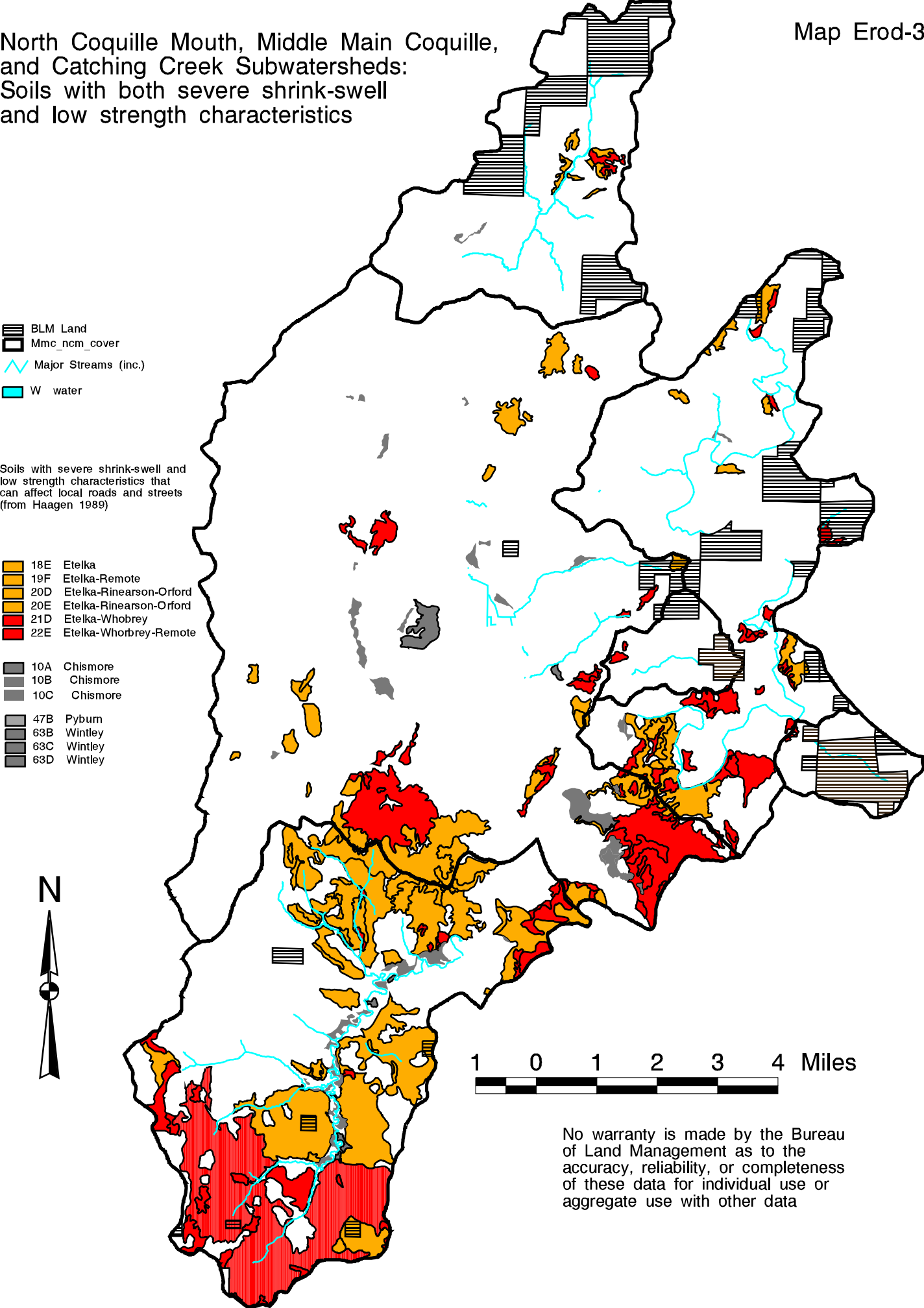
Map Erod-2



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

North Coquille Mouth, Middle Main Coquille, and Catching Creek Subwatersheds: Soils with both severe shrink-swell and low strength characteristics

Map Erod-3



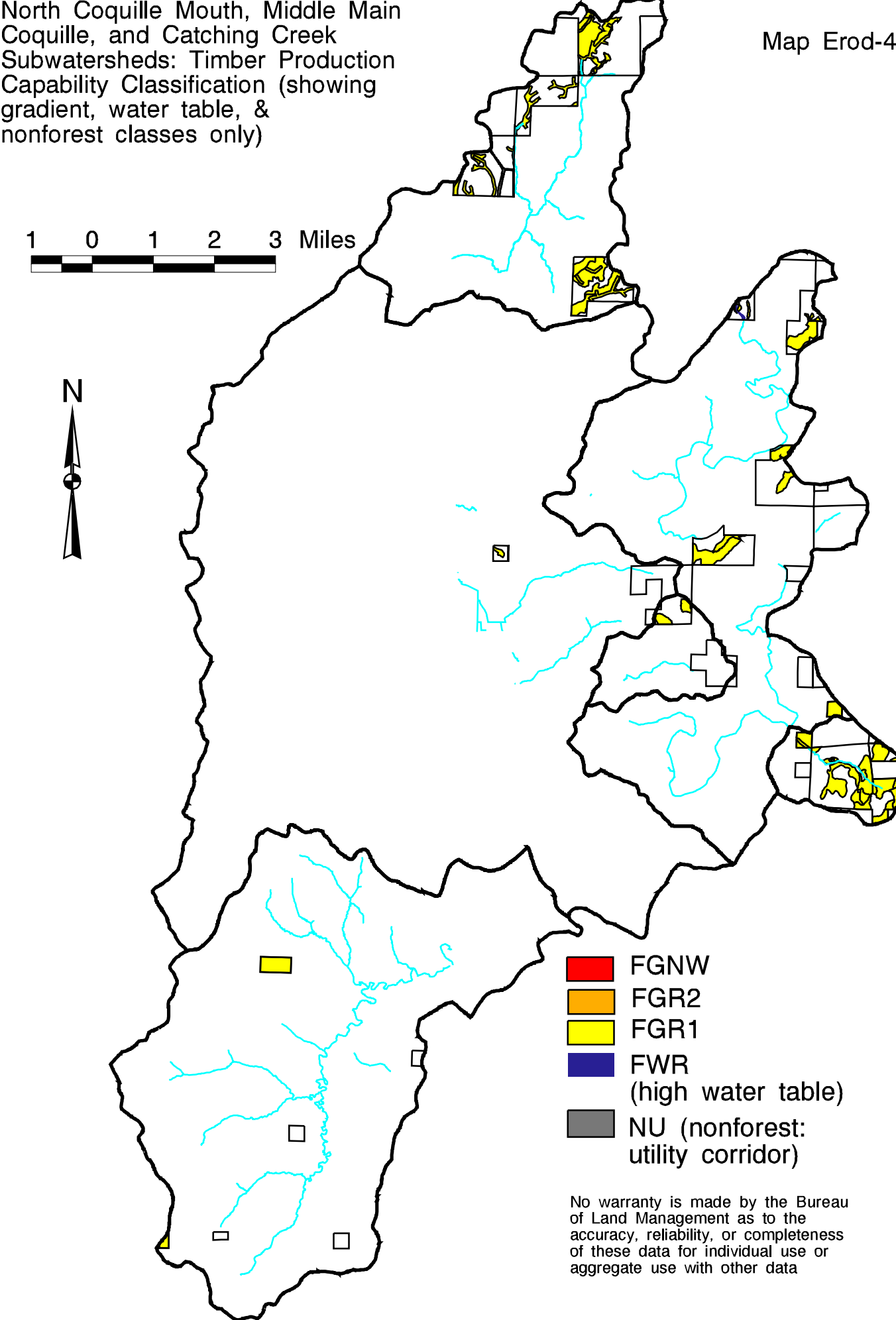
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

North Coquille Mouth, Middle Main Coquille, and Catching Creek Subwatersheds: Timber Production Capability Classification (showing gradient, water table, & nonforest classes only)

Map Erod-4

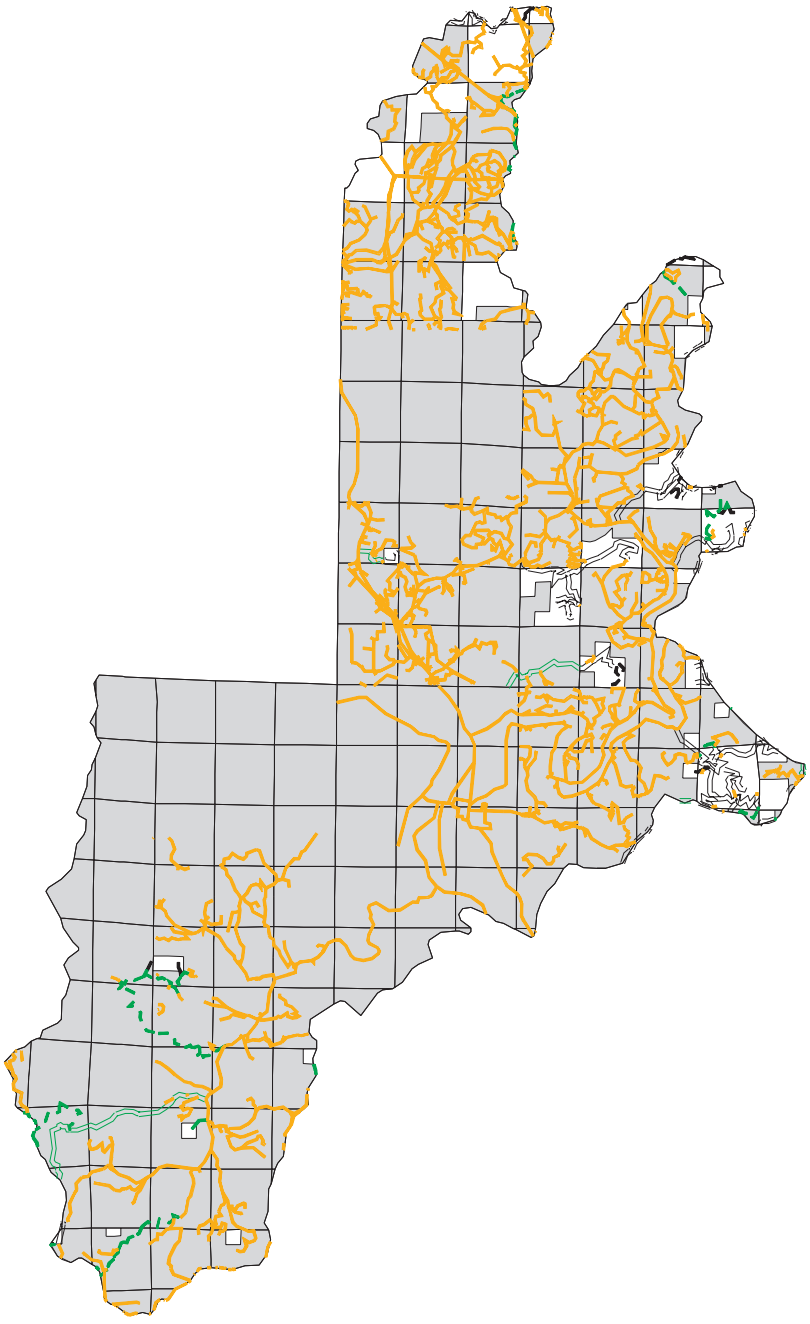
1 0 1 2 3 Miles

N



Map Erod-5 Roads by Surface Type and Control

CATCHING CR M MAIN COQ N COQ MOUTH



MAP FEATURES

- *BST Roads, BLM Control*
- *Rocked Roads, BLM Control*
- *Nat. Surf. Roads, BLM Control*
- *Unknown Surf., BLM control*
- *Roads, No Data Available*
- *BST Roads, Private Control*
- *Rocked Roads, Private Control*
- *Nat. Surf. Roads, Private Control*
- *Unkown Surf., Private Control*
- *State, Cty, Pvt, and/or Oth. Lands*

Note: Some map features shown in the legend may not appear in the mapped area.

Scale 1: 200950

1 0 1 2 miles

1 0 1 2 3 4 km

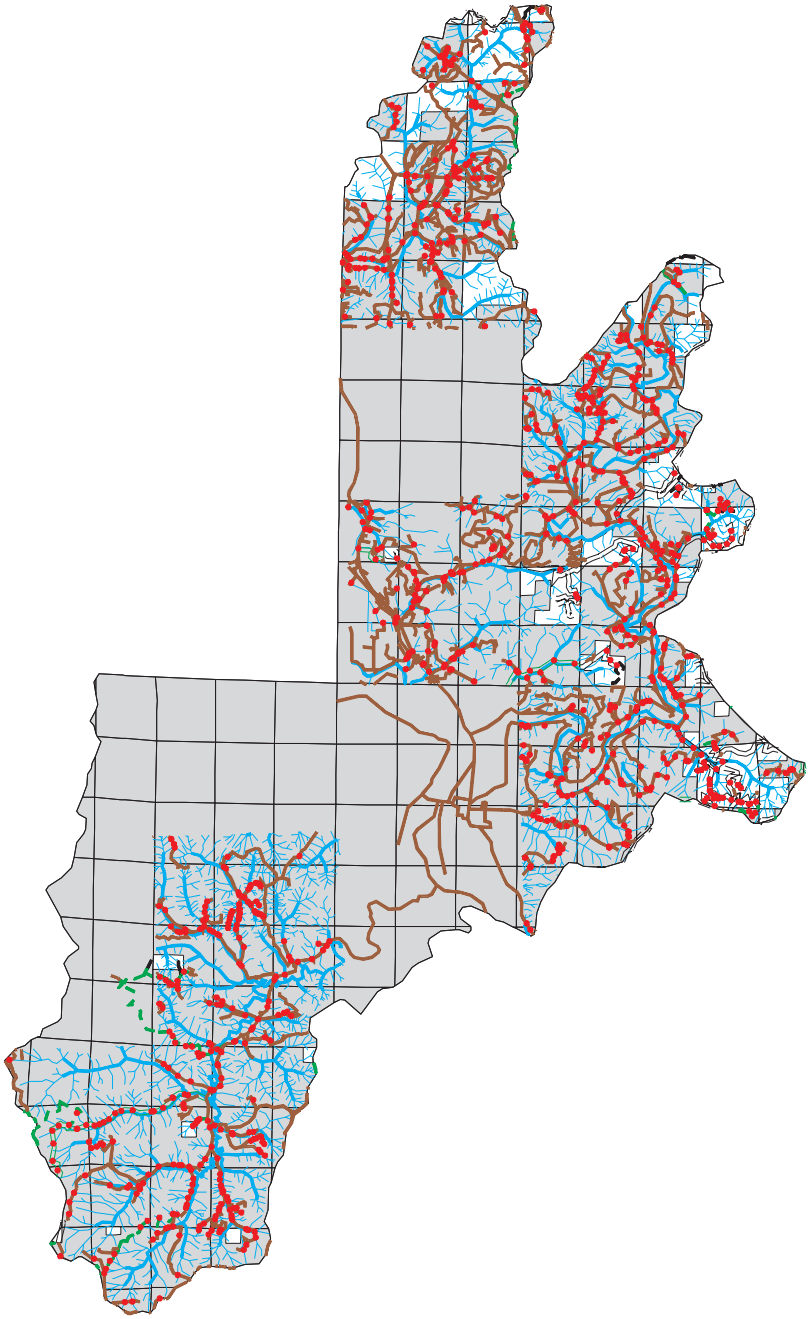
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

N

award 06/13/97 /usr3/wsa/coq_catch/fnl_trb.aml

MAP EROD −6 Intersections of Roads and Streams

CATCHING CR M MAIN COQU N COQ MOUTH



MAP FEATURES

- *BST Roads, BLM Control*
- *Rocked Roads, BLM Control*
- *Nat. Surf. Roads, BLM Control*
- *Unknown Surf., BLM control*
- *Roads, No Data Available*
- *Streamorder 0-2*
- *BST Roads, Private Control*
- *Rocked Roads, Private Control*
- *Nat. Surf. Roads, Private Control*
- *Unkown Surf., Private Control*
- *State, Cty, Pvt, and/or Oth. Lands*
- *Streamorder 3-9*

Scale 1 : 200950

1 0 1 2 miles

1 0 1 2 3 4 km

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

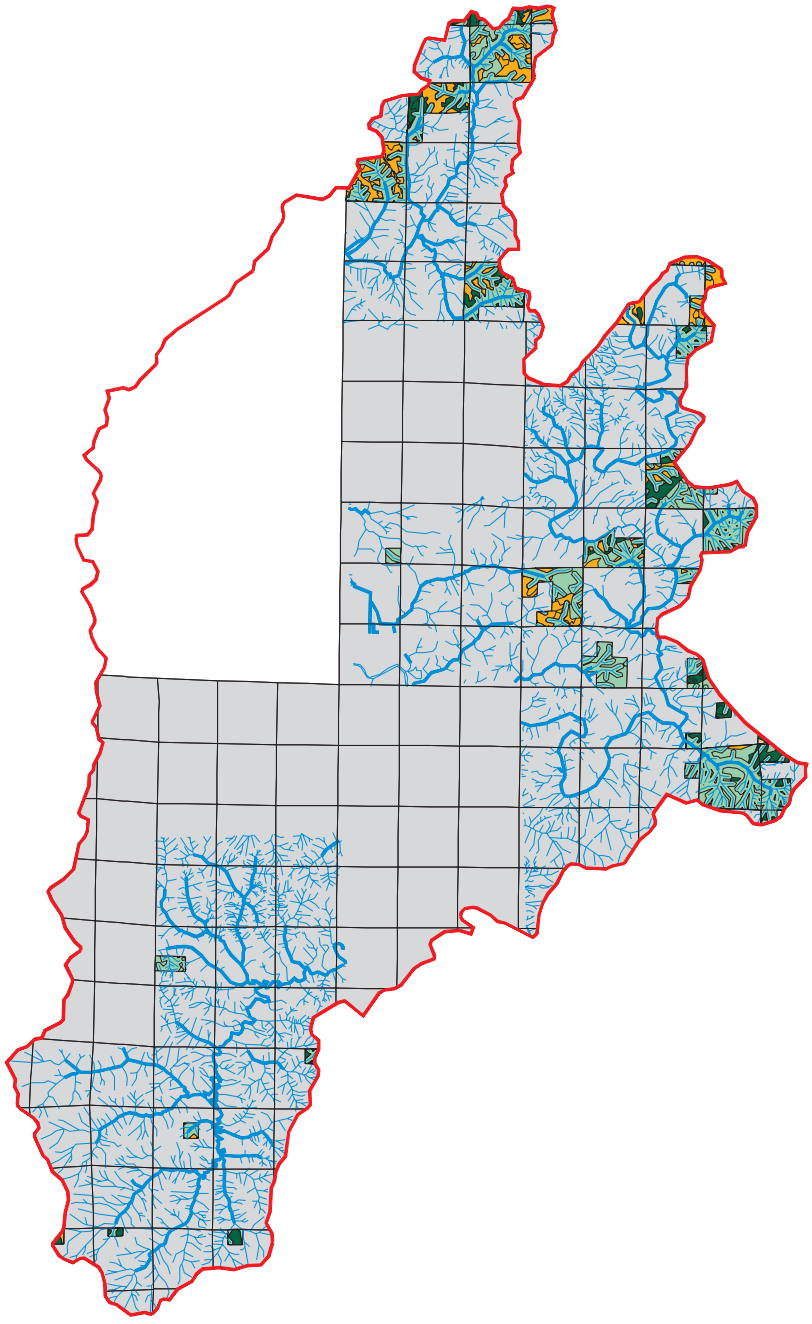
N

award 02/20/98 /usr3/wsa/coq_catch/fnl_intrsct.aml

Note: Some map features shown in the legend may not appear in the mapped area.

Figure _____ Potential Thinning and Regen Harvest Units

CATCHING CR M MAIN COQ N COQ MOUTH



MAP FEATURES

- GFMA Lands
- LSR Lands
- Connectivity Lands
- Marbled Murrelet Reserve
- State, Private or Other Lands
- USDA Forest Service Lands
- Potential Thin (Age 30-60yrs)
- Potential Regen (Age 60yrs+)
- Fish-bearing Stream

Note: Some map features shown in the legend may not appear in the mapped area.

