rapid juvenile growth, and their ability to fix nitrogen. Landslides that reach creeks can deliver structural material.

**Regulation Changes**: By the 1980's, state regulations required private companies to leave buffers and remove logging debris from streams. Simultaneously, BLM required an 80' buffer and logging debris removal on third order and larger streams. Regulations for all federal lands required 100' no-treatment buffers on all streams carrying water at the time units were sprayed with herbicides. This eliminated efforts to control vegetation that competes with conifers along streams. The net result was that riparian areas were unintentionally converted from conifer or mixed conifer/maple/oak to alder or brush.

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USDI - BLM, Tioga Resource Area. *Tioga Creek Subwatershed Analysis First Iteration*, 1995. Unpublished document on file at the Coos Bay Dist., North Bend, OR.


## CHAPTER 4: STREAM CHANNEL

**CHARACTERIZATION**

The subwatershed is composed of 4 frontal drainages that all flow directly into the Umpqua River. Two of the drainages flow from south to north while the other two flow from west to east. 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. (Some reaches may be different channel types, 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 majority of the subwatershed is steep, water-cut, deeply dissected, and forested. The lower ends of each of the drainages are low gradient, entrenched, meandering reaches that flow across the Umpqua River floodplain. The drainage pattern is dendritic and has a density of 4.93 miles/square mi. All of the drainages start as A type channels, evolve into B type, and finally into C type channels. See Map CHAN-1 for specific locations.

- 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 critical 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.

All of 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 any proposed 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 riprap) | Very Few Limitations | Channel Edge Boulders (Not Riprap) |
| 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 general channel types have not changed drastically from historic conditions. However, the substrate composition and the processes through which the 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.

**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. The following list describes some of the channel conditions observed in the subwatershed:

- 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 of the larger channels have scoured to bedrock or migrated laterally and have difficulty retaining substrate. The systems that are capable of retaining a substrate may have difficulty recruiting it due to the present road system. The stream-side and mid-slope roads function as terraces that trap material that would normally 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 subwatershed are: private domestic water supply, industrial water supply, irrigation, livestock watering, anadromous fish passage, salmonid fish rearing, salmonid fish spawning, resident fish, other aquatic life, wildlife and hunting, fishing, boating, water-contact recreation, and aesthetic quality (USDI 1995). The water quality parameters that are critical to the beneficial uses are, turbidity, dissolved oxygen, water temperature, nutrients, pesticides/toxics, bacteria/viruses, total dissolved gases, pH, sedimentation, low flow, and structure.

**CURRENT CONDITIONS**

The water quality parameters that have been identified as potential problems or can indicate past practices are low dissolved oxygen, bacteria/viruses, low flow in the Umpqua River, and nutrients and structure in Mehl Creek (DEQ 1988). This assessment was based primarily on observations because there is limited data available on water quality. The USGS does continuously collect water quality data on the Umpqua River and a study of water resources in western Douglas County was also conducted (Curtiss *et. al.* 1984). This report includes a summary of the water quality data collected between 1974 and 1980 from the Umpqua River. It also contains some ground water well information and other water quality data from similar systems outside the subwatershed. The only other water quality data specific to the subwatershed is obtained through habitat surveys conducted by Oregon Department of Fish and Wildlife (ODFW) and relates to instream structure. See the Fisheries section of this document for more specific information on the results of these habitat surveys.

**HISTORIC CONDITIONS**

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

**SYNTHESIS AND INTERPRETATION**

Because there is little water quality data available to compare past to current conditions, 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 and at a relatively low cost, and are likely to indicate the effects of both natural and man's activities specific to the subwatershed, are water temperature, sedimentation and habitat modification.

Water temperature is affected by many natural factors including climate, solar intensity, shade, channel orientation, elevation and ground water influence. These factors are generally static and unaffected by man's activities. However, management activities can have a direct effect on water temperature through removal of streamside vegetation which exposes the stream channel to solar radiation. Stream temperature increases of $10^0$ F or more have been recorded following removal of streamside vegetation by clear cutting and burning in both the Oregon Cascades and Coast Range (Brown and Krygier 1970; Levno and 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. The primary concern with water temperature increases is the potential for detrimental effects on fish and other aquatic organisms.

Stream cleaning, timber harvest and road building activities had, and continue to have, the potential to affect water temperature. Sedimentation, or more specifically the sediment cycle, is a parameter that is affected by many factors such as gravity, geology, topography, climate, soils, vegetation and land use activities. The sediment cycle is defined by the three closely related processes of erosion, transportation and deposition. Deposition is the process most directly related to impacts to water quality. Sediments 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 timber harvest, road building 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 of this document.

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## CHAPTER 6: SPECIES and HABITAT - AQUATIC

**CHARACTERIZATION**

The subwatershed contains important habitat for chinook and coho salmon, steelhead trout, and coastal cutthroat trout. Umpqua Basin coastal cutthroat trout below barriers to fish passage are listed as threatened. Coho salmon and steelhead trout have been proposed for listing and the National Marine Fisheries Service (NMFS) is expected to make decisions on the status of these species in April and July 1997, respectively. Salmonid species abundance is thought to be relatively low in the four primary streams (Sawyer, Heddin, Mehl and Fitzpatrick Creeks). Sculpin and dace are present but the extent of their distribution is unknown. Pacific lamprey, an Oregon state listed vulnerable species, is likely present. A well-established population of smallmouth bass, an introduced warm water species, inhabits the mainstem Umpqua River. Map FISH-I shows the known range of fish distribution for both anadromous and resident salmonid species. The endemic species are found in the following stream types:

- Chinook are limited to the Umpqua River and the lowest stream mile of Sawyer Creek
- Coho and Steelhead are found in the third to sixth order streams in Sawyer Creek, Hedden Creek, Fitzpatrick Creek, and Mehl Creek.
- Cutthroat trout are found in second to sixth order streams, but their presence has not been verified in many smaller streams (2nd and 3rd order).

The relative abundance of all fish populations is a data gap. Coho populations may be severely depressed as suggested by recent ODFW spawner survey results below:

| Stream | Spawning Season | Distance (miles) | Times Surveyed | Peak No. Redds | Peak No. Adults |
|---|---|---|---|---|---|
| Sawyer Creek | 1991-92 | 1.2 | 11 | 0 | 0 |
| Mehl Creek | 1992-93 | 1.0 | 11 | 0 | 1 |
| Fitzpatrick Creek | 1993-94 | 1.1 | 4 | ? | 5 |
| Mehl Creek | 1994-95 | 1.0 | 10 | 2 | 2 |

Most spawning and rearing habitats in this subwatershed are on the lower gradient reaches of the streams listed above. The amount of spawning in the Umpqua River is unknown.

**CURRENT CONDITIONS**

ODFW completed stream habitat inventories for Mehl, Heddin and Fitzpatrick Creeks in 1994[6]. Copies of the aquatic inventories are on file at the Coos Bay District Office. The stream habitat conditions documented in those surveys were altered to some degree by the intense storms, flooding, and landsliding that have occurred since late 1995. Therefore, the confidence level, for these data, is unknown. Table FISH-1 in the appendix summarizes some the inventory and compares the observed conditions with benchmark levels formulated by ODFW. The habitat elements that were most frequently ranked as poor on the 12 inventoried reaches are:

- The number of large woody debris (LWD) pieces on 3 reaches.
- The volume of LWD >10 feet in length and 6 inches in diameter on 8 reaches.
- The width/ depth ratio for riffles on 5 reaches.
- Percent sand, silt, and organics on riffles on 5 reaches.

Of the 12.1 stream miles surveyed, 75% rated poor in either the number of wood pieces, or wood volume. Often where the number of pieces is rated either fair or good, the volume of wood is rated as poor. Because ODFW does not differentiate between hardwood and conifer pieces in their inventories, many of the recorded pieces are probably hardwoods, which decay far more rapidly than conifer species. The deficiency of LWD is probably the primary cause of degraded conditions because large wood is necessary to reduce stream velocities, retain bedload, create meanders, maintain stream depth, protect stream banks from erosion, and provide cover for fish. The poor ratings for the width/depth ratios of riffles are also typical of streams that are deficient in instream structure.

The poor ranking for the high percent silt, sand and organics on riffles may be due to the fact that the sandstone/siltstone parent material breaks down in this subwatershed. Because there is no data on the pre-management sediment rates for this watershed, it is unknown if the natural range of sediment delivery has been exceeded.

