III.8 RIPARIAN RESERVE EVALUATION

Analysis Questions

What are the primary ecological values associated with Interim riparian Reserves in the Big Creek analysis area? Which values are particularly sensitive and may need special management?

What species are present in riparian systems in the Big Creek analysis area? What is their abundance and distribution?

Which management activities are appropriate for riparian reserves? What are the potential effects of various management activities (including reductions in the reserve width) on these ecological values?

Are there areas where modification to the interim reserves along intermittent streams could occur?

What effect would modifications in the width of Riparian Reserves have on terrestrial and aquatic species?

PART I - CHARACTERIZATION

REFERENCE CONDITION

Riparian Vegetation
Information here is a summary of a detailed discussion of riparian reference condition contained in Section III.6-Species & Habitats.

Historic riparian vegetation in Big Creek may be classified into two somewhat distinct types: lowland (inhabiting floodplain terraces along the Middle Fork Coquille River and the lower five miles of big Creek, up to the mouth of Axe Cr.) and upland communities (inhabiting Big Creek above the mouth of Axe Cr. and along the higher-gradient tributaries of Big Cr.

Lowland Communities- Lowland vegetative communities are typically structured and maintained by the interaction of the stream channel with the floodplain and respond to soil composition, structure and moisture content and riparian disturbance (flood innundation, scour, deposition) (Mitsch and Grosslink 1993). Vegetation here may also be affected by the construction of dams and diversions by beaver which raise the water table, trap sediments on streambanks, and create side channels. Thus, historic lowland riparian vegetation in Big Creek probably consisted of moisture-tolerant and disturbance/colonizer species such as shrubs and low-growing woody vegetation (such as willow, vine maple), and hardwoods such as alder, ash, maple and myrtle (Mitsch and Gosselink 1993, Franklin and Dyrness 1973). Conifer (especially Port-Orford

Cedar and Western Redcedar) was probably sporadically present along lowland stream reaches, on high terraces (with less frequent fluvial disturbance).

Upland Communities-The upland riparian community in Big Cr. is associated with the higher gradient, hillslope-constrained reaches of Big Creek and its tributaries as well as higher terraces along Lower Big Creek. These communities are typically structured/maintained by disturbance processes such as infrequent floods, debris torrents, windthrow, and fire. (Swanston 1991 and others). In Big Creek, these may be divided into three types:

> **Conifer-Dominated Reaches**: located along hillslope-constrained, erosional, headwater streams and the upper reaches of low-order streams. V-shaped valleys, steep streambanks with little interaction between stream and riparian vegetation. Narrow or no discernible riparian "zones." Canopy cover is often 100%.
>
> **Hardwood-Dominated Reaches**: primarily located along low-gradient, depositional reaches. U-shaped valleys with floodplains of varying width containing recent or historic fluvial deposition. Beaver activity common. Canopy cover along these hardwood-dominated reaches can be highly variable, ranging from little (in the event of recent disturbance or intense beaver activity) to 100%. Hardwood-dominated reaches may also be located along high-gradient, hillslope-constrained streams where frequent disturbance precludes conifer establishment.
>
> **Mixed Reaches**: located along streams with moderate floodplains alternately constrained by hillslopes. Riparian area is a diverse mosaic of stands depending on local conditions (i.e., floodplain development, disturbance patterns, etc.). Hardwoods predominate where floodplains are well-developed; conifers predominate (with a narrow band of hardwoods immediately adjacent to the stream) where there is a little interaction between the stream channel and riparian area. Canopy cover along these reaches is high, often completely covering the channel.

<u>Riparian Species and Habitat</u>
Refer to Section III.6-Species & Habitats for additional information on species and habitats historically present in the watershed.

All riparian associated species (Appendix F, Table F-1) were probably more abundant and widespread historically. Habitat loss, fragmentation, degradation, and competition or predation from exotic species have contributed to population declines. While many of these factors have been affecting populations for centuries, changes have been more pronounced in this century (since European settlement). Some species, including Southern torrent salamanders and tailed frogs, are particularly susceptible to these changes and have probably experienced more pronounced declines. Other species, such as beaver, have been the target of specific removal efforts and have subsequently experienced significant population declines.

CURRENT CONDITION

Physical Characteristics

For the Big Creek analysis area, the GIS database indicates that interim Riparian Reserves occupy approximately 5,038 acres (56%) of the BLM-managed land (Figure I.-4), based on a site-potential tree height of 220'. It should be noted that this riparian acreage is an estimate; sources of error include unmapped streams and the difference between the actual location of the interim Riparian Reserve boundary (based on slope distance) and the computer-generated boundary (based on horizontal distance).

The extent of water-dependant vegetation may be used to delineate Riparian Reserves in some cases. However, in most cases, the width of this riparian vegetation width is very narrow for intermittent streams. It is highly unlikely that riparian vegetation would extend the Riparian Reserve beyond one-quarter to one-half site-potential tree height in the analysis area.

The inner gorge may also be used to delineate Riparian Reserve boundaries in some places. For the purposes of this exercise, an inner gorge is defined as the first slope break above the active channel margin and terraces. Typically, an inner gorge break would only be used to define a Riparian Reserve boundary of a canyon or similar geomorphological feature; however, such features are fairly rare within this analysis area.

Intermittent vs. Perennial Streams

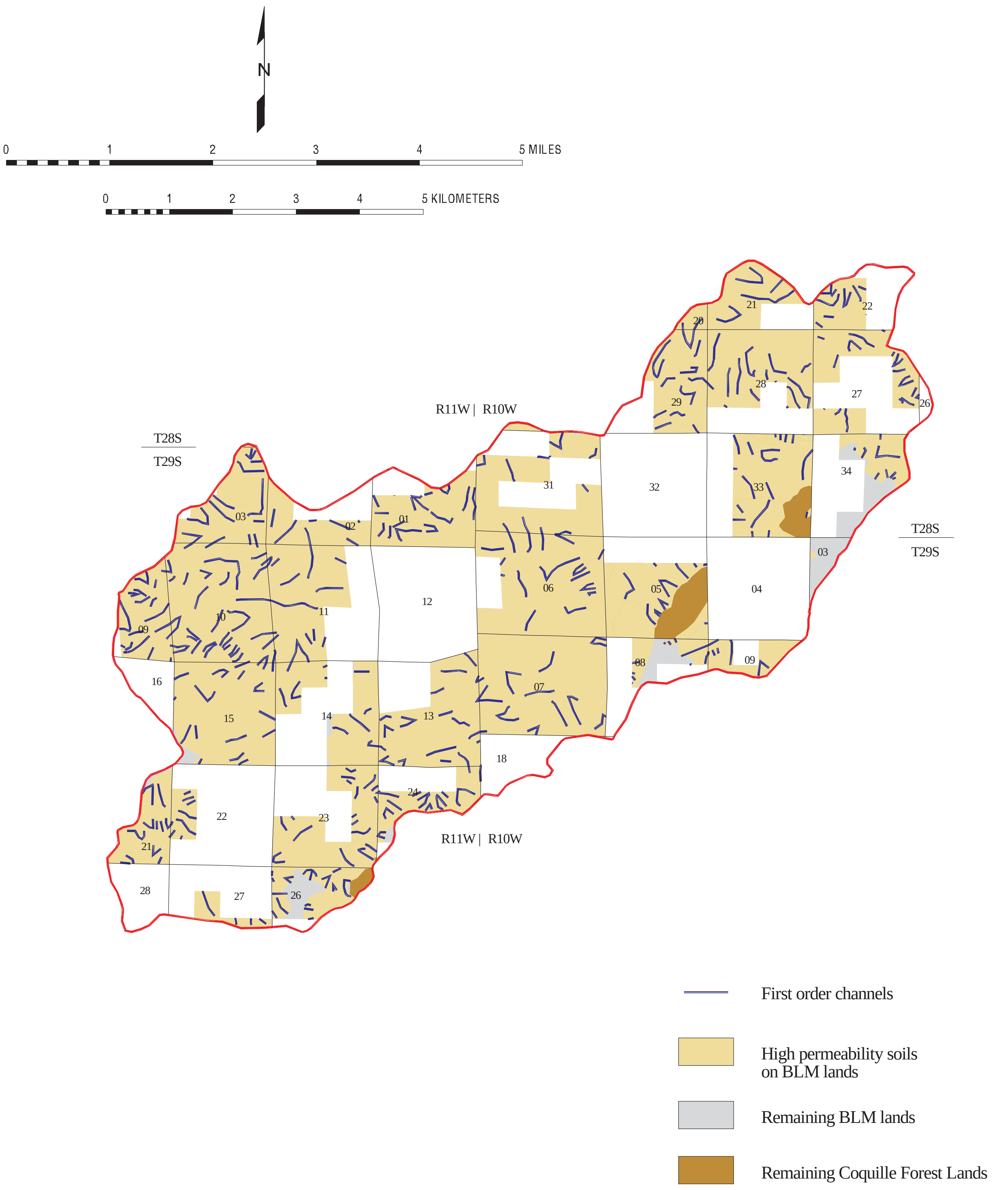
An initial stratification process to identify intermittent channels (Figure III.8-1) indicates that approximately 3035 acres of Riparian Reserve (33% of BLM-managed land in the analysis area) is adjacent to intermittent streams.

The initial stratification process used Darcy's law of groundwater flow, mapped soil types, and flow recession to estimate intermittent channels. It was found that a watershed of approximately 20-40 acres is necessary on high-permeability soil types (infiltration rates of 2-6"/hr.) to sustain perennial flow; streams in smaller catchments are likely to be intermittent (Dunne & Leopold 1978 and Haagen 1989). This drainage area roughly corresponds to the 1st order channels in the analysis area. According to this stratification process, there are approximately 102 miles of these streams in the analysis area, approximately 57 miles of which are on BLM-managed lands.

A perennial stream is "a stream that typically has running water on a year round basis" (FEMAT 1993). Alternate definitions include "a perennial stream or stream reach has measurable surface discharge more than 80 percent of the time. Discharge is at times partly to totally the result of spring flow or ground-water seepage because the streambed is lower than surrounding ground-water levels" (Meinzer 1923). Well-formed, adjustable channels have continuous channel boundaries and several distinct in-channel features. Fluvial action of sufficient duration (i.e., stream flowing year-round in most years) will carve a low flow channel. This is the so-called inner-berm, and is really a slight depression in the channel bottom which carries the minimum streamflow. Streams that have ponding, such as beaver dams, or that flow over bedrock will lack this feature. However, this cross-section dip is observable in most alluvial channels. In the

Figure III.8−1 Estimated Intermittent Streams for Big Creek

First Order Channels on High Permeability Soils (infiltration rate = 2-6 inches/hour)



Scale = 1:84480 (3/4" = 1 mile)

analysis area, some perennial seeps and outflows have not had sufficient discharge to form the inner-berm feature.

Intermittent streams in the analysis area tend to be 1st order, high gradient (>10%), low sinuosity, entrenched channels, with low width/depth ratios and bedrock, gravel, and/or sand substrates. This description fits A1a, A4a, and A5a stream types (Rosgen 1994). Other 1st order streams in the analysis area are more likely to be perennial because the deep, fine-textured soils surrounding these channels store large volumes of water, have low permeabilities, and drain slowly. This would correspond to A6a and A6 stream types. Some of these channels are lower gradient (4-10%), and may drain perched water tables.

Final determination of intermittent streams will be made in the field, based on the following definition and supporting criteria:

> Intermittent streams are defined as any nonpermanent drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria (FEIS ROD, p. B-14).

The Myrtlewood hydrologist provided the following interpretations of the terms used in the Northwest Forest Plan definition of intermittent streams:

- To be a nonpermanent drainage feature, the stream should have a streamflow duration of less than 80% of the time.

- A definable channel should have some minimum depth of incision, or be within a stream-adjacent inner gorge. The channel should be able to convey streamflow, and be essentially continuous. A definable channel can exist even though large organic debris may at times be lying in the channel or partially obscuring the channel.

- Annual scour or deposition usually is evidenced with distinct physical features. This may include: a stream scour line on the edges of the active channel, sediment accumulations behind obstructions in the channel, substrate in the channel more rounded than angular, and evidence of bankcutting on the outside of bends.