Scale 1 : 200950

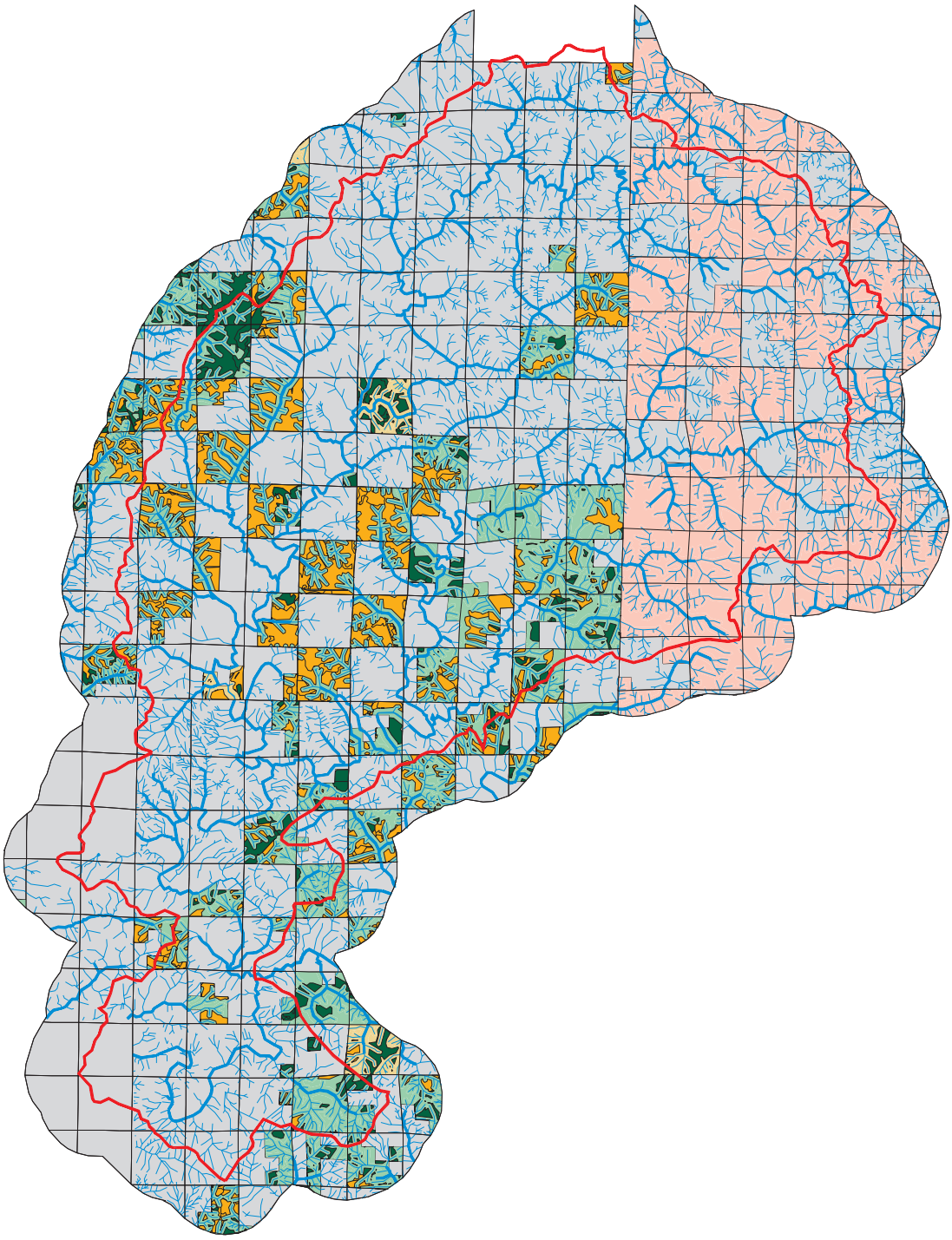
1 0 1 2 miles

1 0 1 2 3 4 km

N

MAP VEG −1b Potential Thinning and Regeneration Harvest Units

NORTH FORK COQUILLE FIFTH-FIELD WATERSHED



MAP FEATURES

- *GFMA Lands*
- *LSR Lands*
- *Connectivity Lands*
- *Marbled Murrelet Reserve*
- *State, Private or Other Lands*
- *USDA Forest Service Lands*
- *Potential Thin (Age 30-60yrs)*
- *Potential Regen (Age 60yrs+)*
- *Fish-bearing Stream*

Note: Some map features shown in the legend may not appear in the mapped area.

Scale 1:195291

2 0 2 4 miles

2 0 2 4 6 km

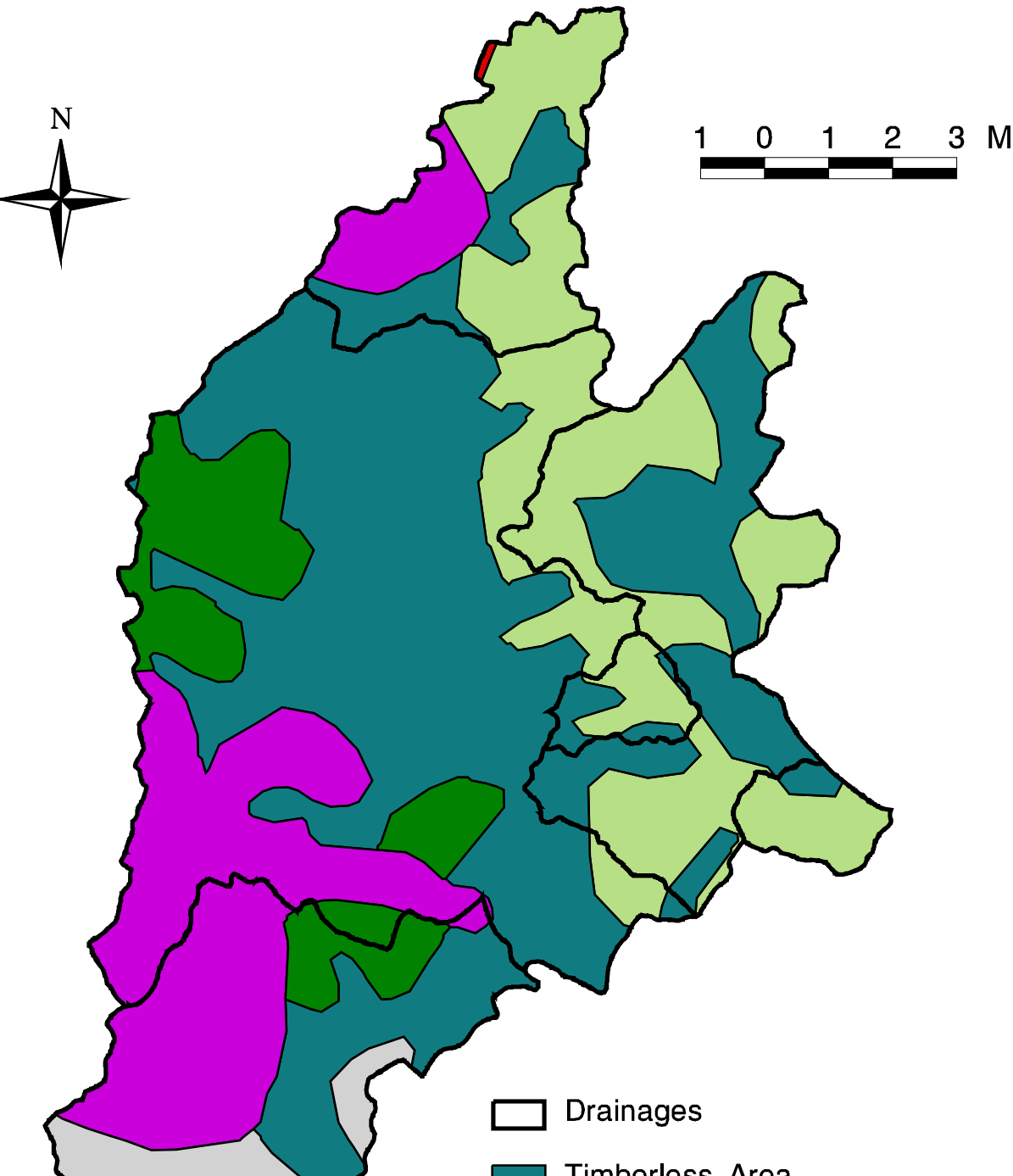
N

award 03/03/98 /usr2/nw_for_plan/nfcoq/fnl_pthrvst.rtl

Map Veg - 2

Middle Main Coquille, North Coquille Mouth, and Catching Creek Subwatersheds

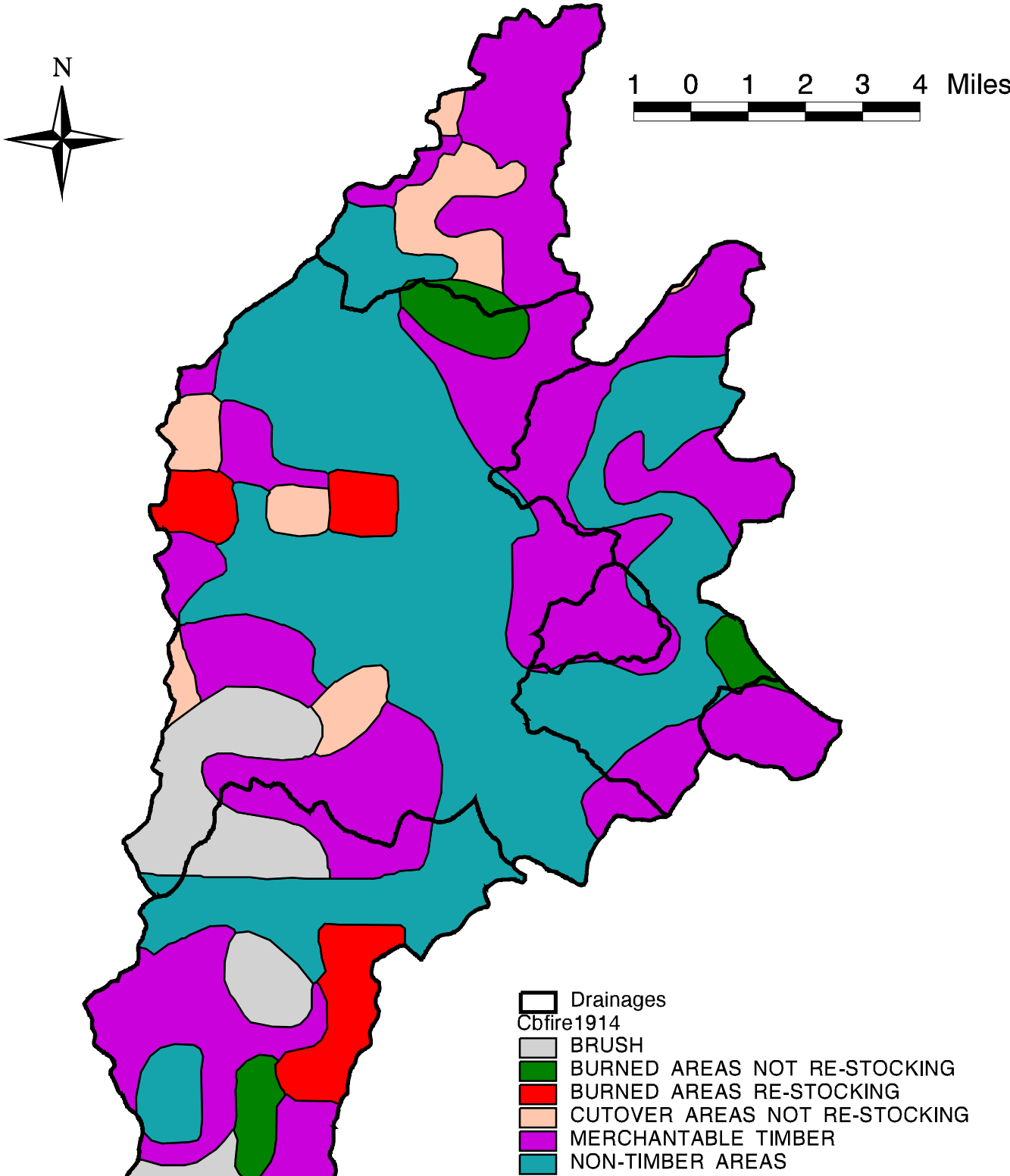
1900 Vegetation Map



MAP VEG - 3

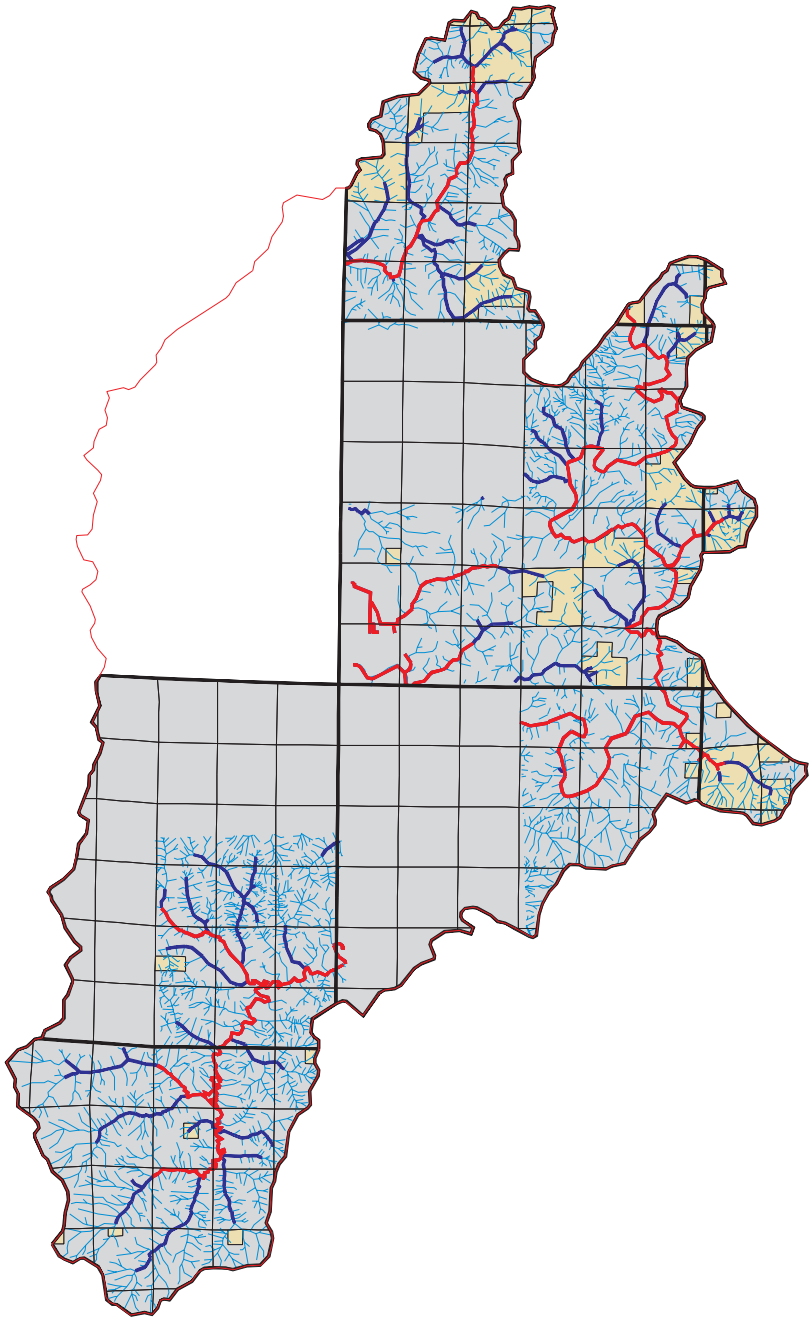
Middle Main Coquille, N. Coquille Mouth, and Catching Cr Subwatersheds

1914 Vegetation Map



Map Fish-1 Fish Presence and Anadromous Fish Presence

CATCHING CR M MAIN COQ N COQ MOUTH



MAP FEATURES

- *BLM Aministered Land*
- *State, Private or Other Lands*
- *USFS Administered Lands*
- *Stream, No Known Fish Presence*
- *Fish-bearing Stream*
- *Anadromous Fish-bearing Stream*

Scale 1 : 200950

1 0 1 2 miles

1 0 1 2 3 4 km

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

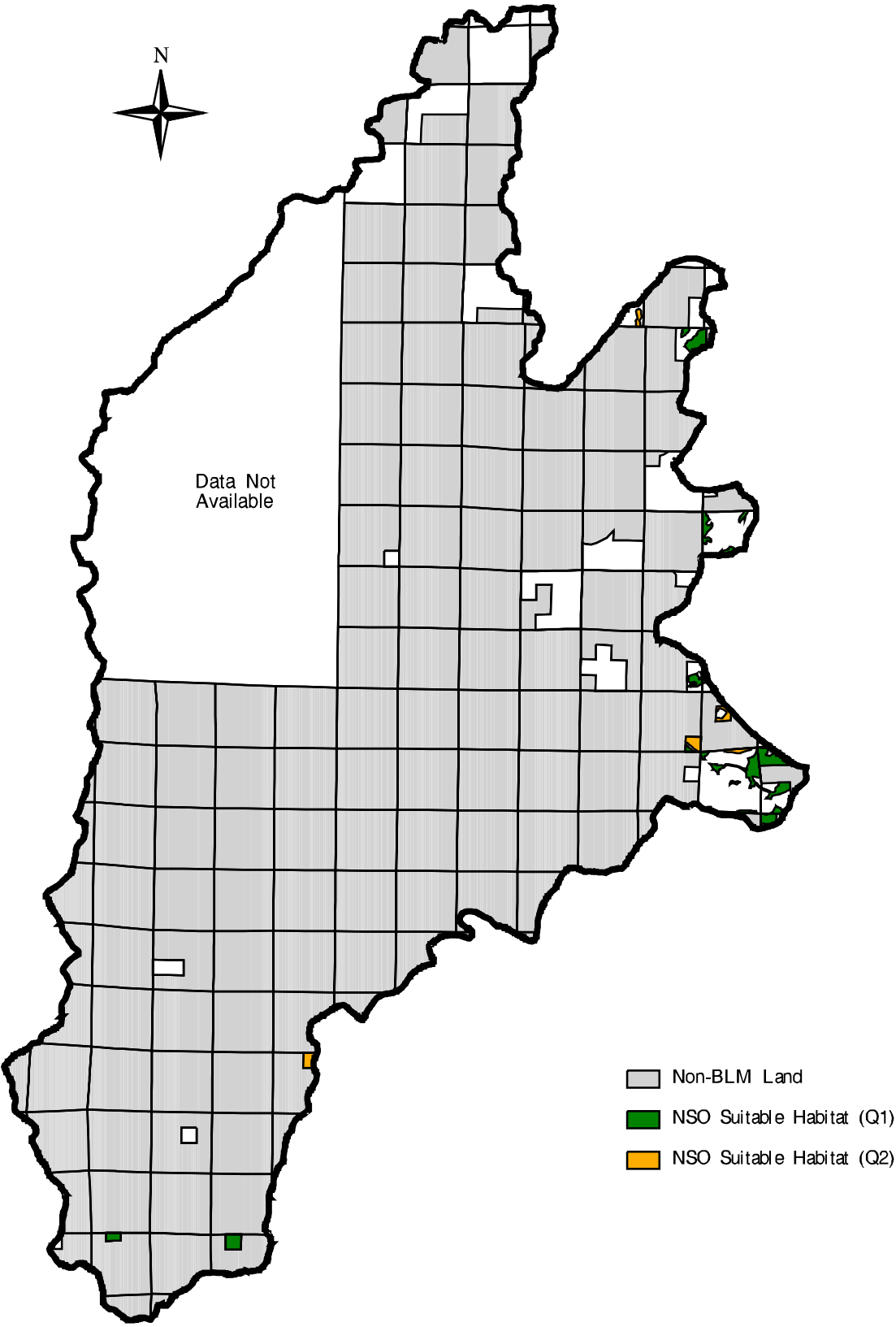
N

Note: Some map features shown in the legend may not appear in the mapped area.