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. The original matrix was published by the NMFS in early 1996, and modified at a regional level in mid-1996. Table FISH-3 in the appendix evaluates the recently inventoried streams 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 subwatershed. These impacts are common throughout much of the Oregon coast and the following lists some the general effects:

- Harvest of large conifers adjacent 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 near future.
- The removal of large wood through stream cleaning, salvage, and to facilitate road construction

[6] Sawyer Creek was inventoried in 1996, but that data was not available in time for this analysis.

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 limit woody debris and gravel recruitment to the streams from slides.
- Road construction along streams has resulted in the establishment of alders adjacent to the stream channels, thus reducing the future recruitment of large, durable conifer debris.

Agricultural practices in the lower reaches of the larger streams have also impacted the quality of aquatic habitats. Many stream reaches in agricultural lands in the subwatershed have narrow strips of trees along the stream banks (based on personal observations and aerial photo interpretation). However, the habitat quality has been degraded by stream-bank damage from livestock, down-cutting of stream channels, reduction of instream structure, and a decrease in future recruitment potential.

**REFERENCE CONDITIONS**

The 1995 Wild Fish Biennial Report (ODFW 1995) contains historical information on the salmonid populations in the Umpqua Basin. Although that information is not specific to this subwatershed, changes in population trends are probably similar. The following information is from that report:

- The 1920's harvest records suggest fall-run fish [chinook] were the most common, at least in that decade. Commercial catch in the lower Umpqua Basin, based on cannery records, was highly variable, ranging from 1,000 to 29,000 fish annually until 1942. Catch data show the fall-run fish populations reached very low numbers in the late 1940's and early 1950's, with extremely low numbers continuing into the 1960's (Nicholas and Hankin 1989).
- Chinook salmon no longer enter the Umpqua Basin year around, indicating a possible loss of some population segments as defined by run timing. Fall chinook probably use the lower Umpqua tributaries less now than they had historically.
- Coho salmon abundance in the Umpqua basin ranged from 100,000 to 250,000 fish between 1890 and 1930, then sharply declined. Abundance in the 1990's is about 15,000.
- From 1946 to 1956, searun cutthroat trout counts over Winchester Dam averaged about 950 adult fish per year and ranged from 400 to 1,800 fish. No searun cutthroat returned above the dam in 1992 and 1994. They are now considered near extinction with a run of 29 fish recorded in 1993.

There are no undisturbed sites near this subwatershed that are usable as reference sites. However, the Matrix of Factors and Indicators for the Southwest Province Tyee Sandstone Physiographic Area does provide a reference standard. The Matrix indicates a "properly functioning" stream in this region should contain a minimum of 50 pieces of LWD per mile, 24 inches in diameter, and 50 feet long. The number of LWD pieces per mile of stream found during the 1994 stream inventories was considerably lower, as depicted in the following table. The numbers are not entirely comparable because the Matrix standard is for pieces $\geq$50 feet long, but the ODFW data includes pieces down to 32 feet in length.

| Stream | Desired Number LWD (Pcs.>50' long/mile) | Actual Number LWD (Pcs.>32' long/mile) | % of Desired Number |
|---|---|---|---|
| Fitzpatrick Creek | 50 | 7.8 | 16% |
| Heddin Creek | 50 | 6.6 | 14% |
| Mehl Creek | 50 | 3.0 | 6% |

The majority of the large wood pieces are in the upper portions of the drainages where there has been less human encroachment. Table FISH-3: Matrix of Factors and Indicators for the Southwest

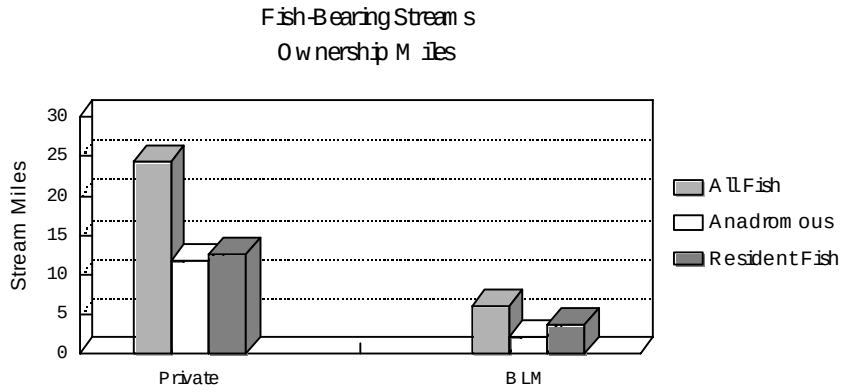
Province Tyee Sandstone Physiographic Area, in the appendix, provides additional information on how the 1994 inventory findings compare to regional standards.

Beaver ponds also provide important instream structure and rearing habitat for salmoides and other aquatic life. Although many of them wash out during high water periods, dams in smaller streams can persist for long periods, providing winter rearing habitat for juvenile salmoides as well resident fish species. These benefits play a much more important role under the current conditions because of the deficiency of LWD throughout the stream systems.

Beaver populations were probably considerably higher and more widely distributed in the subwatershed before settling by Europeans; especially in the lower, flatter reaches that flow through what is now agricultural land. The 1994 stream habitat inventories show there is still a significant beaver activity, but it is concentrated in the upper reaches. For instance, 16 beaver dams were counted in Heddin Creek, but none were in the lower 2.3 miles of the 3.2 miles surveyed. Of the 29 beaver dams observed in Mehl Creek, 23 were in the upper 3.6 miles, and only 6 in the lower 3.5 miles. Fitzpatrick Creek, which flows primarily through agricultural lands, has only 3 beaver dams. The present beaver distribution is probably strongly correlated with the smaller stream sizes, stream gradient, and valley widths further up in the systems. However, much of the habitat lower in these streams is similar, and increased human activity has likely impacted the distribution of beavers, and thus the quality of instream habitat.

**SYNTHESIS AND INTERPRETATION**

Historical impacts that have degraded aquatic habitats in the subwatershed are limited on BLM administered lands. As depicted in the following graph, relatively small portions of the fish-bearing streams are on public lands. Where timber harvest has occurred along the mainstem reaches of fish-bearing streams, riparian buffers containing large conifers were retained and are still intact.




Figures do not include the main-stem Umpqua River

Stream restoration projects on BLM lands alone would not result in substantial improvements to aquatic habitats due to the ownership pattern described above. However, if restoration efforts are carried out cooperatively with private landowners or watershed associations, significant improvements could be made. If BLM is able to spend money on private lands, the opportunities and types of restoration work would also increase.

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

the following reasons:

- Riparian Reserves are required by the ROD-RMP (USDI 1995) on Federal lands to protect aquatic resources.
- The ROD-RMP (USDI 1995) requires the use of Best Management Practices for Maintaining Water Quality and Soil Productivity, which are listed in Appendix D for that document.
- Many streamside and headwall sites are presently dominated by young conifer. As these stands mature, they will become sources of LWD.
- On private lands, the Oregon State Forest Practices Act requirements for riparian buffers will aid in the recovery of instream and riparian habitat conditions. At present, agricultural practices are not regulated to ensure the protection or recovery of aquatic habitats. However, several landowners in the subwatershed have begun riparian protection and restoration projects on their lands (Dennis Chamberlain, per. com; also, see Appendix: Interviews).
- The Coos Bay District has developed and is carrying out a program to replace culverts that are undersized or block fish passage, as required by the ROD-RMP (USDI 1995). On private lands, correcting passage problems will take place over a longer period. See Map EROD-6 in the appendix for the location of culverts on both public and private lands.

Culverts are the primary human-caused factor affecting the distribution of the salmonid species in the subwatershed. Improperly installed or undersized culverts have a range of effects on fish populations. Some are complete barriers to all upstream fish passage, while others limit fish passage relative to fish size, species, and stream levels. Most of the culverts limiting or preventing fish passage are on the smaller tributary streams. Many are gravel-rich with the potential to provide spawning habitat for salmoides, and could become important winter refuge areas for overwintering anadromous juveniles and resident species. These refuge areas are especially important because the larger stream channels lack significant amounts of instream cover, side channels, and alcoves or other features that provide important low-velocity, winter rearing habitat. The fish populations above man-made barriers likely have reduced genetic interchange because fish movement is limited to downstream migration. Immediate obstacles to replacing culverts that are:

- The BLM has not completed culvert surveys inside this subwatershed at the time of writing of this document. The time for the surveys was delayed because of the need to do emergency repairs stabilizing roads damaged by extreme weather conditions in late 1996.
- Private landowners are not required to replace culverts that are fish passage barriers until the existing culvert fails. Current state regulations require new culverts to be sized to pass a 50-year flood and allow fish passage. The BLM has no jurisdiction over these factors.