Biological criteria are also useful in distinguishing between perennial and intermittent streams, and determining the upstream terminus of perennial surface flow. The presence of aquatic invertebrates with protracted larval histories (> 1 year) (*Lara avara, Juga spp., Philocasca rivularis*), or larval amphibians (tailed.frogs, Southern torrent salamanders, Pacific giant salamanders), strongly indicate perennial flow or persistent moisture sufficient to support biota associated with the perennial condition.

<u>Riparian Vegetation</u>

Lowland Community: Currently, the riparian zone along Lower Big Creek is predominately agricultural and residential. Tree diversity and abundance are low. The stream channel in Lower Big Creek is downcut and the channel lacks any substantial structures (debris jams, beaver dams) which might aggrade the streambed and divert water to floodplains. As a result, interaction between the stream channel and floodplain has been eliminated along most of Lower Big Creek. Elimination of a high water table in the floodplain, combined with agriculture and residential development, has resulted in the conversion of predominately wetland, riparian vegetation to predominately dryland species.

Average canopy cover in Lower Big Creek exceeds 75%, but notable exceptions may be found where grazing and agriculture have encroached on riparian vegetation. In several locations, riparian vegetation consists only of a thin strip of single trees bordering the stream.

Upland Communities: The primary impacts to upland riparian vegetation include timber harvest and road-building. Clearcut harvesting (with no or inadequate riparian buffers) and repeated salvage of trees and logs have eliminated many large old-growth conifers and logs from riparian areas. Comparison of aerial photos between 1949 and 1992 indicates incursion by red alder throughout the watershed, particularly along roads and where harvest with ground-based systems has occurred.

In general, mature and old-growth confers are lacking throughout Riparian Reserves. FOI analysis indicates that roughly 58% of riparian reserves in the Big Creek watershed are dominated by conifers younger than 80 years; only 2.4% of reserves are dominated by conifers 161 years or older.

Canopy cover: on average, exceeds 75%. While the average is high, there are several reaches along tributaries with little or no canopy cover. For example, Jones Creek averages only 33% and a substantial portion of Upper Swamp Creek is bordered only by brush and scattered alder.

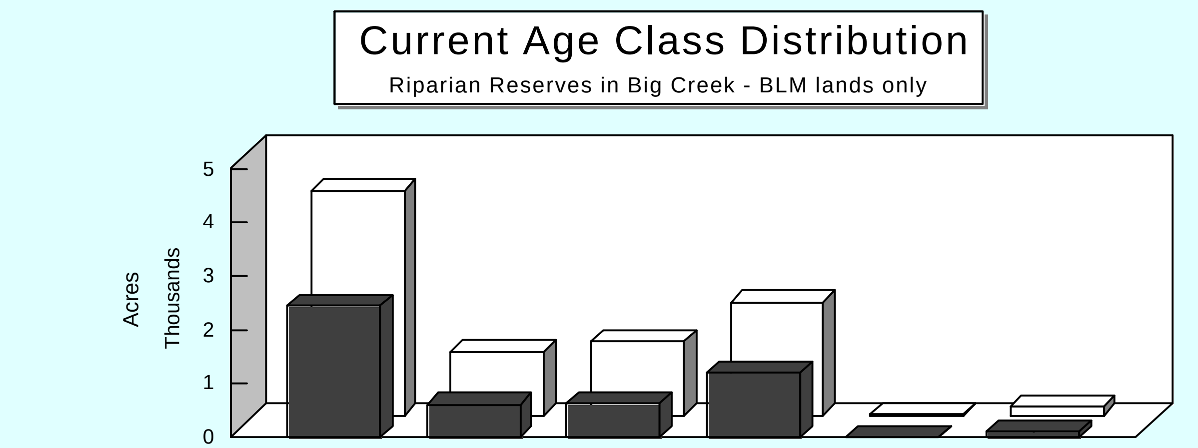
<u>Riparian Species</u>
Refer to Section III.6 - Species & Habitats for information about species abundance, distribution, and population trends. Distributions for these species were not mapped because surveys for most of them have not been conducted and FOI vegetation information has limited utility for mapping many habitats. The process described in the Riparian Reserve Evaluation Techniques and Synthesis Appendix B (Feb 1997 draft) was used to develop a list of species of concern which would be the subject of further analysis in this Riparian Reserve Evaluation. The working lists and information used to develop this final list are on file at the Coos Bay District Office. Appendix F lists the riparian and aquatic plant and animal species of concern for the Big Creek analysis area.

<u>Riparian Reserve Habitat Types</u>
Habitats in Riparian Reserves can be characterized into 8 general habitat types:

> *Late-successional forest* - While GIS/FOI age class information for older stands (>80 years or so) is often inaccurate, FOI offers the best available picture of forest condition. Currently, approximately 39% of Riparian Reserves contain forests >80 years of age. Approximately 2% of Riparian Reserves contain forests >160 years of age (Figure III.8-2

). Potential Reserve late-successional forest is distributed across the analysis area. The oldest forests in Riparian Reserves are located in Section 3, T.29 S., R.11 W. In the long-term, Riparian Reserves will offer late-successional forest habitat dispersed across the landscape. These habitats have two functions: providing dispersed habitat islands to temporarily support mobile species dispersing between large LSRs, providing habitat to support persistent populations of less-mobile species, and serving as refugia from which adjacent GFMA lands can be repopulated. In the subwatershed, these habitats are almost exclusively restricted to BLM lands, particularly along Bear Pen Creek, Axe Creek, and upper reaches of Brownson Creek and Big Creek. Late-successional forest habitat in Riparian Reserves is particularly important for many bat species (foraging, roosting, reproduction, and hibernation), marten, and northern spotted owls.

Figure III.8-2 Age Class Distribution in Riparian Reserves



Forest Age Class	0-40	41-80	81-120	121-160	161-200	200+
Riparian Reserves	2455	623	638	1207	5	109
All BLM	4179	1184	1369	2102	13	169

Based on 1997 FOI

Riparian - For this analysis, riparian habitat is defined *functionally* as the zone of interaction between the stream channel and floodplain. These areas are characterized by the presence of multiple terraces, woody debris deposited during high flows, variable soil moisture conditions, and a characteristic vegetative community. In the Big Creek watershed, these characteristic vegetative communities are restricted to low-gradient, wide-floodplain reaches such as the lower portions of Big and Brownson Creeks. This vegetation consists of moisture-tolerant and disturbance/colonizer species such as shrubs and low-growing woody vegetation (such as willow, vine maple), and hardwoods such as alder, ash, maple and myrtle (Mitsch and Gosselink 1993, Franklin and Dyrness 1973). Conifers may also be present on higher terraces and other areas which receive less-frequent fluvial disturbance. Riparian habitats provide optimal habitat for a large number of species. Some riparian-associated species (such as amphibians, mustellids, and invertebrates) depend on riparian habitats for all stages of their life cycle while other species (such as a variety of bat and bird species) are riparian obligates for portions of their life cycle (such as foraging or nesting), but may use upslope habitats as well.

Aquatic (lotic) - These habitats include the streams themselves and the immediate streambank and splash zones. The analysis area contains approximately 186 miles of lotic stream habitats, ranging from low-gradient 5th order streams, to high gradient, intermittent streams. Most of the aquatic species on the list of species of concern depend on stream habitats for all or part of their life history. For example, southern torrent salamanders inhabit high gradient headwater perennial streams with high water quality and low temperature. Pacific giant salamanders inhabit headwater and lower perennial streams. Tailed frogs are found primarily in larger perennial streams, often with high gradient. Foothill yellow-legged frogs inhabit still larger streams (e.g. lower reaches of Big Creek). Beaver use low-gradient streams with wide floodplains such as lower Brownson, Bear Pen, and Fall creeks.

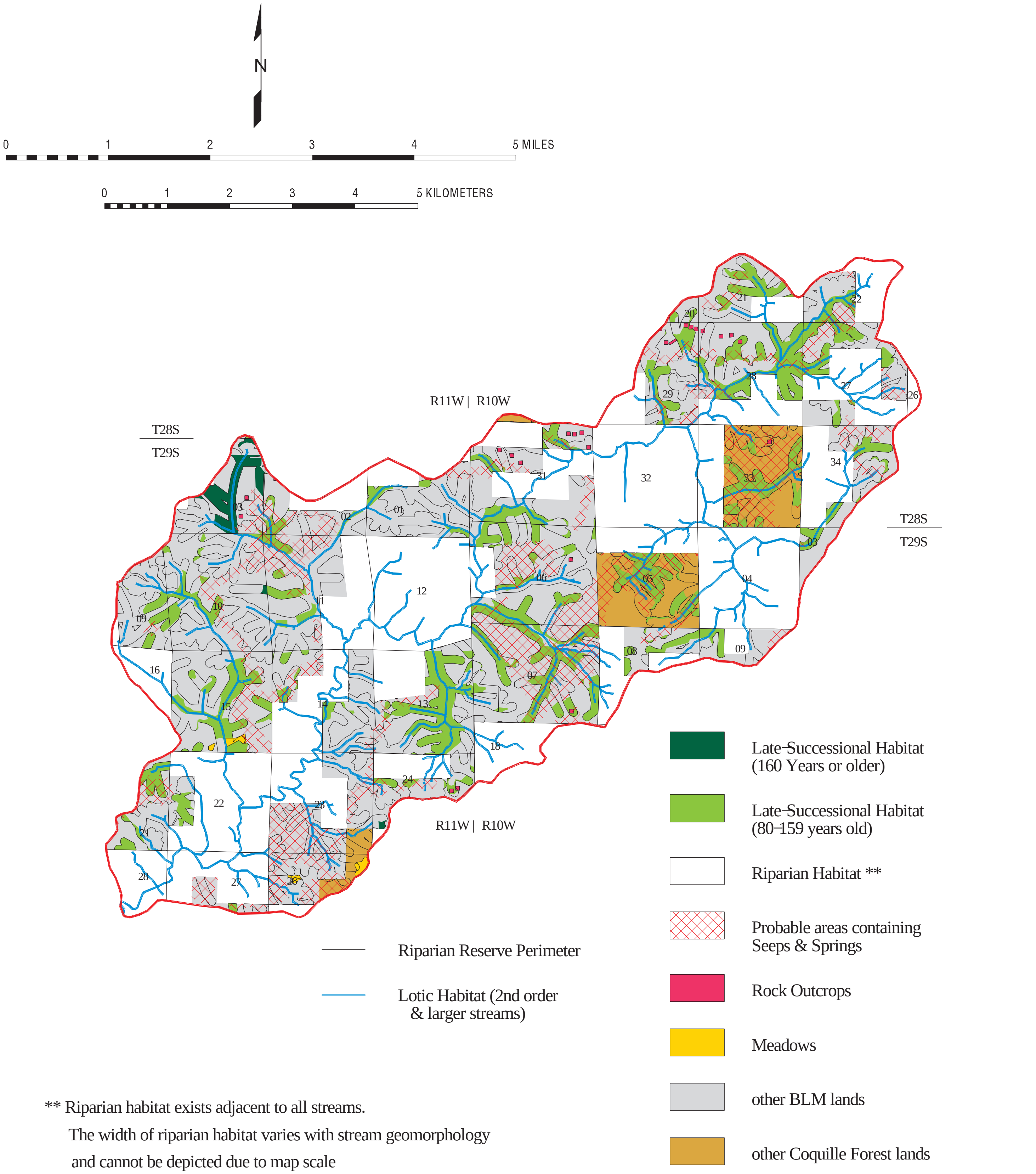
Aquatic (lentic) - With the exception of beaver ponds, no pond habitats are known to occur in the planning area. If they occur, they are most likely on private land.

Seeps and Springs - Seeps and springs are unique among aquatic habitats because they contain microclimate and habitat conditions not found elsewhere in watersheds. They provide habitat for rare and unique species (such as amphibians, molluscs, and other invertebrates) confined to constant conditions as well as facilitate dispersal (by providing aquatic "stepping stones) across the watershed for other aquatic associates . Seeps and springs are often associated with soils having low permeability rates (0.2- 0.6"/hr), such as the Preacher-Bohannon soil type (46) and along geologic faults. Additional areas containing seeps and springs can be located along contact zones between low permeable soils which are downslope from highly permeable soils. (Figure III.8-3). Groundwater within highly permeable soil types travels downslope until it flows into low-permeable soils. These soils do not allow the groundwater to percolate through it as well and the ground water flows to the surface. Roads that similarly intercept groundwater could also produce seeps.