award 07/09/97 /usr3/wsa/coq_catch/fnl_fish.aml

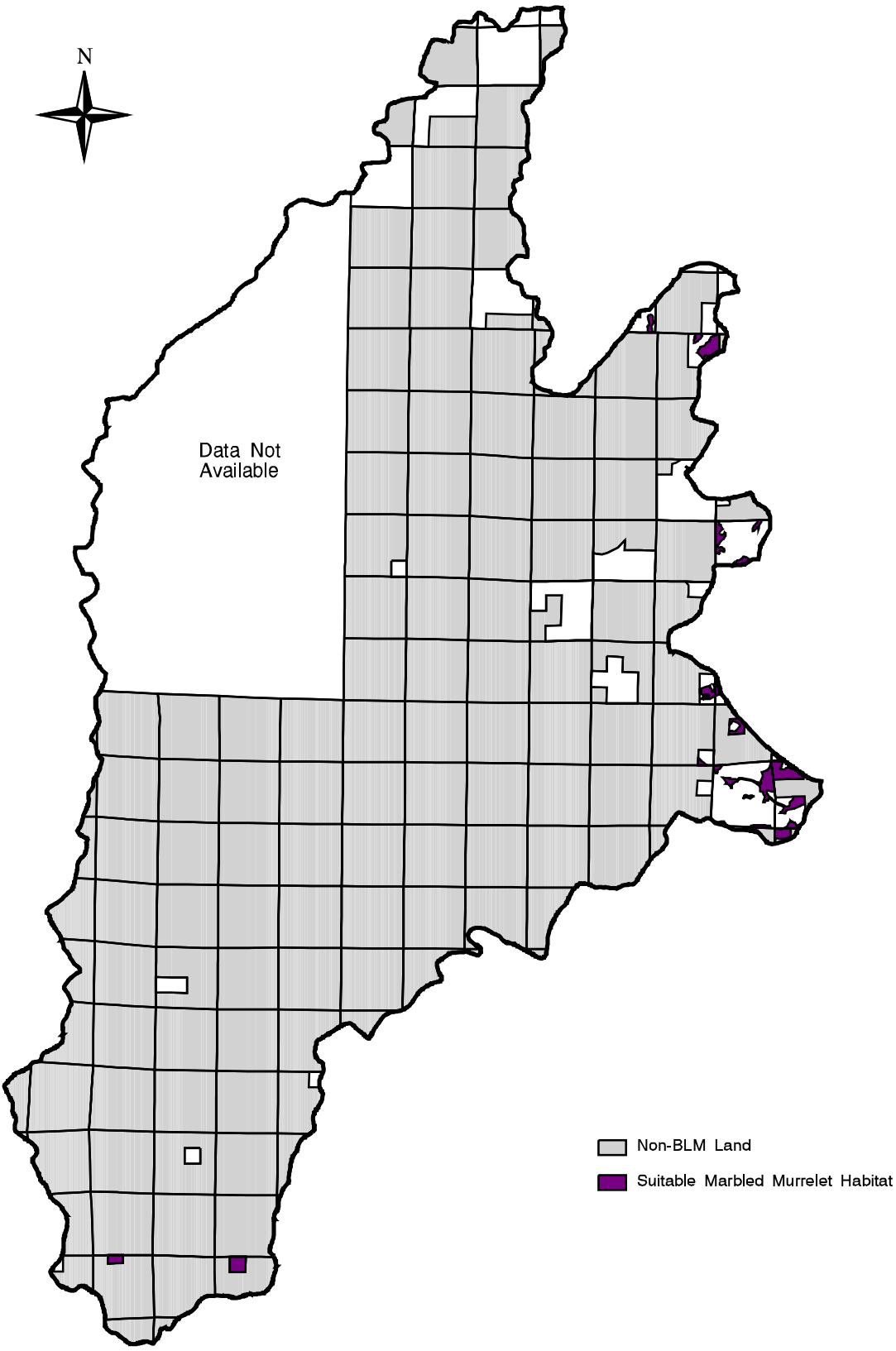
Suitable Habitat for the Northern Spotted Owl

M Main Coquille / N Coq Mouth / Catching Creek Subwatersheds

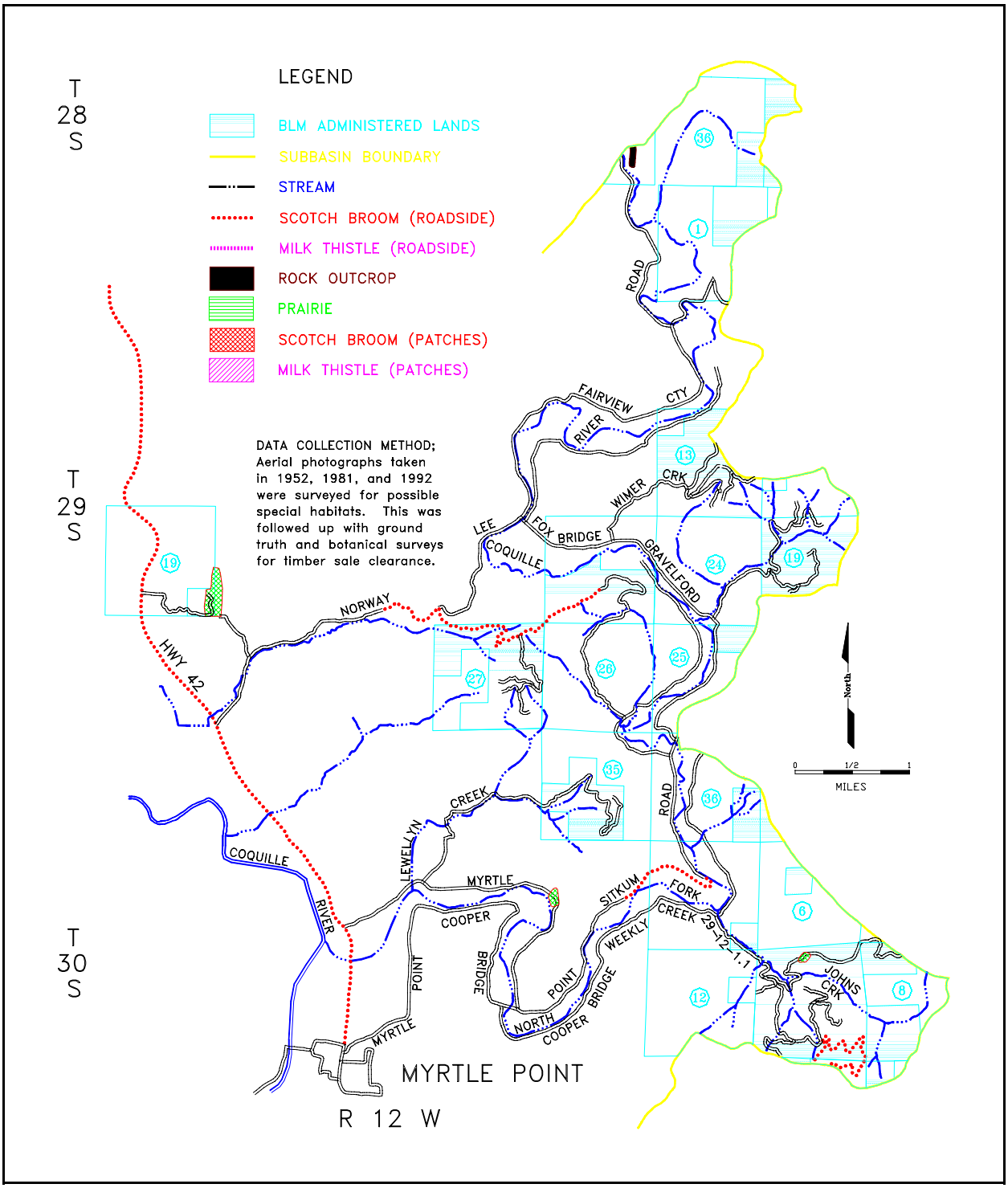


Suitable Marbled Murrelet Habitat

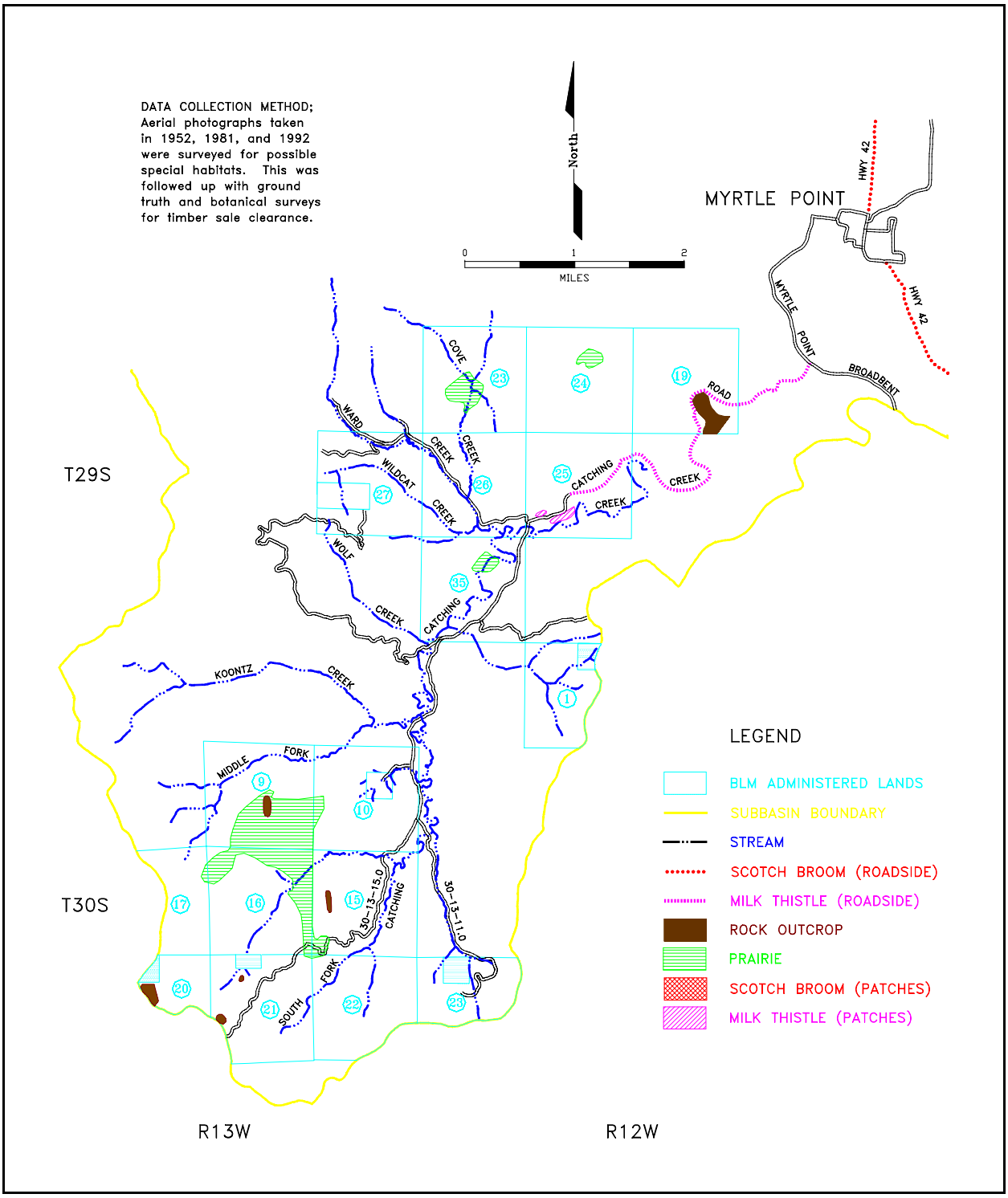
M Main Coquille / N Coq. Mouth / Catching Creek Subwatersheds



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



Map Nox-1a



Map Nox-1b

EROSION PROCESSES APPENDIX

Geologic Features in the Watershed Analysis Area The descriptions are from Bulletin 80 (Baldwin et. al. 1973), and Bulletin 87 (Bealieu & Hughes 1975)

Quaternary

Qal Alluvium: Consisting of varying proportions of unconsolidated clay, silt, sand and gravel. Associated geologic hazards include stream-bank erosion, ponding, high ground water, flooding siltation and locally compressible soils.

Ql landslide debris: Irregular topography resulting from earth flows and slumps. Associated hazards include ground movement, variable foundation strength, caving in excavations, and poor drainage. Excavations, stream-bank erosion, excavations, fills, drainage modifications, or use of area for a drain field may reactivate or accelerate sliding.

Qt Marine and stream terraces: Elevated deposits of loosely compacted, rudely bedded sand and minor gravel with subordinate organic matter locally; as mapped, includes the Coquille formation. Hazards include ponding, stream bank erosion, and locally high water table.

Coaledo Formation

Tecu upper member: Consisting of coal-bearing, cross-bedded, tuffaceous sandstone. Low permeability and ground water potential. Hazards include earthflows in deep cuts.

Tecm middle member: Consists of thinly bedded siltstone with minor sandstone. Very low permeability and ground water potential. Hazards include erosion, and local mass movement.

Tecl lower member: Consisting of coal-bearing, cross-bedded, tuffaceous[1] sandstone. Low permeability and ground water potential. Hazards include earthflows in deep cuts.

Flournoy Formation

Tef Rhythmically bedded micaceous sandstone passing upward into thin-bedded sandstone and siltstone. Very low ground water potential. Geologic hazards include flash flooding, erosion, rapid earthflows and debris flows.

Lookingglass Formation

Telg Rhythmically bedded sandstone and siltstone; basal beds are coal-bearing and conglomeratic locally near the base. Similar ground water potential and hazards to those of Flournoy.

Roseburg Formation

Ter Thick sequence of sandstone and siltstone; rhythmically bedded locally; contains minor conglomerate and massive sandstone. Low permeability and ground water potential. Faulted and sheared in southern Coos County. Hazards include mass movement, erosion, and variable foundations.

Terv Pillowed and brecciated[2] submarine basalts abundant locally. Hazards include rapid erosion, and mass movement.

---

[1] tuff: A rock formed of compacted volcanic fragments.

[2] Breccia: Fragmental rock whose components are angular and therefore, as distinguished from conglomerates, are not water worn.

Otter Point

Js Bodies of blue schist

Jop Otter Point Formation composed primarily of sheared sedimentary rock. Major hazards include mass movement, slope erosion, stream-bank erosion, and variable bearing strength.

Local observations on soils and geology

The winter 1996-97 storms caused very little damage to BLM roads inside this assessment area. Only 2 sites were proposed as ERFO projects. They are a failed undersized culvert on the 29-12-4.0 Road along Llewellyn Creek, and a slump/ fill failure on the 28-12-22.0 Road accessing Shuck Mountain. Long time observers have seen few road failures on the BLM roads in this assessment area. Most failures are related to bank slough, plugged culverts and other maintenance problems, or occurred on old roads built to lower standards than those used today. The most notable exceptions are roads built on Etelka and Whobrey soils (see Map Erod-3). Whobrey and Etelka soils are particularly prone to slumps and earth flows, and very large slump features characterize landscapes containing those two soils. Sites with these soils are mapped in the Coos County Soil Survey (Haagen 1989). An example of an actively moving large slump causing chronic road problems is where the Myrtle Point Sitkum County Road (92001A) crosses sections 2 and 3, T.29S., R.12W., Will. Mer.

Road building in the Wimer Creek area (where the 28-12-19.1 and the 28-12-19.4 roads join the 28-12-24.0 road) exposed the blue-gray clay C-horizon of the Whobrey soil. This small area was a constant road maintenance problem until the effected portion of the 28-12-19.4 road was rebuilt using engineering fabric and the effected portion of the 28-12-19.1 road was dug out effectively closing that road. The exposed blue-gray clay C-horizon at the 28-12-19.1 road junction is a chronic source of suspended particulates. The suspended sediments cause the affected stream to have a milky color all year long. Other streams in and near the assessment area also are milky colored suggesting the Wimer Creek site is not unique. The overlaying soil in this area is very productive for trees. However, tree roots cannot blue-gray clay subsoil located 20 inches below the surface. This restricts tree rooting depth and makes this area particularly prone to windthrow.

Timber Production Capability Classification (TPCC)

The TPC classification for BLM land was done in 1986 and 1987 following the protocol given in the *Timber Production Capability Classification, Handbook 5251-1,* BLM Manual Supplement, Coos Bay District Edition, May 1986 (USDI 1986). Apndx Table E-1 shows additional guidance on fragile gradient sites provided by the District Soil Scientist the TPC classifiers.

Apndx Table E-1: TPCC Slope Gradient Classification Criteria Used by Coos Bay District in 1986/87

	Not Fragile	FGR1	FGR2	FGNW
TPCC MAP UNIT over all characteristics				
slope - ave. for unit	0-60%	50-70%	70-80%+	mostly 80%+
dissection - ave. for unit	low	low-mod.	mod.-high	high- very high
soils*	57,10,14,63	63,57,66,64,166	64,564,66,63,R	564,64,R,66,63
soil depth	deep & moderately deep	shallow to deep	shallow to moderately deep & skeletal	shallow & skeletal
rockland/ % rock outcrop	0-5%	0-10%	5-20%	10-30%
HEADWALLS (upper 1st order draws)				
channel gradient	10-35%	35-60%	60-80%	80+
channel adjacent slopes	10-60%	50-70%	60-80%+	80%+
shape of headwall draw	-----	smooth "U" shape	"V" shaped	"V" shaped
dissection density	low	low to moderate	moderate to high	very high
soils*	57,10,14,63	63,57,66,64,166	64,564,66,63,R	564,64,R,66,63
instability indicators	none to few	few	common	many, including active failure
STREAM ADJACENT SLOPES outside headwall areas				
channel gradient	<20%	10-35%	35-60%	50-70%
slope	10-60%	50-70%	70-80%	mostly 80%
dissection density	low	low to moderate	moderate to high	very high
soils*	57,10,14,63	63,57,66,64,166	64,564,66,63,R	564,64,R,66,63
instability indicators	none to few	few	common	many, including active failure
MANAGEMENT CONCERNS (generalization)				
landslide risk	none to low	low to moderate	high	High to very high
surface erosion risk	low to moderate	moderate to high	high to very high	high to very high
burn hazard to the soil	low	moderate	high to very high	high to very high

* soil mapping unit codes from Townsend et. al. (1977)

Apndx Table E-2: BLM Acres by TPCC Classification

TPC Classification (fragile classes only)	Suitable for timber management	acres
Fragile gradient not suitable (FGNW)	no	123
Nonforest: utility R/W (NU)	no	21
Fragile gradient restricted 2 (FGR2)	yes with some restrictions	183
Fragile gradient restricted 1 (FGR1)		1,022
Fragile gradient restricted 1 and fragile mass movement potential (FPGR1)		175
BLM land clssified as fragile mass movement potential (FPR)		206
Fragile high watertable		8
BLM land not classified as fragile	yes	3,983
total BLM land	----	5,721

Private land (and therefore excluded from TPCC data base) in the subwatershed	83,859

The FPR sites are sites with deep-seated, slumps or earth flow types of mass movements. The Coos Bay

Edition of the TPCC Handbook 5251-1 (USDI 1986), specified that the FPR classifiaction be used only for areas of Whobrey and Etalka soils. In actual application, areas with Apts soils, mapped by Townsend et. al (1977) were also classified as FPR. Based on recent soil mapping (Haagen 1989), Whorbrey and Etalka soils are found in areas not mapped as FPR in the current TPCC, and Apts soils are not mapped at all inside the assessment area. The TPCC map prepared for this analysis area shows only fragile gradient sites.

Confidence in work products: The overall confidence in this product is moderately high. The TPCC data set was developed using aerial photos, local knowledge, and ground truthing. The limitations of TPCC maps are:

- Field checking was done at the rate of a square mile/ day. That was usually only enough time to make one pass out across a section and back.
- The data was transferred from the aerial photos to base maps without benefit of cartographic tools for removing photo distortion.
- TPCC was completed before Coos County Soil Survey (Haagen 1989) was available for reference. Therefore, area of FPR is not fully reflected.
- TPCC was done only on BLM land.
- The TPCC was designed to address timber production and site productivity issues, not risks to aquatic and hydrologic issues.