**REFERENCES**

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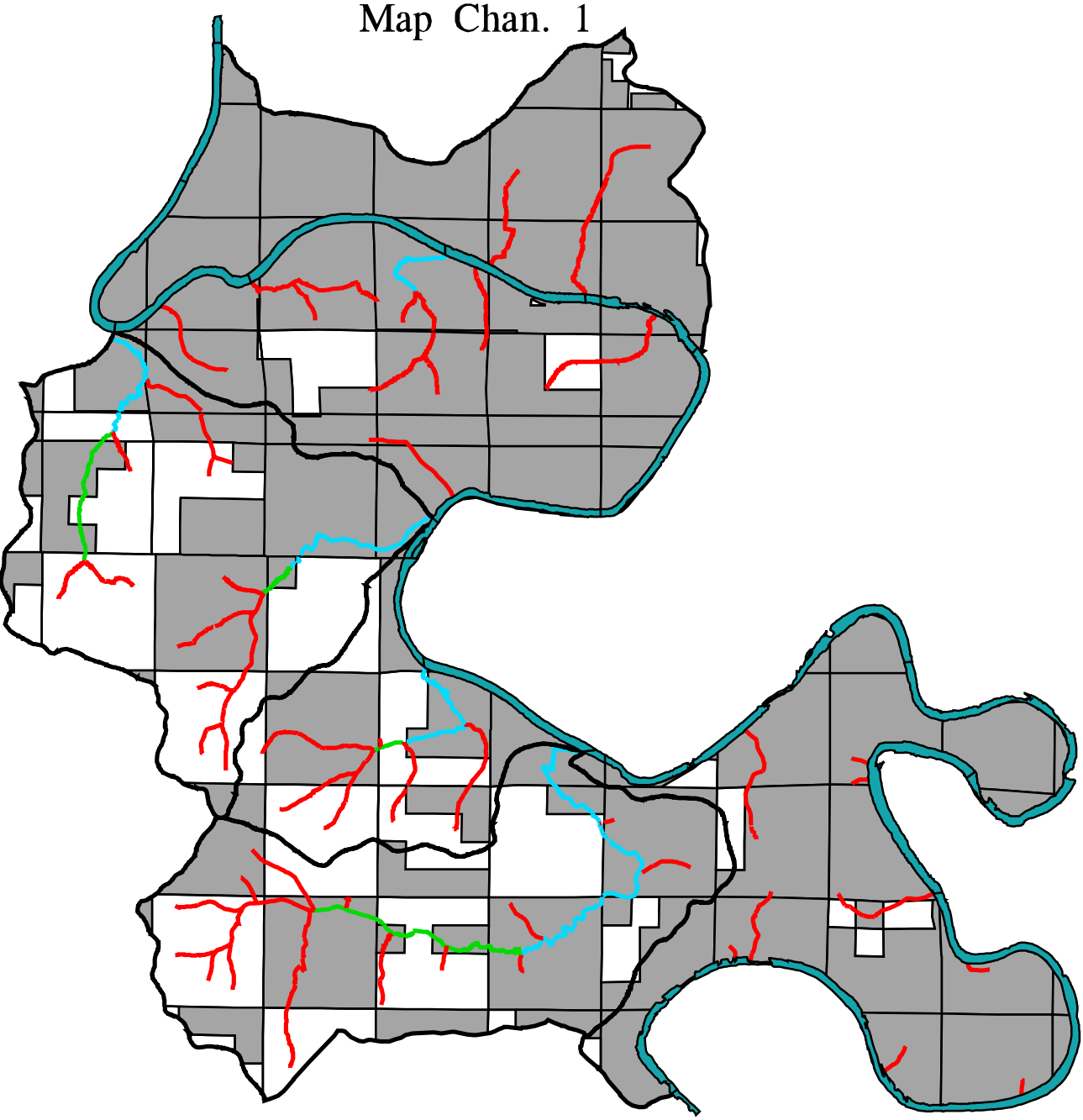
ODFW. 1995. Aquatic Inventory Projects for Mehl Creek, Fitzpatrick Creek, and Heddin Creek. Ore Dept of Fish and Wildlife, Portland, OR.
USDI. 1994. *Record of Decision Standards and Guidelines*, Apr 1994. Coos Bay Dist. BLM, North Bend, OR.
USDI. 1995. *Coos Bay District Record of Decision and Resource Management Plan, May 1995*. Coos Bay Dist.-BLM, North Bend, OR. 99 pp. plus appendices and maps.

