III.6 CORE TOPIC - SPECIES & HABITAT

TERRESTRIAL HABITAT

Analysis Questions:

What are the key habitats in the watershed?

What was the historical condition, pattern, and distribution of key habitats in the watershed?

What is the current condition, pattern, and distribution of key habitats in the watershed?

What is the current open road density, and how does it compare with goals from the RMP?

What is the function of the analysis area within the larger 5th field watershed?

What are the influences and relationships of key habitats with other ecosystem processes in the watershed?

What are the management objectives (desired condition) for the wildlife habitat in the analysis area? How should habitat types be arranged (spatially and temporally)?

What management actions (restoration, maintenance, protection, etc.) could be undertaken that would maintain and/or restore the integrity and productivity of the wildlife habitat within the analysis area? (refer to Section IV - Recommendations)

REFERENCE CONDITION

Key Habitats

Key habitats and habitat elements in the analysis area include vegetative complexity, late-successional forest, landscape patterns (including roads), snags and down logs, and rocky habitats. These key habitats and habitat elements represent a composite of the following:

1. Habitats used by wildlife species of concern (Terrestrial Species Table III.6-4 and Appendix C, Table C-2).
2. Habitats that are relatively scarce in the landscape.
3. Key elements of habitats that affect many species and guilds

Refer to Section III.5-Vegetation for a description of historical and current stand conditions, including age-class distributions. Further discussion of wildlife habitats will focus on the key habitats and habitat elements listed above.

CURRENT CONDITIONS

Vegetative Complexity

On the Coos Bay District, the systematic forest inventories needed to accurately evaluate the abundance and distribution of key vegetative and structural forest components have not been conducted. As a result, only a general analysis of forest complexity and its effects on wildlife can be presented at this time. These inventories need to be conducted to facilitate more detailed future analysis.

The majority of the area (74%) supports second growth plantations less than 80 years old and pastures/meadows. Conventional methods of logging, site preparation, regeneration, and stand maintenance encourage development of even-aged, homogenous stands of Douglas fir. The result is a vegetatively and structurally simplified landscape with one or two-storied stands (not multi-storied) that are fairly devoid of legacies (remnant green trees, snags, logs).

The remaining 26% of the analysis area supports a combination of small mid and late-successional forest patches, found almost exclusively on BLM administered lands. From a habitat perspective, these stands are vegetatively and structurally complex, containing canopies of much greater volume and habitat complexity than the single storied, uniform canopies typical of many plantations. These complex stands support a greater abundance and diversity of birds, bats, rodents, invertebrates and other species which forage, roost, or reproduce in the canopies. However, the small size of these patches may limit their value for some species.

Late-successional Forest Habitat

Several wildlife species of concern (Table III.6-4) prefer to use old growth forest habitat. LSRs and other Reserve areas are expected to provide old growth habitat for associated species in the long term; however, in the short term, many of the Reserve areas do not currently contain late-successional forests. Table I-3 indicates that 40% of BLM lands in the analysis area contain stands >80 years of age and 25% contain forests >160 years of age. Old growth forests, those > 200 years of age, currently occur on < 2% of the analysis area (all on BLM-administered land). The age class distribution in Reserve areas mirrors that of the watershed as a whole. On private land, cursory aerial photo interpretation suggests that all private forests are < 80 years of age (Table III.5-1). Private land in the analysis area is primarily managed for timber production or livestock grazing and will likely never provide significant amounts of late-successional or old growth habitat. Therefore, this type of habitat will eventually be only be located on the Reserve land allocations on BLM lands and the Coquille Forest. Opportunities may exist to encourage development of late-successional or old growth habitat within Connectivity lands.

Snag/Down Log Habitat

In natural forests of the Oregon Coast Range, snag and down log abundance was highest in stands which had recently experienced a severe fire. Mid-seral stages often have fewer snags and down logs, because the trees in the regenerating forest were too small to contribute (Spies et. al. 1988). Table III.6-1 shows mean numbers of larger snags and down logs found by Spies et. al. (1988) and Ursitti (1991) in the Coast Range.

The analysis area likely faces a shortage of snag and down log habitat because of the minimal acreage of older stands present and because of past harvest, salvage, and snag falling contracts in the 1940s-60s. BLM inventory data from harvest units in the Middle Fork Coquille watershed indicates that approximately 26 lineal feet/acre remain on units harvested 1988-1993.

Table III.6-1 Average numbers of snags/acre and volume of down logs/acre (all decay classes) in naturally regenerating stands in the Coast Range (from Spies et. al. 1988, Ursitti 1991). [$\pm$ 2 standard errors]

	Young (40-70 yrs old)	Mature (80-120 yrs old)	Old Growth (200-525 yrs old)
# snags/acre >20 in. dia. and 16 ft tall[1] [range]	1.6 [0 - 3.2]	2.8 [0.4 - 5.3]	4.0 [2.4 - 5.7]
volume of down logs/acre (ft^3/ac)[2]	1101 [514 - 1615]	1730 [757 - 2701]	3260 [2372 - 4144]
volume of down logs/ac (ft^3/ac) - riparian areas [range]	—	6531 [3501 - 11733]	11504 [7989 - 18435]

[1] Minimum retention levels for snags equate to approximatly 40% (theoretically) of levels found in natural stands.
[2]The minimum down log retention levels for hard logs (decay class 1 and 2) from the RMP equates to 167 ft^3/ac (approximately 5-15% of what is found in natural stands). Divide ft^3/ac by 1.39626 to get the number of feet of 16 inch diameter log necessary to equal the given volume.