Landslide Potential Based on Soil Mapping Units

The soils in the Middle Main Coquille Watershed, and North Coquille Mouth Subwatershed were classified, as to their landslide potential, based on soil mapping done by the USDA Soils Conservation Service (SCS) (Haagen 1989). In previous watershed analyses (Sandy Creek, Middle Creek, Paradise Creek, Upper Middle Umpqua), landslide potential maps were compared to landslide histories covering the same areas (USDI 1995a, 1995b, 1995c, & 1997). The ability of the landslide potential maps to predict corresponded favorably to the observed pattern of landslides found in the landslide histories.

Apndx Table E-3: Acres by Landslide Potential Based on Soil Mapping Units

Landslide potential class	stratification criteria	code	acres
High	Shallow to moderately deep gravelly soils on 80%+ slopes.	high	0
Mix of moderateand high	Moderately deep to deep gravelly and nongravelly soils on 60% to 80% slopes.	M-H	14,255
mix of moderate and low	Deep to moderately deep soils on 35% to 60% slopes	L-M	29,889
Low	Deep soils on gentle slopes (10% to 35%).	low	15,960
None	Deep soils on level to gently sloping terraces and flood plans.	none	28,805
not apply or no data		n/a	35
water		W	641
total			89,585

The "mix of moderate and high" and the "mix of low and moderate" classes are necessary because of two artifacts of soil mapping. Some soil mapping units cover a broad range of slopes with the soils on the steeper ground having a higher potential for sliding than similar soils on less steep ground. Other mapping units are assemblages of diverse soils found intermixed on complex topography. In this case quite different soils with respect to slope, depth, and composition are included in the same mapping unit. That was necessary because the mapping scale was too small to allow drawing separate polygons for each separate soil type. See Apndx Table E-4 for the landslide hazard rating assigned to each soil mapping unit.

Confidence in work products: The overall confidence in this product is moderate. Map Erod 4: Landslide Potential Based on Soil Mapping Units compares favorably to the TPCC provided one considers that the slope breaks used by the SCS when mapping soils do not match those used to map TPCC. The landslide potential map is less reliable than the TPCC for assessing landslide hazard on BLM land. However, unlike the TPCC, the landslide potential map does cover all of the land inside the subwatershed, and is sufficiently reliable to provide an overview of landslide hazard in the subwatershed. The map is not suitable for indicating site specific landslide hazard without benefit of a site visit.

The weaknesses of the landslide potential map are the inability to fully separate areas of different hazard potential in the "mix of moderate and high" (M-H), and the "mix of low and moderate" (L-M) classes, which is described above. The map is based on soil mapping units and is therefore an adaptation of a data set to purposes other than the original intentions for collecting that data.

Apndx Table E-4: Soils found in Middle Main Coquille and Catching Creek Subwatersheds

soil type	code	acres	common location	landslide potential
Digger-Preacher-Umpcoos assoc., 50-90% slope	14f	2536	mountain	M-H
Digger-Umpcoos-rock outcrop assoc., 50-80% slope	15f	562	mountain	M-H
Preacher-Blachly assoc., 30-60% slope	44e	208	mountain	L-M
Preacher-Blachly-Digger assoc., 12-30% slope	45d	155	mountain	L
Preacher-Blachly-Digger assoc., 30-60% slope	45e	453	mountain	L-M
Preacher-Bohannon loams, 3-30% slope	46d	909	mountain	L
Preacher-Bohannon loams, 30-60% slope	46e	6167	mountain	L-M
Preacher-Bohannon loams, 60-90% slope	46f	1593	mountain	M-H
Remote-Digger-Preacher complex, 12-30% slope	50d	151	mountain	L
Remote-Digger-Preacher complex, 30-50% slope	50e	1918	mountain	L
subtotal		**14652**		
Blachly silt clay loam, 0-30% slope	4d	1956	low hills & mountain	none
Blachly silt clay loam, 30-50% slope	4e	3292	low hills & mountain	L
Remote loam, 30-50% slope	49e	870	low hills & mountain	L-M
Remote loam, 50-75% slope	49f	828	low hills & mountain	M-H
subtotal		**6945**		
Dement silt loam, 2-12% slope	13c	403	low hills	none
Dement silt loam, 12-30% slope	13d	2779	low hills	none
Dement silt loam, 30-50% slope	13e	6279	low hills	L
Dement silt loam, 50-70% slope	13f	346	low hills	L-M
Etelka silt loam, 30-50% slope	18e	3413	low hills	L-M
Etelka-Remote complex, 50-70% slope	19f	704	low hills	M-H
Etelka-Rinearson-Orford complex, 12-30% slope	20d	537	low hills	none
Etelka-Rinearson-Orford complex, 30-50% slope	20e	3694	low hills	L-M
Eteka-Whobrey silt loams, 7-30% slope	21d	1486	low hills	L-M
Etelka-Whobrey-Remote complex, 30-60% slope	22e	6162	low hills	M-H
Giesel silt loam, 2-12% slope	26c	5	low hills	none
Giesel silt loam, 12-30% slope	26d	74	low hills	none
Harrington very gravelly loam, 30-50% slope	27e	359	low hills	L-M
Harrington very gravelly loam, 50-70% slope	27f	508	low hills	M-H
Honeygrove silty clay loam, 3-30% slope	30d	1627	low hills	none
Honeygrove silty clay loam, 30-50% slope	30e	2154	low hills	L
Rinearson silt loam, 0-30% slope	51d	2921	low hills	none
Rinearson silt loam, 30-50% slope	51e	12730	low hills	L-M
Rinearson silt loam, 50-70% slope	51f	1362	low hills	M-H
Salander silt loam, 2-30% slope	52d	252	low hills	L
Salander silt loam, 30-50% slope	52e	851	low hills	L
Salander silt loam, 50-75% slope	52f	164	low hills	L-M
Templeton silt loam, 7-30% slope	54d	126	low hills	none
Templeton silt loam, 30-50% slope	54e	98	low hills	none
subtotal		**49034**		

soil type	code	acres	common location	landslide potential
Chetco silty clay loam	9	1722	flood plains & terraces	none
Chismore silt loam, 0-3% slope	10a	228	flood plains & terraces	none
Chismore silt loam, 3-7% slope	10b	546	flood plains & terraces	none
Chismore silt loam, 7-12% slope	10c	335	flood plains & terraces	none
Coquille silt loam	12	776	flood plains & terraces	none
Eilertsen silt loam, 0-7% slope	17b	513	flood plains & terraces	none
Gardiner sandy loam	24	116	flood plains & terraces	none
Kirendall silt loam	33	2850	flood plains & terraces	none
Langlois silty clay loam	34	1768	flood plains & terraces	none
Langlois peaty silty clay loam	35	80	flood plains & terraces	none
McCurdy silt loam, 3-15% slope	36c	753	flood plains & terraces	none
McCurdy silt loam, 15-30% slope	36d	127	flood plains & terraces	none
Meda loam, 3-15% slope	37c	8	flood plains & terraces	none
Nehalem silt loam	40	1837	flood plains & terraces	none
Nestucca silt loam	41	2089	flood plains & terraces	none
Nestucca-Willanch complex	42	10	flood plains & terraces	none
Pyburn silty clay, 0-8% slope	47b	353	flood plains & terraces	none
Quosatana silt loam	48	1107	flood plains & terraces	none
Willanch fine sandy loam	62	215	flood plains & terraces	none
Wintley silt loam, 0-8% slope	63b	991	flood plains & terraces	none
Wintley silt loam, 8-15% slope	63c	460	flood plains & terraces	none
Wintley silt loam, 15-30% slope	63d	625	flood plains & terraces	none
Zyzzug silt loam	65	424	flood plains & terraces	none
subtotal		**17933**		
Udorthents, level	57	348	filled wet lands	none
no data	--	35	Curry Co. pt of watershed	--

Landslide Distribution Analysis

The method used to document recent landslide occurrence and distribution is based on the Mass Wasting Module - level 1 assessment described in the Standard Methodology for Conducting Watershed Analysis ver. 1.10 (Washington Forest Practice Board 1992). The 1992 and 1986 are the only aerial photo flights providing complete coverage for the assessment area that are available to the watershed team. Due to time constraints, only the 1992 photos were used. The 1992 aerial photos are 1:12,000 scale. The acres of land in each geological formation were estimated by counting the sections on the geology map inside each formation. Landslide locations were marked on 7.5 minute quad maps.

Large deep-seated ancient slumps: Large ancient deep-seated slumps were not diligently documented during the landslide inventory because that information was already published on geologic hazard maps covering the assessment area (Bealieu & Hughes 1975). Those maps document earthflow and slump topography on typically on 15% to 30% slopes in several formations throughout the assessment area. Soil creep and very large deep-seated slump indicators are most readily visible through out the Otter Point Formation, and on the Roseburg Formation in Cunningham Creek and outside Myrtle Point.

Notes on the tables and graphs: The tables and calculations below reflect only recent slide activity and do not include old/ ancient very large persistent slump features. The only very large persistent deep-seated slumps included are those that appear to be newly initiated.

Abbreviations used in this section

slope form -
CV: concave slope CX: convex slope S: straight slope All: combination

slope position -
U: upper slope M: mid slope L: lower slope All: combination

Drainages in the North Coquille Mouth Subwatershed -
NEV: Echo Valley NJC: Johns Creek NLC: Lllewellyn Creek

Drainages in the Middle Main Coquille Subwatershed -
MCU: Cunningham Creek MMC: Main Coquille River

Drainages in the Catching Creek Subwatershed - MCA: Catching Creek

Apndx Table E-5: Number of Slides by Geology, And by Slope Form And Position

	Qal	Ql	Qt	Tecu	Tecm	Tecl	Tef	Telg	Ter	Terv	Jop	Js	total
CX-U				1					6	8			15
CX-M				4					2	4			10
CX-L				1		2			1	1			5
CV-U				3	4				5		1		13
CV-M				3		2			7		4		16
CV-L		1		7	2	1			8		1		20
S-U				4	2	5			10		1		22
S-M				13	5	3			21		5		47
S-L		1		10	2	5			15				33
all-all									1				1
total		2		46	15	18			76	13	12		182

Fourteen out of the 76 slides (18%) observed on the Roseburg Formation were close to or on the contact with another formation. Eight other slides were in other formations near the contact with the Roseburg Formation or the Roseburg Volcanic member. Nine of the 46 slides on the Coaledo Formation Upper Member (20%) were on steep highly dissected land. The Coaledo Formation Middle Member consists of thinly bedded siltstone and is weaker than the Upper Member sandstone. The relative strength differences between the Upper and Middle Members may be responsible for steep features in the Upper Member, at least near the common contact.

Apndx Table E-6: Slides/100 Acres by Geological Formation

formation	acres	observed slides	slides/100 ac
Qal	11,738	0	0
Ql	618	2	0.3
Qt	4,325	0	0
Tecu	7,414	46	0.6
Tecm	6,796	15	0.2
Tecl	8,649	18	0.2
Tef	618	0	0
Telg	1,236	0	0
Ter (sed)	35,214	76	0.2
Terv	6,796	13	0.2
Jop	6,178	12	0.2
total	89,580	182	0.2

Apndx Table E-7: Slides by Size Class, Activity at Origin & Sediment Delivery on The 1992 Aerial Photos

	size slide class and sediment delivery to streams										
	very small: <100 sq yds		small: 100-500 sq yds		medium: 500-1000 sq yds		large: 1000-5000 sqyds		very large: >5000 sq yds		total
	yes	no	yes	no	yes	no	yes	no	yes	no	
Agriculture		1	1	1							3
stand >50 yrs. old			1	1							2
stand 20-50 yrs. old	1	1	4	3		1					10
cut within 20 yrs.	4	6	4	6	1						21
recent clearcut (cable)	11	25	20	30	2			1			89
recent cat yarding		10	2	8		1	1		3		25
landing		1		3	1	1					6
road	3	2	1	8	1	2		2			19
road cut		1		2							3
power line road				2							2
power line R/W				1							1
unknown				1							1
total	19	47	33	66	5	5	1	3	3		182

Note: the cat yarding sites classified as "very large - sediment delivered" were areas of high disturbance where it was difficult to separate surface disturbance from slides. Sediment delivery to streams was likely due to the amount and proximity of disturbance to streams.

In the assessment area, 91% of the observed slides are smaller than 500 square yards. Sixty-three percent of the slides are associated with recent yarding, and 16% with roads (including cut slopes and landings).

Apndx Table E-8: Total Number of Slides by Activity at Origin And Sediment Delivery on The 1992 Aerial Photos

	sediment delivered to streams		total
	yes	no	
Agriculture	1	2	3
stand >50 yr. old	1	1	2
stand 20-50 yr. old	5	5	10
cut within 20 yrs.	9	12	21
recent cc (cable)	33	56	89
recent cat yarding	6	19	25
landing	1	5	6
road	5	14	19
road cut		3	3
power line road		2	2
power line R/W		1	1
unknown		1	1

Apndx Table E-9: Percent of Slides by Each Activity at Origin And Percent Delivering Sediment

	sediment delivering slides as a percent of all slides	percent of all observed slides by associated activity
Agriculture	0.55%	1.65%
stand >50 yr. old	0.55%	1.10%
stand 20-50 yr. old	2.75%	5.49%
cut within 20 yrs.	4.95%	11.54%
recent cc (cable)	18.13%	48.90%
recent cat yarding	3.30%	13.74%
landing	0.55%	3.30%
road	2.75%	10.44%
road cut	0.00%	1.65%
power line road	0.00%	1.10%
power line R/W	0.00%	0.55%
unknown	0.00%	0.55%

Apndx Table E-8: Total Number of Slides by Activity at Origin And Sediment Delivery on The 1992 Aerial Photos			
	sediment delivered to streams		total
	yes	no	
total	61	121	182

Apndx Table E-9: Percent of Slides by Each Activity at Origin And Percent Delivering Sediment		
	sediment delivering slides as a percent of all slides	percent of all observed slides by associated activity
total	33.52%	100.00%

About a third of the landslides delivered sediment to streams. Of those, over half originated in recently cut units. However in absolute terms, current management related landsliding is probably a minor source is sediment inside this assessment area. Naturally occurring soil creep and stream bank erosion, and management related surface erosion are probably the most important sources of sediment delivery today. Based on what is readily visible on 1:12,000 scale aerial photographs, the sites and activities that have the greatest potential for delivering sediment to streams are:

- cat logging without designated skid trails,
- new residential construction,
- industrial sites next to streams,
- cat trails,
- dirt roads and poorly maintained roads that intersect or closely parallel streams,
- aggressive cat site preparation next to streams on moderate slopes,
- and denuded banks along the major streams.

In most cases, verifying and quantifying sediment delivery from these potential sources would require entry on to private property. The state regulates several of these activities, and consequently sediment delivery is lower today than in the recent past.

In most cat logged units visible in the 1992 photos, there are very few cat trails crossing the streams. The number of cat trails suggests the operators are using designated skid trails and are bull lining logs to minimize soil damage. A few units were cat logged in a way reminiscent of the 1960s. These units, with higher cat trail densities and considerably more soil disturbance, stand out in stark contrast on the aerial photos. Under the current forest practices regulations, ODF&W and the forest practices officers review proposals to do ground based yarding, which can affect a stream. Operators are required to place culverts where skid trails cross streams and to minimize sediment delivery. The large industrial forest land owners are cooperative and try to comply with regulations designed to protect streams. However companies do differ from each other in how willing they are to use environmental protection measures beyond those required by regulation[3]. The forest practices officers rely on both their own data sets and information reported in the logging plan to decide if protection measures are needed. Most environmental damage problems occur on small woodland owner lands. These problems are due to:

- The landowner/ operator did not include information on the logging plan that would have alerted the forest practices officer to a potential problem.
- The operator did not follow the logging plan.
- Forest regulations, particularly those for riparian zones can be complex and confusing to the small woodlot owner that only occasionally cuts timber.
- Some landowners and/or operators that are new to Oregon either do not know or understand the laws regulating forest activities.

[3] Publicly owned companies face a dilemma in balancing environmentally responsible stewardship with bottom line profitability. Investing in environmental protection beyond what is required by law can depress profits and in return reduce the value of the company stock. If the stock value falls significantly below the value of the companies assets (land mills, and most important for this discussion, standing merchantable timber) the company risks being taken over by a corporate raider. The corporate raider then rapidly liquidates the company assesses to reap his profit.

(per. com. Chuck Goodwin, forest practice officer.)

Based on the aerial photos many small wood lot owners have trouble accessing their land to remove harvested timber in a way that minimizes environmental risk. These small woodlot landowners stub in steep tracks, often with many switch backs, entirely on their own land. This approach avoids investing time and money in obtaining legal access and constructing a forest access road across neighbors' lands. This approach concentrates road construction on the more slide prone mid slopes. Also this piece meal approach to access results in more miles of road per square mile with in the larger landscape than would have been necessary had the landowners coordinated efforts to develop timber access.

Apndx Table E-10: Landslide Origin and Sediment Delivery by Slope Position and Shape

	upper slope	mid slope	lower slope	all	total	total delivered
Concave no delivery	7	10	11		28	
Concave sediment delivered	6	6	9		21	21
Convex no sediment delivery	14	5	1		20	
Convex sediment delivered	1	1	3		5	5
Straight no delivery	16	43	14		73	
Straight sediment delivered	6	8	20		34	34
combination delivered				1	1	1
totals	50	73	58	1	182	61

More slides occur on straight mid slope locations in this assessment area than any where else on the landscape. However, most of the slides that result in sediment delivery to streams originated on straight lower slopes. Given the typically small slide size in this assessment area and the moderate slopes, few slides from other locations on the landscape have sufficient mass to generate the momentum to reach a stream.

Apndx Table E-11: Total Number of Slides by Geology, and Drainage

	Qal	Ql	Qt	Tecu	Tecm	Tecl	Tef	Telg	Ter	Terv	Jop	Js	total
North Coquille Mouth													
NEV									20	5	7		32
NJC									6	1			7
NLC									1				1
Catching Creek													
MCA						2			34		4		40
Middle Main Coquille													
MCU				3	2	7			2				14
MMC		2		43	13	9			13	7	1		88
total		2		46	15	18			76	13	12		182

Apndx Table E-12: Number of Slides Delivering Sediment to Streams by Geology, and Drainage

	Qal	Ql	Qt	Tecu	Tecm	Tecl	Tef	Telg	Ter	Terv	Jop	Js	total
North Coquille Mouth													
NEV									7				7
NJC									1				1
NLC									1				1
Catching Creek													
MCA									12				12
Middle Main Coquille													
MCU						2			2				4
MMC		1		20	5	5			2	3			36
total		1		20	5	7			25	3			61

Apndx Table E-13: Number of Slides by Geology, and Slide Type

	Qal	Ql	Qt	Tecu	Tecm	Tecl	Tef	Telg	Ter	Terv	Jop	Js	total
DT				2	2								4
SR				23	9	15			38	11	6		102
SSDS		2		21	4	3			34	2	6		72
recent LPDS									1				1
SE									3				3
totals		2		46	15	18			76	13	12		182

Apndx Table E-14: Number of Slides Delivering Sediment to Streams by Geology, and Slide Type

	Qal	Ql	Qt	Tecu	Tecm	Tecl	Tef	Telg	Ter	Terv	Jop	Js	total
DT				2	2								4
SR				13	3	5			11	2			34
SSDS		1		5		2			10	1			19
recent LPDS									1				1
SE									3				3
totals		1		20	5	7			25	3			61

Shallow rapid slides make up both 56% of the observed slides and 56% of the slides that deliver sediment to a stream. Small sporadic deep-seated slumps make up 40% of the slides, but only 31% of the slides that delivered sediments were the small sporadic deep-seated slumps.

Confidence in work products: The level of confidence in the data is moderately high for observations on open ground and for ground with stands less than 20 years old. The low rate and small size of landslides documented in this analysis are consistent with the subjective assessment by long time observers of this

landscape. The primary sources of error are small slides are difficult to distinguish from thin soil, surface disturbance, or root wad holes. The level of confidence in the data on the number of slides in stands that are more than 20 years old is low. Slides under the canopy are likely under sampled due to difficulty of seeing small slides under a canopy. This survey is based on a single aerial photo flight. Therefore the observed slide rates, by geological formation, may be different from the true relative susceptibility of land in each formation to failing. This is because activities predisposing land to sliding may not be uniformly distributed across the assessment area.