# Rosgen Stream Types

Map Chan. 1



Umpqua River

Drainage Boundaries

Type A Channels

Type B Channels

Type C Channels

Land Status

BLM

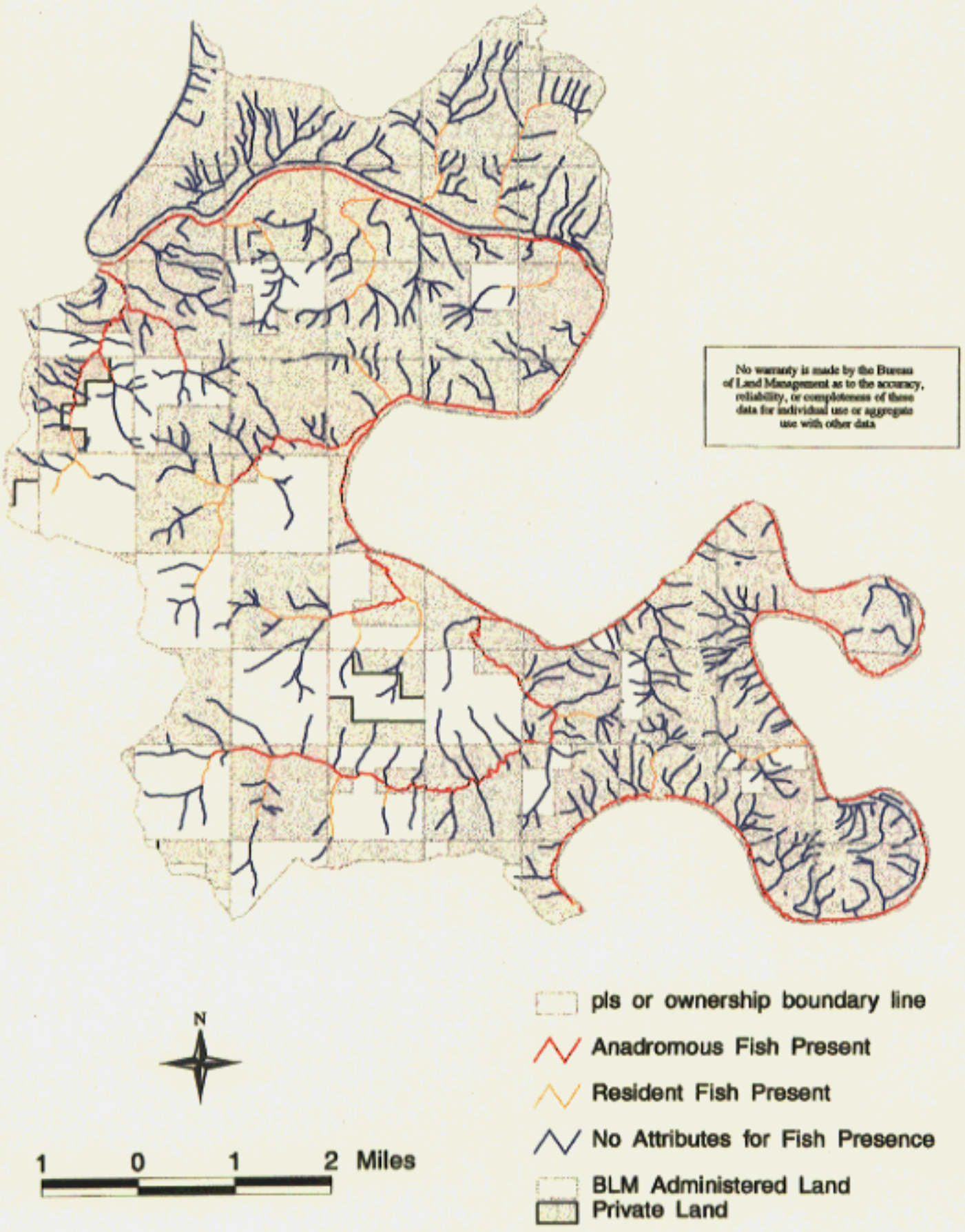
Other

N

1 0 1 2 Miles

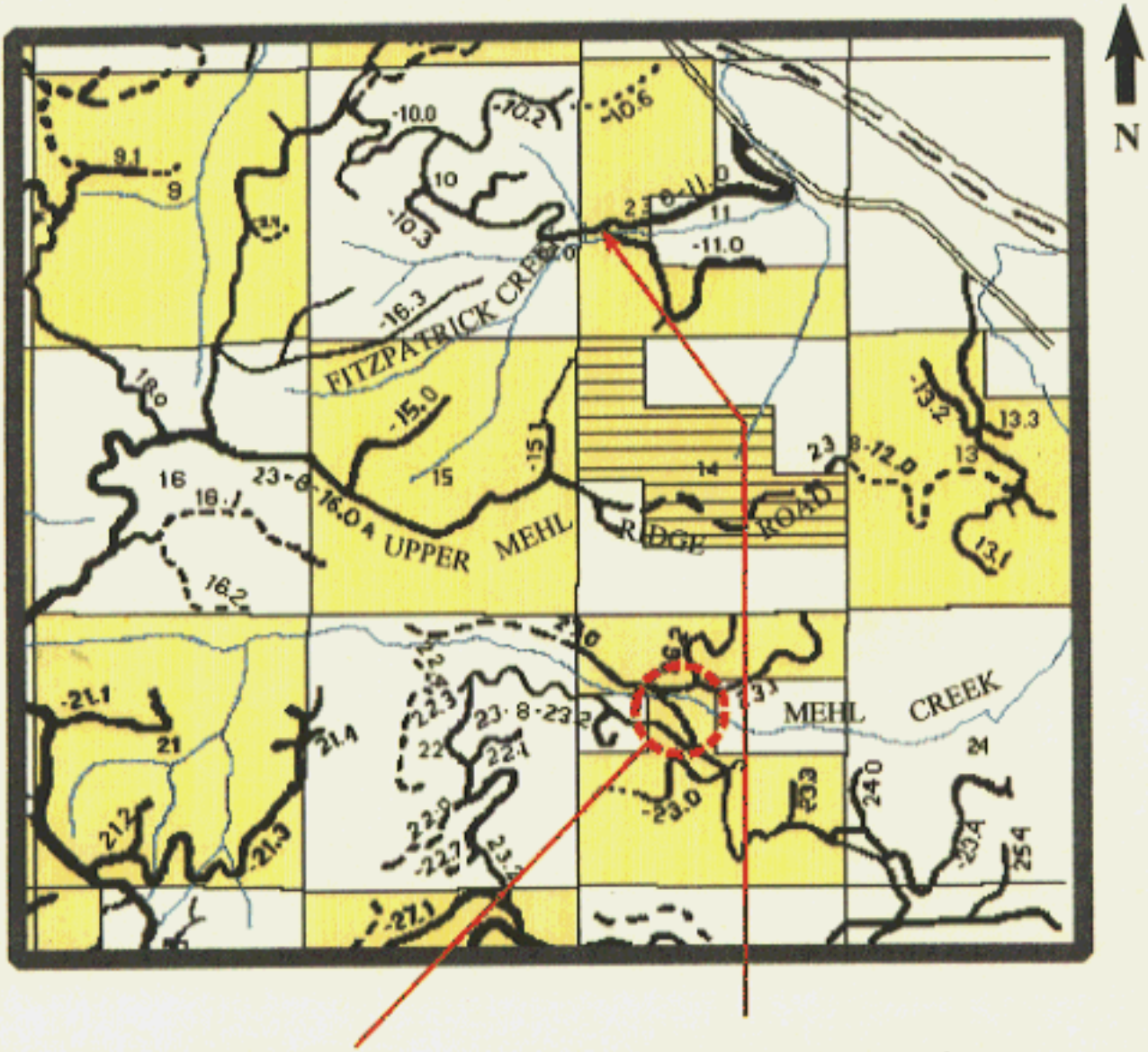
/nfs/or4003/usr3/workarea/mstorzer/rosgen/upmidump/ump_rosgen.apr

# MAP FISH-1: Known Range of Fish Distribution



# MEHL CREEK & FITZPATRICK CREEK

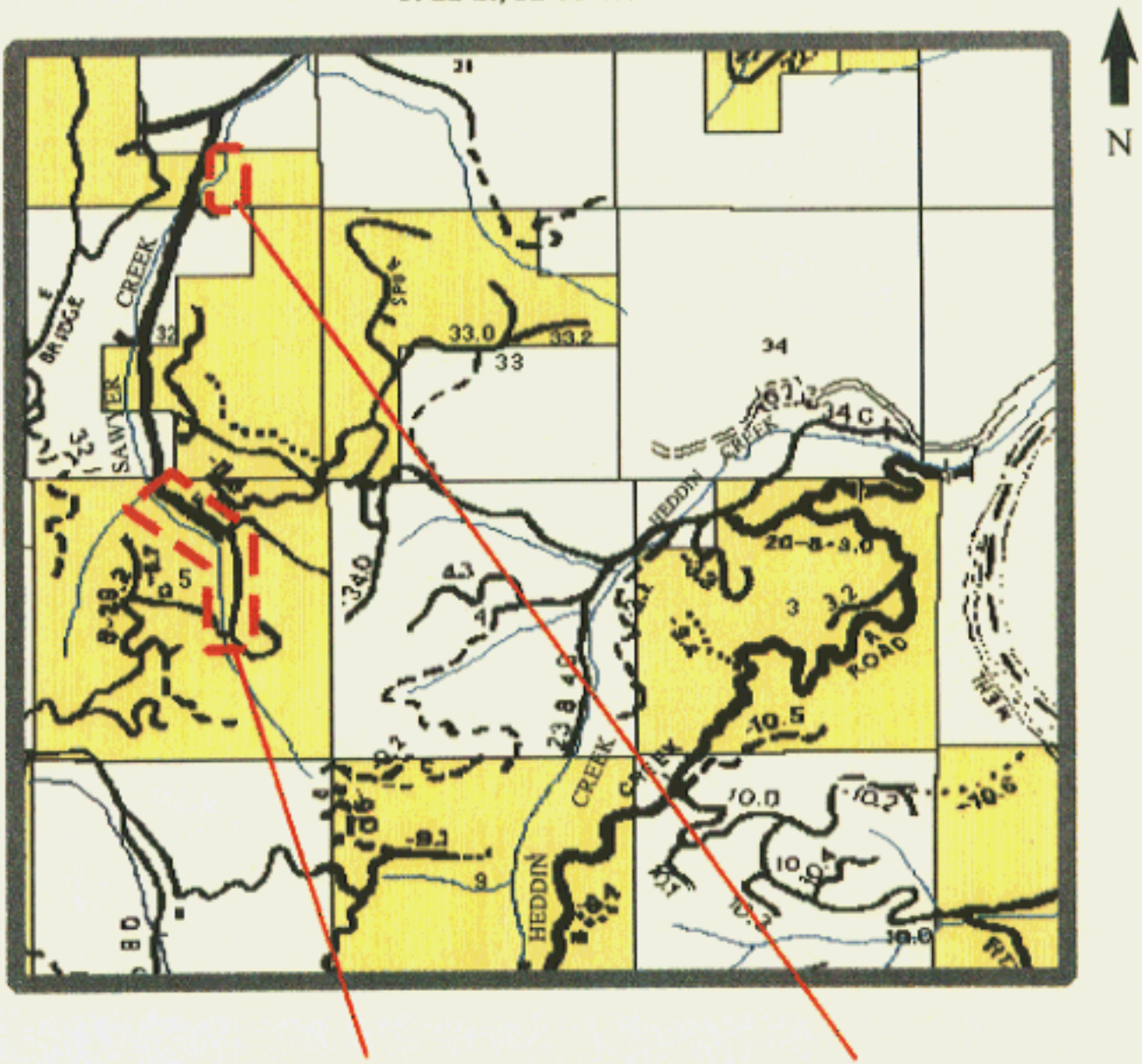
## T. 23 S., R. 08 W.




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 FISH - 2

**Sawyer and Hedden Creeks**
**T. 22 S., R. 08 W.**




BLM Lands:
Private Property:

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 FISH -3**

## RIPARIAN RESERVE SECTION APPENDICES

### TABLE OF CONTENTS

**INTRODUCTION**:
This evaluation was prepared using the Riparian Reserve Module - Riparian Reserve Evaluation Techniques and Synthesis, final draft, June 19, 1996 [1]. This is intended, together with the Upper Middle Umpqua watershed analysis, to provide a watershed-scale view in support of a Level 1 Analysis[2] 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.