Rock and Talus - These habitats include rocky outcrops and talus habitats. Like seeps and springs, they provide habitat-types (such as rocky crevices) not found elsewhere. These habitats are relatively rare on the landscape but critically important for species such as Dunn's salamanders, bats (roosting, reproduction, and hibernating), as well as many invertebrates and molluscs. See Figure III.8-3 for locations of known rocky outcrops. See Section III.6 (Species & Habitats) for further discussion.

Down Logs - Numerous wildlife species including many invertebrates depend heavily on down log habitat. Down log habitat in Riparian Reserves is critically important because it offers the opportunity to support significantly higher levels of down log habitat than will be available in the GFMA and it will provide this habitat scattered across the landscape to serve as centers for recolonization. Research indicates that the majority (85-90%) of LWD in streams is recruited from within 30 meters of the stream bank (M^{c}Dade et. al. 1990, Ursitti 1991). Down log habitat in the Riparian Reserves is particularly important for bats (roosting) and marten as well as a variety of invertebrates and molluscs. Their proximity to streams offer the possibility of unique microclimates which are cooler and moister than similar habitats in upland areas. Down log habitat is

Figure III.8−3 Riparian Reserve Habitat as classified by the Seven Ecological Functional Groups & other Special Habitat Areas



** Riparian habitat exists adjacent to all streams. The width of riparian habitat varies with stream geomorphology and cannot be depicted due to map scale

Scale = 1:84480 (3/4" = 1 mile)

likely more scarce on private lands. Given the level of salvage and road location, many Riparian Reserves have probably already been salvaged. See Section III.6 (Species & Habitats) for further discussion.

Snags - Numerous wildlife species including many invertebrates depend heavily on snags. Snag habitat in Riparian Reserves is critically important because it management restrictions here offer the opportunity to provide substantially higher levels of snag habitat than will be available in the GFMA. High densities of snags in Riparian Reserves habitat scattered across the landscape will serve as centers for recolonization. These habitats are particularly important for bats (roosting, reproduction, and hibernation) and marten, as well as a large number of invertebrates and molluscs. Snag habitat is more scarce on private lands but is also still deficient in many areas on BLM land because of past salvage. See Section III.6 (Species & Habitats) for further discussion.

Potential Likely Future Condition

<u>Vegetation and Habitat</u>
As management guidelines for Riparian Reserves are implemented, contiguous late-successional and riparian habitats will dominate Riparian Reserves. This transition though could take many decades. It will require more than 80 years for the majority of Riparian Reserves to contain stands >160 years of age (Appendix C, igure C-4). Time will also allow structures such as snags, cavities, and down logs to develop. Small-scale disturbances such as windthrow and landslides will continue to affect Riparian Reserves resulting in small areas with earlier seral stages. Large-scale disturbances like stand-replacement fires are relatively infrequent and unlikely to affect any particular subwatershed at a given time.

<u>Species</u>
Improving conditions in Riparian Reserves (compared to existing conditions) will facilitate recovery of species that have been adversely impacted by management activities since the turn of the century (see Reference Conditions). Improved connectivity within the riparian/aquatic systems and across the landscape will facilitate movements and genetic interchange of wildlife; however, more limited riparian protection on interspersed private lands will continue to hinder connections for some species, particularly less mobile species.

PART II - VALUES ASSOCIATED WITH BIG CREEK WATERSHED RIPARIAN RESERVES

<u>Physical and Biological Values of Big Creek Watershed Riparian Reserves</u>
See Section III.6 - Riparian Vegetation for detailed discussion of ecological values of riparian zones in Big Creek and the effects of various management activities on these values.

Riparian Reserves are designed to protect physical and biological values (described in the ACS objectives) which are associated with riparian areas as well as to benefit upland species. These physical and biological values include:

- *Structural Complexity*-Riparian zones are characterized by assorted physical processes such as earth movement, deposition, erosion and disturbance which create an array of terraces, old channels, standing and down wood, snags, etc. Streamside vegetation often offers a structural contrast to upland habitats within the Riparian Reserves.

- *Diverse Array of Soil Moisture Conditions*-Riparian zones typically contain a diverse mosaic of surface soil conditions which vary in time and space.

- *High Plant and Animal Diversity*-Diversity and complexity of habitat features combined result in high native plant and animal species diversity. Additionally "soft" edges characterizing interface between upland and riparian forest and "hard" edges defining interface between riparian vegetation and stream channel promote riparian species diversity as does the proximity of water and riparian and upland habitats.

- *Sediment Regime*: Riparian vegetation moderates the rate of sediment input into stream channels. Along low-gradient streams, floodplains are zones of sediment storage, while LWD traps sediments along high-gradient channels.

- *Water Quality*-Riparian zones maintain and restore water quality through interception of sediments and nutrients, and through the moderation of solar radiation.

- *Water Quantity and Delivery*-Riparian zones store and release water, helping to maintain summer base flows and to moderate high flows. Riparian structures reduce water velocity, reducing erosion, scour and downcutting.

- *Connectivity and Interspersion of Habitat Features*- Riparian ecosystems have a linear form, providing spatial and temporal connectivity across the landscape. In addition to providing protective pathways for riparian-associated animals, riparian zones facilitate dispersal between widely dispersed upslope habitat areas by serving as "stepping stones" for animals dispersing between LSRs or across the landscape. Riparian Reserves support two functions for connectivity:

    1. Landscape scale - Facilitating the movements of mobile species associated with late-successional habitat as they move between large LSRs. Riparian Reserves can serve as "stepping stones" of late-successional habitat between LSRs.

    2. Subwatershed/Site scale - Supporting persistent populations of relatively immobile species associated with late-successional and riparian habitat in order to facilitate genetic interchange between adjacent populations and to prevent isolation of populations.

- *Nutrients*- Riparian zones provide the foundation for aquatic foodwebs through the contribution of organic material. In turn, invertebrates produced in the aquatic system provide a major food source for many terrestrial animals.

- *Refugia*-Riparian zones provide refugia for organisms during stress and disturbance. For example, terrestrial animals utilize riparian zones for thermal regulation during winter and summer months; fishes find refugia from high flows in floodplains.   In the administrative sense (i.e., implementation of the NW Forest Plan), Riparian Reserves play a critical role in providing refugia for sessile and less-mobile late-successional species by maintaining a higher quality habitat conditions in relation to adjacent GFMA lands (i.e., high levels of down logs and snags) as well as serving as species source-areas for repopulating adjacent areas undergoing harvest and subsequent recovery.

Hazards to Physical and Biological Values

Table III.8-I summarizes the risks to the identified resource value associated with Riparian reserves from potential hazards. The table evaluates the likelihood that a given resource value will experience a decrease in function in the short term (zero-to-ten years) and long term (beyond ten years) if a listed hazard occurs. It is important to note that the type and severity of hazard will effect the vulnerability and that those listed below are intended to reflect the "worst case scenario". For a detailed discussion on the effects of various management activities on Riparian Zones in Big Creek, see Section III.6 - Riparian Vegetation.

Table III.8-1. Hazards to values associated with riparian reserves

Resource Value	Zone of Effect[1]	Associated species groups by habitat-type	Hazard	Vulnerability of Resource Value to Decrease in Function (short/long term[2])
Structural Complexity	1-5	Late-successional Riparian Lotic Lentic	Harvest Windthrow Landslide Peak/Base Flow Changes Fire	Moderate/Moderate Low/Low Low/Low Moderate/Low Low/Low
Soil Moisture	2 - 5	Late-successional Riparian Seeps/Springs	Harvest Windthrow Landslides Peak/Base Flow Changes Fire	Moderate/Low Low/Low Moderate/Moderate High/Moderate High/Moderate
Microclimate	2-5	All	Harvest Windthrow Landslides Peak/Base Flow Changes Fire	High/Moderate Moderate/Low Moderate/Moderate Moderate/Moderate High/Moderate
Plant & Animal Diversity	1-5	All	Harvest Windthrow Landslides Peak/Base Flow Changes Fire	Moderate/Moderate Low/Low Moderate/Low Moderate/Low High/Moderate

LWD Recruitment-Aquatic	1 - 4	Late-successional Riparian Lotic Lentic Seeps/Springs	Harvest Windthrow Landslide Peak/Base Flow Changes Fire	High/High Low/Low Low/Low Low/Low Low/Low
Down Logs	2-4	Late-successional Riparian	Harvest Windthrow Landslide/Debris Flow Peak/Base Flow Changes Fire	High/High Low/Low Low/Low Low/Low Low/Low
Sediment Regime	1 - 4	Lotic Lentic Riparian Seeps/Springs	Harvest Windthrow Landslide Peak/Base Flow Changes Fire	High/Moderate Low/Low High/Moderate High/High High/High
Streambank/Slope Stability	1 & 2	All	Harvest Windthrow Landslide/Debris Flow Peak/Base Flow Changes Fire	High/Low Moderate/Low High/Low Moderate/Moderate High/Low
Water Temperature	1 - 3	Riparian Lotic Lentic Seeps/Springs	Harvest Windthrow Landslide/Debris Flow Peak/Base Flow Changes Fire	High/Moderate Moderate/Low Low/Low Moderate/Moderate High/Moderate
Water Quantity	1-5	All	Harvest Windthrow Landslide/Debris Flow Fire	Moderate/Low Low/Low Low/Low High/Low
Connectivity	1-5	All	Harvest Windthrow Landslide/Debris Flow Peak/Base Flow Changes Fire	High/Moderate Moderate/Moderate Low/Low Moderate/Moderate High/Moderate
Nutrients	1-5	All	Harvest Windthrow Landslide/Debris Flow Peak/Base Flow Changes Fire	High/Low Low/Low Low/Low Moderate/Moderate High/Low

Refugia	2-5	All	Harvest Windthrow Landslide/Debris Flow Peak/Base Flow Changes Fire	High/Moderate Moderate/Low Moderate/Moderate Moderate/Moderate High/Moderate
Snags	3-5	Late-successional Riparian	Harvest Windthrow Landslide/Debris Flow Peak/Base Flow Changes Fire	High/High Moderate/Moderate Moderate/Moderate Low/Low Moderate/Moderate

[1]Zones of Effect:

Zone 1 - Aquatic (includes streams and seeps
Zone 2 - Stream bank (includes splash zone)
Zone 3 - Zone of riparian influence (includes area inhabited by riparian vegetation)
Zone 4 - ½ site potential tree height (approximately 110')
Zone 5 - One site potential tree height

[2]Vulnerability/Susceptibiliy is defined as the potential for the relevant resource value to experience a decrease in function as a result of the identified hazards (should they occur).

PART III - SYNTHESIS AND INTERPRETATION

Condition of Riparian Network With Respect to Acs Objectives
Refer to Page B-11 in Standard and Guidelines for complete description of ACS objectives.

It is difficult to evaluate riparian conditions in the Big Creek subwatershed with respect to ACS objectives because these objectives are general, subjective, and provide no quantitative criteria or benchmarks for comparison. Therefore, performance of the Big Creek subwatershed with respect to ACS objectives is addressed only qualitatively here. For specifics, readers are encouraged to consult the Aquatic and Riparian Habitat section in the Watershed Analysis for quantitative evaluations of habitat conditions based on ODFW Benchmark Criteria and the NMFS Matrix of Factors and Indicators.

Significance of Differences Between Expected and Existing Wildlife Habitats

Because of past management practices, many Riparian Reserves are not currently functioning at their potential. In order for Riparian Reserves to maximize their contribution to connectivity and refugia for wildlife, the majority must be in late-successional habitats and must contain snag and down log habitat at levels found in unmanaged stands. Only 39% of Riparian Reserves are currently in potential late-successional forests (> 80 years of age). It will take 40 years before more than half of Riparian Reserves are in late-successional condition (Appendix C,Figure C-4). Greater than 80 years are required for the majority of Riparian Reserves to contain stands >160 years of age. Many Riparian Reserves contain recent harvest units or have been subject to salvage or snag falling activities which have left them deficient in snag and down log habitat.

Table III.8-2 Evaluation of riparian conditions in the Big Creek Analysis Area with respect to ACS objectives.