Changes in Federal Land Management Practices over Time

The following changes resulted in a decrease of soil erosion and subsequent sediment entering the streams:

- NEPA passed in 1969 resulting in increased environmental awareness
- Shift from sidecast to full bench road construction started in the 1970s.
- Also in the 1970s, better equipment and aerial systems allowed for full log suspension when logging fragile ground.
- The 1975 TPCC was the first formal stratification of BLM land based on slope stability. Very fragile land was removed from the timber base. Recommendations restricting road construction and logging methods were applied to other fragile lands.
- District soils inventory, with management recommendations, was published in 1977 (Townsend *et. al.* 1977)
- The 1983 MFP required stream buffers on third order and larger streams (USDI 1983).
- The 1987 TPCC revision (USDI, 1986) resulted in more land removed from the timber base due to slope fragility.
- The Aquatic Conservation Strategy put forth by FEMAT (1993), and incorporated into planning and decision documents (USDA; USDI 1994, USDI 1995).
- Best Management Practices are required under the Resource Management Plan (USDI 1995).

The Interaction of Fire and Soil Saturation, and their Effects on Landslide Frequency and Timing

The mechanism predisposing a site to slope failure, following denuding by either fire or cutting, is the loss of root strength. The time of lowest root strength begins about 5 years after the disturbance when the previous stand's roots decay. The period ends about 15 years after the stand replacing event when the replacement stand starts to fully reoccupy the soil with new roots. Whether a particular site slides during the 5 to 15 year low root strength window depends on if there is a storm of sufficient intensity during that time to full saturate the soil. Using the fully forested state as the reference, then one can argue there are more slides on denuded sites than on forested sites all other factors being equal. But if one looks at periods sufficiently long to include both stand replacing fire, and low to moderate severity stand modifying fires, then landslides have to be viewed as a normal site response to disturbance. The differences between the wild and managed landscapes, with respect to landslides, then become:

- a function of frequency disturbance and whether the disturbances are regularly spaced (matching the rotation age) or irregularly spaced (as a function of drought and wet weather cycles).
- Disturbance severity (stand replacement fire/ clearcutting; shelterwood cuts or thinning/ moderate severity fire).
- Whether course woody debris is a component of/ redistributed by slides.

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Large Organic Debris Recruitment Potential: DNR Module Appendix*

Table of Contents

*This entire appendix is available in hardcopy in the analysis file located at BLM's Coos Bay District Office.

Fire History Appendix:

The hard copy version of this appendix contains photocopied pages from several sources:

Cover page, and pages 3-1, 3.2-1, 3.2-44, 3.2-45 and 3.2-46 from Near Coastal Waters National Pilot Project “Action Plan for Oregon Coastal Watersheds, Estuary, and Ocean Waters” 1988-1991, Oregon Department of Environmental Quality. The Coos Bay Public Library holds a copy of the whole document.

Prints made from microfilms of the Coos Bay Times. The Coos Bay Library holds a copy of the microfilm. The prints are an incomplete collection of newspaper articles about the 1936 fires from September 26 to October 9, 1936.

Photocopy of the fire report for the 1936 McKinley-Fairview Fire.

Potential Harvest Area Appendix

Table of Contents

*This working map is available in hardcopy in the analysis file located at BLM's Coos Bay District Office.

MIDDLE-MAIN-COQUILLE WATERSHED ANALYSIS
SPECIES AND HABITAT: AQUATIC SPECIES

TABLE OF CONTENTS FOR APPENDICES

Table FISH-1: 1993 Stream Habitat Inventories Relative to ODFW Benchmark Levels

John's Creek

REACH	4JOHN001		4JOHN002		3JOHN006	
Reach Length (miles):	1.0		0.8		0.2	
Ave. % Gradient:	2.6		2.5		4.0	
No. Pools > 3' Depth	0		2		0	
% of Pools > 3' Depth	-		1.5		-	
POOLS	Actual	Rating	Actual	Rating	Actual	Rating
% Area:	14	Fair	33	Fair	4	Poor
Residual Depth (ft.):	0.8	Good	1.1	Good	0.5	Good
RIFFLES						
Width/Depth:	25.6	Fair	20.8	Fair	16.7	Fair
% Silt/Sand/Organics:	10	Fair	16	Poor	6	Fair
% Gravel Area:	48	Good	48	Good	30	Good
WOODY DEBRIS						
LWD Pcs/100 yds*:	20	Fair	13	Fair	42	Good
Conifer Pcs/100 yds	8	Poor	16	Fair	23	Good

* Woody debris data used for this analysis are intended only to portray an approximation relative to ODFW's benchmark values. The data represented includes all wood pieces >3' in length and >5" in diameter, however ODFW's benchmarks are based on wood pieces of the same minimum length, but larger diameter (>5.9"). The LWD category includes conifer and hardwood pieces; conifer pieces are also listed separately.

Table FISH-2: Matrix of Factors and Indicators for the Southwest Province Tyee Sandstone Physiographic Area

FACTORS	INDICATORS	PROPERLY FUNCTIONING (PF)	AT RISK (situations not described as PF or NPF)	NOT PROPERLY FUNCTIONING (NPF)
Water Quality:	Temperature (7 Day Max.Avg.)	$\leq$ 64 Deg. F.		$\geq$ 70 Deg. F.
	Turbidity	Frequency and duration similar to unimpacted streams in basin		Frequency and duration higher than unimpacted streams in basin
	Chemical Contamination/ Nutrients	No Biological evidence of chemical contamination		Obvious biological evidence of chemical contamination e.g. fish kills
Habitat Access:	Physical Barriers	No manmade barriers in watershed that inhibit upstream passage of any life stage of salmonid to historical habitat		One or more manmade barriers that prevent upstream passage of any life stage of salmonid to historical habitat
Habitat Elements:	Substrate/ Sediment	$\geq$ 30 % gravel in riffles & very little embeddedness		$\leq$ 10 % gravel in riffles & embedded
	Large Woody Debris (LWD)	$\geq$ 50 pieces/mile, 24" dia., 50' long, no evidence or record of stream clean out or management related debris flows		$\leq$ 15 pieces/mile, 24" dia., 50' long, evidence or record of stream clean out or management related debris flows
	Pool Area %	$\geq$ 55%		$\leq$ 40%
	Pool Quality	Residual pool depth $\geq$ 1.5' or 20% pools deeper than 3'.		Residual pool depth $\leq$ .6' or 10% pools deeper than 1 m.
	Off-channel Habitat	Frequent backwaters with cover, and low energy off-channel areas (ponds oxbows, etc.)	Some backwaters and high energy side channels	No backwaters, nor off-channel ponds
Channel condition & Dynamics:	Width/depth ratio (in wetted riffles)	< 15	15 - 30	> 30
	Streambank Condition	Relatively stable banks. Few or no areas of active erosion.	Moderately stable banks. Some active erosion occurring on outcurves and constrictions.	Highly unstable stream banks. Numerous areas of exposed soil and stream bank cutting.

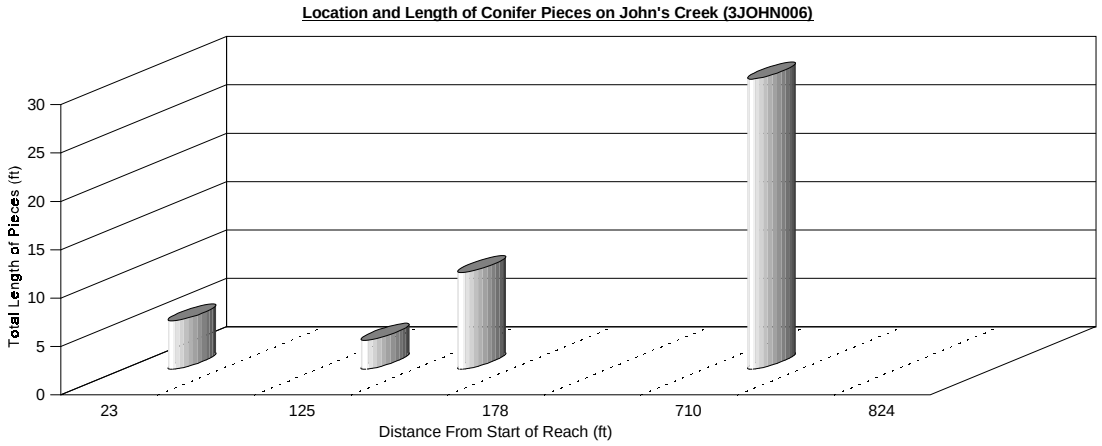
FACTORS	INDICATORS	PROPERLY FUNCTIONING (PF)	AT RISK (situations not described as PF or NPF)	NOT PROPERLY FUNCTIONING (NPF)
	Floodplain Connectivity	Logjams and other features create pools and secondary channels, which trap debris and food and maintain a high water table that provides cool late-season flows. Floodplain well vegetated.		Secondary channels lacking. Unconstrained main channel often down cut to bedrock and relatively short, without pools, meanders, and food. Warm low late-season flows.
Watershed Condition:	Road Density & Location/ Drainage Network	< 2 mi./mi.sq. No valley bottom roads.	2 - 3 mi./mi.sq. Some valley bottom roads.	> 3 mi./mi.sq. Many valley bottom roads.
	Disturbance History	Entire watershed with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian reserves; and for NWFP area (except AMA's), $\geq$ 15% retention of LSOG in watershed.		Entire watershed with disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian reserves; does not meet NWFP standard for LSOG retention.
	Landslide Rates	No obvious increase in landslide rates caused from management related activities		> 2X natural rate of landslides, that appears to be management related.
	Riparian Reserves	The Riparian Reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers include known refugia for sensitive aquatic species (> 80% intact).	Moderate loss of function (shade, LWD recruitment, etc.) Of riparian reserve system, or incomplete protection of habitats and refugia for sensitive aquatic species (~70-80% intact).	Riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitats and refugia for sensitive aquatic species (<70% intact).

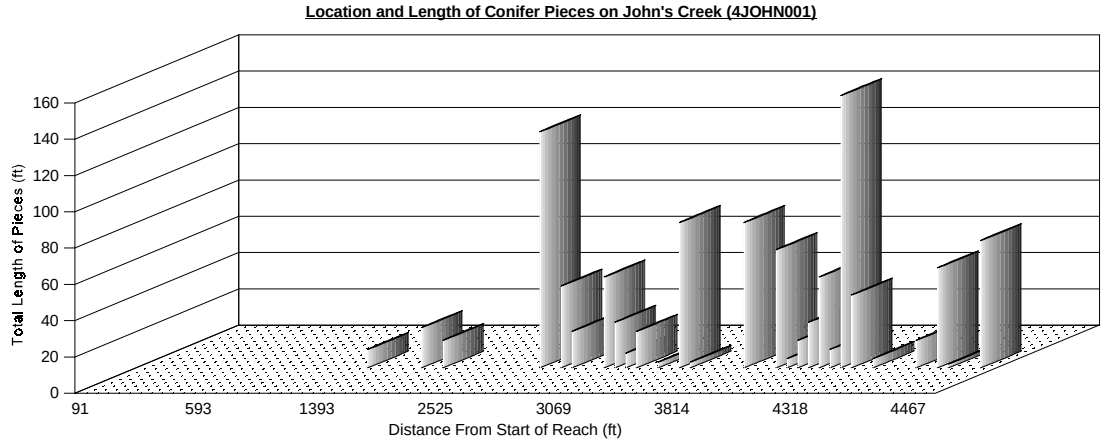
Table FISH-3: Matrix of Factors and Indicators in the SW Province Tyee Sandstone Physiographic Area

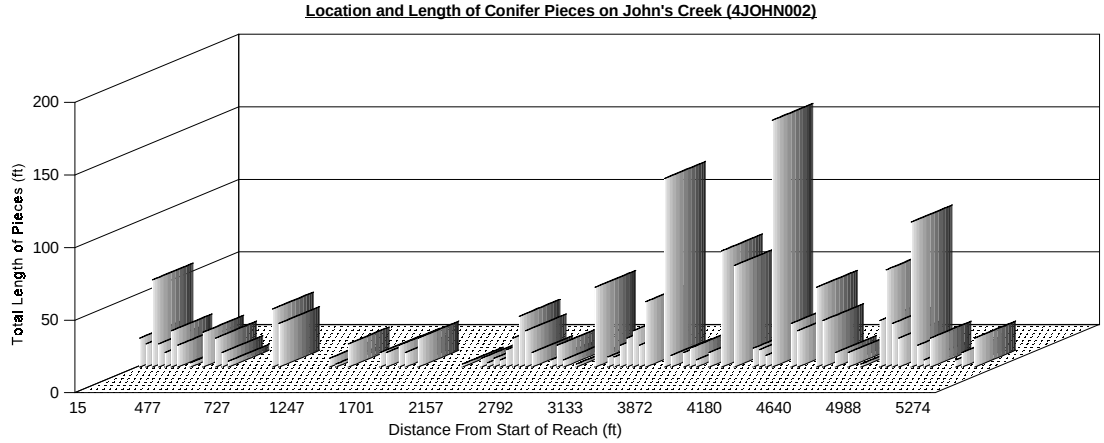
Factor	John's Creek	Wimer Creek
Water Quality		
Temperature	PF	UNK
Turbidity	UNK	UNK
Chemical Contamination/ Nutrients	PF	PF
Habitat Access		
Physical Barriers	NPF	NPF
Habitat Elements		
Substrate/Sediment	PF	AR
Large Woody Debris	UNK	NPF
Pool Area (%)	NPF	UNK
Pool Quality	NPF	NPF
Off-channel Habitat	AR	AR
Width/Depth riffles	AR	UNK
Streambank Condition	UNK	UNK
Floodplain Connectivity	AR	AR
Watershed Condition		
Road Density & Location/ Drainage Network	NPF	NPF
Disturbance History	PF	NPF
Landslide Rates	PF	PF
Riparian Reserves	NPF	NPF

PF:Proper Functioning, AR:At Risk
NPF:Not Proper Functioning UNK:Unknown

Chart FISH-1: Location and Total Length of Conifer Pieces in John's Creek







Appendix Wl - 1. The following species list was compiled by wildlife biologists for the Coos Bay District BLM. It is intended to be a comprehensive list of all vertebrate wildlife species known or suspected to utilize the District, and will continue to be updated as new information becomes available. The determination of species presence within the subwatershed was made using a combination of documented sightings, professional knowledge of and review of distribution information found in field guides and the Oregon Natural Heritage Database. The codes used for Presence, Federal and State Status are given below.

[1] Presence in subwatershed

N	-	Not thought to be present within the subwatershed at any time.
S	-	Suspected to be present within the subwatershed, but has not been documented and local biologists have no direct evidence of presence.
K	-	Known to be present within the subwatershed through observations by trained biologists, most sightings documented in Resource Area files.

[2] Status Federal

FE	-	Federally Endangered Species
FT	-	Federally Threatened Species
FC	-	Federal Candidate Species
BS	-	Bureau Sensitive Species
BT	-	Bureau Tracking Species
BA	-	Bureau Assessment Species

[3] Status State

SE	-	State Endangered Species
ST	-	State Threatened Species
SSC	-	State Sensitive- Critical Species
SSV	-	State Sensitive- Vulnerable Species
SSP	-	State Sensitive- Peripheral or Naturally Rare Species
SSU	-	State Sensitive- Undetermined Status Species

[4] Represents some type of change from the published version of Table C-3 of the Coos Bay District Record of Decision and Resource Management Plan (May 1995). Changes are due to administrative and legal changes in species status by federal and state agencies, changes to lists maintained by the Oregon Natural Heritage Program and correction of errors in the published version of Table C-3.

[5] Represents change to a common or scientific name for a Special Status Species from the name provided in the published version of Table C-3 of the Coos Bay Distict Record of Decision and Resoure Management Plan (May 1995).

[6] Introduced species.

[7] This species is not associated with the primary habitat characteristics listed in this table.

Common/Latin Name	Presence[1]	Status		Special Habitats				Seral Stage				
		Status Federal[2]	Status State[3]	Cliff(C) Talus (T)	Dead/ Down	Riparian/ Wetland	Hardwood Forest	Early	Mid	Late	Mature	Old-Growth
AMPHIBIANS												
NORTHWESTERN SALAMANDER *AMBYSTOMA GRACILE*	S				X	X	X	X		X	X	
LONG-TOED SALAMANDER *AMBYSTOMA MACRODACTYLUM*	S				X	X		X	X	X		
PACIFIC GIANT SALAMANDER *DICAMPTODON TENEBROSUS*	K				X	X	X	X		X	X	X
SOUTHERN TORRENT SALAMANDER *RHYACOTRITON VARIEGATUS*	S	BT	SSC[4]		X	X						
CLOUDED SALAMANDER *ANEIDES FERREUS*	S	BT	SSU		X		X	X	X	X		
ENSATINA *ENSATINA ESCHSCHOLTZII*	S				X	X	X		X			
DUNN'S SALAMANDER *PLETHODON DUNNI*	S			T	X	X				X	X	X
WESTERN RED-BACKED SALAMANDER *PLETHODON VEHICULUM*	S			T	X	X			X	X	X	X
ROUGH-SKINNED NEWT *TARICHA GRANULOSA*	K					X	X	X	X	X	X	X
WESTERN TOAD *BUFO BOREAS*	N	BT	SSV		X	X	X	X				
PACIFIC TREEFROG *PSEUDACRIS REGILLA*	K				X	X	X	X	X	X	X	X
TAILED FROG *ASCAPHUS TRUEI*	K	BA[4]	SSV		X	X			X	X	X	X
RED-LEGGED FROG *RANA AURORA*	S	BS[4]	SSU			X	X					
FOOTHILL YELLOW LEGGED FROG *RANA BOYLII*	S	BS[4]	SSV			X						
BULLFROG [6] *RANA CATESBEIANA*	S					X						
SPOTTED FROG *RANA PRETIOSA*	N	FC	SSC			X						
REPTILES												
PAINTED TURTLE *CHRYSEMYS PICTA*	N	BA[4]	SSC			X						
NORTHWESTERN POND TURTLE[5] *CLEMMYS MARMORATA MARMORATA*	S	BS[4]	SSC		X	X	X	X	X			
NORTHERN ALLIGATOR LIZARD *ELGARIA COERULEA*	S				X		X	X	X			
SOUTHERN ALLIGATOR LIZARD *ELGARIA MULTICARINATA*	S			T			X	X				

Common/Latin Name	Presence[1]	Status Federal[2]	Status State[3]	Special Habitats: Cliff(C) Talus (T)	Special Habitats: Dead/ Down	Special Habitats: Riparian/ Wetland	Special Habitats: Hardwood Forest	Seral Stage: Early	Seral Stage: Mid	Seral Stage: Late	Mature	Old-Growth
REPTILES (CONT.)												
WESTERN FENCE LIZARD *SCELOPORUS OCCIDENTALIS*	S				X	X		X	X			
WESTERN SKINK *EUMECES SKILTONIANUS*	S			T	X		X					
RUBBER BOA *CHARINA BOTTAE*	S				X			X	X			
RACER COLUBER CONSTRICTOR	S						X	X				
SHARPTAIL SNAKE *CONTIA TENUIS*	S	BA[4]	SSV	T	X	X						
RINGNECK SNAKE *DIADOPHIS PUNCTATUS*	S				X	X	X	X	X			
COMMON KINGSNAKE *LAMPROPELTIS GETULUS*	N	BA[4]	SV[4]			X						
GOPHER SNAKE *PITUOPHIS CATENIFER*	S						X					
WESTERN AQUATIC GARTER SNAKE *THAMNOPHIS COUCHI*	S					X	X					
WESTERN TERR.GARTER SNAKE *THAMNOPHIS ELEGANS*	S				X	X	X					
NORTHWESTERN GARTER SNAKE *THAMNOPHIS ORDINOIDES*	S					X		X				
COMMON GARTER SNAKE *THAMNOPHIS SIRTALIS*	S					X	X					
WESTERN RATTLESNAKE *CROTALUS VIRIDIS*	S			C	X							