**ASSUMPTIONS:**
At present, there is little reason to modify the Interim Riparian Reserves that overlay lands inside the Late-Successional Reserve (LSR) or Marbled Murrelet Reserve (MMR). These reserves are managed under different objectives but so far the objectives for the LSR and MMR have not been in conflict with meeting the Aquatic Conservation Strategy objectives. Therefore, we assume there will be little need to alter the Riparian Reserve inside the LSR and thus few if any such proposals are anticipated.

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.

The maps used in this analysis are EROD-4: Landslide Potential Based on Soil Mapping Units, EROD-3:TPCC, Veg-1: Current Land Use Allocations, USGS 7.5 min. quads and age classes. All but the USGS quad maps are included in the watershed analysis document.

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.

For purposes of this analysis only those sites 30-years and older that could supply timber to meet the objective of providing jobs and contribute to community stability (ROD-MFP page 22 (USDI 1995)) during the next 10 years were considered.

The landslide history work shows the TPCC and the landslide potential map based on soil mapping units to be reliable predictors of landslide hazard at the drainage and subwatershed scale. Therefore, they provide a basis for identifying candidate areas for site-level evaluation and possible Riparian Reserve width modification.

**RELATIONSHIP OF THIS APPENDIX TO THE REST OF THE WATERSHED ANALYSIS:**
This appendix is compilation of information directly related to the assumptions behind Riparian Reserve widths on intermittent streams. It also draws heavily on those sections in the watershed analysis

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[1] The analysis for the Upper Middle Umpqua Watershed Analysis was done using "final draft - June 19, 1996" version. The "draft February 1997" version came out just as the analysis was being brought to a close.

[2] 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.

concerned with Erosion Processes, Species and Habitats: Wildlife, and Species and Habitats: Botany sections and their associated appendices.

**Findings with respect to obtaining Aquatic Conservation Strategy objectives**:
The Bateman formation and Tyee formation, excluding the Elkton member, are composed of resistant sediment rock type. The Elkton member is composed of intermediate sediment rock type. Considering these rock types, 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 70% or less, and slope stability is not a concern.

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-4: 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 to obtain the Aquatic Conservation Strategy with respect to slope stabilities 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. 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 1 site potential tree wide on ground classified as fragile.

**Table RR-Apdx-1: Summary of Recommendations for Riparian Reserves on Intermittent Streams**

| Site conditions | | | Actions to meet ACS and ROD-RMP objectives |
|---|---|---|---|
| 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 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. |

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 this subwatershed.

Based on a subwatershed scale analysis, two sites were found where we would likely obtain the Aquatic Conservation Strategy objectives with a ½ site potential tree Riparian Reserve widths on intermittent streams. These sites are in the SE¼ of the SE¼ section 31, T.22S., R.8W., and S½ of the NE¼ section 33, T.22S., R.8W., Will. Mer. The site in section 31 was identified using Map Veg-1: Current Land Use Allocations. The site in section 33 was identified based on USGS quad map information. Both sites

have to be verified at the project level. The stream in section 31 is only suspected to be intermittent. For the site in section 33, a site evaluation will be necessary to find the upper limit of the intermittent streams and whether a projected 1 site potential tree reserve width would even reach BLM administered land.

Site level evaluation on a project by project basis may identify additional sites where the Aquatic Conservation Strategy may be met following Riparian Reserve width changes along intermittent streams (by either expansion or reduction). The total area that potentially could be involved in modifying riparian reserves is expected to be less than 10 percent of the Interim Riparian Reserve acreage.

**WILDLIFE SPECIES FOR CONSIDERATION IN THE RIPARIAN RESERVE DELINEATION:**

Table RR-Apdx-2 contains the list of Species of Concern that were initially considered during the Riparian Delineation Module (Appendix B of *Riparian Reserve Evaluation Techniques and Synthesis, 6/96*). Table RR-Apdx-3 contains a final list of species to be considered when evaluating Riparian Reserve widths.

**FEMAT Ratings for Wildlife:**

For this process, the FEMAT (1993) ratings for Option 1 and Option 9 were compared for the species listed in Table RR-Apdx-3 Wildlife Species Ecological Classification (Table RR-Apdx-4). Though there were other differences between the Options, this review focused on riparian widths. Riparian Reserve buffer widths were expressed as multiples of the height of a site-potential tree, measured on each side of: fish bearing streams; non-fish bearing streams; and intermittent streams, respectively. In the draft version, Option 1 riparian widths were 2:1:1, while Option 9 widths were 2:1:1 in Aquatic Conservation Emphasis Key Watersheds, and 2:1:1/2 for other watersheds.

The FEMAT ratings for Projected Future Likelihoods of Habitat Outcomes Under Land Management Options evaluated 4 outcomes (FEMAT 1993, pg IV-43). Our target is to manage for the Option that was judged to have an 80 percent or greater likelihood that the habitat on federal land would be sufficient to support well-distributed stable populations over the next 100 years (Outcome A) (FEMAT 1993 pg II-28).

Based on a subwatershed scale evaluation, reducing Riparian Reserve widths on intermittent streams to a half-site potential tree could reduce the likelihood below 80 percent of having a well distributed stable population over the next 100 years for 7 of the J2 species (southern torrent salamander, tailed frog, fringed myotis, long-eared myotis, long-legged myotis, hoary bat, and American marten). Refer to FEMAT (1993) and Appendix J2 (1994) for an explanation of the ratings and mitigation measures for the above species. No modification of the Riparian Reserve can be made until field evaluations are completed. Those evaluations must include a site specific determination on presence of those 7 species and their habitat. If any of those 7 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 1-site potential tree. 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.

Table RR-Apdx-2. Riparian Reserve Delineation - Species of Consideration.

| Species of Consideration | **Reference for Consideration**[3] | **Source Habitat**[4] Exclusive | **Source Habitat** Supplemental | **Dispersal**[5] Restricted | **Dispersal** Broad | **Distribution**[6] Localized | **Distribution** Wide | **Abundance** Rare | **Abundance** Common | Reason for Exclusion from Further Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| Southern torrent salamander | List 1, J2 | X | | X | | X | | X | | |
| Clouded salamander | List 2 | - | - | X | | | X | X | | Non-riparian assoc. |
| Tailed frog | List 1, 2, J2 | X | | X | | | X | X | | |
| Common merganser | List 1, J2 | X | | | X | | X | | X | Wide & Common |
| Marbled murrelet | List 2 | | X | | X | | X | X | | |
| Northern spotted owl | List 2 | - | - | | X | | X | X | | |
| Fringed myotis | List 1, S/M, J2 | Feeding | | | X | | X | X | | |
| Hoary bat | List 1, J2 | Feeding, Resting | | | X | | X | X | | |
| Long-eared myotis | List 1, S/M, J2 | Feeding | | | X | | X | X | | |
| Long-legged myotis | List 1, S/M, J2 | X | | | X | | X | X | | |
| Pallid bat | List 1, PB, J2 | - | - | | X | | X | X | | Non-riparian assoc. |
| Silver-haired bat | List 1, S/M, J2 | - | X[7] | | X | | X | ? | | |
| Big brown bat | List 2 | X (B, F, R) | | | X | | X | | X | Wide & Common |

[3] List 1 and 2 are from the Appendix B of the Riparian Reserve Module (1996). S/M = Survey and Manage species. PB = Protection Buffer species within the S/M list.

[4] Source Habitat designation from Thomas et al. (1993) and Brown et al. (1985). X = Exclusive source habitat, B = Breeding habitat, F = Feeding habitat R = Resting habitat.

[5] Dispersal Habitat from Thomas et al. (1993), and field Guides..

[6] Distribution and Abundance rating for some species were from Thomas et al. (1983) and J2 (1994).