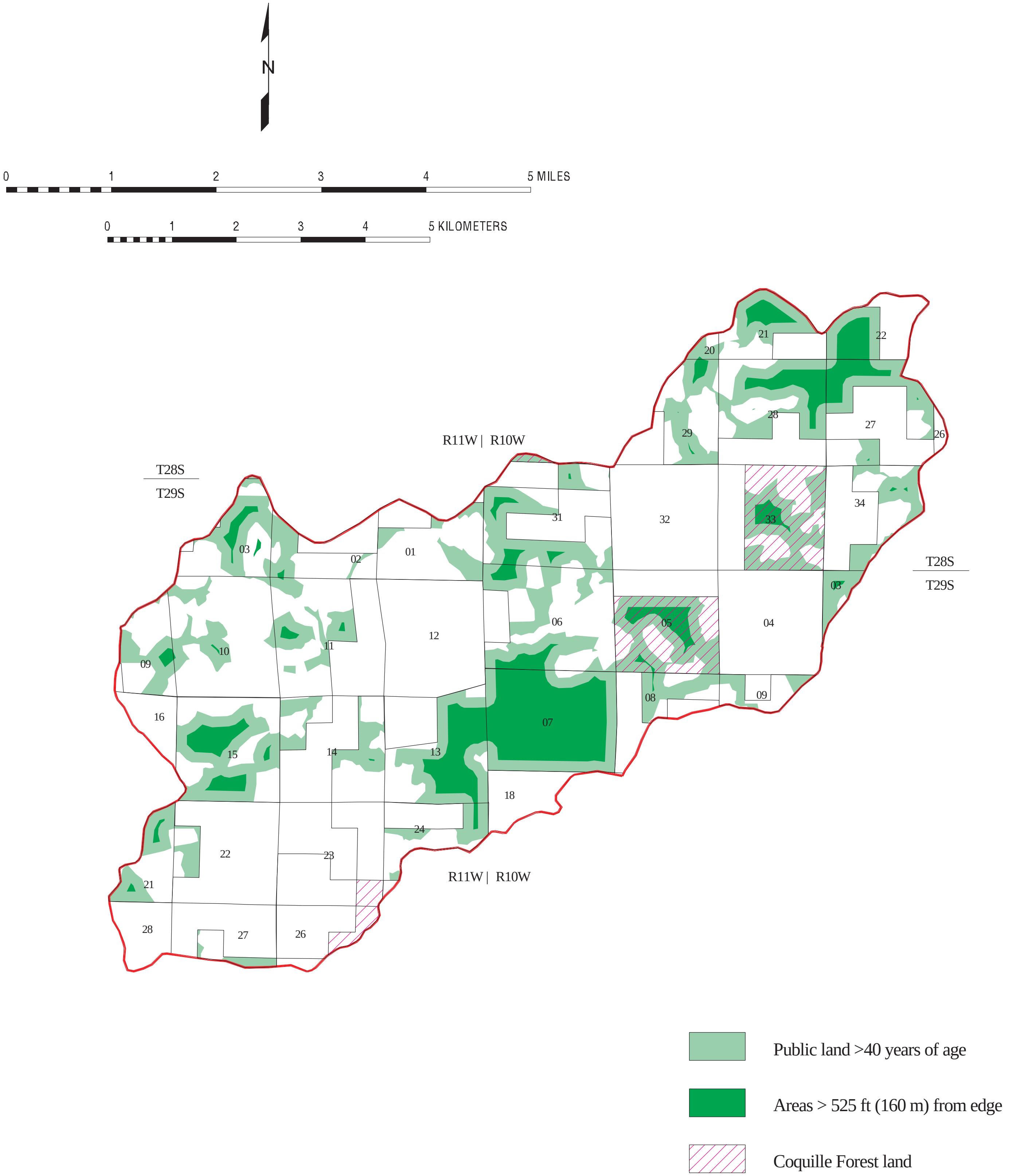
Rocky Habitats

The Big Creek analysis area contains some rocky outcrop habitat (Figure III.8-3). Several species including bats, raptors, and woodrats utilize these habitats for roosting, nesting, or resting. Based on some limited field surveys, many of the smaller formations contain at least one or two deep cracks that could be used by bats and also contain other protected ledges or cavities that could be used by other wildlife for resting. Talus areas provide habitat for invertebrates, amphibians, sharp-tailed snakes, among others.

Landscape Pattern

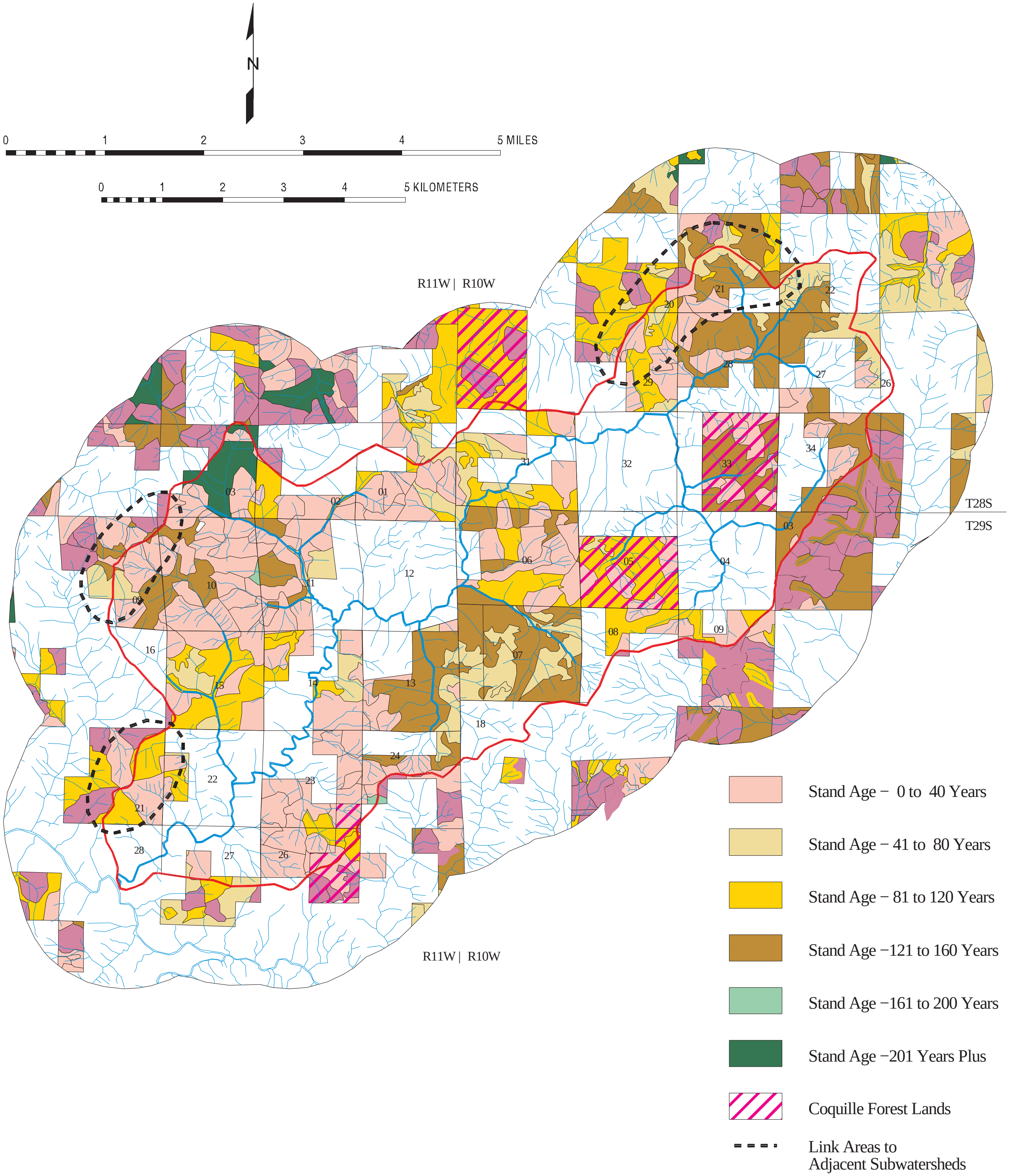
Evaluation of landscape patterns usually incorporates degree of fragmentation, edge effects, and available refugia and connectivity. The analysis area is highly fragmented and probably contains little interior forest habitat; notable exceptions occur in Bear Pen and Axe Creeks (29-10-7, 29-11-13), Upper Big Creek (28-10-21,22,27,28), and Fall Creek (29-11-15). Bear Pen and Axe Creeks in particular have over 700 acres of potential interior habitat 40 years of age or older (see Figure III.6-1). Areas of existing late-successional habitat offer refugia which can serve as sources for repopulation of adjacent areas for species associated with late-successional habitat (see Late-successional section above). Late-successional habitat which connects across ridge tops can provide connectivity to adjacent drainages. Figure III.6-2 shows three areas holding potential for providing connections to adjacent subwatersheds.