Common/Latin Name	Presence[1]	Status Federal[2]	Status State[3]	Special Habitats: Cliff(C) Talus (T)	Special Habitats: Snags (S) Dead/Down	Special Habitats: Riparian/ Wetland	Special Habitats: Hardwood Forest	Seral Stage: Early	Seral Stage: Mid	Seral Stage: Late	Seral Stage: Mature	Seral Stage: Old-Growth
MAMMALS												
VIRGINIA OPOSSUM *DIDELPHIS VIRGINIANA*	S				S,D/D	X	X					
PACIFIC WATER SHREW *SOREX BENDIRII*	S				D/D	X						
PACIFIC SHREW *SOREX PACIFICUS*	S				D/D	X	X	X				
TROWBRIDGE'S SHREW *SOREX TROWBRIDGII*	S				D/D		X			X	X	X
VAGRANT SHREW *SOREX VAGRANS*	S					X		X				
SHREW-MOLE *NEUROTRICHUS GIBBSII*	S				D/D	X	X			X	X	
PACIFIC MOLE *SCAPANUS ORARIUS*	S					X	X	X	X			
TOWNSEND'S MOLE *SCAPANUS TOWNSENDII*	S					X		X				
BIG BROWN BAT *EPTESICUS FUSCUS*	S			C	S	X	X	X				X
SILVER-HAIRED BAT *LASIONYCTERIS NOCTIVAGANS*	S	BT	SSU		S		X		X	X	X	X
HOARY BAT *LASIURUS CINEREUS*	S					X	X	X	X		X	X
CALIFORNIA MYOTIS *MYOTIS CALIFORNICUS*	S			C	S	X	X	X	X	X	X	X
LONG-EARED MYOTIS *MYOTIS EVOTIS*	S	BT	SSU		S	X	X			X	X	X
LITTLE BROWN MYOTIS *MYOTIS LUCIFUGUS*	S				S	X	X	X	X		X	X
FRINGED MYOTIS *MYOTIS THYSANODES*	S	BS	SSV	C		X	X	X	X	X	X	X

Common/Latin Name	Presence[1]	Status Federal[2]	Status State[3]	Special Habitats: Cliff(C) Talus (T)	Special Habitats: Snags Dead/Down	Special Habitats: Riparian/ Wetland	Special Habitats: Hardwood Forest	Seral Stage: Early	Seral Stage: Mid	Seral Stage: Late	Seral Stage: Mature	Seral Stage: Old-Growth
MAMMALS CONT.												
LONG-LEGGED MYOTIS *MYOTIS VOLANS*	S	BT[4]	SSU[4]	C	S	X	X		X	X		X
YUMA MYOTIS *MYOTIS YUMANENSIS*	S	BT[4]	SSU[4]	C	S	X	X	X			X	X
PACIFIC WESTERN BIG-EARED BAT *CORYNORHINUS TOWNSENDII TOWNSENDII*[5]	S	BS[4]	SSC			X		X	X	X	X	X
COYOTE *CANIS LATRANS*	S				D/D	X	X	X	X			
GRAY FOX *UROCYON CINEREOARGENTEUS*	S				D/D		X					
RED FOX *VULPES VULPES*	S				D/D	X	X	X				
BLACK BEAR *URSUS AMERICANUS*	K				S&D/D	X	X	X	X	X	X	X
RINGTAIL *BASSARISCUS ASTUTUS*	N	BT	SSU	T			X					
RACCOON *PROCYON LOTOR*	K				S	X	X	X	X	X	X	X
RIVER OTTER *LUTRA CANADENSIS*	K					X						
AMERICAN MARTEN *MARTES AMERICANA*	S	BA[4]	SSV[4]		S&D/D						X	X
FISHER *MARTES PENNANTI*	S	BS[4]	SSC	T	S&D/D						X	X
STRIPED SKUNK *MEPHITIS MEPHITIS*	S					X						
WESTERN SPOTTED SKUNK *SPILOGALE GRACILIS*	K				D/D	X	X	X	X			
SHORT-TAILED WEASEL *MUSTELA ERMINEA*	S			T	D/D		X	X		X	X	X

Common/Latin Name	Presence[1]	Status Federal[2]	Status State[3]	Special Habitats: Cliff(C) Talus (T)	Special Habitats: Snags (S) Dead/Down	Special Habitats: Riparian/ Wetland	Special Habitats: Hardwood Forest	Seral Stage: Early	Seral Stage: Mid	Seral Stage: Late	Seral Stage: Mature	Seral Stage: Old-Growth
MAMMALS CONT.												
LONG-TAILED WEASEL *MUSTELA FRENATA*	S				D/D		X	X	X			
MINK *MUSTELA VISON*	K				D/D	X						
MOUNTAIN LION *FELIS CONCOLOR*	S			C&T		X		X	X		X	
BOBCAT *FELIS RUFUS*	S			C&T	D/D	X		X	X			
ROOSEVELT ELK *CERVUS ELAPHUS*	K					X		X	X		X	X
BLACK-TAILED DEER *ODOCOILEUS HEMIONUS*	K					X		X	X	X	X	X
MOUNTAIN BEAVER *APLODONTIA RUFA*	S				D/D		X	X	X			
NORTHERN FLYING SQUIRREL *GLAUCOMYS SABRINUS*	S				S						X	X
WESTERN GRAY SQUIRREL *SCIURUS GRISEUS*	S	BT[4]	SSU[4]		S		X					
CALIFORNIA GROUND SQUIRREL *SPERMOPHILUS BEECHEYI*[7]	S											
TOWNSEND'S CHIPMUNK *TAMIAS TOWNSENDII*	S			T	D/D				X	X	X	X
DOUGLAS' SQUIRREL *TAMIASCIURUS DOUGLASII*	S				S				X	X	X	X
WESTERN POCKET GOPHER *THOMOMYS MAZAMA*	S						X	X				
BEAVER *CASTOR CANADENSIS*	K					X						
NUTRIA *MYOCASTOR COYPUS*	N					X						

Common/Latin Name	Presence[1]	Status Federal[2]	Status State[3]	Special Habitats: Cliff(C) Talus (T)	Special Habitats: Snags (S) Dead/Down	Special Habitats: Riparian/ Wetland	Special Habitats: Hardwood Forest	Seral Stage: Early	Seral Stage: Mid	Seral Stage: Late	Seral Stage: Mature	Seral Stage: Old-Growth
MAMMALS CONT.												
DEER MOUSE *PEROMYSCUS MANICULATUS*	S			T	D/D		X	X	X			
WESTERN HARVEST MOUSE *REITHRODONTOMYS MEGALOTIS*	N					X	X					
HOUSE MOUSE *MUS MUSCULUS* [7]	S											
WHITE-FOOTED VOLE *ARBORIMUS ALBIPES*	S	BS[4]	SSU		D/D	X					X	
RED TREE VOLE *ARBORIMUS LONGICAUDUS*	S									X	X	X
WESTERN RED-BACKED VOLE *CLETHRIONOMYS CALIFORNICUS*	S				D/D					X	X	X
LONG-TAILED VOLE *MICROTUS LONGICAUDUS*	S			T	D/D	X		X				
CREEPING VOLE *MICROTUS OREGONI*	S				D/D	X	X	X	X			
TOWNSEND'S VOLE *MICROTUS TOWNSENDII*	S					X		X				
PACIFIC JUMPING MOUSE *ZAPUS TRINOTATUS*	S					X	X	X				
BUSHY-TAILED WOODRAT *NEOTOMA CINEREA*	S			C&T	D/D		X			X	X	X
DUSKY-FOOTED WOODRAT *NEOTOMA FUSCIPES*	N						X	X	X	X	X	X
NORWAY RAT *RATTUS NORVEGICUS* [7]	S											
BLACK RAT *RATTUS RATTUS* [7]	S											
MUSKRAT *ONDATRA ZIBETHICUS*	S					X						

Common/Latin Name	Presence[1]	Status Federal[2]	Status State[3]	Special Habitats: Cliff(C) Talus (T)	Special Habitats: Snags (S) Dead/Down	Special Habitats: Riparian/ Wetland	Special Habitats: Hardwood Forest	Seral Stage: Early	Seral Stage: Mid	Seral Stage: Late	Seral Stage: Mature	Seral Stage: Old-Growth
MAMMALS CONT.												
PORCUPINE *ERETHIZON DORSATUM*	S			C	D/D		X	X	X	X	X	X
BRUSH RABBIT *SYLVILAGUS BACHMANI*	S						X	X	X		X	

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
BIRDS																
PACIFIC LOON *GAVIA PACIFICA*	N					X										
COMMON LOON *GAVIA IMMER*	N	BA				X				X						
PIED-BILLED GREBE *PODILYMBUS PODICEPS*	S				X					X						
EARED GREBE *PODICEPS NIGRICOLLIS*	N				X	X				X						
DOUBLE-CRESTED CORMORANT *PHALACROCORAX AURITUS*	N				X	X	C			X						
AMERICAN BITTERN *BOTAURUS LENTIGINOSUS*	N				X	X				X						
REAT EGRET *ARDEA ALBA*	N	BT[4]			X	X				X						
SNOWY EGRET *EGRETTA THULA*[4]	N				X	X				X						
CATTLE EGRET *BUBULCUS IBIS*	N				X	X										
GREAT BLUE HERON *ARDEA HERODIAS*	S					X				X						
GREEN HERON *BUTORIDES VIRESCENS*	S				X	X				X						
BLACK-CROWNED NIGHT HERON *NYCTICORAX NYCTICORAX*	N				X	X				X						
TUNDRA SWAN *CYGNUS COLUMBIANUS*	N					X				X						

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
GREATER WHITE-FRONTED GOOSE *ANSER ALBIFRONS*	N			X		X				X						
CANADA GOOSE *BRANTA CANADENSIS*	N			X		X				X						
ALEUTIAN CANADA GOOSE *BRANTA CANADENSIS LEUCOPAREIA*	N	FT	SE			X				X						
CACKLING CANADA GOOSE *BRANTA CANADENSIS MINIMA*[4]	N			X						X						
DUSKY CANADA GOOSE *BRANTA CANADENSIS OCCIDENTALIS*	N	BA[4]		X		X				X						
WOD DUCK *AIX SPONSA*	S			X				X		X				X	X	
GREEN-WINGED TEAL *ANAS CRECCA*	S			X		X				X						
MALLARD *ANAS PLATYRHYNCHOS*	S			X		X				X						
NORTHERN PINTAIL *ANAS ACUTA*	S			X		X				X						
BLUE-WINGED TEAL *ANAS DISCORS*	N			X		X				X						
CINNAMON TEAL *ANAS CYANOPTERA*	S			X						X						
NORTHERN SHOVELER *ANAS CLYPEATA*	N			X		X				X						
GADWALL *ANAS STREPERA*	N			X		X				X						
EURASIAN WIGEON *ANAS PENELOPE*	N			X		X				X						

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
AMERICAN WIGEON *ANAS AMERICANA*	N			X		X				X						
CANVASBACK *AYTHYA VALISINERIA*	N			X		X				X						
REDHEAD *AYTHYA AMERICANA*	N			X		X				X						
RING-NECKED DUCK *AYTHYA COLLARIS*[4]	N			X						X						
GREATER SCAUP *AYTHYA MARILA*	N			X		X				X						
LESSER SCAUP *AYTHYA AFFINIS*[4]	N			X		X				X						
COMMON GOLDENEYE *BUCEPHALA CLANGULA*	S			X		X		X		X						
BARROW'S GOLDENEYE *BUCEPHALA ISLANDICA*	N					X		X		X						
BUFFLEHEAD *BUCEPHALA ALBEOLA*[4]	N			X		X		X		X				X	X	
HOODED MERGANSER *LOPHODYTES CUCULLATUS*	S			X				X		X				X	X	
COMMON MERGANSER *MERGUS MERGANSER*	S			X		X		X		X				X	X	
RED-BREASTED MERGANSER *MERGUS SERRATOR*	S			X		X		X		X				X	X	
TURKEY VULTURE *CATHARTES AURA*	S				X		C				X				X	
OSPREY *PANDION HALIAETUS*	K					X		X		X				X	X	

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
WHITE-TAILED KITE *ELANUS LEUCURUS*	N	BT								X						
BALD EAGLE *HALIAEETUS LEUCOCEPHALUS*	K	FT	ST			X		X		X					X	
GOLDEN EAGLE *AQUILA CHRYSAETOS*	S										X					X
NORTHERN HARRIER *CIRCUS CYANEUS*	S									X						
SHARP-SHINNED HAWK *ACCIPITER STRIATUS*	K												X	X	X	
COOPER'S HAWK *ACCIPITER COOPERII*	S												X	X	X	
NORTHERN GOSHAWK *ACCIPITER GENTILIS*	S	BS[4]	SSC											X	X	
RED-SHOULDERED HAWK *BUTEO LINEATUS*	N									X						
RED-TAILED HAWK *BUTEO JAMAICENSIS*	K										X				X	X
ROUGH-LEGGED HAWK *BUTEO LAGOPUS*	N									X						
AMERICAN KESTREL *FALCO SPARVERIUS*	S							X		X	X					
MERLIN *FALCO COLUMBARIUS*	S	BA								X						
AMERICAN PEREGRINE FALCON *FALCO PEREGRINUS ANATUM*[5]	N	FE	SE			X	X			X						X
RING-NECKED PHEASANT *PHASIANUS COLCHICUS*	S			X						X						

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
BLUE GROUSE *DENDRAGAPUS OBSCURUS*	S			X							X	X	X	X	X	
RUFFED GROUSE *BONASA UMBELLUS*	S			X						X						X
WILD TURKEY *MELEAGRIS GALLOPAVO*	K			X												X
CALIFORNIA QUAIL *CALLIPEPLA CALIFORNICA*	K			X												X
MOUNTAIN QUAIL *OREORTYX PICTUS*[4]	S			X							X	X				X
VIRGINIA RAIL *RALLUS LIMICOLA*	N				X					X						
SORA *PORZANA CAROLINA*	N				X					X						
AMERICAN COOT *FULICA AMERICANA*	S			X		X				X						
KILLDEER *CHARADRIUS VOCIFERUS*	S					X				X						
SPOTTED SANDPIPER *ACTITIS MACULARIA*	S				X	X				X						
COMMON SNIPE *GALLINAGO GALLINAGO*	S			X	X	X				X						
MARBLED MURRELET BRACHYRAMPHUS *MARMORATUS MARMORATUS*	S	FT	ST[4]			X									X	
BAND-TAILED PIGEON *COLUMBA FASCIATA*	S			X		X				X						X

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
ROCK DOVE *COLUMBA LIVIA*	S					X	C									
MOURNING DOVE *ZENAIDA MACROURA*	S									X						
BARN OWL *TYTO ALBA*	S							X			X					X
WESTERN SCREECH-OWL *OTUS KENNICOTTII*	S							X		X						
GREAT HORNED OWL *BUBO VIRGINIANUS*	S									X	X			X	X	X
NORTHERN PYGMY-OWL *GLAUCIDIUM GNOMA*	K	BT	SSU					X						X	X	
BURROWING OWL *ATHENE CUNICULARIA*	N	BS	SSC			X										
NORTHERN SPOTTED OWL *STRIX OCCIDENTALIS CAURINA*	S	FT	ST					X						X	X	
BARRED OWL *STRIX VARIA*	S							X						X	X	
SHORT-EARED OWL *ASIO FLAMMEUS*	N				X					X						
NORTHERN SAW-WHET OWL *AEGOLIUS ACADICUS*	S	BA[4]									X			X	X	X
COMMON NIGHTHAWK *CHORDEILES MINOR*	S				X	X	T			X	X					X
BLACK SWIFT *CYPSELOIDES NIGER*	N				X		C									
VAUX'S SWIFT *CHAETURA VAUXI*	S				X			X		X	X	X			X	

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
ANNA'S HUMMINGBIRD *CALYPTE ANNA*	S															X
RUFOUS HUMMINGBIRD *SELASPHORUS RUFUS*	S				X					X	X	X		X		X
ALLEN'S HUMMINGBIRD *SELASPHORUS SASIN*	S	BT[4]			X						X	X				X
BELTED KINGFISHER *CERYLE ALCYON*	S				X	X	C	X		X						
LEWIS' WOODPECKER *MELANERPES LEWIS*	N	BA[4]	SSC					X	X							
ACORN WOODPECER *MELANERPES FORMICIVORUS*	S	BT[4]						X								X
RED-BREASTED SAPSUCKER *SPHYRAPICUS RUBER*	S								X	X						
DOWNY WOODPECKER *PICOIDES PUBESCENS*	S							X		X						
HAIRY WOODPECKER *PICOIDES VILLOSUS*	S							X	X					X	X	
BLACK-BACKED WOODPECKER *PICOIDES ARCTICUS*	N	BA[4]	SSC					X								
NORTHERN FLICKER *COLAPTES AURATUS*	S							X	X		X			X	X	X
PILEATED WOODPECKER *DRYOCOPUS PILEATUS*	S	BA[4]	SSV[4]					X	X						X	
OLIVE-SIDED FLYCATCHER *CONTOPUS BOREALIS*	S				X									X	X	
WESTERN WOOD-PEWEE *CONTOPUS SORDIDULUS*	S													X	X	

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
WILLOW FLYCATCHER *EMPIDONAX TRAILLII*	S									X						
HAMMOND'S FLYCATCHER *EMPIDONAX HAMMONDII*	S													X	X	
DUSKY FLYCATCHER *EMPIDONAX OBERHOLSERI*[7]	S															
PACIFIC SLOPE FLYCATCHER *EMPIDONAX DIFFICILIS*	S														X	
BLACK PHOEBE *SAYORNIS NIGRICANS*	N	BT			X		C			X						
WESTERN KINGBIRD *TYRANNUS VERTICALIS*[7]	N															
HORNED LARK *EREMOPHILA ALPESTRIS*	N					X										
PURPLE MARTIN *PROGNE SUBIS*	N	BA[4]	SSC			X		X		X	X					
TREE SWALLOW *TACHYCINETA BICOLOR*	S							X		X	X				X	X
VIOLET-GREEN SWALLOW *TACHYCINETA THALASSINA*	S						C	X		X						
NORTHERN ROUGH-WINGED SWALLOW *STELGIDOPTERYX SERRIPENNIS*	S						C			X						
BANK SWALLOW *RIPARIA RIPARIA*	S	BT[4]	SSU[4]				C			X						
CLIFF SWALLOW *HIRUNDO PYRRHONOTA*	S						C									
BARN SWALLOW *HIRUNDO RUSTICA*	K									X						X

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
GRAY JAY *PERISOREUS CANADENSIS*	S											X	X	X	X	
STELLER'S JAY *CYANOCITTA STELLERI*	K											X	X	X	X	
SCRUB JAY *APHELOCOMA CALIFORNICA*	S															X
AMERICAN CROW *CORVUS BRACHYRHYNCHOS*	K									X					X	
COMMON RAVEN *CORVUS CORAX*	K						C				X	X		X	X	X
BLACK-CAPPED CHICKADEE *PARUS ATRICAPILLUS*	S							X		X						
MOUNTAIN CHICKADEE *PARUS GAMBELI*	S							X								
CHESTNUT-BACKED CHICKADEE *PARUS RUFESCENS*	S							X				X	X	X	X	
BUSHTIT *PSALTRIPARUS MINIMUS*	S															X
RED-BREASTED NUTHATCH *SITTA CANADENSIS*	S							X	X					X	X	
WHITE-BREASTED NUTHATCH *SITTA CAROLINENSIS*	S							X								
BROWN CREEPER *CERTHIA AMERICANA*	S							X						X	X	
BEWICK'S WREN *THRYOMANES BEWICKII*	S								X		X					X
HOUSE WREN *TROGLODYTES AEDON*	S							X	X		X					

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
WINTER WREN *TROGLODYTES TROGLODYTES*	S								X					X	X	
MARSH WREN *CISTOTHORUS PALUSTRIS*	S									X						
AMERICAN DIPPER *CINCLUS MEXICANUS*	S					X				X						
GOLDEN-CROWNED KINGLET *REGULUS SATRAPA*	S												X	X	X	X
RUBY-CROWNED KINGLET *REGULUS CALENDULA*	S										X	X		X	X	
WESTERN BLUEBIRD *SIALIA MEXICANA*	S	BA[4]	SSV					X			X					
TOWNSEND'S SOLITAIRE *MYADESTES TOWNSENDI*	S						C		X		X	X		X	X	
AMERICAN ROBIN *TURDUS MIGRATORIUS*	S									X	X	X				X
SWAINSON'S THRUSH *CATHARUS USTULATUS*	S				X						X	X	X	X	X	X
HERMIT THRUSH *CATHARUS GUTTATUS*	S										X	X		X	X	
VARIED THRUSH *IXOREUS NAEVIUS*	S													X	X	X
WRENTIT *CHAMAEA FASCIATA*	S					X										
MOCKINGBIRD *MIMUS POLYGLOTTOS*	N					X										
AMERICAN PIPIT *ANTHUS SPINOLETTA*	S					X				X						