ACS OBJECTIVE	RATING	JUSTIFICATION FOR RATING
Objective 1- Distribution, diversity and complexity of landscape-scale features	At risk	Watershed-scale features such as flow conditions, sediment regime, habitat condition and access to historic habitat have been altered from conditions to which aquatic populations in the subwatershed have adapted.
Objective 2 - Spatial & temporal connectivity	Not properly functioning	High densities of culverts and riparian roads in subwatershed reduce connectivity in riparian areas. Lower 8 miles of mainstem downcut and disconnected from floodplain. Poor water and habitat quality in Middle Fork Coquille river reduces between-watershed connectivity.
Objective 3 - Physical integrity of aquatic system	Not properly functioning	Most fish-bearing streams in watershed downcut due to lack of large roughness elements. Large down wood generally absent in streams and on floodplains. Extensive riparian harvest along non-fishbearing streams. Streamside roads abundant.
Objective 4 - Water Quality	Not properly functioning	Big Creek exceeds the Basin Standard for temperature, during portions of the summer. High turbidities are noted during storms.
Objective 5 - Sediment Regime	Not properly functioning	Insufficient LWD is deficient in headwaters channels to store sediment. Increased rate of landslides due to influence of roads and past harvest. Most valley bottom streams are downcut and access to bank materials. Big Creek and lower tributary streams lack floodplains to deposit sediments.
Objective 6 - Instream Flows	Not properly functioning	Factors missing that may moderate high flows including instream structure, floodplains, and beaver dams. High road density may lead to quicker runoff. Harvest in rain-on-snow zones of watershed lead to greater risk for elevated peak flows. Channel entrenchment, lack of pool-forming elements such as beaver and LWD decrease storage capacity of watershed streams.
Objective 7 - Floodplain Innundation	Not properly functioning	Most streams in lower reaches are disconnected from floodplains and receive little or no seasonal innundation. Floodplains along Big Creek supporting only dryland vegetation.
Objective 8 - Species Community Diversity and Riparian Veg Function	Not properly functioning	Riparian zones disconnected from floodplains not supporting communities of wetland vegetation. Existing riparian zones fragmented. Many areas not supporting expected abundance and diversity of riparian species.
Objective 9 -Plant, Invertebrate, and Vertebrate Habitat	At risk	Many Riparian Reserves were already heavily impacted by harvest, salvage, snag falling, and roading prior to their designation. Existing habitat is fragmented.

Connectivity & Refugia - Landscape Scale

Late-successional wildlife species dependent on Riparian Reserves for connectivity include northern spotted owls, marten, some bats, and pileated woodpeckers. Maintaining connections across the landscape for relatively mobile species requires “stepping stones” and corridors of late-successional habitat throughout each subwatershed. Riparian Reserves will provide dispersal habitat spread throughout the subwatershed. Fifty six percent of BLM-administered land (30% of the subwatershed) is in Riparian Reserves; these forest areas will provide dispersal habitat as they mature and develop late-successional habitat characteristics. Table III.6-5 summarizes current and projected dispersal habitat conditions for northern spotted owls (see also Appendix C, Figure C-1). Fifty three percent of existing BLM dispersal habitat is in Riparian Reserves. In the long term, 68% of BLM dispersal habitat will be in Riparian Reserves. Dispersal conditions for northern spotted owls may accommodate dispersal habitat needs for other mobile late-successional species as well.

Maintaining connections between LSRs for marten and pileated woodpeckers depends heavily on maintaining late-successional habitat in Riparian Reserves and on maintaining adequate levels of down log and snag habitat. Snag and down log habitat will continue to develop in Riparian Reserves at the natural (relatively slow) rate. Management activities could accelerate (tree topping or falling) or decelerate (salvage, harvest) this rate.

Overall, connectivity and refugia functions for relatively mobile species wildlife species associated with late-successional habitats are currently at some risk (due to past management activities), but conditions will improve significantly as habitats in Riparian Reserves mature. Considering the relatively high proportion of the analysis area in Reserves, these areas should support the long-term connectivity and refugia functions for relatively mobile wildlife species.

Subwatershed/Site scale

Existing Riparian Reserves must fulfill all life requirements for relatively immobile species and riparian-dependent species such as red tree voles, white-footed voles, beaver, some bats, reptiles, amphibians, and invertebrates. Riparian Reserves will serve as species source-areas for repopulating adjacent areas undergoing harvest and subsequent recovery. In order to maintain connectivity and refugia for these species, Riparian Reserves must be dominated by late-successional habitats, contain snag and down log habitat levels similar to unmanaged stands, and be relatively free of barriers such as roads and culverts.

Riparian Reserves will also serve as corridors for movements and genetic interchange of species. Late-successional forests and Riparian Reserves near the edge of the subwatershed can also provide connections to adjacent subwatersheds. Harrison (1992) and Meffe and Carroll (1994) recommend using animal home ranges as a guide for determining corridor widths. Harrison (1992) suggested to assume that home ranges are twice as long as wide. Following this assumption, Table III.8-3 summarizes the data on home ranges and movements for species potentially persisting in Riparian Reserves (as well as others with life histories similar to Pacific Northwest species). See Appendix C, Table C-5 for additional information.

Table III.8-3 Ability of various corridor widths to accommodate home ranges or movements of wildlife potentially needing to persist within Riparian Reserves.

Corridor Width	220 ft (½ tree height RR)	330 ft	440 ft (1 tree height RR)	550 ft	660 ft (1½ tree height RR)
Percent of species accommodated	65	79	88	88	97

The ability of Riparian Reserves to accommodate the full life history needs of species is heavily dependent on maintaining suitable microclimate, particularly for species such as amphibians, bats, and invertebrates. Figure V-13 from FEMAT indicates that riparian buffers of 1 tree height maintain soil moisture, radiation, and soil temperature near streams; air temperature was maintained with buffers 2 tree heights; wind speed and relative humidity required 3 tree height buffers to ameliorate edge effects. Maintaining suitable microhabitat characteristics is especially important around scarce habitats such as seeps, springs, and rocky outcrops. Maintaining connections within these riparian corridors can be impeded by roads and culverts (see Road Density in Section III.6 Species and Habitats). Some road density in Riparian Reserves should decrease as we strive to meet ACS Objectives.

Overall, connectivity and refugia functions for relatively immobile wildlife species wildlife species associated with late-successional or riparian habitats are currently at some risk, due to:

- relatively limited area available in late-successional habitat (39%).
- fragmented nature of habitats
- presence of potential barriers (roads, culverts, areas of unsuitable habitat)

Connectivity for less-mobile organisms should improve as Riparian Reserves attain late-successional status and culverts are upgraded; however, the long-term ability to retain connectivity between areas of optimal habitat will always be compromised as long as riparian roads persist and private lands (managed to offer limited connectivity) intersect public lands.

Current and Future Key Habitat Areas

Table III.8-4 is an evaluation of riparian areas in the watershed based on their capacity to provide the key physical and biological values discussed earlier. In this table, those values have been integrated into six “indicators” of key habitat areas, both for the present and future. This analysis was conducted at the sub-drainage level. Finer analysis is not possible due to lack of site-specific information.

Table III.8-4 Results of the Composite Riparian Reserve Area Ranking Process.

Indicator	Axe		Bear Pen		Brownson		Fall		Jones		Lower Big		Middle Big		Upper Big	
	Curr	Pot	Curr	Pot	Curr	Pot	Curr	Pot	Curr	Pot	Curr	Pot	Curr	Pot	Curr	Pot
Large Proportion Late-successional Habitat	H	H	H	H	M	H	M	H	L	M	L	M	M	M	M	H
Contiguous Habitats within Drainage	H	H	H	H	M	H	M	H	L	M	L	L	L	M	M	H
Provides connections betw. drainages and adjacent rip. reserves	L	M	L	M	L	H	L	H	L	L	L	M	L	L	M	H
High LWD and Snags[1]	L	H	M	H	L	H	L	H	M	M	L	L	L	M	L	H
Potential for Riparian Restoration	L	L	L	L	H	M	M	L	M	L	H	M	H	M	M	L
Road Density	L	L	H	H	L	L	L	L	M	M	M	M	M	M	H	H
Instream Habitat	M	H	H	H	M	H	M	M	L	L	L	M	L	M	M	M
Potential for In-stream Restoration	M	M	H	H	H	H	M	M	L	L	L	L	M	M	H	H

H = High value from a biological perspective (example: low road density in Bear Pen Creek=high biological value)
M = Medium value from a biological perspective
L = Low value from a biological perspective

[1]No significant inventories for snags or down logs have been conducted. The rating is based solely on the known occurrence of past salvage activities which removed these structures and the presence of roads parallel to the stream which facilitated theft and removal of individual down logs (areas with known salvage activity or roads received "L", all others received "M").

Site-scale Riparian Reserve Characteristics

The following are characteristics important to understanding Big Creek riparian ecosystem structure and function at the site scale.

- position in stream network
- duration of flow (i.e., perennial vs. intermittent)
- magnitude of peak and base flows
- soil type
- local topography & geology
- disturbance regime and history
- presence and distribution of riparian-dependent and associated species
- fire history
- floodplain dynamics
- geomorphology
- management history
- aspect/potential exposure to solar radiation
- presence of/proximity to seeps, springs, and rock-outcrops.

Susceptibility of Riparian Values to Management Activities

Table III.8-1 discussed the relative vulnerability/susceptibility of the physical and biological values of riparian reserves to various hazards should they occur. The following (Table III.8-5) is an evaluation of the likelihood that the *rate* or *magnitude* of those hazards will increase if certain management activities are carried out.

Table III.8-5 Evaluation of the susceptibility of various hazards to increases in rate or magnitude following a given management activity.

Management Activities (carried out under ACS requirements)	Hazard	Susceptibility of hazard to increase in rate/magnitude given management activity	
		Short Term	Long Term
Reduction in Riparian Reserve Width (Regen Harvest and accompanying activities)	Landslide/Debris Torrent Peak/Base Flow Changes Water Quantity/Quality Sediment Regime Temperature/Humidity Windthrow	Low-Moderate Low Low Low Moderate-High Low-Moderate	Low Low Low Low Low-Moderate Low
Density Management, Thinning, PCT, Port-Orford Cedar Treatments	Landslide/Debris Torrent Peak/Base Flow Changes Water Quantity/Quality Sediment Regime Temperature/Humidity Windthrow	Low Low Low Low Low-Moderate Moderate	Low Low Low Low Low-Moderate Moderate
Road-building and reconstruction	Landslide/Debris Torrent Peak/Base Flow Changes Water Quantity/Quality Sediment Regime Temperature/Humidity Windthrow	High Low-Moderate Moderate-High Moderate-High Low-Moderate Low	High Low-Moderate Moderate-High Moderate Low-Moderate Low
Road-decommissioning	Landslide/Debris Torrent Peak/Base Flow Changes Water Quantity/Quality Sediment Regime Temperature/Humidity Windthrow	Moderate Low Low-Moderate Low-Moderate Low Low	Low Low Low Low Low Low
Riparian Silviculture	Landslide/Debris Torrent Peak/Base Flow Changes Water Quantity/Quality Sediment Regime Temperature/Humidity Windthrow	Low-Moderate Low Low-Moderate Low Moderate-High Moderate	Low Low Low Low Low Low
In-stream Projects	Landslide/Debris Torrent Peak/Base Flow Changes Water Quantity/Quality Sediment Regime Temperature/Humidity Windthrow	Low Low Low-Moderate Low-Moderate Low Low	Low Low Low Low Low Low

PART IV - RECOMMENDATIONS

Management Activities Appropriate for Riparian Reserves
The implementation of certain management activities in Riparian Reserves may be appropriate if the implementation and effects of those actions *meet* or *do not retard* or *prevent attainment* of Aquatic Conservation Strategy objectives. Actions proposed for Riparian Reserves should maintain existing condition or restore the ecological function appropriate for the site as defined in the Watershed Analysis (see Standards and Guidelines, B-10).

Site-specific analysis is required in order to determine the suitability of a given management action for implementation in a Riparian Reserve. However, management activities listed in Table III.8-5 (above) which are accompanied by moderate-to-high increases in rate/ magnitude of hazards following implementation in both the short AND long term should be undertaken with extreme caution or avoided. An example is road-building across stream channels, which is likely to prevent or retard attainment of ACS objectives in both the short and long term.

Activities (such as road decommissioning, POC treatment, riparian silviculture, in-stream projects) may retard attainment of ACS objectives in the short term (i.e., by increasing sedimentation or by removing riparian vegetation); however, these actions help attain ACS objectives in the long-term and are therefore appropriate for Riparian Reserves.