Figure III.6−1 Interior habitat areas in stands > 40 years of age



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

Figure III.6−2 Age Class Distribution on Federally Managed Lands Showing Links to Adjacent Subwatersheds



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

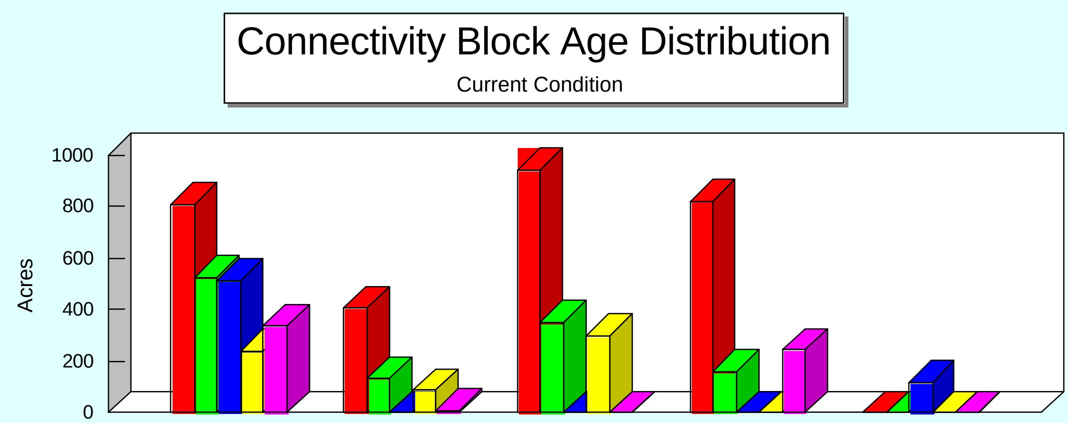
Connectivity Areas

The analysis area contains nearly 3000 acres of Connectivity land use allocation. These connectivity areas are situated between LSR260 to the north and LSR261 to the southeast (Figure III.6-4). Several connectivity areas (or blocks) are wholly or partially contained within the Big Creek analysis area. Because these connectivity areas were intended to function as islands of habitat in the landscape and because several of these areas crossed the analysis area boundary, we analyzed habitat and function of all the connectivity area LUA in the Big Creek planning area vicinity (blocks 1,2 and 4; see Figure III.6-4).

Connectivity blocks are to be managed to retain at least 25 - 30 % of the block in late-successional habitat. Presently, blocks ‘1’, ‘2’, and ‘4’ in the Big Creek analysis area contain 60%, 43%, and 47% respectfully of their area in the 80+ age class. In addition, these blocks are to be managed so that they will eventually contain 4 - 5 different age groups or habitat classifications (early, mature, transitional, and old-growth). With the exception of the old growth/160+ age class, these age groups are present (Figure III.6-3).

Cursory field examination of stands 60-100 years of age indicated they contain a Douglas fir overstory and a dense brush ground cover. The understory is primarily comprised of hardwoods (myrtle, tanoak, and chinkapin) on south aspects and more conifer (hemlock, Port-Orford cedar) on north aspects. The small diameter snags (suppression mortality) are falling down creating new class 1 and 2 down log habitat.

Figure III.6-3 Age Class Distribution of Connectivity Blocks In and Around Big Creek Analysis Area

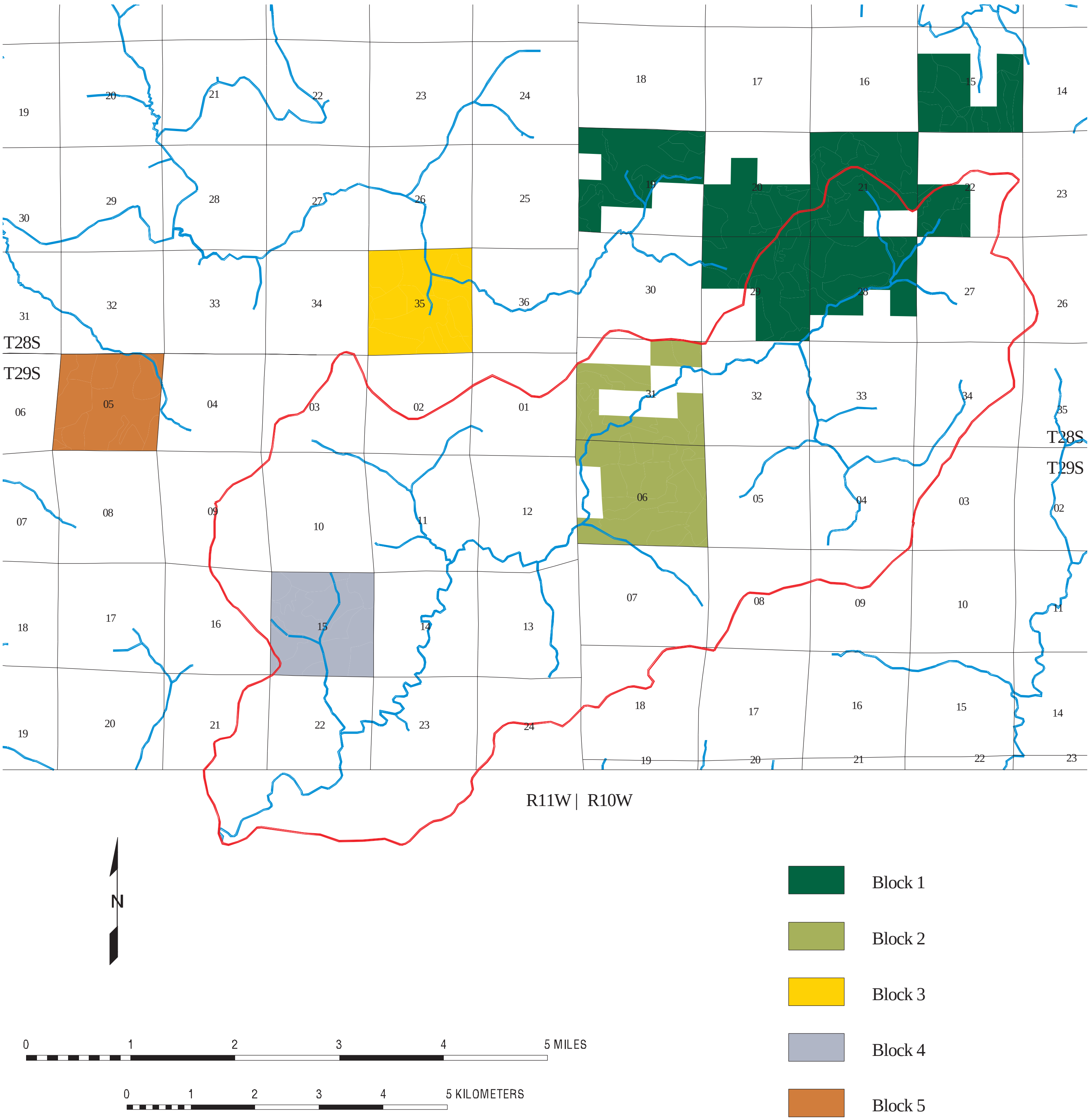


Age Class	0- 40 Yrs	41-80 Yrs	81-120 Yrs	121-150Yrs	>151 Yrs
Conn Block 1	810	406	940	819	0
Conn Block 2	525	133	351	159	0
Conn Block 3	515	0	0	0	121
Conn Block 4	243	87	298	0	0
Conn Block 5	337	10	0	244	0

Road Density

The current road density for the analysis area averages 4.16 miles/mile^2. The density of roads on BLM lands is slightly higher at 4.24 miles/mile^2 (Appendix E, Table E-1). The open road density is currently 4.0 miles/mile^2.

Figure III.6−4 Connectivity Blocks in and around Big Creek Analysis Area



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

SYNTHESIS & INTERPRETATION

Vegetative Complexity

Managed plantations and landscapes have much lower vegetative and structural complexity than natural forests. These even-aged plantations are typically dense, containing trees more evenly spaced and more uniform in diameter, age and height than natural forests (Spies and Franklin, 1991). They have closed, uniform canopies with few gaps, and trees or snags from the previous stand are scarce or absent. Natural processes occasionally result in dense uniform stands, but more often, natural stands retain a great deal of variability, and substantial habitat complexity.