[7] Large water bodies (i.e., rivers, large streams)

| Species of Consideration (cont.) | Reference for Consideration | **Source Habitat** Exclusive | **Source Habitat** Supplemental | **Dispersal** Restricted | **Dispersal** Broad | **Distribution** Localized | **Distribution** Wide | **Abundance** Rare | **Abundance** Common | Reason for Exclusion from Further Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| California myotis | List 2 | Feeding | | | X | | X | | X | Wide & Common |
| Little brown myotis | List 2 | Feeding | | | X | | X | | X | Wide & Common |
| Yuma myotis | List 2 | Feeding | | | X | | X | | X | Wide & Common |
| American Marten | List 1, J2 | - | X | | X | | X | X | | |
| Fisher | List 1, J2 | - | - | | X | | X | X | | Non-riparian assoc. |
| Red tree vole | List 1, 2, J2 | - | - | X | | X | | X | | Non-riparian assoc. |
| Osprey | Potential species | - | X [5] | | X | | X | | X | Wide & Common |
| Bald Eagle | Potential species | X | | | X | | X | X | | |
| Golden Eagle | Potential species | - | - | | X | | X | X | | Non-riparian assoc. |
| Northern goshawk | Potential species | - | - | | X | | X | X | | Non-riparian assoc. |
| Northern pygmy-owl | Potential species | - | - | | X | | X | | X | Non-riparian assoc. |
| Pileated woodpecker | Potential species | - | - | | X | | X | | X | Non-riparian assoc. |
| Purple martin | Potential species | - | - [5] | | X | | X | X | | Non-riparian assoc. |
| Western bluebird | Potential species | - | - | | X | | X | X | | Non-riparian assoc. |
| Pacific Western big-eared bat | Potential, PB, J2 | - | - | | X | | X | X | | Non-riparian assoc. |
| White-footed vole | Potential species | X | | | X | X | | X | | |

Selection process for species that are Localized and Rare.

Selection for species that are Exclusive and are also either Rare OR Localized.

Flagged species.

[8] X = Water/forest edge for breeding, feeding, and resting. Riparian areas for feeding.

Table RR-Apdx -3. Wildlife Species Ecological Classification.[1]

| | Exclusive & Rare | Exclusive & Broad | Supplemental & Rare | Supplemental & Broad |
|---|---|---|---|---|
| Late-successional | Bald Eagle<br>Forest bats | | Northern spotted owl<br>Marbled murrelet<br>American marten | |
| Riparian | Forest bats (4 species)[2]<br>White-footed vole | | | |
| Aquatic - lotic | Southern torrent salamander<br>Tailed frog | | | |
| Aquatic - lentic | | | | |
| Special - springs and seeps | Southern torrent salamander | | | |
| Special - rock outcrops | | | | |
| Special - other | | | | |

[1] This table follows the format for Table B6 in the Riparian Reserve Module, pg 38 (6/96).

[2] Exclusive and Rare Forest Bats include: fringed myotis, long-eared myotis, long-legged myotis, and hoary bat.

- Shaded blocks indicate species addressed by the ACS objectives and that have strict aquatic/riparian dependencies (pg 38 of the Riparian Reserve Module 1996).
- Unshaded blocks are species that are benefitted by Riparian Reserves, but are not aquatic/riparian dependent.

Table RR-Apdx-4. FEMAT Ratings for Projected Future Likelihoods of Habitat Outcomes Under Land Management Options by the Wildlife Species Listed in Table RR-Apdx-3 of this document.[1]

| **WILDLIFE SPECIES** | **FEMAT - OPTION 1 (Outcome A-B-C-D)** | **FEMAT - OPTION 9 (Outcome A-B-C-D)** |
|---|---|---|
| **Strict Aquatic/Riparian Dependencies** | | |
| Southern torrent salamander | 81-19-0-0 | 74-23-3-1 |
| Tailed frog | 93-8-0-0 | 78-20-3-0 |
| White-footed vole | N/A | N/A |
| 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 |
| Hoary bat | 98-3-0-0 | 53-48-0-0 |
| **Benefitted by Riparian Reserves** | | |
| Bald Eagle | 100-0-0-0 | 100-0-0-0 |
| Northern spotted owl | 89-10-1-0 | 83-18-0-0 |
| Marbled murrelet | 90-10-0-0 | 80-20-0-0 |
| American Marten | 83-17-0-0 | 67-27-3-3 |
| Forest bats | | |
| 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 |
| Yuma myotis | 100-0-0-0 | 83-18-0-0 |

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

**BOTANICAL SPECIES TO CONSIDER IN THE RIPARIAN RESERVE DELINEATION:**

Table RR-Apdx-5 contains the list of Species of Concern that were initially considered during the Riparian Delineation Module (Appendix B of *Riparian Reserve Evaluation Techniques and Synthesis, 6/96*). Table RR-Apdx-6 contains a final list of species to be considered when evaluating Riparian Reserve widths.

Table RR-Apdx-5: Riparian Reserve Delineation - Plant Species of Consideration

| | | Source | Habitat | Dispersal | Habit | Distribution | (Range) |
|---|---|---|---|---|---|---|---|
| Species of Consideration | Reference for Consideration | Exclusive | Supplemental | Restricted | Broad | Localized | Wide |
| *Phlogiotis helvelloides* | List 1, J2 | X | | X | | | X |
| *Antitrichia curtipendula* | List 1, J2 | X | | X | | | X |
| *Douinia ovata* | List 1, J2 | X | | X | | | X |
| *Kurzia mackinoana* | List 1, J2 | X | | X | | | X |
| *Scouleria marginata* | List 1, J2 | X | | X | | | X |
| *Cetrelia cetrariodes* | List 1, J2 | | X | X | | | X |
| *Collema nigrescens* | List 1, J2 | | X | X | | | X |
| *Clitocybe subditopoda* | List 1, J2 | | X | X | | | X |
| *Clitocybe senilis* | List 1, J2 | | X | X | | | X |
| *Helvella compressa* | List 1, J2 | | X | X | | | X |
| *Helvella crassitunicata* | List 1, J2 | | | X | | | X |
| *Helvella elastica* | List 1, J2 | | X | X | | | X |
| *Helvella maculata* | List 1, J2 | | X | X | | | X |
| *Moss dwelling mushrooms* | List 1, J2 | | X | X | | | X |
| *Platismatia lacunosa* | List 1, J2 | | X | X | | | X |
| *Usnea longissima* | List 1, J2 | | X | X | | | X |
| *Gomphus clavatus* | List 2, J2 | | X | X | | | |
| *Cimicifuga elata* | List 2, J2, BS | | X | X | | X | |
| *Gomphus bonarii* | List 2, J2 | | X | X | | | X |
| *Gomphus floccosus* | List 2, J2 | | X | X | | | X |
| *Gomphus kauffmanii* | List 2, J2 | | X | X | | | X |
| *Phaeocollybia* - 13 spp | List 2, J2 | | X | X | | | X |
| decaying wood - 8 spp | List 2 | | X | X | | | X |
| Forage lichens - 10 spp | List 2 | | X | X | | | X |
| *Allotropa virgata* | List 2, J2, SpoC | | X | X | | | X |
| *Lystichum americanum* | FEMAT | X | | X | | | X |
| *Mitella caulescens* | FEMAT | X | | X | | | X |
| *Mitella ovalis* | FEMAT | X | | X | | | X |

| Species of Consideration | Reference for Consideration | Source | Habitat | Dispersal | Habit | Distribution | (Range) |
|---|---|---|---|---|---|---|---|
| | | Exclusive | Supplemental | Restricted | Broad | Localized | Wide |
| *Asarum caudatum* | FEMAT | X | | X | | | X |
| *Bryoria tortuosa* | J2 | | X | X | | | X |
| *Pin lichens (11 spp.)* | J2 | | X | X | | | X |
| *Dendriscocaulon intricatulum* | J2 | | X | X | | | X |
| *Lobaria hallii* | J2 | | X | X | | | X |
| *Lobaria oregana* | J2 | | X | X | | | X |
| *Lobaria pulmonaria* | J2 | | X | X | | | X |
| *Lobaria scrobiculata* | J2 | | X | X | | | X |
| *Nephroma bellum* | J2 | | X | X | | | X |
| *Nephroma helveticum* | J2 | | X | X | | | X |
| *Nephroma laevigatum* | J2 | | X | X | | | X |
| *Nephroma parile* | J2 | | X | X | | | X |
| *Nephroma resupinatum* | J2 | | X | X | | | X |
| *Pannaria leucostictoides* | J2 | | X | X | | | X |
| *Pannaria mediterranea* | J2 | | X | X | | | X |
| *Pannaria saubinetii* | J2 | | X | X | | | X |
| *Peltigera collina* | J2 | | X | X | | | X |
| *Peltigera neckeri* | J2 | | X | X | | | X |
| *Peltigera pacifica* | J2 | | X | X | | | X |
| *Psuedocyphellaria anomala* | J2 | | X | X | | | X |
| *Pseudocyphellaria anthraspis* | J2 | | X | X | | | X |
| *Pseudocypellaria crocata* | J2 | | X | X | | | X |
| *Sticta beauvoisii* | J2 | | X | X | | | X |
| *Sticta fuliginosa* | J2 | | X | X | | | X |
| *Sticta limbata* | J2 | | X | X | | | X |
| *Gastroboletus turbinatus* | J2 | | X | X | | | X |
| *Boletus piperatus* | J2 | | X | X | | | X |
| *Macowanites chlorinosmus* | J2 | | X | X | | | X |
| *Endogone oregonensis* | J2 | | X | X | | X | |
| *Leucogaster citinus* | J2 | | X | X | | | X |
| *Rhizopogon exiguus* | J2 | | X | X | | X | |
| *Balsamia nigrens* | J2 | | X | X | | X | |