Guidelines for Reductions in Riparian Reserve Widths
Based on the proceeding analysis and the professional judgement of wildlife, fisheries, botany, hydrology, and soils specialists, there are opportunities to modify the interim Riparian Reserve boundaries on some intermittent streams in accordance with the Aquatic Conservation Strategy. The team recognizes that the analysis area encompasses diverse geomorphic features and habitats, and that the distributions of the species listed in Appendix F, Table F-1 within this area are not mapped or completely understood. Therefore, any modifications of interim Riparian Reserve boundaries must be analyzed at the site level and tailored to the specific features and biota of the site. To this end, the following recommendations are intended to guide the interdisciplinary team in subsequent site-level analysis and planning:

<u>General Recommendations:</u>

1. Riparian Reserves on areas subject to mass wasting or shallow-rapid debris flows (Figure III.1-ISE), extremely steep soil hazard (Figure III.1-hazard), and sensitive soils including FRGR2 (Figure III.1-TPCC) should be wide enough to protect the aquatic system from landslides and sedimentation. See drainage-specific recommendations below.

   a.. *Upper Big Creek drainage*: Based on slope hazard, mass wasting and erosion potential, and presence of susceptible soil types, recommend leaving intermittent stream interim width of 220 feet when doing regen harvest. For commercial or pre-commercial thinnings, a no-cut zone of 30' adjacent to stream channels will provide adequate filtering of surface erosion from disturbed soils created during the action. For Hardwood conversion and Riparian improvement projects a site level analysis will determine the leave strip widths. (See Appendix F-4 for specifics on soil types, erosion potential, etc.).

b. *Swamp Creek, Middle Big Creek, and Middle Upper Big Creek drainages:* Based on slope hazard, mass wasting and erosion potential, and presence of susceptible soil types, recommend leaving intermittent stream interim width of 110 feet in regeneration harvest units and no-cut zones of 30 feet in thinning units. For Hardwood conversion and Riparian improvement projects a site level analysis will determine the leave strip widths.

c. *Lower Big Creek drainage*-Based on geology (Roseburg formation and presence of volcanics), slope hazard, and mass wasting potential, recommend reserve widths of 110 to 150 feet each side of the stream in regeneration harvest units. Leave no-cut zones of 30 feet when thinning to filter surface runoff of fine sediment. For Hardwood conversion and Riparian improvement projects a site level analysis will determine the leave strip widths.

d. *Brownson, Bear Pen, Axe, and Fall Creek drainages* **-** Based on presence of susceptible soil types (such as 14 and 15F), recommend reserve widths of 110 to 220 feet each side of intermittent streams and no-cut zones of 30 feet during thinning. For Hardwood conversion and Riparian improvement projects a site level analysis will determine the leave strip widths.

e. *Jones Creek drainage*-Based on presence of susceptible soils, slope hazard, and unique geology (Otter Point formation), recommend reserve widths of 110 feet each side of intermittent stream and no-cut zones of 30' during thinning. For Hardwood conversion and Riparian improvement projects a site level analysis will determine the leave strip widths.

2. Seeps/springs/wetlands - ensure these special habitats are included within Riparian Reserves and that the reserve widths are sufficient to maintain the characteristics of the site (e.g. shading, cool water, sediments, stable substrates, similar flow patterns/timing, maintenance of riparian vegetation, etc.).

3. Rocky habitats - when rocky habitats occur within Riparian Reserves, ensure that Reserve widths are sufficient to maintain the characteristics of the site (e.g. temperature, humidity and wind velocity). Interim Riparian Reserve widths should not be reduced where such reductions would isolate TPCC withdrawal areas.

4. To maintain LWD dynamics, Riparian Reserves should be at least 100' wide on each side of intermittent streams, except: 1) where a ridge line exists within 100' of a stream, in which case the ridge line may be used to delineate the Riparian Reserve boundary, and 2) where discontinuous/disjunct stream channels preclude the possibility of downstream conveyance of LWD, in which case an appropriate site-specific prescription could be developed to maintain the characteristics of the site.

5. Riparian Reserves should generally be a minimum of ½ site-potential tree height in order to accommodate home ranges of many small mammals, amphibians, and birds.

6. The following species are terrestrial and occur within the outer one-half of the interim Reserve width. Impacts to these species will be greater through loss of habitat and changes in microclimate. Therefore, presence of the these species should be determined prior to management actions that reduce Riparian Reserve widths.

BRYOPHYTES
- Kurzia makinoana
- Plagiochila satoi
- Racomitrium aquaticum

LICHENS
- Lobaria hallii

7. The level of habitat connectivity analyzed in the is watershed analysis was based upon the assumption of maintaining at least 50% of BLM acreage in a Reserve system (TPCC, Riparian, etc.) in order to maintain long term connectivity.. Therefore, if the amount of Reserve acres fall below 50% of BLM acreage, then the analysis of connectivity needs to be readdressed.

8. Although trees in Riparian Reserves provide wildlife benefits, Riparian Reserve trees should not be used to fulfill the green-tree requirement for an adjacent harvest unit.

9. Reductions in interim widths of “high value” Riparian Reserves may pose a higher risk of adverse ecological impacts. Therefore, management activities in these areas will require careful analysis. “High value” Reserves include the following:

a. Reserves containing forests > 120 years of age (offering incipient old-growth habitat),

b. Reserves which offer connectivity to other Reserves, particularly if they connect across ridges to adjacent drainages (Figure III.6- links map). Specifically, Reserves in sections 20,21,29 of T.28 S.,R.10 W. (Connectivity Block #1); sections 9,10 (NW/4) of T.28 S.,R.11 W. (Upper Fall Creek); and section 21 of T.29 S.,R.11 W. (Anderson Mtn.) because of their potential for connecting to adjacent subwatersheds.

c. Reserves which contain contiguous mid and late-successional habitat (providing connectivity and refugia for less-mobile species) (Figure III.8-3).

d. Reserves in Bear Pen, Upper Big, Axe, and Brownson Creeks (in that order),

e. Reserves in sections 21 and 22 of T.29 S.,R.11 W. (Anderson Mtn. area) containing late-successional habitats (potential for supporting nesting for bald eagles).

f. Reserves on prominent ridgetops, which can provide bat roost habitat and facilitate lichen spore dispersal,

g. Reserves currently uninterrupted by culverts or road crossings (facilitate connectivity),

h. Reserves with high amounts of down log or snag habitat.

IV.1 - RECOMMENDATIONS -

Specific to the BIG CREEK ANALYSIS AREA

FOREST MANAGEMENT

Potential Thinning & Regeneration Harvest Areas

Identify areas of timber harvest needed to meet the District's probable sale quantity (PSQ) commitment.

The following analysis was used to identify general areas of harvest, leaving the specifics such as selection of logging systems, specific unit prescriptions and final unit boundaries to be addressed through the NEPA process.

The first step in the selection process of potential harvest areas was the development a GIS map of all available stands. The map identified areas only within GFMA designated lands; which were greater than 35 years of age; and not located within Riparian Reserve, "Withdrawn" Timber Production Capability Classification allocated lands, or other administratively withdrawn areas.

This first step identified 277 acres of potential thinning based upon stands which are between 35 and 50 years of age. In order to concentrate on areas which are economically or physically feasible to harvest, only areas 5 acres or larger in size were mapped. Additional opportunities for commercial thinning may be available in stands less than 35 years old. The timing and intensity of thinning will be dependant upon the results of site-specific stand exam analysis.

This step also identified 989 acres of potential regeneration harvest based upon stands which were greater than 60 years of age and, again, only areas 5 acres or larger in size were mapped. Recommendations used to identify the potential regeneration harvest areas were:

- Concentrate areas of harvest to lessen the effects of fragmentation. Harvest units and roads should not be placed within the interior of relatively large, contiguous late successional habitat blocks. If part of a late-successional habitat block must be modified, treatment units should be selected on the edge of the block and designed to minimize fragmentation, to maintain the largest block of habitat intact, and to avoid breaking an otherwise contiguous stand into two stands.

- Maintain late-successional forest connections between adjacent watersheds. Key areas are those in Sections 9 & 21, T.29 S., R.11 W. and Sections 21& 29, T28S-R10W.

- Maintain unfragmented late-successional forests in Sections 7, T29S-R10W and 13, T29S-R11W.

- Concentrate the timing of harvest activities to more closely emulate patterns of infrequent natural disturbance. Remove the portion of the decadal PSQ commitment attributable to the analysis area within a few years, rather than a gradual harvest schedule throughout the decade.

Potential harvest areas (Figure IV.1-1) were prioritized. It was understood that commercial thinning areas would receive first priority for treatment depending upon results from subsequent field surveys. These surveys would identify actual tree stocking density (TPA) and appropriate silvicultural prescription to obtain the desired stocking level should be used.

Potential thinning harvest areas were prioritized as follows:

Priority 1 are areas that would receive first consideration for commercial thinning depending upon results from subsequent stand exams. Road construction should be limited to short temporary spur roads. Changes to unit size and shape is anticipated upon extensive field review.

Priority 2 are areas which appear to have marginal stocking and have poor accessibility. Use of existing roads or helicopter is preferred.

Regeneration harvest areas were categorized as a harvest priority 1, 2, or 3, based upon the following definitions:

Priority 1 are areas that are available for harvest during the first entry into the watershed. These potential units do not have obvious conflicts with wildlife, fisheries, soils, and are physically harvestable. Road construction associated with harvesting these units could be limited to short temporary spur roads. Extensive field review is required prior to proposing to cross small streams, even those already impacted by roads. Changes to unit size and shape are anticipated upon extensive field review.

Priority 2 are areas that are a moderate to high preference to defer from harvest for wildlife concerns to minimize fragmentation of the remaining areas. Extensive field review is required prior to proposing to cross small streams, even those already impacted by roads.

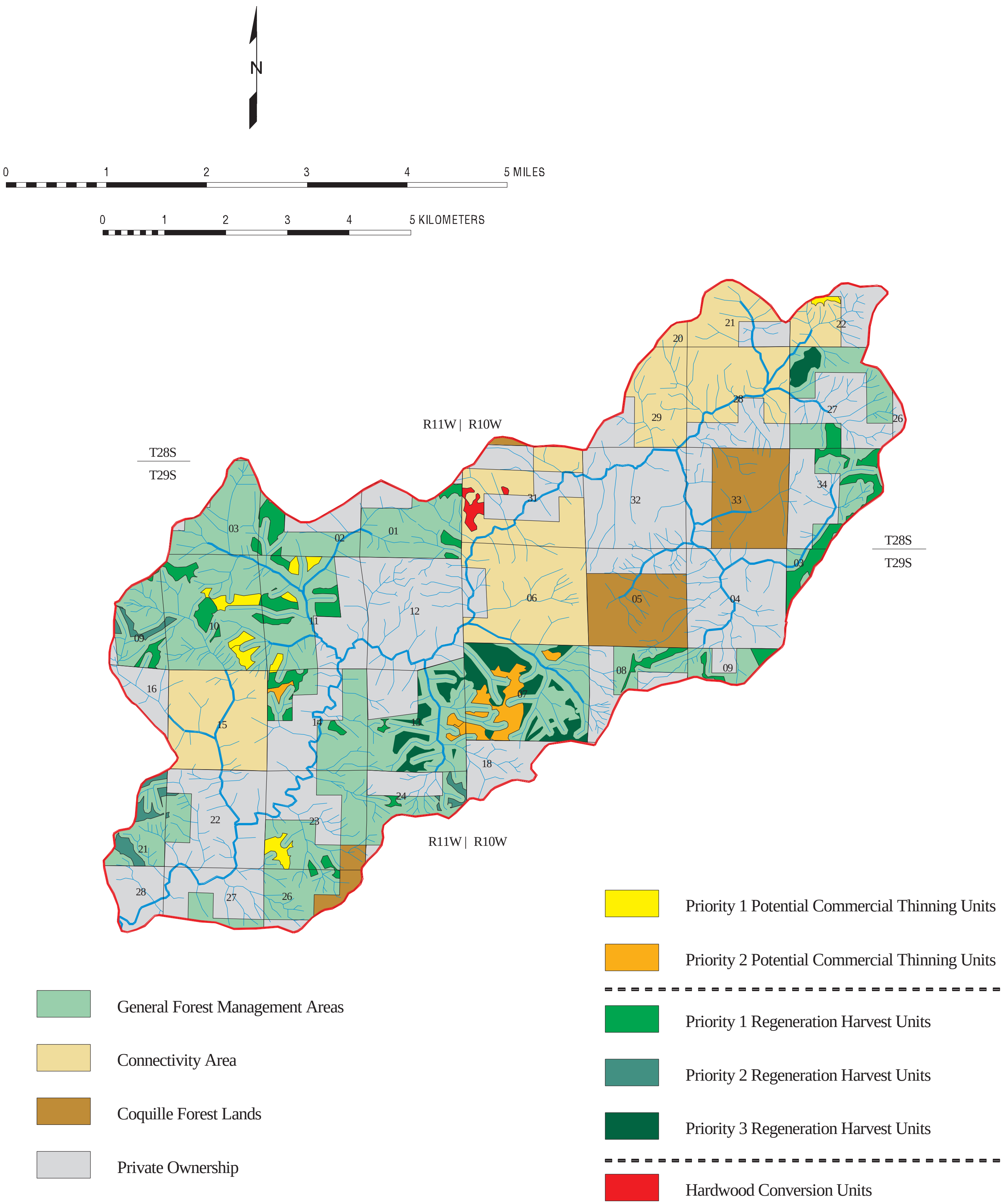
Priority 3 are areas that are a high preference to defer from harvest for wildlife concerns to minimize fragmentation of the remaining areas and to retain the oldest stands (150 yrs+) in the watershed. In addition, these areas offer a high degree of hydrologic and habitat connectivity. Road construction associated with harvesting these units could involve longer permanent type roads across streams which are currently unroaded.