Late-successional Forest Habitat and Function

The analysis area contains no mapped LSRs. Administrative withdrawals (TPCC), unmapped LSRs (owl and murrelet sites), and Riparian Reserves provide the only long-term late-successional habitat. The majority of habitat needs for wildlife associated with late-successional forest habitats are met with the LSR network; however, analysis at the subwatershed scale is still appropriate to ensure the area can support populations of late-successional species with limited mobility and accommodate dispersal of late-successional wildlife species as they disperse or travel between large LSRs. The region-wide LSR network should accommodate the long-term needs of these species. The critical point is in the next few decades while harvest of some existing late-successional habitats continues in the GFMA before similar habitat characteristics (broken and decayed trees, down logs, snags, etc.) have the chance to develop in LSRs. This results in a net decreased availability of these habitats until LSRs begin to develop late-successional habitat characteristics.

With <1% of the analysis area containing old growth (>200 years of age), the habitat function for old growth dependent species will be lacking until old growth habitat characteristics develop in the Reserve areas. Significant acreage of forests will not enter the 200+year age class for 60 years (see Section III.5 Vegetation). Currently, nearly all of existing old growth habitat is in Reserves and will not be subject to harvest.

Retention of 15% late-successional habitat

Both the Northwest Forest Plan and Coos Bay's RMP require the retention of late-successional forests in fifth field watersheds "in which federal forest lands are currently comprised of 15 percent or less late-successional habitat". Late-successional forests are those seral stages that include mature (80 to 159 years old) and old-growth classes (160 years and older)(S&G B-1). The highest priority for retention should be the older age classes on those lands which have a 'reserve' designation (i.e., Late-Successional Reserve, Riparian Reserve, Administratively Withdrawn Reserve), followed by GFMA & Connectivity land use designations.

The Middle Fork Coquille-fifth field watershed contains 62,764 acres of BLM managed lands and 15% of these (9414 acres) must be maintained in the late-seral condition. According to FOI analysis, 6967 acres of the more desired transition or old-growth habitat types are located in LSR, MMR, and other withdrawn areas (Table III.6-2). Due to the accuracy of hydrologic data, it is not possible to calculate acres of Riparian Reserves on a fifth-field scale to evaluate their contribution towards the 9414 acres of late-successional habitat. Analysis of Riparian Reserves is possible on the subwatershed level and Sandy-Remote and Big Creek show a contribution of contribute 2518 acres. As watershed analysis is completed in the remaining subwatersheds, the acreage calculation of old-growth habitat types within the Riparian Reserves will be completed and that acreage added to the total. Therefore, the objective of retaining 15% of the federal land base in transition or old-growth habitat types will be met through the Reserve network.

Table III.6-2 reflects the reductions in 80 year and older timber from GFMA lands as a result of sold or planned 1997 and 1998 timber sales.

Table III.6-2 Late-Successional Habitat Acreage - Middle Fork Coquille Watershed

Land Allocation	Middle Fork Coquille (62,764 total BLM acres)			
	0 - 79 yrs	80 - 119 yrs	120- 159 yrs	160+ yrs
LSR & MM Reserves	7329 (11%)	2639 (4%)	1212 (2%)	4797 (8%)
Riparian Reserves*	4954 (8%)	1228 (2%)	2285(4%)	233 (<1%)
other withdrawals	743 (1%)	788 (2%)	658 (1%)	300 (<1%)
CONN	2536 (4%)	769 (1%)	1077 (1%)	626 (1%)
GFMA**	19,174 (31%)**	5,531 (9%)**	4,000 (6%)**	1829 (3%)**
Totals	34,736 (55%)	10,955 (18%)	9,228 (15%)	7,785(12%)

* This figure reflects the Riparian Reserve acres within the Sandy-Remote and Big Creek analysis area ONLY. The accuracy of the data in the HYD coverage precludes calculation of RR acreage on this large a scale.
** This figure includes acres of Riparian Reserves within the GFMA allocation outside of above two analysis areas.

For comparison purposes, the percentage of late-successional forest within the Big Creek analysis area shown below in Table III.6-3. A direct comparison of this 80 yr+ reserved acreage to that present in the Middle Fork Coquille watershed cannot be made until Riparian Reserves acreages are calculated for the Middle Fork Coquille.

Table III.6-3 Late-Successional Habitat Acreage - Big Creek Analysis Area

Land Allocation	Big Creek (9,021 total BLM acres)			
	0 - 79 yrs	80 - 119 yrs	120- 159 yrs	160+ yrs
LSR & MMReserves	-	-	-	-
Riparian Reserves & other withdrawals **	3129 (35%)	731 (8%)	1259 (14%)	173 (2%)
CONN	751 (8%)	391 (4%)	202 (2%)	-
GFMA	1473 (17%)	253 (3%)	651 (9%)	8 (<1%)
Totals	5353 (60%)	1375 (15%)	2112 (23%)	181 (2%)

** The acreage within Riparian Reserves is calculated from an edited HYD coverage which allows for this calculation. This acreage does not account for additional streams which will be located upon field reviews or minor modification of riparian reserve widths on intermittent streams.

Snags and Down Logs

Snag and down log abundance has declined dramatically throughout the landscape over the last 50 years. The availability of these structures is influenced by past management activities such as timber harvest, salvage, and natural disturbances (or lack thereof) such as fire and windthrow (see Section III.5-Vegetation). Without major changes to the current Forest Practices Regulations, snag and down log abundance is likely to remain very low compared to natural stands on private and state lands. Although snag and down log abundance will be greater on BLM lands, it is also likely to remain low on GFMA lands compared to natural stands. Snag and down log retention levels on GFMA lands represent approximately 40% and 5-15% respectively of the levels found in natural stands. One critical function of Reserve Areas is that they will eventually contain substantially more snag and down log habitat than GFMA areas.

Snags

Currently, snag abundance is probably far below 40% population levels on most early, mid, and late-seral BLM lands in the analysis area. The Snag Recruitment Simulator model (Marcot 1991) suggests that approximately 2 hard snags per acre, 11" or greater DBH, distributed throughout the landscape are necessary in order to provide sufficient hard snags in the present and soft snags in the future (Appendix C, Table C-3). Appendix C, Table C-4 shows snag levels necessary to support various population levels. The model further suggests critical snag shortages in the near future unless additional snags are created through management. Even with aggressive snag creation efforts, short-term shortages of soft snag habitat are probably unavoidable because it takes 19-50 years for a hard snag to become a soft snag, decay class 3+ (Cline et. al. 1980).

The District RMP directs that at a minimum, snags be retained sufficient to support cavity nesting species at 40% of potential population levels throughout the GFMA. It will take at least 60 years (one harvest rotation) to eventually meet the 40% population level on GFMA lands, if snag creation efforts are limited to harvest units. It is possible to hasten the attainment of the 40% population potential goal on GFMA lands by either managing for >40% population potential in harvest units or creating snags on other GFMA lands before they are subject to regeneration harvest. Even if these levels are eventually achieved throughout the GFMA, actual cavity nester population levels on the landscape will likely be much lower, due to the lack of snags on intermingled private lands.

Snag abundance is also probably critically low on reserve lands and will continue without aggressive snag creation efforts. The current lack of hard snags (and therefore, future soft snags) creates a situation where it will be impossible to meet snag density goals for both hard and soft snags for at least 19-50 years.

Location of snags is also important. Preliminary radio telemetry data on bats suggests at least some species may preferentially roost in ridgetop snags. Harvest practices in the past tended to leave most wildlife trees on the edges of harvest units, but doing so discourages maintaining snags in a variety of topographic positions. Snags representing a variety of decay classes, topographic positions, seral stages, and distributions (i.e. large and small clumps and singly) need to be provided through time.