| Species of Consideration | Reference for Consideration | Source | Habitat | Dispersal | Habit | Distribution | (Range) |
|---|---|---|---|---|---|---|---|
| | | Exclusive | Supplemental | Restricted | Broad | Localized | Wide |
| *Cantharellus formosus* | J2 | | X | X | | | X |
| Uncommon coral fungi 13spp. | J2 | | X | X | | | X |
| rare coral fungi 15 spp. | J2 | | X | X | | | X |
| Uncommon gilled mushrooms 7 spp | J2 | | X | X | | | X |
| Tooth fungi 5 spp. | J2 | | X | X | | | X |
| Uncommon cup fungi 11 spp. | J2 | | X | X | | | X |
| *Clavulina 3* spp. | J2 | | X | X | | | X |
| *Sparassis crispa* | J2 | | X | X | | | X |
| Parasitic fungi 6 spp. | J2 | | X | X | | | X |
| Club coral fungi 7 spp. | J2 | | X | X | | | X |
| *Phytoconis ericetorum* | J2 | | X | X | | | X |
| *Clavicorona avellanea* | J2 | | X | X | | | X |
| *Aster Vialis* | J2, SpoC | | X | X | | X | |
| *Achlys triphylla* | FEMAT | | X | X | | | X |
| *Adiantum pedatum* | FEMAT | | X | X | | | X |
| *Anemone deltoidia* | FEMAT | | X | X | | | X |
| Arceuthobeum tsugensea | J2 | | X | X | | | X |
| *Boschnsakia strobilacea* | FEMAT | | X | X | | | X |
| *Calypso bulbosa* | FEMAT | | X | X | | | X |
| *Chimaphila menziesii* | FEMAT | | X | X | | | X |
| *Chimaphila umbellata* | FEMAT | | X | X | | | X |
| *Coptis laciniata* | FEMAT | | X | X | | | X |
| *Corallorhiza maculata* | FEMAT | | X | X | | | X |
| *Corallorhiza mertensiana* | FEMAT | | X | X | | | X |
| *Corallorhiza striata* | FEMAT | | X | X | | | X |
| *Disporum hookeri* | FEMAT | | X | X | | | X |
| *Disporum smithii* | FEMAT | | X | X | | | X |
| *Dryopteris austriaca* | FEMAT | | X | X | | | X |
| *Eburophyton austiniae* | FEMAT | | X | X | | | X |
| *Goodyera oblongifolia* | FEMAT | | X | X | | | X |
| *Habernaria unalascensis* | FEMAT | | X | X | | | X |
| *Hemitomes congestum* | FEMAT | | X | X | | | X |
| *Heirochloe occidentalis* | FEMAT | | X | X | | | X |

| Species of Consideration | Reference for Consideration | Source Habitat | | Dispersal Habit | | Distribution (Range) | |
|---|---|---|---|---|---|---|---|
| | | Exclusive | Supplemental | Restricted | Broad | Localized | Wide |
| *Hemitomes congestum* | FEMAT | | X | X | | | X |
| *Lathyrus polyphyllus* | FEMAT | | X | X | | | X |
| *Listera cordata* | FEMAT | | X | X | | | X |
| *Monotropa uniflora* | FEMAT | | X | X | | | X |
| *Oxalis oregana* | FEMAT | | X | X | | | X |
| *Pityopis californica* | FEMAT | | X | X | | | X |
| *Pyrola picta* | FEMAT | | X | X | | | X |
| *Scoliopis hallii* | FEMAT | | X | X | | | X |
| *Selaginella oregana* | FEMAT | | X | X | | | X |
| *Smilacina racemosa* | FEMAT | | X | X | | | X |
| *Smilacina stellata* | FEMAT | | X | X | | | X |
| *Streptopus amplexifolius* | FEMAT | | X | X | | | X |
| *Taxus brevifolia* | FEMAT | | X | | X | | X |
| *Thuja plicata* | FEMAT | | X | | X | | X |
| *Tiarella trifoliata* | FEMAT | | X | X | | | X |
| *Tiarella unifoliata* | FEMAT | | X | X | | | X |
| *Trillium ovatum* | FEMAT | | X | X | | | X |
| *Vaccinium parvifolium* | FEMAT | | X | | X | | X |
| *Vancouveria hexandra* | FEMAT | | X | X | | | X |
| *Viola glabella* | FEMAT | | X | X | | | X |
| *Whipplea modesta* | FEMAT | | X | | X | | X |

Selection process for species that are Localized and

Selection process for species that are Widely

List 1 and 2 are from the Appendix B of the Riparian Reserve Module (1996). Remaining species are either Survey and Manage Species or were identified as old-growth dependent species in FEMAT.

Appendix J2 of the ROD is the source of information concerning species distribution, habitat, and rarity of most Survey and Manage Species. Information for FEMAT species is based on Flora of the Pacific Northwest Hitchcock 1991.

**Table RR-Apdx-6. Plant Species Ecological Classification.1**

| | Exclusive & Rare | Exclusive & Broad | Supplemental and Rare |
|---|---|---|---|
| Late-successional | | | *Clitocybe subditopoda*<br>*Clitocybe senilis*<br>*Helvella compressa*<br>*Helvella crassitunicata*<br>*Helvella elastica*<br>*Cimicifuga elata*<br>*Gomphus clavatus*<br>*Allotropa virgata*<br>*Endogone oregonensis*<br>*Rhizopogon exiguus*<br>*Balsamia nigrens* |
| Riparian | *Kurzia mackinoana*<br>*Phlogiotis helvelloides* | *Cetralia cetrarioides*<br>*Collema nigrescens*<br>*Platismatia lacunosa*<br>*Usnea longissima*<br>*Mitella ovalis*<br>*Mitella caulescens*<br>*Asarum caudatum* | |
| Aquatic-lotic | *Scouleria marginata*<br>*Lystichum americanum* | | |
| Aquatic -lentic | | | |
| Special - springs & seeps | | | |
| Special - rock outcrops | | | |
| Special - other | | *Bryoria tortuosa*<br>*Aster vialis* | |

1 This table follows the format for Table B6 in the Riparian Reserve Module, pg 38 (6/96). The category of Supplemental and Broad was excluded from this table, as none of the species would have been within the shaded blocks.
- Shaded blocks indicate species addressed by the ASC objectives and that have strict aquatic/riparian dependencies.

**FEMAT Ratings for Botanical Species**:

For this process, the FEMAT (1993) ratings for Option 5 and Option 9 were compared for the species listed in Table RR-Apdx-6. Though there were other differences between the Options, this review focused on riparian widths. As stated in Appendix B of the draft Riparian Reserve Module (pg 17), Option 5 closely resembles Option 7, but includes the Riparian Reserve Scenario 2 of having half buffers on intermittent streams. The ratings reflect outcomes of alternate widths of all buffers in the range of the species. Consequently, the outcomes may differ for altering a small percentage of riparian reserve widths.

**Table RR-Apdx-7. FEMAT ratings for Projected Future Likelihoods of Habitat Outcomes Under Land Management Options by the Plant Species Listed in Table RR-Apdx-6 of this document.**

| Species | Helvella spp<br>**A B C D** | Phologiotis helvelloides<br>**A B C D** | Endogone oregonensis<br>**A B C D** | Rhizopogon exiguus<br>**A B C D** | Cimicifuga elata<br>**A B C D** |
|---|---|---|---|---|---|
| Option 9 | 0 35 38 28 | 10 25 43 22 | 0 18 60 23 | 0 35 50 15 | 48 40 13 0 |
| Option 5 | 0 35 38 28 | 10 22 47 25 | 3 20 60 18 | 5 35 50 15 | 48 41 11 0 |

| Species | Kurzia makinoana<br>**A B C D** | Scouleria marginata<br>**A B C D** | Riparian Lichens<br>**A B C D** | Balsamia nigrescens<br>**A B C D** |
|---|---|---|---|---|
| Option 9 | 91 3 3 3 | 100 0 0 0 | 9 54 32 5 | 0 18 60 23 |
| Option 5 | 91 3 3 3 | 80 20 0 0 | 6 52 36 6 | 3 20 60 18 |

| Species | Aster vialis<br>**A B C D** | Asarum caudatum<br>**A B C D** | Mitella caulescens<br>**A B C D** | Mitella ovalis<br>**A B C D** | Lystichum americanum<br>**A B C D** |
|---|---|---|---|---|---|
| Option 9 | 0 48 53 0 | 87 14 0 0 | 95 5 0 0 | 95 5 0 0 | 96 4 0 0 |
| Option 5 | 0 56 44 0 | 87 14 0 0 | 95 5 0 0 | 97 3 0 0 | 97 4 0 0 |

**A** - well distributed **B** - locally restricted **C** - restricted to refugia **D** - risk of extirpation

**Discussion of Species included in Table RR-Apdx-7**

*Helvella compressa*, *H. crassitunicata*, *H. elastica*, *H. maculata* (mushrooms): These species are associated with late-successional forests and, although they are not strictly riparian, it has been determined that appropriate management of riparian zones will contribute to their survival. Although the riparian reserves under consideration appear to include habitat for these species, the FEMAT rating does not indicate a change to the survival of the species between full and half buffer widths. There is a documented location of *H. compressa* in the Paradise Creek drainage, in a nearby watershed. This increases the probability that this species occurs in this drainage also.