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
CEDAR WAXWING *BOMBYCILLA CEDRORUM*	S				X											X
NORTHERN SHRIKE *LANIUS EXCUBITOR*[7]	S															
LOGGERHEAD SHRIKE *LANIUS LUDOVICIANUS*[4]	S	BT[4]			X					X						
EUROPEAN STARLING *STURNUS VULGARIS*	S							X								X
SOLITARY VIREO *VIREO SOLITARIUS*	S													X	X	
HUTTON'S VIREO *VIREO HUTTONI*	S															X
WARBLING VIREO *VIREO GILVUS*	S															X
ORANGE-CROWNED WARBLER *VERMIVORA CELATA*	S				X						X	X				X
NASHVILLE WARBLER *VERMIVORA RUFICAPILLA*	S				X											X
YELLOW WARBLER *DENDROICA PETECHIA*	S				X											X
YELLOW-RUMPED WARBLER *DENDROICA CORONATA*	S				X						X	X	X	X	X	X
BLACK-THROATED GRAY WARBLER *DENDROICA NIGRESCENS*	S										X	X	X	X	X	X
TOWNSEND'S WARBLER *DENDROICA TOWNSENDI*	S				X									X	X	
HERMIT WARBLER *DENDROICA OCCIDENTALIS*	S				X								X	X	X	

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
PALM WARBLER *DENDROICA PALMARUM*	N				X					X						X
BLACK-AND-WHITE WARBLER *MNIOTILTA VARIA*	N				X											
MACGILLIVRAY'S WARBLER *OPORORNIS TOLMIEI*	S				X					X						
COMMON YELLOWTHROAT *GEOTHLYPIS TRICHAS*	S				X					X						
WILSON'S WARBLER *WILSONIA PUSILLA*	S				X											X
YELLOW-BREASTED CHAT *ICTERIA VIRENS*[7]	S															
WESTERN TANAGER *PIRANGA LUDOVICIANA*	S				X						X			X	X	
BLACK-HEADED GROSBEAK *PHEUCTICUS MELANOCEPHALUS*	S				X											X
LAZULI BUNTING *PASSERINA AMOENA*[7]	S				X											
RUFOUS-SIDED TOWHEE *PIPILO ERYTHROPHTHALMUS*	S										X	X				X
CHIPPING SPARROW *SPIZELLA PASSERINA*	S				X						X	X				X
VESPER SPARROW *POOECETES GRAMINEUS*	S	BT[4]	SSC[4]		X	X										
SAVANNAH SPARROW *PASSERCULUS SANDWICHENSIS*	S									X						
FOX SPARROW *PASSERELLA ILIACA*	S															X

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-Tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
SONG SPARROW *MELOSPIZA MELODIA*	S									X						X
LINCOLN'S SPARROW *MELOSPIZA LINCOLNII*	S				X					X						
GOLDEN-CROWNED SPARROW *ZONOTRICHIA ATRICAPILLA*	S									X						
WHITE-CROWNED SPARROW *ZONOTRICHIA LEUCOPHRYS*	S				X						X					X
HARRIS' SPARROW *ZONOTRICHIA QUERULA*[7]	N															
DARK-EYED JUNCO *JUNCO HYEMALIS*	S										X	X		X	X	X
LAPLAND LONGSPUR *CALCARIUS LAPPONICUS*	S					X										
SNOW BUNTING *PLECTROPHENAX NIVALIS*	N					X										
WESTERN MEADOWLARK *STURNELLA NEGLECTA*[7]	S	BA[4]														
RED-WINGED BLACKBIRD *AGELAIUS PHOENICEUS*	S				X	X				X						
YELLOW-HEADED BLACKBIRD *XANTHOCEPHALUS XANTHOCEPHALUS*	N				X					X						
BREWER'S BLACKBIRD *EUPHAGUS CYANOCEPHALUS*	S				X	X				X	X					X
BROWN-HEADED COWBIRD *MOLOTHRUS ATER*	S				X					X	X	X				X
BULLOCK'S ORIOLE *ICTERUS BULLOCKII*	S				X					X						

Common Name	Presence	Status Federal	Status State	Game Bird	Neo-tropical	Coastal	Cliff Talus	Snags	Dead & Down	Riparian Wetland	Early Seral	Mid Seral	Late Seral	Mature	Old-Growth	Hardwood Forests
PURPLE FINCH *CARPODACUS PURPUREUS*	S											X			X	
HOUSE FINCH *CARPODACUS MEXICANUS*[7]	S															
PINE SISKIN *CARDUELIS PINUS*	S									X	X	X	X	X	X	X
LESSER GOLDFINCH *CARDUELIS PSALTRIA*	S									X						
AMERICAN GOLDFINCH *CARDUELIS TRISTIS*	S															X
RED CROSSBILL *LOXIA CURVIROSTRA*	S													X	X	
EVENING GROSBEAK *COCCOTHRAUSTES VESPERTINUS*	S										X	X	X	X		
HOUSE SPARROW *PASSER DOMESTICUS*[7]	S															

APPENDIX WL-2. SALVAGE WITHIN THE RIPARIAN RESERVES.

Introduction: This appendix was created to try to determine when it would be appropriate to conduct salvage in Riparian Reserves according to the Standards and guidelines in the ROD (USDA;USDI 1994, pg. C-32). Rather than recreate the "wooden wheel," refer to the downed log sections of the Tioga Creek Watershed Analysis (USDI 1996b) for a background on the subject.

Literature Review:

Table App_WL4_1. Studies on Coarse Woody Debris Levels..

Study	Young Stands	Mature	Old-Growth	Riparian Areas
Spies et al. (1988) Cascade & Coast Range	525-1979 ft^3/ac	300-3162 ft^3/ac	1382-5141 ft^3/ac	
Hemstrom and Logan (1986) Coast Range, OR			17-78 tons/ac	
Grier and Logan (1977) western Cascades, OR			85 tons/acre	259 tons/acre
Franklin et al. (1981) Cascade Range			38-85 tons/ac	
-MacMillian et al.[1] western Cascades, OR			82 tons/ac (midslope)	
- Forestry Science Lab[1] Cascades, N. OR & S. WA			53 tons/ac (38-70 tons/ac range)	
Ursitti (1990) Coast Range, OR				11,889 ft^3/ac

[1] From Franklin et al. (1981)

Siuslaw Plant Association and Management Guide (Hemstrom and Logan 1986, pg. 31): Total amounts ranged between 17-78 tons/acre.

Decay Class 1 & 2	10 tons/acre
Decay Class 3 & 4	15-25 tons/acre
Decay Class 5	Trace

Bartels et al. (1985): There was a loose correlation between stand age and weights of coarse woody material (CWM). Large accumulations of downed wood in young stands were carried over as snags that had fallen down from within the stand at an earlier date (pg. 178). Recommended retention of at least two uncharred class 1 or 2 logs/acre and the retention of all class 3, 4, and 5 logs. Logs should be 12-17 inches dbh at the large end and 20 feet or greater in length (pg. 183).

Tioga Creek Watershed Analysis (USDI 1996b): Surveys in the Fairview Subwatershed reported that 0.7% of the land contained 100% down log levels.

Spies et al. (1988) reported on downed wood levels in unmanaged forests. A large part of the volume was large diameter logs that decay slowly and often continue to function as wildlife habitat for 100 years or more. Ranges for the stands were: young 525-1979 ft^3/acre; mature 300-3162 ft^3/acre; and old-growth

1382-5141 ft^3/ac.

High et al. (Draft): Total accumulations in the western hemlock zone can reach 350-400 tons/acre of live, above-ground biomass, and 15,000 ft^3/acre of standing wood volume. Downed wood from old growth plots (site class 1) averaged 30' (+- 11) length, 17.4" (+-5.4) dbh, number of pieces was 109 (+- 40), and decay class was 2.9 (+-0.9).

ROD (USDA; USDI 1994): References on down wood within Riparian Reserves include: B-11 #8, C-32 paragraph 2, and C-37 RA-2.

ROD/RMP (USDI 1995a): References on down wood within Riparian Reserves include: pg. 13 and Appendix D - Best Management Practices.

Discussion: There is limited literature on the amounts of downed wood in unmanaged stands; the paper most cited is Spies et al. (1988), which gives levels for unmanaged young, mature, and old-growth stands. However, it does not break the stands into upslope, midslope, or riparian area. It is assumed that down wood levels would be higher in the downslope and riparian areas, and this is indicated by Grier and Logan (1977).

Due to the limited time for review, and limited research sources, I cannot recommend a quantifiable level of decay class 1 and 2s that could be salvaged in the Riparian Reserve. Following are some reasons on why salvage should not be conducted in the Riparian Reserve for this analysis area:

- The assumption is that Riparian Reserves would be managed to provide late-successional habitat; in most cases, salvaging of down wood does not meet objectives for managing for this habitat. Downed wood is a key component of late-successional habitat (Franklin et al.1981). Salvage activities would remove decay class 1 and 2s. Spies et al. (1988) reported that there were higher proportions of decay class 1 and 2s in the old-growth stands compared to other seral stages. Consideration also needs to be given to the fact that removing decay class 1 and 2s will affect the level of 3, 4, and 5s in the future. I cannot identify many situations where salvage would benefit the habitat except if it would reduce a legitimate fire hazard, provide for plantability, or reduce the risk of insect/disease infestation. In many instances, salvage was allowed to occur because of the risk of theft (USDI 1996a). In addressing the fear of theft, if the wood is removed, there is no chance for it to become habitat. If the wood is left and not stolen, you have one more log to provide habitat than would have been available if it had been removed because of a fear of theft.

- Review of past management activities indicates that the area has been actively salvaged and snags have been cut down (USDI 1995b). Snag cutting interrupted the process of the snags providing downed wood for the future in a variety of decay classes. Downed wood abundance in the Fairview subwatershed was low with only 0.7 percent of the lands containing 100 percent down wood levels (USDI 1995b). Moderate wood levels were present on 20.3 percent of the subwatershed. It can be assumed from this information that the Riparian Reserves do not contain downed wood levels comparable to unmanaged stands, and that there is a deficiency of all decay classes. At this point in time, if no salvage occurred, the existing downed wood would decay, and over time would provide the higher decay classes to the stand. Decay class 1 and 2s provide habitat for those species that utilize hard down logs and will provide habitat for those species that utilize decay class 3-5 if the wood is left in place to decay (Maser and Trappe 1984).

- It is assumed snag and downed wood levels are higher on BLM verses private timberlands; however, BLM manages only 6 percent of the watershed. This is a very small percentage of the analysis area in which to provide this key component for species throughout the 89,596-acre analysis area.

- Salvage is most profitable when the larger diameter logs are removed. However, these large logs can stay in the system for a very long time, and provide premium habitat for down wood-dependent species (i.e., clouded salamander). In general, these large logs originate in stands that are over 80 years of age. In considering our analysis area, BLM manages only 6 percent of the area and only 10 percent of this is older than 80 years of age. Another way of looking at this is that of the 89,587 acres in the analysis area, only 575 acres are comprised of BLM stands greater than 80 years of age (0.6 percent of the area). If you assume that 50 percent of the late-successional acreage is designated as Riparian Reserve, the area under consideration is 287.5 acres. This is a very small percentage of the land base; a large downed log in the Riparian Reserve would provide a long term legacy for short distance travelers such as the clouded salamander.

- When downed wood levels from unmanaged stands (Spies et al. 1988) are compared to standing volume on the District, it can be seen that a high percentage of the stand would have to be on the ground before the downed wood levels of Spies et al. (1988) would be exceeded. Standing volume for three regeneration harvests in the Umpqua Resource Area were: 5,407 ft^3/ac, 8,785 ft^3/ac, and 11,182 ft^3/ac (USDI 1997). It is doubtful that there would be a Riparian Reserve in the analysis area that would exceed even the minimum level of downed wood for old growth stands (1,382 ft^3/ac) reported by Spies et al. (1988).

- One of the reasons for designating Riparian Reserves was to benefit terrestrial wildlife species. Downed wood is an important habitat component for many wildlife species that are also associated with riparian areas. Key habitat features for the American marten (a J2 species) are downed wood, large patches of late-successional forest, and intact forest along riparian zones (Holthausen et al. 1994). Providing downed wood for clouded salamanders would be a conservation measure for this State Protected species. Loss of large decaying downed wood through harvest activities and the interruption of the downed wood legacy are reasons for its sensitive status (Marshall et al. 1996). These are just two examples of species benefitting from downed wood in the Riparian Reserves (for additional species refer to Holthausen et al. 1994, Marshall et al. 1996, Maser et al. 1981, Thomas et al. 1993, and FEMAT 1993).

- The Allowable Sale Quantity (ASQ) for the District did not appear to have included the volume of downed wood. This could provide the District with an opportunity to leave this volume on the ground to provide wildlife habitat without violating the assumptions in the District RMP for meeting ASQ objectives (USDI 1996b).

Recommendations: Best Management Practices (USDI 1995a, Appendix D) state that naturally occurring down logs will not be removed from Riparian Reserves except for the benefit of the stream or Riparian Reserve. When an entry must be made to benefit the Riparian Reserve (i.e., to reestablish conifers on a conifer site, or improve plantability following a catastrophic event) leave log and snag amounts that are within the levels reported by Spies et al. (1988) for old-growth stands.

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APPENDIX: BOT-I

The following list was compiled from the 1995 issue of "Rare, Threatened and Endangered Plants and Animals of Oregon", a compilation of species produced by the Oregon Natural Heritage Program. Consideration was given to known locations, range and habitat requirements when determining the probability of occurrence.

Special status plants which may occur in the Coquille Watershed

Species	Common name	Status	Probability
Adiantum jordanii	California. maidenhair fern	Review species	high
Ammannia robusta	ammannia	Review species	low
Arctostaphylos hispidula	Howell's manzanita	Assessment species	low
Astragalus umbraticus	woodland milk-vetch	Tracking species	low
Carex brevicaulis	short stemmed sedge	Review species	medium
Cyperis bipartitus	shining cyperus	Review species	low
Erythronium revolutum	coast fawn lily	Tracking species	medium
Hieracium bolanderi	Bolander's hawkweek	Assessment species	low
Iliamna latibracteata	California globe mallow	Assessment species	high
Mimulus douglasii	Douglas' monkeyflower	Tracking species	medium
Ophioglossum pusillum	adder's-tongue	Assessment species	medium
Pellaea andromedifolia	coffee fern	Assessment species	low
Phacelia verna	spring phacelia	Tracking species	low
Polystichum californicum	California swordfern	Assessment species	high
Romanzoffia thompsoni	Thompson's mistmaiden	Species of Concern	low
Scirpus subterminalis	water bulrush	Review species	medium
Sidalcea cusickii	Cusick's checkermallow	Tracking species	high
Trillium angustipetalum	Siskiyou trillium	Assessment species	low
Limbella fryei	moss	Species of concern	low

RIPARIAN RESERVES APPENDIX

Introduction:
This evaluation was prepared using the Riparian Reserve Module - *Riparian Reserve Evaluation Techniques and Synthesis, draft February 1997 - Supplement to Section II of Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis. Version 2.2.* (RIEC 1997). This is intended, together with the watershed analysis, to provide a subwatershed-scale view in support of a Level 1 Analysis[1] for adjusting Riparian Reserve along intermittent non-fish bearing streams. The Riparian Reserve Module describes the additional site-scale analysis needed during the project planning and NEPA compliance stage. The areas covered by this analysis are the Middle Main Coquille, North Coquille Mouth and Catching Creek Subwatersheds.

The need to meet the 15% rule in the Middle Main Coquille Watershed, and the lack of candidate stands that are over 80-years old in the North Coquille Mouth Subwatershed means there will be few instances where modifying Riparian Reserve widths would affect mature or old-growth stands in the assessment area during the next 20 years. The available decision space for modifying Riparian Reserves may affect:

- our ability to meet the 15% rule in the future.
- the number of acres available for regeneration harvest in conifer and mixed second growth stands between 60 and 80 years old on some sites.
- whether we do density management to met Riparian Reserve objectives or commercial thinning to met economic objectives, and whether that cut volume can be counted toward meeting the ASQ.
- whether habitat and aquatic objectives or economic objectives should drive hardwood conversion project design.

Assumptions: Data may be limited. Much of the physical and biological information and mapping will be approximate and will change as it is field verified during the site-scale analysis.

For planning purposes the site potential tree height is assumed to be 220 feet, which is the District average. Actual site potential tree height will vary from site to site.

Relationship of this Appendix to the Rest of the Watershed Analysis: This appendix is compilation of information and assumptions behind Riparian Reserve widths on intermittent streams. It also draws heavily on those sections in the watershed analysis concerned with Erosion Processes, Species and Habitats: Wildlife, and Species and Habitats: Botany sections and their associated appendices.

Consideration of Physical Characteristics in the Riparian Reserve Delineation
The following table lists the geological formations, and the combinations of rock types and the slope ranges where a half-site potential Riparian Reserve width (110 ft slope distance) on intermittent streams

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[1] The significant/ limitations of the level 1 analysis are as follows:
- A watershed analysis (or supplement) has been completed that addresses the module topics listed under data needs section of the Riparian Reserve module (section II C Data Needs).
- The total cumulative Riparian Reserve acreage proposed for management in the subject watershed does not exceed 10 percent of the total area of delineated interim. A need to exceed the 10 percent level will require the completion of a level 2 analysis. Data needs "including products from the specified modules" are listed in the *Riparian Reserve Evaluation Techniques and Synthesis* module.
- The Riparian Reserve width for any given intermittent stream reach is not reduced below one-half of a site-potential tree height (FSEIS, pages 4-68).
- Part A. 1 through 4, B. and D of Section III. Site-Scale Analysis and NEPA Compliance Stage is completed

Reducing the riparian reserve width below one site potential tree width, or altering the Riparian reserve by more than 10% requires a level II analysis. This includes completing section I and II and completing the modules listed under data needs of the Riparian Reserve module.

will meet or exceed the protection widths identified in FEMAT (1993) and incorporated into the FSEIS Appendix B (USDA; USDI 1994).

Formation	rock type	Where there is no mass movement, a half-site potential Riparian Reserve width (110 ft slope distance) on intermittent streams will meet or exceed the protection widths identified in FEMAT (1993, page V-38) where stream adjacent slopes are:			
		<30%	30%-50%	50%-70%	>70%
Quaternary Alluvium	unconsolidated	yes - exceed	yes ~ meet	no - recommend wider reserve	no - recommend wider reserve
Quaternary landslide debris	unconsolidated	yes - exceed	yes ~ meet	no - recommend wider reserve	no - recommend wider reserve
Quaternary terrace	unconsolidated	yes - exceed	yes ~ meet	no - recommend wider reserve	no - recommend wider reserve
Coaledo Upper Member	intermediate sediment	yes - exceed	yes - exceed	yes - exceed	no - recommend wider reserve
Coaledo Middle Member	intermediate sediment	yes - exceed	yes - exceed	yes - exceed	no - recommend wider reserve
Coaledo Lower Member	intermediate sediment	yes - exceed	yes - exceed	yes - exceed	no - recommend wider reserve
Flournoy	resistant sediment	yes - exceed	yes - exceed	yes - exceed	yes - exceed
Lookingglass	intermediate sediment	yes - exceed	yes - exceed	yes - exceed	no - recommend wider reserve
Roseburg Sedimentary Member	intermediate sediment	yes - exceed	yes - exceed	yes - exceed	no - recommend wider reserve
Roseburg Volcanic Member	other resistant	yes - exceed	yes - exceed	yes ~ meet	no - recommend wider reserve
Blue Schist bodies in Otter Point	other resistant	yes - exceed	yes - exceed	yes ~ meet	no - recommend wider reserve
Serpentine inclusions in Otter Point	serpentine	yes - exceed	yes - exceed	no - recommend wider reserve	no - recommend wider reserve
Otter Point	weak rock	yes - exceed	yes - exceed	no - recommend wider reserve	no - recommend wider reserve

note: when a Riparian Reserve wider than 110 ft is recommended, refer to either figure V-14 in FEMAT (1993, pg. V-38) or figure B6-1 in Appendix B for the FSEIS (USDA; USDI 1994, pg. B-89) for the recommended width.