Down Logs
Currently, down log abundance is probably far below natural levels on most early, mid, and late-seral BLM lands and virtually nonexistent in recent harvested areas. Future recruitment of down logs is severely limited by the current low numbers of snags throughout the area, which often turn into down logs as they age.

Although the District RMP establishes interim guidelines for down log retention within regeneration harvest units, these guidelines are considered a minimum requirement until more accurate models are developed which establish specific down log retention levels for groups of plant associations or stand types. For most regeneration units harvested using the minimum retention requirements, down log volumes after treatment would likely be much lower than average values for naturally regenerated forests because a portion of class 3 -5 down logs are inevitably destroyed during the logging process. Minimum retention levels are 5-15% of the level found in natural stands and are probably well outside the natural range of variability (Table III.6-1). If down log creation efforts are limited to future harvest units, it will take at least 60 years (one harvest rotation) to eventually meet down log targets on GFMA lands. It is possible to hasten the attainment of down log target levels on GFMA lands by either managing to exceed target levels in harvest units or creating down log habitat on other GFMA lands before they are subject to regeneration harvest.

Down log abundance is also probably critically low on reserve lands and will continue without aggressive down log creation efforts. Because the current lack of hard snags and down logs (and therefore, future down logs) creates a situation where it will be impossible to provide adequate soft down log habitat in the future.

Rocky Habitats
Unique habitat characteristics and the relative scarcity of rocky outcrops and talus enhance their ecological value in the landscape. Rocky habitats offer unique microclimates; the interstitial spaces between rocks in talus provide habitat for many amphibians and invertebrates; cracks, crevices, shallow caves, and overhangs can provide shelter for raptors, invertebrates, woodrats, bats, and other mammals. Many lichens and bryophytes find habitat only on rocky substrates. Many of the species associated with rocky habitats are especially sensitive to the microclimates they offer. The surrounding vegetation, topography, geology, and hydrology all contribute to creating unique microclimates that these sites provide for wildlife and vegetation. Many of the smaller rock formations and talus habitats have not been located and mapped.

Vegetative Complexity
The spatial and temporal landscape patterns of the Oregon coastal forests have changed dramatically over the last century, substantially affecting the ecological communities associated with these forests. Forest management practices have converted a landscape dominated by large interconnected patches of late-successional forest, to one dominated by young managed plantations, within which only small, isolated patches of late-successional forest remain. The intensive forestry practices and short rotations used to maximize yields have also prevented the reestablishment of vegetatively and structurally complex forest habitats on these plantations.

Landscape Pattern:

Fragmentation

Simple observation and comparison of historic (1943 and 1950) and current aerial photos show a landscape which has become much more fragmented with smaller patch sizes and more edge. For species such as the American marten or northern spotted owl which have large home ranges, many of the existing old forest patches are too small to support a successfully reproducing pair. Further fragmentation of late-successional habitats will continue to reduce the size of patches and create edge habitats, thereby reducing the effectiveness of their interior habitats. While most late-successional forest patches are large enough to support one or more reproducing pairs of species with small home ranges, patch size also has a major influence on key physical and biological conditions which affect habitat suitability. For example, bats select roost sites with very specific habitat characteristics that are well protected from variations in temperature and humidity. These conditions are commonly found within the interior portions of large late-successional forest blocks. However, within small patches, environmental conditions are more variable and strongly influenced by the environmental conditions of the adjacent habitats.

Edge effects can alter habitat characteristics up to 3 tree heights (approx. 600 feet) into the adjacent stand (Harris 1984), effectively reducing a circular 111 acre stand to only 30 acres of interior habitat. Lehmkuhl and Ruggiero (1991) cite research suggesting microclimate edge effects persist within 525 ft of forest edges. Landscapes dominated by edge habitats favor generalist species at the expense of others dependent on interior habitat. Birds nesting on these edges may experience higher failure rates due to predation and nest parasitism (see Noss and Cooperrider, 1994 for a discussion). Fragmentation has been identified as an important threat to biodiversity (see Noss and Cooperrider 1994).

Refugia

Reserve, or refugia, areas function as centers for repopulation of adjacent habitats, and can support populations for relatively immobile species such as small mammals, invertebrates, and herps and are especially important for species associated with late-successional forests.

Based on the existing age class distribution of lands in the analysis area, at least four decades growth will be needed before the late-seral stands could attain sufficient vegetative and structural complexity to function as old growth forest habitat (see Section III.3 General Vegetation). In the interim, protecting the remaining refugia sites will be critical to maintaining existing populations of late-successional species, and facilitating their recolonization of recovering habitats throughout the landscape.

Due to landscape and regional changes in habitat quality, abundance, distribution and disturbance frequency, habitat refugia are likely more important to the ecology of the current managed forests than they were to the natural forest landscape. The ecologically simple early seral plantations which dominate the current landscape cannot support many native wildlife species. Refugia that are scattered across the landscape and that are large enough to support populations of species with limited mobility and small home ranges are critical for the conservation of these species.

Habitat Connections

Connections between habitat areas become especially important for species in fragmented landscapes. Habitat connections occur at two scales: connections between large LSRs to facilitate movements of fairly mobile species such as spotted owls and marten between these LSRs; and connections between individual habitat patches to facilitate movements of less mobile species between these patches. Ultimately, the connections between individual habitat patches promote movement between large LSRs as well. Smaller Reserve areas (Riparian Reserves, small LSRs, owl 100 acre cores, TPCC withdrawals) and remaining habitat in the GFMA accommodate movements of species between large LSRs.

In the long term, connection between large LSRs should be accommodated by the approximately 59% of BLM land in the analysis area (32% of all ownerships) in some form of Reserve areas (Table I-1). Connectivity Blocks, with their additional protective measures, will also facilitate dispersal of mobile late-successional species across the landscape. In the short term,however, 59% of the Reserve areas are currently < 80 years of age.

Existing mid and late-seral habitats on GFMA and Connectivity Blocks can bolster habitat connections for the next 40 years or so until the Reserve areas grow older (Appendix C, Figures C-1, C-2, & C-3). Given harvest pressures though, retaining mid and late seral habitats in the GFMA by deferring harvest for 40 years is unlikely; therefore the emphasis should be on deferring harvest as long as possible on the areas which contribute most to habitat connectivity such as stands which connect to adjacent subwatersheds, larger more contiguous stands, and stands in areas with relatively little late-successional habitat.

Maintaining connections between individual habitat patches will depend on minimizing fragmentation of existing connected habitats in the GFMA and Reserved allocations. Riparian Reserves on intermittent streams are particularly important for maintaining these connections because they often connect upland with riparian habitats and, together with perennial stream reserves, form continuous corridors through BLM lands. Even though 51% of Riparian Reserves are >40 years of age, the current fragmentation pattern of these areas does not lend themselves to form these critical connections (Figure III.8-2). Suitable habitat on GFMA lands can bolster critical connections between individual habitat patches. Riparian reserves will not receive significant additional acreage of forest > 80 years of age for 50 years. Habitat patches which span ridges separating subwatersheds can facilitate movements of individuals between these adjacent subwatersheds. Figure III.6-2 shows three areas holding potential for connectivity to adjacent subwatersheds, one of which also lies in a Connectivity Block.

Roads can block or discourage movements between habitat patches. Road density, open road density, road closure type, surface type, and right-of-way width all impart the barrier effect of roads to different species. Open road density is currently above goals established in the RMP and is of particular concern in the ODFW Tioga Wildlife Unit because of impacts to deer and elk. Building new road corridors into unroaded habitat can fragment those habitats and inhibit movements to a variety of species (see Noss and Cooperrider 1994 for more discussion). Minimizing new road construction, decreasing open road density, decommissioning existing roads and encouraging vegetation growth on them would decrease the disturbance and barrier effects of roads to wildlife.