*Phlogiotis helvelloides* (jelly mushroom): In the Pacific Northwest, this species occurs in riparian areas, including small stream channels. It grows on soil or conifer debris. It is possible, though not likely, that this species occurs in the analysis buffers. FEMAT ratings reflect a small amount of increased risk between the two Options.

*Endogone oregonensis* (zygomycete), *Rhizopogon exiguus* (false truffle): These mushrooms grow in old growth stands and are probably ectomycorrhizal associates of western hemlock. They can also be found in young stands with an abundance of large woody debris. There is a documented location of *Endogone oregonensis* in an adjacent subwatershed in the Waggoner Cr. drainage. *Rhizopogon exiguus* is known from only four localities but one of these is in the coast ranges near Mapleton. These occurrences increase the probability of these species occurring in this subwatershed. FEMAT ratings indicate added benefit under Option 5 from Option 9, but this may not be a result of the riparian reserve widths.

*Cimicifuga elata* (vascular): Habitat for this plant is lowland Douglas-fir forests with bigleaf maple and sword fern. It has a narrow range, from near Eugene down to Roseburg. Some populations occur in the coast range. There is habitat for this plant in these buffers.

*Kurzia makinoana* (liverwort): This species is mostly associated with stream terraces. Buffers considered for width

adjustment are near the headwalls of the stream and would have very narrow terraces, if any. As there is no habitat for this plant, altering the width of these buffers should have no effect.

*Scouleria marginata* (moss): As this plant grows directly in the streams, altering buffer width should not effect it, as long as sediment into the stream is kept to a minimum. It is highly unlikely that this species occurs in the buffers considered for width adjustment, as the streams are probably too small and steep.

*Cetralia cetrariodes*, *Collema nigrescens*, *Platismatia lacunosa*, *Usnea longissima* (lichens): These epiphytes occur mostly on hardwoods in riparian areas. Large, old hardwoods are best suited for these lichens. None of these species are rare. *Collema nigrescens* is found most commonly on oak. *Platismatia lacunosa* is usually found on foggy coast or valleys. The buffers under consideration are near ridge tops. It is not likely that either of these species occur in the buffers. *Cetralia cetrariodes* can grow in a wide variety of habitats, including openings and ridge tops. *Usnea longissima* is generally thought to be riparian, but personal observations have led to the conclusion that it grows in a wide variety of habitats on this district. Altering riparian width should not adversely effect these species.

*Balsamia nigrescens* (truffle): This species is mostly associated with xeric pine/oak forests, although sometimes found with Douglas-fir. It is unlikely that this species occurs in the buffers under analysis.

*Aster vialis* (vascular): The range for this aster is confined to the Willamette and Umpqua valleys. The nearest known locations are near Lorane. Habitat is low elevation xeric Douglas-fir forests with open canopies. Associated species include madrone, California hazel, and poison-oak. Although there are places in this watershed that appear to be habitat for this plant, the buffers under consideration do not appear to be suitable habitat.

*Mitella ovalis*, *Mitella caulescens*, *Asarum caudatum* (vascular): Although these species are chiefly associated with riparian areas, they are also found in moist forests. These plants are very common throughout the district and should not be adversely effected by altering buffer widths.

*Lystichum americanum* (vascular): This common species grows in many swampy or marshy areas. It is unlikely that this species occurs in the buffers under consideration. Even if it were in the streams, the altering of buffer width will not effect the species as a whole.

## RECOMMENDATIONS

### Recommendations for Altering Riparian Reserves in a manner consistent with Obtaining Aquatic Conservation Strategy Objectives:

If considering altering Riparian Reserve widths or managing inside the Riparian Reserve then follow the procedures site evaluation for outlined in *Riparian Reserve Evaluation Techniques and Synthesis - Supplement to Section II of Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis. Version 2.2.* The recommended Riparian Reserve widths to address slope stability concerns are shown in Table RR-Apdx-1.

The two sites identified as potential locations for altering Riparian Reserves are in the SE¼ of the SE¼ section 31, T.22S., R.8W., and S½ of the NE¼ section 33, T.22S., R.8W., Will. Mer. Additional locations may be identified for site level evaluation on a project by project basis.

**Summary of Recommendations for Riparian Reserves on Intermittent Streams**

| Site conditions | | | Actions to meet ACS and ROD-RMP objectives |
|---|---|---|---|
| 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 assumption 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 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-3 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). To protect habitat for the white-footed vole, historic hardwood-dominated riparian areas should not be reduced.

Four of the forest bats are dependent on riparian areas as source habitat (Table RR-Apdx-2). 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 (J2 1994, pg 456). To maintain the likelihood of 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 (J2, 1994, pg 418). The recommended mitigation was to conduct stream surveys, and maintain a riparian reserve width of Option 1 within occupied segments (J2, 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. Seeps/springs should be buffered sufficiently to maintain the characteristics of the site. Seeps/springs will be most likely found in rotational-slump prone areas in the Elkton geologic member.

**Late-successional species:** In this particular subwatershed, the Riparian Reserves are key habitat for the bald eagle. The FEMAT viability for the bald eagle did not change between Option 1 and Option 9.

However, key assumptions that make bald eagle viability independent of Riparian Reserve widths are contained in the ROD-RMP (1995, page 36) which states we will comply with the Pacific Bald Eagle Recovery and Implementation Plan, and provide 440-yard radius buffers around known and future nest sites and protect all snags within 550 yards of nest and roost sites. Maintaining a 1-site potential tree Riparian Reserve on intermittent streams within 1 mile of the Umpqua River, where there is suitable habitat, will help meet those objectives.

Stand manipulations designed to provide large trees suitable for Bald Eagle habitat inside Riparian Reserves within a mile of the Umpqua River, does not appear to be in conflict of immature stands Aquatic Conservation Strategy. However, such proposals will have to be evaluated on a site specific basis through the NEPA process.

Late-successional habitat in the Riparian Reserve also provides key characteristics for marbled murrelet, and American marten. The Riparian Reserve could also serve as dispersal habitat for many wildlife species. Dominant wolfy trees with large mossy limbs may provide nest sites for the marbled murrelet. Large downed logs within the riparian area are critical for the marten. The primary mitigation for the marten in J2 (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. For these reasons, it is recommended 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 the marten.

As this subwatershed has such few acres that would be considered for Riparian Reserve reduction -- the reduction of dispersal habitat for the Northern spotted owl is not a concern.

**Mollusks:** Due to a lack of knowledge, mollusks were not included in Tables RR-Apdx-2 or RR-Apdx-3. None of the Survey and Manage Strategy 1 or 2 Mollusk species are known to occur in the Coos Bay District. *Lanx alta* is the only mollusk from the Riparian Module List 1 and 2 that may be present in the subwatershed (Frest and Johannes 1993). *Lanx alta* is a freshwater snail associated with large streams containing stable cobble-boulder substrates and high water quality. The original distribution included the Umpqua river drainage, and the Umpqua mollusks may be better classified under *lanx subrotundata* (Frest and Johannes 1993). It is expected to benefit from Riparian Reserves as its primary habitat association is within the aquatic system.

**Recommendations concerning J2 plant species benefitting from a 1 site potential wide Riparian Reserve**

Prior to reducing the width of riparian reserves, on the ground surveys are needed. This riparian reserve analysis indicates that surveys should concentrate on the following species:

*Helvella* spp *Phologiotis helvelloides* *Endogone oregonensis* *Rhizopogon exiguus* *Cimicifuga elata*

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