Additional concerns to be incorporated into the site-specific analysis process:

- Evaluate effects of planned regeneration harvest activities on peak flow increase and channel response in the Upper Big Creek drainage.

- Use best available and effective types of Best Management Practices to minimize sediment delivery in Jones Creek.

Figure VI.1−1 Potential Harvest Areas 1999–2000



Scale = 1:84480 (3/4" = 1 mile)

RESTORATION

Aquatic and In-stream

Maintain and/or restore connection between stream channels and riparian zones, stream structure, aquatic habitat complexity, water quality and quantity.

- Big Creek (BLM-ownership reach in section 6 and 31) is a good candidate for a tree-lining project due to the availability of large conifer trees in the adjacent riparian area and apparent suitability of stream channel to this type of habitat improvement (low terrace, accessible floodplain, low-gradient channel unconstrained by hillslopes), and lack of large down wood in adjacent riparian zones and floodplains. Aquatic and riparian habitat within this reach should be further inventoried and evaluated by fishery and wildlife biologists to determine habitat conditions and project feasibility.

- Bear Pen Creek is an excellent candidate for placement of large down wood in the riparian zone/floodplain and in stream channel along the reach in the extreme southern end of Section 6. The stream is slightly downcut, but not so far that it is out of reach of its floodplain. It receives heavy spawning use but currently (due to stream cleaning and salvage from the riparian zone/floodplain) has little rearing habitat for fishes. Past salvage activites also removed down wood which provided riparian habitat for wildlife. The riparian zone is currently un-roaded so horse-teams should be used to place any logs in the riparian zone, floodplain, and stream channel.

- Axe Creek is a good candidate for placement of large down wood in the riparian zone/floodplain and in stream channel. Spawning occurs along Axe Creek, but there is little rearing habitat. The down wood currently in the channel is providing small, complex pools along the channel margins, but these pieces are few and habitat abundance is low. The smaller size of the channel in this area makes feasible the use of shorter length logs, not necessarily whole trees.

- Brownson Creek is a good candidate for placement of large down wood in the riparian/zone floodplain and in stream channel. The stream currently has numerous scour pools but generally lacks complexity. There is little down wood in floodplains to store/stabilize sediments or provide habitat for riparian wildlife.

- Reduce the impact of a segment of Upper Brownson Creek Road (29-11-11.1A). This segment , located between Road No 29-11-11.4 and 29-11-11.3, was constructed within the floodplain of Brownson Creek. Currently, the stream is undercutting the road, thereby, releasing road-grade sediments into the stream channel and undermining the integrity of the road. This area of Brownson Creek receives heavy spawning use by coho salmon and has the potential to provide excellent rearing habitat. Appropriate measures to attain ACS objectives and increase habitat quality should consider the following:

    - avoid actions (e.g. installation of rip-rap) which harden the streambank as this type of activity reduces the stream's natural tendency to meander and increases channel scour, reduces habitat quality, and prevents attainment of ACS objectives.

- consider the removal of this segment from the floodplain of Brownson Creek. The existence of a road in the floodplain and severely constricts streamflow, subsequently resulting in increased channel scour, downcutting, and substantial reduction in coho habitat quality and quantity.

Human-caused barriers and impediments to movements should be removed or modified to allow access for all aquatic species to their historic range.

C Replace, repair, or retrofit culverts blocking passage of fishes (Figure III.6-6) and other aquatic organisms. It is important to note that culverts currently providing passage for salmonids restrict access and passage by non-jumping fishes and crawling aquatic organisms. Future culvert replacements and retrofits should provide passage for all aquatic biota by placing culverts on or slightly below stream grade, with outlets in contact with the stream bottom. In areas where high habitat quality exists and non-jumping special status species are present, add roughening baffles to culverts to collect gravel throughout the culvert-bottoms.

C Cooperate with private landowners, the Coquille Tribe, and the Coquille Watershed Association to further identify and possible replace, repair, or retrofit barrier culverts in the Swamp and Upper Big Creek drainages.

Riparian

When possible, using silvicultural techniques, restore natural vegetation patterns and assemblages as well as critical components of riparian function (riparian down wood, physical and hydrologic connections between stream channel and floodplains).

C The Swamp Creek drainage is an excellent candidate for riparian restoration. Numerous reaches along Swamp Creek and its tributaries are lacking conifer, long-lived hardwoods, or even sufficient alder coverage to adequately shade the stream or provide any structure to the stream channel.

C Do not undertake riparian silviculture projects along hardwood-dominated reaches of riparian zones in lower and middle Bear Pen Creek. Analysis of early aerial photographs on-the-ground reconnaissance (determining presence of conifer stumps and extent of floodplain) indicate that this reach was historically hardwood dominated. The reach currently contains a diverse mixture of hardwood species.

C Riparian silviculture projects along Axe Creek should be undertaken with caution. Conduct further investigations of historic conifer presence and floodplain delineation along lower and middle Axe Creek. Initial reconnaissance located no conifer stumps along lower and middle Axe Creek, but aerial photo analysis was inconclusive.

C Brownson and Fall Creek are an excellent candidate for riparian restoration projects. On-the-ground reconnaissance and/or aerial-photo delineation to determine floodplain extent and past distribution of riparian conifers located several areas in Sections 11 (Brownson Cr) and 15 (Fall Cr) where cedar and Douglas fir existed on raised “lenses” in floodplains and on high terraces adjacent to historic floodplains. Riparian silviculture in these areas should focus on leaving existing long-lived hardwoods (maple, myrtle, ash), removing selected alder, and planting conifers in these locations.

- Lower Big Creek is a candidate for riparian restoration. It should be noted that the hydrologic conditions (high water table, frequent flooding, etc.) which supported the historic community have been altered and it may not be possible to re-establish the original vegetative community . Additionally, explore opportunities to establish joint riparian project between BLM and private landowners and the Coquille Watershed Association along lower Big Creek. The Watershed Association has expressed interest in riparian projects in this area.

Watershed (General)

Improve late-successional forest habitat function.

- Defer harvest of the Bear Pen and Axe Creek drainages (T29S-R10W Sec. 7 & T29S-R11W Sec.13) until consideration is given through the RMP amendment process for designating these areas as LSR. The LSR designation would provide long-term protection for two of the few drainages in the Middle Fork Coquille Watershed with few or no roads and stream-crossing structures and a high level of aquatic habitat and hydrologic connectivity. Similar acreages of LSR could be located in other subwatersheds for conversion to GFMA land allocation in order to balance the land allocation acreages.

- Pursue opportunities to convert brushfields and hardwood stands to conifer, such as areas in W1/2 section 31, T28S-R10W. (Figure IV.1-1)

- Connectivity Blocks in the planning area vicinity have been examined for potential thinning or density management opportunities to promote tree growth and stand complexity. There are no stands in the 35-45 age class available for initial thinning opportunities. Older stand (60 - 100 years) were also field examined; only one small 10 acre stand could potentially benefit from thinning opportunities (Figure IV.1-1). The naturally regenerated stands closer to the 100 year age would not benefit from intensive management at this time. Some of the stands may not contain sufficient snag and down log habitat, so creation of large-diameter snags and down logs may be needed to meet management goals.

Maintain habitats for vegetative Species of Concern.

- Protect *Iliamna latibracteata* site (along Big Creek road 28-11-28.0 below the junction with 28-10-31.0) by delaying or eliminating road maintenance work (brush removal) following seed dispersal (after Sept 1). It may be determined that some removal of roadside vegetation may actually benefit the species. Before any proposed road maintenance occurs consult with District Botanist.

- For the *Sarcosoma mexicana* site in the NW1/4 Section 10, T29S- R11W, conduct inventories during the fruiting season (winter and spring) to determine presence and extent of population in the area.

- Maintain deep litter layer around the existing site (and any future sites) of *Sarcosoma mexicana* by deferring prescribed burning of understory vegetation and other activities that would reduce litter layer.

Roads

Reduce erosion from roads caused by culvert failure, outlets, or improper location

- Conduct a thorough culvert inventory of roads. Concentrate on roads in proximity to riparian areas or that contain streams. Replace or repair culverts and outlet erosion with "Jobs-in-the-Woods" program or upcoming timber sales, whichever is applicable. Replacement of culverts has been identified, but is not limited to:

Road System/Area	Recommendation	miles
Fall Creek Systems	culvert replacement	4.0
Brownson Creek Systems	culvert replacement	2.0
Jones Creek Systems	culvert replacement &installation*	9.5
Other Big Creek roads	culvert replacement	4.5

* several locations in the Jones Creek system have been identified to be in need of additional culverts (see TMO recommendations for specific roads).

- Cooperate with willing landowners and Watershed Associations to identify and rectify sediment sources from roads and replace/repair culverts acting as barriers to aquatic biota.

- Due to the high erodibility of soil types 14F, 15F, 38F, 46F, and 58F, any culvert outlet within these soils should not be 'shotgunned' and stream culverts should be placed on the original stream gradient. Add energy dissipaters at all outlets, unless natural ground conditions prevent erosion. Road fills over the large (i.e., 48") culverts should be armor-plated on both inlet and outlet to reduce erosion of the fill.

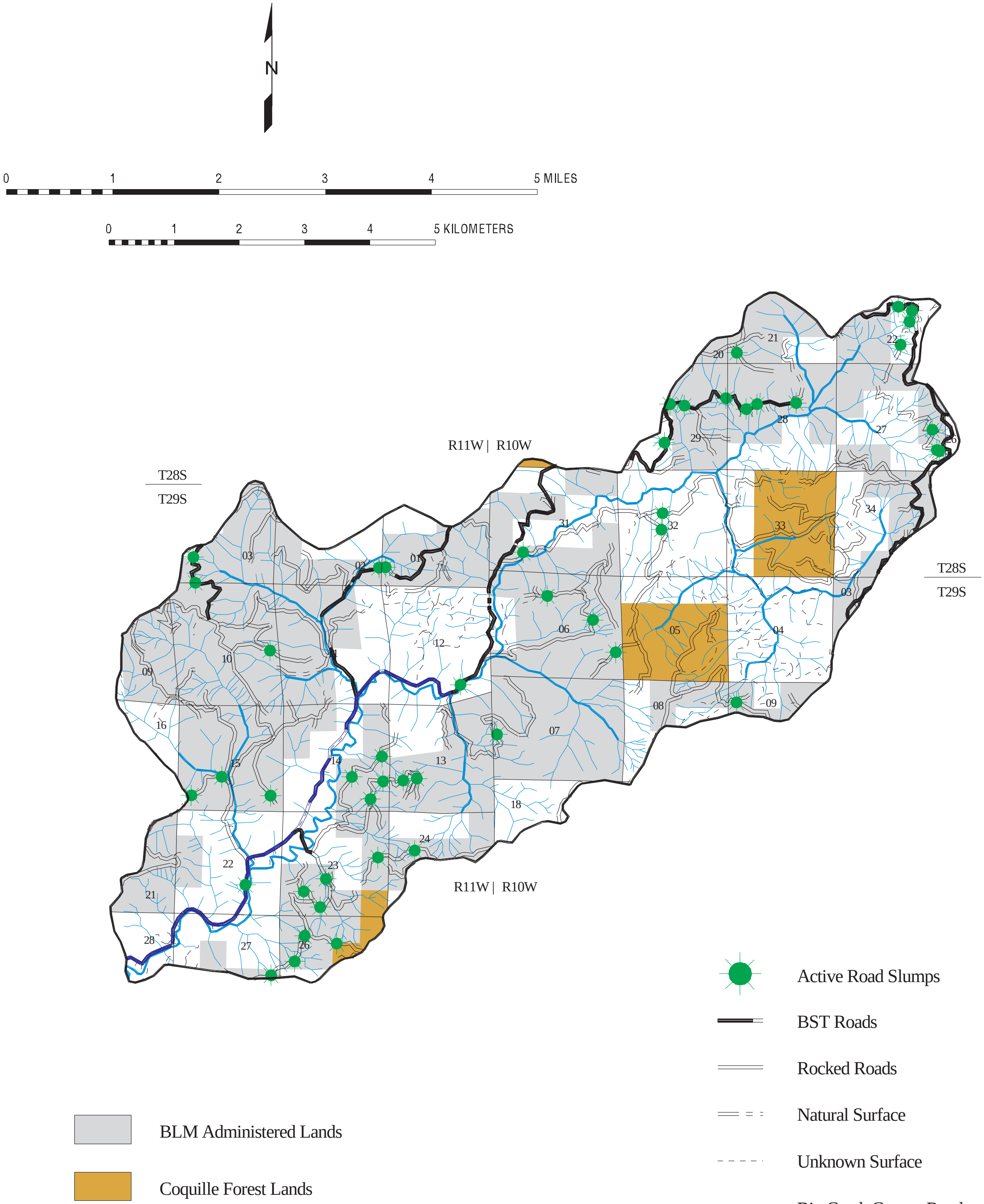
Reduce erosion from roads caused by surface runoff or lack of maintenance.