Road Density

The RMP provides goals for open road density. Numerous studies suggest that some wildlife species, particularly small mammals and invertebrates, seldom cross roads - even roads that are closed to vehicles (Noss and Cooperrider 1994). Roads can also affect wildlife by encouraging harassment by vehicle traffic and increased access for legal or illegal hunting. These effects have been particularly well documented for large mammals such as elk (Wisdom et al. 1986). Roads can also provide a travel path into interior habitat for edge associated species.

Pope and Anthony (In Press) noted that vehicle traffic on secondary roads was greatest during fall hunting seasons. Even short, dead end spur roads received an average of 171 vehicle trips/month. In a telemetry study of elk in the Coos Bay District, Pope and Anthony (In Press) found that elk avoided areas within 164 feet of roads and poaching accounted for 50% of the elk mortality.

While all closed roads, including gated roads, are considered closed for purposes of open road density calculation, the location of closed roads and the type of closure can dramatically affect their impact to wildlife. For example, closing a road which is paralleled by a road remaining open obviously does little to reduce the effective road density. Similarly, the type of device used to close a road has a direct correlation to its effectiveness. A gated road which continues to receive significant administrative use or because gates are left open also does little to reduce harassment to wildlife. An explanation of the types of road closures as well as some assumptions of the duration and degree of closure are found in Coos Bay's TMO data dictionary.

Management Objectives

1. Provide a landscape where fragmentation and edge contrast is generally decreasing and where refugia of high quality late-seral habitat are scattered throughout the area and connected by mid and late-seral habitats; reserve areas should be dominated by late-seral habitats interspersed with small areas of earlier-seral habitats with soft-edged transitions between habitats.

2. Emulate the timing, intensity, variability, and scale of natural disturbance processes where practical. The following guidelines can be used to accomplish this objective:

- Concentrate harvest units in space and time.
- Use wildlife trees or harvest prescriptions to feather edges of harvest units to soften the transition across edges.
- In thinning units, use harvest prescriptions with variable spacing.
- Maintain species diversity of canopy species and understory shrubs, including hardwoods, in harvest units.

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

TERRESTRIAL SPECIES

Analysis Questions:

What are the species of concern in the watershed? What was the historical and what is the current relative abundance and distribution of species of concern in the watershed?

How have management activities and natural processes changed the abundance and distribution of these species and the character of their habitats?

What are the influences and relationships of species and their habitats with other ecosystem processes in the watershed?

What is the management objective (desired condition) for the wildlife species in the analysis area?

What management actions (restoration, maintenance, protection, etc.) could be undertaken that would maintain and/or restore the integrity and productivity of the wildlife habitat within the analysis area? (refer to Section IV - Recommendations)

REFERENCE CONDITION

No historic data exists on the distribution or relative abundance of wildlife species in the Big Creek vicinity. Interviews of long-time residents of Big Creek suggested black bear and beaver used to be more common. Given the preponderance of late-successional and old growth habitats which historically occurred in the Coast Range (see Section III.5 - Vegetation), wildlife species associated with late-successional habitats and fairly stable environments were probably more common than they are now. Wide-ranging species intolerant of frequent disturbance such as wolverine and grey wolf were likely present in the Coast Range; although they have been extirpated in historic time. All the wildlife species of concern were likely more abundant and widespread historically. Habitat loss and fragmentation, human disturbance and hunting/trapping, and competition or predation from exotic species have all 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, tailed frogs, bald eagle, band-tailed pigeons, northern spotted owls, marten, and red tree voles have probably experienced the most significant declines.

Conversely, edge and disturbance-adapted species such as great horned owls, crows, ravens, and raccoons were probably less common than they are currently. Barred owls, opossums, and perhaps other species native to eastern U.S. have expanded their range into the Coast Range in historic time. Exotic species were not introduced until white settlers moved in during the mid-1800s.

CURRENT CONDITION

Table III.6-4 lists the wildlife species of concern, grouped by taxonomy or habitat associations, which were considered for analysis in this document. See Appendix C, Table C-2, for a comprehensive list of species and a description of the derivation of the list of wildlife species of concern.

Arthropods

This diverse species group is associated with a variety of forest layers and structures. No surveys or inventories have been conducted for arthropods. Generally they are sensitive to plant species composition, forest structure (number of layers, presence of openings, presence of snags/down logs, etc.), and disturbances. Little is known about these important species groups. We do know however that arthropods hold critical roles in the function of forest ecosystems as they pollinate plants, recycle nutrients, and feed numerous insectivorous animals. Arthropods and plants form the foundation of terrestrial food webs.

Bats

Bats are associated with a variety of habitat structures. Bats roost in buildings, bridges, rock crevices, tree cavities or foliage, and loose tree bark. Old growth forests provide higher quality roost sites than younger forests (Christy and West 1993). Foraging areas include the forest and forest openings, riparian areas, and open water. Only limited, opportunistic surveys have been conducted for bats. Bats are known to roost on bridges over Big Creek at Axe Creek, Bear Pen Creek, and the 29-11-28.0 road. Rock bluffs, hollow trees and snags, and deeply fissured or loose bark may offer roosting crevices for bats. Only a few rocks bluffs have been casually surveyed for bat roosting habitat potential; suitable roosting crevices were noted in many of the rocks. Most of this rock habitat has not been surveyed for bat potential.

Old growth forest birds:

Northern Spotted Owl

The analysis area has been extensively surveyed for spotted owls. There are three site centers known. Much of the available habitat is in marginal condition (mature forest). In spite of the relative shortage of prime suitable habitat, owls have nested (but irregularly) at two of the sites. Based on radio telemetry data for the owl at the third site, this site is probably only occasionally used by floater or dispersing individuals. Since most of the area around the owl sites is GFMA, all the sites will likely eventually "wink out" as surrounding habitat is cut. The long-term conservation strategy for the owls is for reproductive populations to persist in the large LSRs while maintaining a matrix of GFMA lands conducive to dispersal between LSRs. Given the 40-60 year harvest rotation on private lands and the almost nonexistence of currently suitable habitat, private land will likely contribute dispersal habitat, but will never contribute significantly to suitable spotted owl habitat. Habitat loss and fragmentation is the primary threat to spotted owl populations (Thomas et al. 1990).

Approximately 54% of BLM-administered land contains habitat suitable for spotted owl dispersal, roughly approximated as forests >=40 years of age, 53% of which occurs in interim riparian reserves. Approximately 44% of the subwatershed (all ownerships) contains spotted owl dispersal habitat.

Table III.6-4 Wildlife species of concern

GROUP	SPECIES
Riparian/aquatic associates [1]	Dunn's salamander (*Plethodon dunni*)
	Yellow-legged frog (*Rana boylei*)
	Pacific giant salamander (*Dicamptodon tenebrosus*)
	Southern torrent salamander (*Rhyacotriton variegatus*)
	Tailed frog (*Ascaphus truei*)
	Beaver (*Castor canadensis*)
Arthropods	Canopy herbivores
	Coarse wood chewers
	Litter & soil dwelling species
	Understory & forest gap herbivores
Bats	Big brown bat (*Eptesicus fuscus*)
	California myotis (*Myotis californicus*)
	Fringed myotis (*Myotis thysanodes*)
	Hoary bat (*Lasiurus cinereus*)
	Little brown myotis (*Myotis lucifugus*)
	Long-eared myotis (*Myotis evotis*)
	Long-legged myotis (*Myotis volans*)
	Pacific western big-eared bat (*Corynorhinus townsendii*)
	Silver-haired bat (*Lasionycteris noctivagans*)
	Yuma myotis (*Myotis yumanensis*)
Old growth forest birds	Northern spotted owl (*Strix occidentalis caurina*)
Bald eagle	Bald eagle (*Haliaeetus leucocephalus*)
Other forest birds	Band-tailed pigeon (*Columba fasciata*)
	Sharp-shinned hawk (*Accipiter striatus*)
Terrestrial mollusks	*Monadenia fidelis flava*
	Vespericola sierranus
Mustelids	Marten (*Martes americana*)
Voles	Red tree vole (*Arborimus longicaudus*)
	White-footed vole (*Arborimus albipes*)

[1] These species are discussed in the Aquatic and Riparian Species subsection.