Most all BLM lands with slopes >70% are classified as fragile in TPCC, and/or as having moderate or greater potential for failure on Map EROD-2: Landslide Potential Map. Where those >70% slopes are adjacent to intermittent streams, Riparian Reserve widths greater than a half-site potential tree may be necessary on many sites to obtain the Aquatic Conservation Strategy with respect to slope stability concerns. The potential for delivery of sediment to streams is inversely proportional to distance from the stream. Therefore, fragility by itself is not a risk factor with respect to obtaining Aquatic Conservation Strategy objectives. The distance to the stream and the presence of unobstructed avenues for delivery are significant factors that must also be considered. Thus site specific evaluations may turn up instances where Aquatic Conservation Strategy objectives are attainable with Riparian Reserve widths less than one site potential tree wide on ground classified as fragile.

Based on available information, and pending site by site field evaluation, we expect to obtain the Aquatic Conservation Strategy objectives without significantly expanding the Riparian Reserves in the matrix

portion of these subwatersheds.

Wildlife Species to be Considered in the Riparian Reserve Delineation
Table RR-Apdx-1 contains the list of Species of Concern that were considered according to the Riparian Reserve Evaluation Techniques and Synthesis Module (RIEC 1997). These species were then evaluated for source by dispersal types (RR-Apdx-2) and abundance by distribution (Table RR-Apdx-3). Shaded blocks in Table RR-Apdx-4 indicate species that were determined to represent the minimum subset for vulnerability assessment as these species were expected to be most sensitive to change in interim Riparian Reserve boundaries. Table RR-Apdx-5 contains a final list of species to be considered when evaluating Riparian Reserve widths.

None of the Survey and Manage Strategy 1 or 2 Mollusk species are known to occur in the Coos Bay District. There are no mollusks from the Riparian Module List 1 and 2 that may be present in the analysis area (RIEC 1997).

Analysis and Discussion for Table RR-Apdx-5 Wildlife Species Ecological Classification
Riparian**:** The white-footed vole is strongly associated with riparian alder/small stream habitat (Maser *et al.* 1981). More specific information is lacking on the species habitat requirements (Marshall *et al.* 1996). This species may be adversely affected by attempts to convert historic hardwood-dominated riparian areas to conifer. Retaining natural hardwood-dominated riparian areas as part of the Riparian Reserves will protect white-footed vole habitat and is consistent with the Aquatic Conservation Strategy. Natural hardwood stands (as opposed to hardwood stands that came in on conifer sites as the result of timber harvest) in proximity to streams are often either the result of high soil moisture, seasonally saturated soils, or slope instability, and therefore intimately tied to aquatic processes.

Nine forest bat species are dependent on riparian habitat (Table RR-Apdx-5). The bats forage by gleaning insects primarily within the riparian zone. The riparian areas also contain snags/green trees that provide roosting, maternity, and hibernacula sites required by forest bats. One of the primary differences in ratings between Option 1 and 9 was the decreased riparian reserve width around wetlands and intermittent streams under Option 9 (Holthausen *et al.* 1994, pg. 456). To maintain the likelihood of an outcome A above 80 percent for these bat species, we recommend that riparian reserves that represent a mature or old-growth seral stage (generally older than 120 years) should not be considered for decreased boundary widths if the area is potential habitat for forest bats.

Aquatic - lotic: The lower FEMAT rating under Option 9 verses Option 1 for both the southern torrent salamander and tailed frog reflected the likelihood of further loss of local populations through harvest of riparian habitat along headwater streams outside of Tier 1 Key Watersheds ((Holthausen *et al.* 1994, pg. 418). The recommended mitigation is to conduct stream surveys, and maintain a riparian reserve width of Option 1 within occupied segments ((Holthausen *et al.* 1994, pg. 418).

Seeps/springs: All units should be field checked to ensure that these habitats are discovered and protected for the southern torrent salamander and tailed frog. Seeps/springs are to be buffered sufficiently to maintain the characteristics of the site (USDI 1995).

Late-successional: Large downed logs within the riparian area are critical for the marten. The primary mitigation for the marten in Holthausen *et al.* (1994, pg. 473) is a combination of increased levels of coarse woody material in the Matrix and implementation of Riparian Reserve Option 1 throughout the species range. Mature or old-growth Riparian Reserve areas (generally older than 120 years) should not

be considered for decreased boundary widths if the areas contain potential habitat for the marten. Manipulation of immature stands in the Riparian Reserve to obtain large trees may help to provide structure and to reestablish sufficient late-successional habitat in the Middle Main Coquille 5th field watershed to meet the 15 percent rule. This does not appear to be in conflict with the Aquatic Conservation Strategy, however, it must be evaluated on a case by case basis through the NEPA process.

Mitigation measures for the red tree vole include the combination of survey and manage guidelines in the Matrix, and implementation of Riparian Reserve scenario 1 or additional landscape controls within the Matrix (Holthausen *et al.* 1994, pg. 475). Connectivity provided by Riparian Reserves is a key factor in the 80 percent likelihood of achieving a well-distributed population.

Table RR-Apdx-1. Riparian Reserve Delineation - Species of Consideration.

Species of Consideration	Reference[1]	**Source Habitat** Exclusive	**Source Habitat** Supplemental	**Dispersal** Restricted	**Dispersal** Broad	**Distribution** Localized	**Distribution** Wide	**Abundance** Rare	**Abundance** Common
Southern torrent salamander	List 1, J2	X		X		X		X	
Clouded salamander	List 2		X		X		X	X	
Del Norte salamander	List 2, S/M		X	X		X		X	
Dunn's salamander	List 2		X		X		X		X
Northwestern salamander	List 2	X			X		X		X
Pacific giant salamander	List 2	X			X		X		X
Rough-skinned newt	List 2	X			X		X		X
Tailed frog	List 1, 2, J2	X			X		X	X	
Common merganser	List 1, J2	X			X		X		X
Marbled murrelet	List 2		X		X		X	X	
Northern spotted owl	List 2		X		X		X	X	
Fringed myotis	List 1, S/M, J2		X		X		X	X	
Hoary bat	List 1, J2		X		X		X	X	
Long-eared myotis	List 1, S/M, J2		X		X		X		X
Long-legged myotis	List 1, S/M, J2		X		X		X		X
Silver-haired bat	List 1, S/M, J2		X		X		X		X
Big brown bat	List 2		X		X		X		X
California myotis	List 2		X		X		X		X
Little brown myotis	List 2	X			X		X		X
Yuma myotis	List 2	X		X			X		X
American marten	List 1, J2		X		X		X	X	
Fisher	List 1, J2		X		X		X	X	
Red tree vole	List 1, 2, J2		X	X		X		X	
Bald eagle	Potential species	X			X		X	X	
Golden eagle	Potential species		X		X		X	X	
Northern goshawk	Potential species		X		X		X	X	
Northern pygmy-owl	Potential species		X		X		X		X
Pileated woodpecker	Potential species		X		X		X		X
Pacific Western big-eared bat	Potential, PB, J2		X		X		X	X	
White-footed vole	Potential species	X			X	X		X	

 List 1 and 2 are from the Appendix B of the Riparian Reserve Module (1997). S/M = Survey and Manage species. PB = Protection Buffer species within the S/M list.

Table RR-Apdx-2. Use of Habitat by Wildlife in Riparian Reserves[1].

	Restricted Dispersal	Broad Dispersal
Exclusive Source	Southern torrent salamander Yuma myotis	Dunn's salamander Northwestern salamander Pacific giant salamander Rough-skinned newt Tailed frog Common merganser Bald eagle Little brown myotis White-footed vole
Supplemental Source	Del Norte salamander Red tree vole	Clouded salamander Marbled murrelet Northern spotted owl Golden eagle Northern goshawk Northern pygmy-owl Pileated woodpecker Fringed myotis Long-eared myotis Long-legged myotis Hoary bat Silver-haired bat Big brown bat California myotis Pacific Western big-eared bat American marten Fisher

[1] Corresponds to Table B3 (RIEC 1997).

Table RR-Apdx-3. Wildlife Species Sorted by Distribution and Abundance[1].

	Localized Distribution	Wide Distribution
Rare Abundance	Southern torrent salamander Del Norte salamander Red tree vole White-footed vole	Clouded salamander Tailed frog Marbled murrelet Northern spotted owl Bald eagle Golden eagle Northern goshawk Fringed myotis Hoary bat Pacific western big-eared bat American marten Fisher
Common Abundance		Dunn's salamander Northwestern salamander Pacific giant salamander Rough-skinned newt Common merganser Northern pygmy owl Pileated woodpecker Long-eared myotis Long-legged myotis Silver-haired bat Big brown bat California myotis Little brown myotis Yuma myotis

[1] Corresponds to Table B4 (RIEC 1997).

Table RR-Apdx-4. Ecological Classification of Species for Preliminary Vulnerability Assessment [1].

	Localized and Rare	Widely Distributed & Rare or Localized & Common	Widely Distributed & Common
Exclusive and Restricted	Southern torrent salamander		Yuma myotis
Exclusive and Broad	White-footed vole	Tailed frog Bald eagle	Dunn's salamander Northwestern salamander Pacific giant salamander Rough-skinned newt Common merganser Little brown myotis
Supplemental and Restricted	Del Norte salamander Red tree vole		
Supplemental and Broad		Clouded salamander Marbled murrelet Northern spotted owl Golden eagle Northern goshawk Hoary bat Fringed myotis Pacific Western big-eared bat American marten Fisher	Northern pygmy owl Pileated woodpecker Long-eared myotis Long-legged myotis Silver-haired bat Big brown bat California myotis

[1] Corresponds to Table B5 (RIEC 1997). Species within the shaded blocks were determined to represent the minimum subset for vulnerability assessment because it is expected that these species would be most sensitive to a change in interim Riparian Reserve boundaries or management (RIEC 1997).

Table RR-Apdx-5. Wildlife Species Ecological Classification[1]

Species	Late-Successional	Riparian	Aquatic Lotic	Aquatic Lentic	Seeps/ Springs	Rock Outcrops	Other
Southern torrent salamander		X	X		X		
Del Norte salamander	X	X				X	
Clouded salamander	X	X				X	
Tailed frog	X	X	X		X		
Marbled murrelet	X	X					
Northern spotted owl	X	X					
Bald eagle	X	X					
Big brown bat	X	X					
Silver-haired bat	X	X					
Hoary bat	X	X					
California myotis	X	X					
Long-eared myotis	X	X					
Little brown myotis	X	X					
Fringed myotis	X	X					
Long-legged myotis	X	X					
Yuma myotis	X	X					
Red tree vole	X	X					
White-footed vole		X					
American marten	X						

[1] Corresponds to Table B6 (RIEC 1997). Species in bold print were species that fell into the shaded regions of Table RR-4.

Table RR-Apdx-6. FEMAT Ratings for Projected Future Likelihoods of Habitat Outcomes Under Land Management Options by the Wildlife Species Listed in Table RR-Apdx-5 of this document.[1]

WILDLIFE SPECIES	FEMAT - OPTION 1 (Outcome A-B-C-D)	FEMAT - OPTION 9 (Outcome A-B-C-D)
Exclusive Source		
Southern torrent salamander	81-19-0-0	74-23-3-1
Tailed frog	93-8-0-0	78-20-3-0
Bald eagle	100-0-0-0	100-0-0-0
Yuma myotis	100-0-0-0	83-18-0-0
White-footed vole	N/A	N/A
Supplemental Source (Benefitted by Riparian Reserves)		
Del Norte salamander	93-8-0-0	90-10-0-0
Clouded salamander	93-6-1-0	81-18-1-0
Northern spotted owl	89-10-1-0	83-18-0-0
Marbled murrelet	90-10-0-0	80-20-0-0
Forest bats		
Hoary bat	98-3-0-0	53-48-0-0
Fringed myotis	97-3-0-0	47-47-5-2
Long-eared myotis	98-3-0-0	64-35-1-0
Long-legged myotis	100-0-0-0	55-45-0-0
Big brown bat	100-0-0-0	83-18-0-0
California myotis	100-0-0-0	85-15-0-0
Little brown myotis	100-0-0-0	84-16-0-0
Silver-haired bat	98-3-0-0	53-48-0-0
California myotis	100-0-0-0	85-18-0-0
Red tree vole	98-2-0-0	73-25-2-0
American marten	83-17-0-0	67-27-3-3

[1] See FEMAT (1993) for a detailed description of Options and explanation of the ratings for projected future likelihoods.

Plant Species to be Considered in the Riparian Reserve Delineation

Table B5: Ecological Classification for Preliminary Vulnerability Assessment
Botany - North Fork Coquille subwatershed - Mouth Coquille Watershed

	Localized & Rare	**Widely distributed & Rare or Localized and Common**	**Widely Distributed & Common**
Exclusive and Restricted	**Bryophytes** *Kurzia mackinoana* **Vascular plants** *Bensoniella oregana*	**Bryophytes** *Scoularia marginata** **Fungi** *Galerina sphagnicola*** **Lichens** riparian *Leptogium saturnium*	**Bryophytes** *Douinia ovata*
Exclusive and Broad		**Fungi** *Helvella compressa* *Ricknella setipes*	**Bryophytes** *Antitrichia curtipendula*
Supplemental and Restricted		**Fungi** *Clitocybe subditopoda* *Helvella maculata* *Phaeocollybia picea* *Phaeocollybia psuedofestiva* *Phaeocollybia scatesiae* *Phaeocollybia spadicea* **Lichens** riparian *Collema nigrescens* *Ramalina thrausta* decaying wood & soil *Cladonia umbricola* *Xylographa vitiligo* rock *Pilophorus acicularis* *Psorama hypnorum* **Vascular plant** *Iliamna latibracteata*	**Fungi** *Phaeocollybia californica* *Phaeocollybia fallax* *Phaeocollybia olivacea* *Galerina atkinsoniana* *Galerina cerina* *Galerina hetrocysis* *Galerina vittaeformis* **Lichens** riparian *Usnea longissima* decaying wood & soil *Cladonia bellidiflora*
Supplemental and Broad		**Fungi** *Helvella elastica* **Vascular plant** *Allotropa virgata*	**Fungi** *Helvella maculata* *Gomphus clavatus* *Gomphus floccosus* *Gomphus kauffmanii* Survey and Manage Strategy 3&4 species **Lichens** forage *Alectoria sarmentosa* *Bryoria capillaris* *Bryoria glabra* *Usnea filipendula*

Gray shaded areas will be analyzed further. The remainder are screened out at this time.
* *Scouleria marginata* does not occur in intermittent streams, which are under consideration for riparian reserve alteration.
* *Galerina sphagnicola* occurs in sphagnum bogs, which do not exist along the intermittent streams in analysis area.

Table B6: Species Ecological Classification
* Indicates taxon addressed by Survey and Manage provisions

Species	Late-Succes.	Riparian	Aquatic -lotic	Aquatic -lentic	Seeps, springs	Rock outcrops	Other
Bryophyte							
*Kurzia mackinoana		X					
Fungi							
Ricknella setipes		X					
*Helvella compressa		X					
Lichens							
Leptogium saturnium		X					
Vascular plant							
Bensoniella oregana					X		

Habitat information for species of concern (from table B6) in the watershed:

Kurzia mackinoana

There is very little documentation about the habitat of this species in this region, as it is extremely rare. It seems to prefer shady, moist organic substrates. According to the range map, it is expected to occur right along the coast. It is unlikely that the riparian reserves in the analysis area would have this species.

Bensoniella oregana

Habitat: In California, along the periphery of meadows adjacent to seeps and small streams in the true fir zone. In Oregon, similar habitats in the mixed conifer and mixed evergreen zones.
Substrate: Soils derived from ancient sedimentary rocks, with prolonged moisture with partial canopy cover. It is unlikely that the Riparian Reserves under consideration have habitat for this species.
The northernmost known population is near Signal Tree Lookout on Kenyon Mtn., above Camas Valley. This location is also the lowest in elevation of the populations.

Leptogium saturnium

Most frequent in moist riparian forests at low elevations. Generally found between 7,000 and 12,000 feet. Usually on bark, esp. deciduous trees and shrubs, occasionally on rock or moss over rock.

Helvella compressa

Gregarious on ground under redwood, oak, mature to old growth forests, in mixed stands and suburban backyards. Most of the analysis area may be considered habitat for this species.

Ricknella setipes

Habitat is mossy meadows and forest glades, considered widespread but not common, growing singly or in scattered groups. Season is summer and fall.

Recommendations

When considering altering Riparian Reserve widths or managing inside the Riparian Reserve, work within the assumptions and follow the procedures for Level 1 site evaluation outlined in Riparian Reserve Module (RIEC 1997). The total area that potentially could be involved in modifying riparian reserves is expected to be less than 10% of the Interim Riparian Reserve acreage. The Riparian Reserve Module (RIEC 1997) recommends additional analysis if we are to exceed that 10% level. Modifications to the interim Riparian Reserve widths on intermittent streams proposed at the project scale are to be based on field evaluation, be consistent with the Aquatic Conservation Strategy, meet the assumptions for viability of J-2 species, and meet or exceed the "ecological protection widths needs" shown on figure B6-1 page B-89 in Appendix B for the FSEIS (USDA; USDI 1994).

For planning purposes, potential locations for altering the interim Riparian Reserves widths based on slope stability considerations, can be identified using TPC classification (Map Erod-4), and Map Erod-2, Predicted Landside Potential. Of the two, the TPCC will be the more reliable predictor. However, neither map is accurate enough to substitute for field evaluation at the project scale. See also the following table for starting point recommendations.

Summary of Recommendations for Riparian Reserves on Intermittent Streams

Site conditions			Generalized recommendations to meet ACS and ROD-RMP objectives. ID teams may identify different recommendations following site evaluation on a project by project basis.
J2 sp. & sp. of local concern	TPC Classification	Landslide Potential Map	
present or absent	FGNW, FGR2	high	Attaining ACS objectives may require Riparian Reserve (RR) widths = or > 1 site potential tree. These widths will satisfy ROD assumptions for those J2 species that benefit from a 1-site potential wide RR.
absent	FGR1	moderate to high	Attaining ACS objectives may require RR widths = 1 site potential tree on some sites. On sites that are inclusions of non-fragile/ low hazard ground, ACS objectives may be obtained with a RR width between a ½ site potential tree and 1 site potential tree.
absent	not classified as fragile	moderate to low	Objectives on some sites may be obtained with a width between a ½ site potential tree and 1 site potential tree, depending on site specific conditions.
absent	not classified as fragile	low or none	Objectives may be obtained with a ½ site potential tree width.
present	any classification	any classification	Satisfying ROD assumptions for species benefitting from a RR width = to 1 site potential tree will attain or exceed ACS objectives on most sites.

Wildlife Recommendations based on Table RR-Apdx-6 FEMAT Ratings**:** Reducing interim Riparian Reserve widths on intermittent streams to a half-site potential tree could reduce the likelihood below 80% of having a well-distributed stable population over the next 100 years for 9 of the J2 species (southern torrent salamander, tailed frog, fringed myotis, long-eared myotis, long-legged myotis, silver-haired bat, hoary bat, red tree vole, and American marten) (Table RR-Apdx-6). Refer to FEMAT(1993) and Holthausen *et al.* (1994) for an explanation of the ratings and mitigation measures for the above species. No modification of Riparian Reserves can be made until field evaluations are completed. Those evaluations must include a site specific determination on the presence of those species and their habitat. If any of those species (or suitable habitat for those species that is likely to be used) are found present

inside the interim Riparian Reserve, then the Riparian Reserve width on intermittent streams in that area will remain at the 1-site potential tree width. Management activity inside that area of the Riparian Reserve should be either neutral or beneficial for those J2 species, and it should always be consistent with the Aquatic Conservation Strategy objectives.

Retain natural hardwood-dominated riparian areas as part of the Riparian Reserves to provide white-footed vole habitat.

Botany Recommendations based on Table B6 and habitat information: Where reducing interim Riparian Reserve widths is considered, survey for: *Leptogium saturnium, Helvella compressa, and Ricknella setipes*. Refer to FEMAT(1993) and Holthausen *et al.* (1994) for an explanation of the ratings and mitigation measures for the above species. If any of those species are found present inside the interim Riparian Reserve, then the Riparian Reserve width on intermittent streams in that area will remain at the 1-site potential tree width.

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