- Improve road drainage and surface condition of the following roads to lessen erosion: 29-11-11.4; 29-11-15.0; 29-11-23.5 .

- Develop MOU with private land owners for repair and sediment management of dirt surfaced roads in Upper Big Creek, Middle Big Creek drainages, and roads no. 29-10-9.3 & 29-11-24.2.

- Evaluate the active slumps (particularly in Jones Creek) within the drainage (Fig IV.1-2) for repairs that will provide long term stability after repair. Do not overburden the slope with additional weight. Provide drainage prior to or within the slump area if possible.

Figure IV.1−2 Locations of Active Road Slumps



Scale = 1:84480 (3/4" = 1 mile)

Close roads identified through the TMO process to reduce their effect on erosion, water quality, and to meet road density objectives.

- The TMO process identified approximately 18 miles of road to close which could be closed through "Jobs-in-the-Woods" programs or upcoming timber sales, whichever is applicable. TMOs for individual roads to be closed are located in Appendix E-2. Generally, proposed road closures can be summarized as follows:

Recommendation	miles	BLM method	Specific Road System/Area
closure	4.7	gates	Bear Pen & T28S-R10W,Sec.29
decommission	12.2	permanent barriers	
decommission	1.3	self close	

  Installation of physical barriers on 16.9 miles will result in a BLM open road density of 2.77 mi./sq.mi. Several un-numbered spur roads are also available for decommissioning and their milage is not reflected in the above figures.

- Some roads recommended for closure are subject to reciprocal right-of-way agreements. Prior to any change in road status, consultation with the Permittee is necessary in accordance with Instruction Memorandum OR-95-87.

- Some roads are recommended to be self closing. These short roads will still allow access for reforestation purposes (planting, release, thinning). However, over time, generally a 10 - 15 year period, the encroaching vegetation would act to prohibit vehicular traffic. Roads recommended to be self closing would not be classified as 'closed' until encroaching vegetation physically prohibited vehicular access. The eventual closing of these roads would further reduce open road density.

- The current open road density on the Coquille Forest lands is 5.3 mi./sq.mi. Reduction in open road density could be accomplished as part of future activities by the Coquille Tribe.

- All self closing roads and those behind permanent barriers should be placed in a self maintaining condition. These roads will not receive further maintenance, and steps need to be undertaken to minimize possible erosion. Construction of waterbars/dips to relieve water traveling in ditches, and removal of culverts and fills in streams are some of the measures which will accomplish these objectives.

Minimize the effects of road construction in Riparian Reserves.

- Areas subject to mass wasting (Figure III.8-2) and sensitive soil areas, including TPCC designation - FGR2 (Figure III.4-1) should be used as guidelines to identify unstable areas in which new road construction should be avoided.

- Avoid fragmentation of remaining contiguous aquatic and riparian habitat areas in the analysis area.

- New road construction in areas on uninfected Port-Orford Cedar should be in compliance with the BLM POC Management Guidelines.

RIPARIAN RESERVE BOUNDARIES

See Section III.8 - Riparian Reserve Evaluation, Part IV Recommendations for appropriate management activities within Riparian Reserves and guidelines for modifications of interim Riparian Reserves.

MONITORING

Hydrology and Stream Channel

- Due to the high level of sediment delivery to Big Creek, it is of interest to determine sediment trends in this watershed. This may be accomplished by sampling stream bed substrates in depositional stream types, where stream gradients are less than 2%. A sampling scheme should concentrate on high value fish spawning riffle habitats.

DATA GAPS AND LIMITATIONS OF THE ANALYSIS

- With respect to fish populations, the role of Big Creek within the larger 5th field watershed (Middle Fork Coquille River) could not be quantified due to limited adult and juvenile salmonid population data, and highly variable ocean conditions. This limits the ability to determine short-term and long-term population trends.

IV.2 - RECOMMENDATIONS -

Generalized for the MIDDLE FORK COQUILLE WATERSHED

FOREST MANAGEMENT

Emulate the timing, intensity, variability, and scale of natural disturbance processes where practical.

- Concentrate harvest units in space and time.

- Establish stocking levels and forest patterns early in each stand's development through planting and pre-commercial thinning treatments. Planting and thinning prescriptions should consider natural stand spacing variations and species composition. The objective is to minimize impacts to wildlife species using the growing stand by reducing the number of silvicultural treatments and harvest entries conducted prior to final harvest.

- Consider wildlife trees or harvest prescriptions to feather edges of harvest units to soften the transition across edges.

- Maintain species diversity of canopy species and understory shrubs, including hardwoods, in harvest units.

Maintain and/or restore canopy complexity and vegetative diversity to plantations.

- During precommercial thinning, manual maintenance, and commercial thinning retain the natural species mix and encouraging variable spacings or forest gaps.

- Survey for opportunities and use prescribed fire as a tool to restore key habitat components and provide variation in stand level vegetation patterns in Reserve areas.

- Look for opportunities to create or retain wolf trees (trees with branches >6 cm in diameter less than 3 meters above the ground) by doing variable spaced thinning in pre-commercial and commercial thinning units. Generally speaking, these should be scattered throughout the overall landscape.

- In Connectivity Blocks, encourage development of more complex canopies on appropriate sites (typically north and east aspects, lower slopes and riparian zones) through pre-commercial and commercial thinning prescriptions.

- Low disturbance silvicultural activities (i.e. thinnings, maintenance, fertilization) could be allowed in Riparian Reserves providing appropriate buffer areas are left to protect water quality and other ACS objectives.

- Use native plant materials when available for restoration and erosion control efforts in accordance with District Native Seed Policy.

- Conduct inventories within potential sites in watershed for potential native seed collection sources.

- Utilize the green tree retention requirement to help maintain vegetative diversity by:

  a. retaining green trees of various sizes, ages, and species in well distributed patches as well as dispersed individuals.

  b. retaining the same green trees over repeated rotations,

  c. retaining trees with heavy epiphytic loads to act as an inoculum,

  d. considering the diversity of tree structure, that is trees with complex canopies, such as asymmetrical crowns or leaning boles, or trees with potential for developing 'wolf-tree' characteristics.

Snags

- On GFMA and Connectivity Blocks, decrease the time it would take to meet snag density goals by managing for 40% population potential by creating snags in other suitable areas not yet scheduled for harvest. Forty percent population potential equates to approximately 2 hard snags/acre. Snags should represent a variety of decay classes, topographic positions, seral stages, and distributions (i.e. large and small clumps and singly) and need to be provided through time.

- On Reserve land allocations, actively strive to meet snag density goals by creating snags in areas currently deficient. Forested Reserve areas should be managed for 100% population potential which equates to approximately 6 hard snags/acre. Snags should represent a variety of decay classes, topographic positions, seral stages, and distributions (i.e. large and small clumps and singly) and need to be provided through time.

- During pre-commercial thinning treatments, consider creating 1 small snag per acre in areas dominated by early and mid-seral stands which contain few snags.

Down Logs

- On GFMA and Connectivity Blocks, decrease the time it would take to meet down log retention goals by exceeding minimum requirements in harvest units and/or by creating down log habitat in areas not yet scheduled for harvest. Minimum retention levels from the RMP (120' of 16" diameter logs) equate to approximately 167 ft^3/ac of hard logs. Existing class 1 and 2 down logs can be removed in harvest units if >214 ft^3/ac (approximately 153' of 16" diameter logs) exist in decay classes 1-2 within the unit (the low end of availability in natural mature stands based on Spies et al. [1988]). Salvage of down logs in GFMA land will be pursuant to District Policy OR-120-96-05.

- In riparian areas within Riparian Reserve lands, actively strive to provide down log levels within the range of natural variability for Oregon Coast Range riparian areas. See Table III.6-1 for down log availability in natural stands. Down logs should represent a variety of decay classes, topographic positions, and orientations and need to be provided through time.

- On upland Reserve lands, actively strive to provide down log levels within the range of natural variability for Oregon Coast Range forests. See Table III.6-1 for down log availability in natural stands. See the LSR Assessment for Southwest Oregon (1997) for additional guidance on down log habitat in Reserve areas. Down logs should represent a variety of decay classes, topographic positions, and orientations and need to be provided through time.

RESTORATION

Aquatic Species and Habitat

Maintain and protect populations of aquatic biota and communities.

- Discourage or prevent introduction of non-native coho fry, parr, or smolts.

Maintain and/or restore stream structure, aquatic habitat complexity, and water quality and quantity.

- Pools throughout the watershed are fairly numerous, but consist chiefly of scour pools. Scour pools may providing moderate-quality summer habitat but, because they are erosional, do not provide adequate rearing and holding habitat at high flows. Any restoration to create pools should concentrate on creating backwater, alcove, or other complex pools which maintain low velocities are high flows and/or increasing the complexity of existing pools.

- Meet or exceed the ODFW (1994) criteria for "good" habitat with respect to all parameters in all fish-bearing reaches, as verified by aquatic habitat surveys.

- If possible, select in-stream project sites with the assistance of a hydrologist. Use the Rosgen (1994) stream classification system and Rosgen and Fittante's (1986) suitability guidelines for selecting and evaluating in-stream fish habitat improvement projects to ensure that they are appropriately matched to habitat sites based on stream and valley form characteristics. For example, where F-type stream channels occur in the area (severe channel entrenchment), be aware that channel widening may occur as a result of in-stream projects. Projects should be designed to avoid converting C-type channels to F-type.

- Where in-stream habitat projects are proposed, use techniques which emulate the habitat complexity found in streams maintained by natural processes. Design structures to mimic the complex aggregations of wood and rock typical of unmanaged Coast Range streams, facilitate trapping of additional materials, and be self maintaining. Boulder weirs, without the incorporation of large and small woody material, often do not provide over wintering habitat for juvenile salmonids. Large conifer logs should be incorporated into the design and configuration of existing or future boulder weirs, boulder clusters, or boulder/log jams. Use large boulders as anchors/wedges to secure logs in place. Structures should resemble naturally occurring jams.

- Focus restoration projects in step/pool and pool/riffle stream types (generally Type B and C channels), where they do not meet the desired trend. This may include gradient control log/rock steps to create pools, and placement of whole trees or logs and other log/rock structures to aid in floodplain connectivity, and aid near surface groundwater recharge.

Consider tree lining/cutting projects where an abundance of large conifer trees exists. At each site, select a large live conifer tree that can serve as a "key" spanner log, and one or more additional live conifers to be incorporated at various angles with the key piece. Where possible, logs should be 2 to 3 times the width of the active channel, with root wad attached. This will provide different obstruction angles for high stream flows to interact with streambanks and floodplains. Additional hardwood trees could be added to the accumulation to contribute twigs, branches, and additional edges.