<u>Bald Eagle</u>

There are no documented bald eagle nesting or roosting sites in the subwatershed. Suitable habitat may be present along the Middle Fork Coquille Rivers, but habitat surveys have not been conducted. Isaacs (personal communication) felt bald eagles likely nested along the Middle Fork Coquille as far up as Remote. Nests averaged 0.5 mile from water in Oregon (U.S. Fish and Wildlife Service, 1986).

<u>Other Forest Birds</u>

These birds are associated with a variety of forested habitats. Band-tailed pigeons use a variety of forest habitats and feed primarily on berries and nuts. Band-tailed Pigeons occur in low numbers throughout the analysis area and seem to have experienced a general population decline from the mid 1960's to the late 1980's (Jarvis and Passmore 1992). Declines may be due to reduced forage and mineral sites, reduced nesting habitat in the United States and increased pressure from agricultural interests and hunting on the winter ranges. They are potentially affected by pesticide and herbicide use which eliminates forage species. Sharp-shinned hawks are associated with a variety of forest types and conditions. Few surveys have occurred for this species. The sharp-shinned hawk is likely to occur in low numbers. No surveys for either species have been conducted in the analysis area.

Terrestrial mollusks
No surveys for terrestrial mollusks have been conducted on the district and very little is known about their life history and distribution. Monadenia is known from sites in nearby Curry County and inhabits deciduous woodlands, often in riparian areas. Vespericola occurs near springs and is associated with old growth forests (Frest and Johannes,1993). Both species associate with riparian areas and are potentially affected by activities in Riparian Reserves and by the designation of final Riparian Reserve boundaries.

Mustelids
The marten is uncommon in the Oregon Coast Range, and populations within the state are probably in decline from habitat loss. Sightings of American marten have been occasionally documented within the district during the past 10 years, although their current abundance and distribution is unknown. Martens are typically associated with large, contiguous blocks of late-successional forest habitat which contain abundant down logs and snags. Several studies have shown associations with down logs and riparian areas (Buskirk and Ruggiero 1994). The analysis area contains a number of late-successional forest blocks which may provide sufficient suitable habitat to support marten.

Voles
Red tree voles are arboreal rodents that occur in patchy distributions primarily in late-successional forests (Huff et al. 1992). Possible nest structures have been noted in 29-11-15 and 21 and 28-10-28. Using habitat definitions if the draft red tree vole protocol (BLM Instruction Memorandum No. OR-97-009 dated 4 Nov 96), approximately 59% of federal land in the Middle Fork Coquille watershed is suitable habitat. This is above the threshhold of 40% stated in the draft survey protocol; therefore, surveys prior to ground disturbing activities are not required. The white-footed vole inhabits riparian areas, particularly along small streams with an alder forest component (Maser, et al. 1981). This rare vole has been documented in the district but no surveys have been conducted. Both species are susceptible to habitat loss and fragmentation.

SYNTHESIS AND INTERPRETATION

Past land management practices have substantially altered the habitat conditions, wildlife populations and ecological communities of the Oregon Coast Range. Species associated with late-successional forest habitats, or key habitat components (snags, complex tree canopies, down logs, or complex stream habitats) have been most affected (see Section III.6 Terrestrial Habitat). Due to these changes, populations of many wildlife species have declined dramatically, and many are restricted to small isolated habitat islands. The small size and isolation of these populations put many species and ecological communities at risk. These species of concern are influenced by disturbances to their habitats, climate, and human activities which disturb reproduction or other critical life function.

One of the major goals identified for both the NWFP and the District RMP is to protect, maintain and restore the native wildlife habitats, biological communities and ecological functions to federally managed forest lands. To accomplish these goals, conventional forest management practices must be modified to better retain and/or restore key habitat components and characteristics to the forests, and insure these components are suitably distributed across the landscape and through time. Due to the large number of native plants and animals inhabiting these forests, and the limited understanding of the ecology and habitat requirements for most species, managing forests to provide habitat on a species by species basis would be ineffective (Marcot, et. al., 1994). Instead, forest management should focus on emulating the habitat patterns and ecological processes which created and maintained the natural forest landscape. Given the current political and social environment, fully emulating all the characteristics and ecological processes of the natural forests is not feasible. For example, reintroducing large-scale catastrophic fires would present an unacceptable threat to homes and private property. However, by modifying conventional forest management practices, and properly applying these techniques across the landscape, many of the habitat components and characteristics critical to the native ecosystems can be restored to our managed forest stands.

Arthropods

Management activities which may benefit this group include limiting broad-scale slash burning and intense forest fires, limiting ground disturbance and compaction, maintenance of tree clumps in harvest units, maintaining the natural diversity of plant species, providing variety in forest structure, and maintaining high levels of snag and down log habitats (SEIS, App. J2). Management of federal land under the Northwest Forest Plan Management incorporates many of these beneficial or mitigating actions to varying degrees. Under Survey and Manage guidelines, general regional surveys were to begin for these species by FY 1996 in an attempt to learn more about their distribution and biology. To our knowledge, these surveys have not been initiated but are sorely needed to fill this information gap. Management activities could affect arthropod communities and specie diversity. Interim management guidelines recommended in the following sections should decrease impacts to these species until regional surveys can refine our knowledge of them: Snags, Down Logs, Vegetative and Structural Diversity. Management actions on private land will likely continue to heavily impact arthropod species.

Bats

The following sections address habitat needs for bats: Riparian Assessment Module, Snags, Late-successional Forest Habitat, and Rocky habitats. Surveys for these species are needed to identify species occurrence and distribution, high activity areas, hibernacula, and unique feeding and roosting habitat.

Old Growth Forest Birds:

Northern spotted owls

The owl sites in Big Creek are expected to eventually "wink out" and support only occasional occupation thereafter. Their long term function for spotted owls will be that of providing habitat for dispersing and floater individuals. The analysis area has been well surveyed for owls and additional owl sites are unlikely given the marginal condition of habitat and the current distribution of known owl sites. The region-wide LSR network is intended to accommodate the long-term survival of spotted owls. The greatest risk to owl survival is in the next few decades as the net amount of habitat decreases (see Late-successional Forest Habitat section). Mitigating that risk requires temporarily maintaining owl sites in the GFMA and retaining existing habitat in the GFMA as long as possible to allow habitat conditions on LSRs, RRs, and other reserves to improve. Since habitat in the GFMA will be reduced gradually, owl sites in the GFMA will continue to persist and produce young for the short term (a few decades).

Approximately 54% of BLM-administered land contains suitable habitat (>=40 years of age) for spotted owl dispersal, 58% of which occurs in Riparian Reserves. Table III.6-5 presents current and projected dispersal habitat availability for the subwatershed. The projected figures account for recruitment of habitat, potential regeneration harvest on BLM land, and assume 33% of private lands provide dispersal habitat (which is approximately what it is now). BLM-administered dispersal habitat increases for the next 40 years and reaches an equilibrium in 2037 with 82% of BLM-administered land supporting dispersal habitat.