C For all projects involving large wood, avoid placing cut logs of lengths less than 2 to 3 times the active channel width in the stream channel. If smaller logs are selected, expect these logs to be floated downstream. If anchoring logs at a site is necessary, it should be done with large boulders or more stable logs to minimize the use of steel cable

C Retain all log jams unless there is compelling risk of damage to the environment or property. An interdisciplinary team (ID) including a hydrologist should review all log/debris jam removal proposals to evaluate both ecological effects and risks to adjacent landowners. This ID team should consider ways to modify the log jam without total removal to meet desired habitat objectives, while assessing the risks to adjacent private property and fish passage

C During major storm events (those that increase peakflows to bankfull width or greater), consider returning woody debris and soil material resulting from an instream channel debris slide and intercepted by roads to the stream system. This could be accomplished by moving the debris below the roadway onto the stream's flood. The next high water event can continue moving this debris along the stream course.

C During harvest activities, place large woody material in mainstems of the drainages when necessary to provide storage and settling of fine sediments.

In areas that have been severely altered by management, use silvicultural techniques to enhance natural vegetation patterns, and restore (to potential natural communities and to the extent possible) historic vegetation assemblages and other critical system components (i.e., natural hydrologic function, bank stability, water quality, and native fish and wildlife habitat).

C In lowland reaches, explore opportunities to re-establish long-lived hardwoods such as bigleaf maple, myrtle and ash. When undertaking riparian silviculture projects, explore opportunities to restore *diversity* of hardwood species (i.e., addition of bigleaf maple and ash) in addition to planting of conifer.

C Before undertaking riparian silviculture projects, determine if the sites were historically dominated by conifers, hardwoods, or both. Historical conifer presence or suitability of a site for conifer planting may be determined by early aerial photos, presence of conifer stumps, or delineation of current or historic floodplain (determined from geormorphic characteristics, presence of alluvium, etc.). Conifers can be established in areas that are dominated by alder by girdling or removing small patches of alder and planting conifers in the created gaps. Mature, long-lived hardwoods (big leaf maple, ash, chinkapin, myrtle, tanoak) should never be removed. In stands dominated by a mixture of hardwoods, alders should be preferentially removed to create the canopy gaps, below which conifers can be planted. Appropriate consideration should be given to follow-up maintenance of project sites. Some sites may require multiple treatments to sustain their recovery.

- In lowland riparian areas, silvicultural treatments should achieve a mixed hardwood stand, with scattered conifers, extending on both sides of the stream to the edge of the floodplains and flood prone terraces. The understory should include native shrubs and herbaceous species.

- In upland riparian sites, silvicultural treatments should achieve a conifer-dominated overstory or conifer/hardwood overstory. Depending on site conditions and the degree of interaction between stream channel and adjacent hillsopes, there may be a narrow strip of hardwoods immediately adjacent to the stream channel. The range of conditions depends on site conditions, reference stand conditions, and ability to meet specific wildlife and fisheries' objectives. On BLM lands, this vegetation would extend on both sides of the stream in accordance with the riparian reserve widths specified in the ROD (1994), as modified in accordance with a riparian reserve evaluation (Section III.8 - Riparian Reserve Evaluation). On private lands, this vegetation would extend on either side of the stream channel in accordance with the State Forest Practice Rules (1994). The understory would include a mixture of native shrub species, varying with site conditions.

- Hardwood dominated sites (including red alder sites), where they would naturally occur, should not be considered for silvicultural treatments (i.e., active floodplains, unstable slopes, rocky headwalls, and areas with frequent intervals of debris torrents, and other unique geologic sites). Consider the function of the alder and brush as debris racks and sediment filters during floods, as a source of litter input, and as stream shade.

- In areas where hardwood densities are planned for reduction, project design should include evaluation of stream temperatures. In areas where stream temperatures are high or moderately-high, projects should remove few overstory trees. In general, 10-30% of the trees should be girdled rather than cut and removed, to provide short-term snag and down log habitat values. Several alders should remain uncut (or girdled) in patches to provide habitat for white-footed voles.

- Sites in which the occurrence of stand/patch replacing disturbances is greater than 80 years are more logical candidates for conifer reestablishment.

- High gradient streams capable of debris torrents and dominated by red alder (associated with past management disturbance) should be considered for silvicultural treatments. Treatments should be at least within one to one and a half site potential tree width from the stream channel, but may extend upslope according to other vegetation and wildlife objectives.

- Mature, single-stemmed myrtles and bigleaf maples should seldom be removed, especially in lowland riparian areas. Their presence may indicate they occupied a given site historically.

- In stands where field or aerial photo investigations indicated a conifer-dominated stand was converted to a stand dominated by a mixture of hardwoods, small patches of hardwood could be removed to create gaps in the canopy. Conifers can then be planted, provided the gaps allow adequate sunlight for survival and growth of the conifers. To maintain habitat for white-footed voles, and patches of alder should be maintained in project areas.

- Alder conversion projects in riparian zones need to consider snag and down log retention/creation; placement of cut material into the stream for structure or hiding cover; control of streambank erosion and fine sedimentation by maintaining live root mass along the stream bank; and maintenance of shade over the stream to moderate water temperature.

- A buffer should be left along the stream to provide shade, bank stability, anchor points for mobile woody debris, and refugia for organisms which may be displaced by management activities. The stability of a site should never be jeopardized to establish conifers.

- On unstable lower slopes, release of bigleaf maples and conifers, particularly western redcedar, is desirable. Planting of western redcedar or bigleaf maple on a small scale may be worthwhile where there are no other options for obtaining coarse woody debris over very long reaches. Initial planting should be considered experimental. The probability of converting these sites to conifer by planting is low on sites with active soil movement. Leaving these sites in native shrub, and/or alder will retain shrub and hardwood habitats on appropriate sites.

- The recommendations mentioned above should be assessed against the need to obtain the reduction in 60% of the overstory canopy necessary to permit enough light to reach the forest floor in order to regenerate the desired species.

- Appropriate consideration must be given to follow-up maintenance of project sites, often each year for 3-5 years following initial treatment. Some sites may require multiple treatments to allow for establishment of regeneration.

Roads

Minimize sedimentation from roads.

- As part of the culvert inventory process, examine evidence of erosion in ditch lines and current culvert spacing. Identify stable locations for additional culverts needed to reduce ditch line erosion or to decrease ditch line length before entering streams.

- Prior to construction or replacement of existing worn out or degraded culverts, stream inventories should be conducted to determine potential impacts to aquatic amphibians. Where appropriate and possible, facilitate upstream movement of aquatic amphibians through new culverts.

- Use culverts made of polypropylene material when replacing culverts where possible as culverts associated with running water appear to be rusting through at the contact point.

- Naturally surfaced roads should be rocked at perennial streams crossings sufficiently to reduce runoff from the road surface.

- Construct waterdips or “flavels” on short, low traffic volume roads. Special consideration should be given to their location on highly erodible soil types. Opportunities for such work can occur as part of timber sale final road maintenance or part of normal scheduled maintenance.

Wildlife Species and Habitat

Minimize human disturbance to wildlife species of concern.

- Minimize construction of additional permanent roads, and when possible close temporary roads immediately following completion of logging and/or planting.

- In order to insure compliance with the Migratory Bird Treaty Act, the Oregon State Office or higher level should develop recommendations for compliance with the Act regarding timber harvest and other activities which could potentially destroy nests of band-tailed pigeons and other migratory birds.

Special habitats.

- Maintain microclimate features of important special habitat areas such as seeps, springs, wetlands, and rocky habitats.

Provide forage opportunities for wildlife where appropriate.

- Consider seeding harvest units with grasses and forbs for big game forage pursuant to the District's Native Seed Policy.

Provide roosting opportunities for bats where appropriate.

- Install bat boxes on BLM-controlled bridges to provide additional roosting habitat for bats.

Noxious Weeds

Control the spread and reduce the level of noxious weeds in the analysis area.

- General guidelines for the management of noxious weeds are addressed in the Noxious Weed Strategy for Oregon/Washington (1994), Partners Against Weeds: An Action Plan for the BLM (1996) and Coos Bay District's Weed Prevention Schedule (1996). Specifically these plan's address the following;

  a. Conduct field inventories for noxious weeds to determine locations and infestation sizes within the watershed.

  b. As mentioned in Partners Against Weeds: An Action Plan for the BLM (1996), work with adjacent landowners to create an awareness of this issue, and work on a coordinated effort to effectively manage these species.

  c. Since most noxious weeds are associated with roads, road building and maintenance equipment should be cleaned using steam or high pressure water prior to entering an area. Cleaning of logging equipment should also be done in a similar fashion.

  d. Treatment methods of noxious weeds will include manual (pulling, cutting, grubbing), biocontrol efforts, and possibly the use of chemicals. The use of chemicals is contingent on the past control measures, the size of infestation, and compliance with the Northwest Area

Noxious Weed Control Program Environmental Impact Statement (USDI 1985).

e. Following any treatment of noxious weeds monitor results of treatment by using before and after photographs or conducting spot checks. Areas should be retreated until weeds are eliminated.

Create and maintain a database inventory of disease centers and noxious weed infection sites.

- C As an inventory of the watershed is obtained, the infection sites will be identified and recorded. A database exists for some infection sites, along with a monitoring effort, but there is a need to input that data into the GIS database and create a Disease and Noxious Weed theme.

Port-Orford-cedar root rot

Reduce the spread and help prevent introduction of Port-Orford-cedar root rot (Phytophthora lateralis) into new areas.

- C General guidelines for the management of *Phytophthora lateralis* are addressed in the *BLM Port-Orford Cedar Management Guidelines 1994*. That document recommends the development of site specific plans to prevent the spread of the disease. The following recommendations address these site specific plans:

a. Timber sales and service contracts, such as manual maintenance and precommercial thinning, address prevention methods. These contracts address such measures as: removing POC from areas where POC is likely to become easily infected (i.e., along roads and running water), washing vehicles before they proceed into an uninfected area, spacing of POC to reduce root contact (thus reduce spread of the disease), and removing POC within 50 feet of an infected area.

b. Develop treatment plans to prevent the spread of the disease. Areas found not to be infected will be identified. Plans to prevent introduction of the disease into these areas will be developed. Project monitoring and evaluation will be conducted following plan development and implementation.

DATA GAPS AND LIMITATIONS OF THE ANALYSIS

- C Baseline information on most wildlife and fish species abundance, distribution, and habitat associations are lacking; this limits the ability to assess population trends and effects of management.

- C Baseline information on current vegetation and habitat features (e.g. snags) is lacking; this limits the ability to quantify wildlife habitats and to calculate landscape parameters such as fragmentation indices.

MONITORING

Aquatic Species

- Spawning survey efforts in the watershed should be directed at determining the spatial distribution of fishes. This effort should focus, in particular, on evaluating spawning use in small streams because spawning and rearing habitat quality in these systems are most likely to be affected by current and projected management actions.

- Fishes such as coho salmon and steelhead trout spend several years rearing in the watershed. Therefore, BLM has the greatest opportunity to positively or negatively affect population levels through management activities which regulate the quality and abundance of rearing habitat. In other words, monitoring of population levels with respect to BLM management and the capacity of BLM to manipulate populations should focus on monitoring density and abundance of fry and parr (i.e., seeding or stocking levels). Monitoring to evaluate population responses to management based on returning adults (spawning surveys) are inconclusive with because of the confounding variables of ocean conditions and return migration, as well as lack sufficient power to detect meaningful population trends.

- Separate monitoring plans (i.e., wildlife; aquatic/stream channel) which address habitat components, species, physical features, and projects have been developed or are in development. See the separate monitoring plans for further recommendations on monitoring needs.

Hydrology and Stream Channel

- Continue trend monitoring including parameters of temperature and turbidity to evaluate effects of land management activities and general watershed health.

- Estimate the flood discharge from the November 1996 flood by channel geometry techniques.

- Establish high flow crest gages on the lower ends of important fisheries drainages.

- Plan a Rosgen Stream Classification Level II Inventory for a morphological description of streamtypes in the watershed.

- When possible, plan a Rosgen Stream Classification Level III Inventory, before modification of instream hydraulics by emplacement of habitat rock or log structures.

- Establish permanent channel cross section monitoring sites to determine channel stability and evaluate changes in channel morphology (width and depth).

- Use permanent channel monitoring sites for determining bank and channel erosion contributions to the drainage sediment regime.

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