Thomas et al. (1990) recommended that at least 50% of an area be in suitable dispersal habitat condition to facilitate dispersal of owls between large LSRs, so while dispersal habitat conditions are adequate on BLM land and in the long term, dispersal habitat condition in the analysis area as a whole may be marginal for the next decade or so. The analysis area lies in an important dispersal corridor between large LSRs to the north and south.

Table III.6-5 Current and projected dispersal habitat conditions (forests >= 40 years of age) for northern spotted owls.

	1997	2007	2037
BLM (% of BLM)	4837 ac (54%)	5476 ac (61%)	7416 ac (82%)
Private (% of pvt.)	2453 ac (32%)	2547 ac (33%)	2547 ac (33%)
Total (% of subwatershed)	7290 ac (44%)	8023 ac (48%)	9963 ac (60%)

Bald Eagle

Potential marginal nesting habitat exists on BLM-administered land in the lower part of Big Creek (29-11-21). This area offers mature/late-successional habitat close to the Middle Fork Coquille river. A potential historic nest occurs along the river in the adjacent Sandy/Remote subwatersheds that was potentially occupied as recently as 8-9 years ago. Very little habitat probably exists west of Myrtle Point on private lands. Maintaining larger riparian reserves in this area would also preserve future nesting options for eagles. The Pacific Bald Eagle Recovery Plan identified habitat loss as the primary threat to bald eagles (U.S. Fish and Wildlife Service 1986). In addition to habitat needs, bald eagles require a nesting area free of unusual disturbance in order to complete their nesting cycle. The recovery plan identifies criteria for minimizing disturbance to nesting bald eagles (U.S. Fish and Wildlife Service 1986).

Other Forest Birds
The previous subsections address habitat needs for other these species: Snags, Landscape Patterns, Forest Complexity.

Terrestrial mollusks
The following section addresses habitat needs for these species: III.8-Riparian Reserve Evaluation.

Mustelids
The previous subsections address habitat needs for these species: Late-successional Forest Habitats, Snags, Down Logs, Landscape Pattern, Forest Complexity, and Section III.8-Riparian Reserve Evaluation.

Voles
Draft survey methods and management recommendations for red tree voles were recently distributed to districts (version 1.1, received 30 Jul 96). The purpose of the protocol is to identify important habitat areas which connect LSRs, to prescribe survey methods, and to prescribe protective measures for the species where necessary to maintain connectivity between LSRs. White-footed voles are perhaps the rarest microtine rodent in North America (Maser et al. 1981), and they have been documented in the Umpqua Resource Area, near Bandon, and other areas further south within the district. They appear to associate with mature alder riparian areas (Maser et al. 1981, Oregon Natural Heritage Database). Projects which reduce mature alder riparian habitat could affect local populations or fragment what is probably an already highly fragmented distribution. (see Section III.8-Riparian Reserve Evaluation); therefore, it could be important to maintain some alder, even in areas targeted for encouraging conifer species. Survey efforts for white-footed voles by the BLM Roseburg District in 1996 were largely unsuccessful.

Management Objective
The management objective for the species of concern is to prevent local extirpations and contribute to recovery of special status species and other species at risk, and to maintain or restore a landscape conducive to movements of individuals among habitat patches.

AQUATIC AND RIPARIAN HABITAT

Analysis Questions: See also Section III.6-Species and Habitats (subsections: Terrestrial Habitat, Terrestrial Species)

What was the historical condition and distribution of aquatic and riparian habitats throughout the analysis area, and how have human activities affected them?

What is the current abundance, distribution, and condition of spawning and rearing habitat for fish, and how are they maintained?

What is the current abundance, distribution, and condition of aquatic and riparian habitats for *other aquatic and riparian associated species (e.g., herptiles, invertebrates, beaver), and how are they maintained?*

Where are"hot spots" for spawning? rearing? for which species?

What and where are the human caused obstructions to the movement and dispersal of fish or other aquatic species?

What is the role of this analysis area within the larger 5th field watershed?

What are the influences and relationships of aquatic and riparian habitats with other ecosystem processes (e.g., sedimentation, vegetation)?

What are the trends in aquatic and riparian habitat condition, and what forces have the potential to reduce or limit the viability of key habitats or habitat elements?

What are the management objectives for aquatic and riparian habitats in the analysis area?

What management actions (restoration, maintenance, protection, etc.) could be undertaken that would maintain and/or restore the integrity and productivity of aquatic and riparian habitats within the analysis area? (refer to Section IV - Recommendations).

REFERENCE CONDITION

Quantitative surveys and measurements of aquatic and riparian habitat prior to 1949 have not been located for the Big Creek Watershed and probably do not exist. Large wood was probably common in streams (both in aggregations and as single pieces), originating from adjacent riparian zones and adjacent hillslopes in the late-seral condition. Additionally, there were likely substantial inputs following landslides, debris torrents and large stand-replacement fires (such as those in the 1860s). Anecdotal evidence (BLM 1997a) suggests that beaver were probably abundant at the turn of the century and as a result, habitat conditions associated with beaver (large complex pools, channel complexity, alcoves, beaver-associated riparian vegetation) were probably also common.

CURRENT CONDITION

Several homesteads were established in the watershed before the turn of the century. Early human impacts to aquatic and riparian habitats included grazing, small-scale agriculture, logging, splash-damming, small-scale road-building, and extensive beaver trapping.   At least one splash dam was present on mainstem Big Creek. Later in the century, additional residential development, widespread timber harvest and road building, beaver dam removal, and stream-cleaning were common.

Formal aquatic and riparian habitat surveys in the Big Creek watershed began in 1949 (Appendix D, Table D-1) These early efforts were primarily intended to locate potential passage barriers for anadromous fish, and species other than anadromous fish and beaver (i.e., amphibians, invertebrates) were not evaluated.

During the summer of 1973, intensive habitat surveys were conducted along Axe, Bear Pen, Big, Swamp, Brownson, and two tributaries of Axe and Brownson Creeks. These surveys quantified stream substrates, pool abundance, amount of shade and noted numerous beaver dams and dam complexes along most of the streams (and especially in Swamp Cr). Turbidity and sedimentation observed during these inventories were often attributed to beaver activity. The surveys also noted frequent debris jams along most of the streams surveyed and, along with beaver dams, recommended their removal.

During the summer of 1994, the BLM conducted intensive stream habitat inventories of Big Creek and its tributaries (reports on file in Myrtlewood Resource Area and ODFW, Corvallis, OR). Data collected during these surveys was intended to allow evaluation of survey streams in relation to ODFW habitat benchmark criteria (Appendix D, Table D-2). It is difficult to compare data from the 1973 and 1994 surveys because they were collected using different methods and for different objectives. However, general comparisons of habitat conditions between the two decades can be made. First, in 1973, streams throughout the watershed were dominated by large wood, both in aggregations and single pieces. In contrast, two decades later, wood is practically non-existent, either as single pieces or in aggregations. Secondly, beaver dams were abundant in surveyed streams in 1973 while in 1994, beaver dams were still present but much reduced.

Generalizations based on a combination of anecdotal evidence (based on interviews of long-time residents of the Big Creek watershed) and extrapolation based on aquatic inventory information suggest the following are the primary effects of human activities on the aquatic and riparian systems in the Big Creek watershed:

- Extensive logging of riparian vegetation reduced inputs of large wood and levels of shading, resulting in loss of instream complexity, downcutting of stream channels, and high water temperatures.

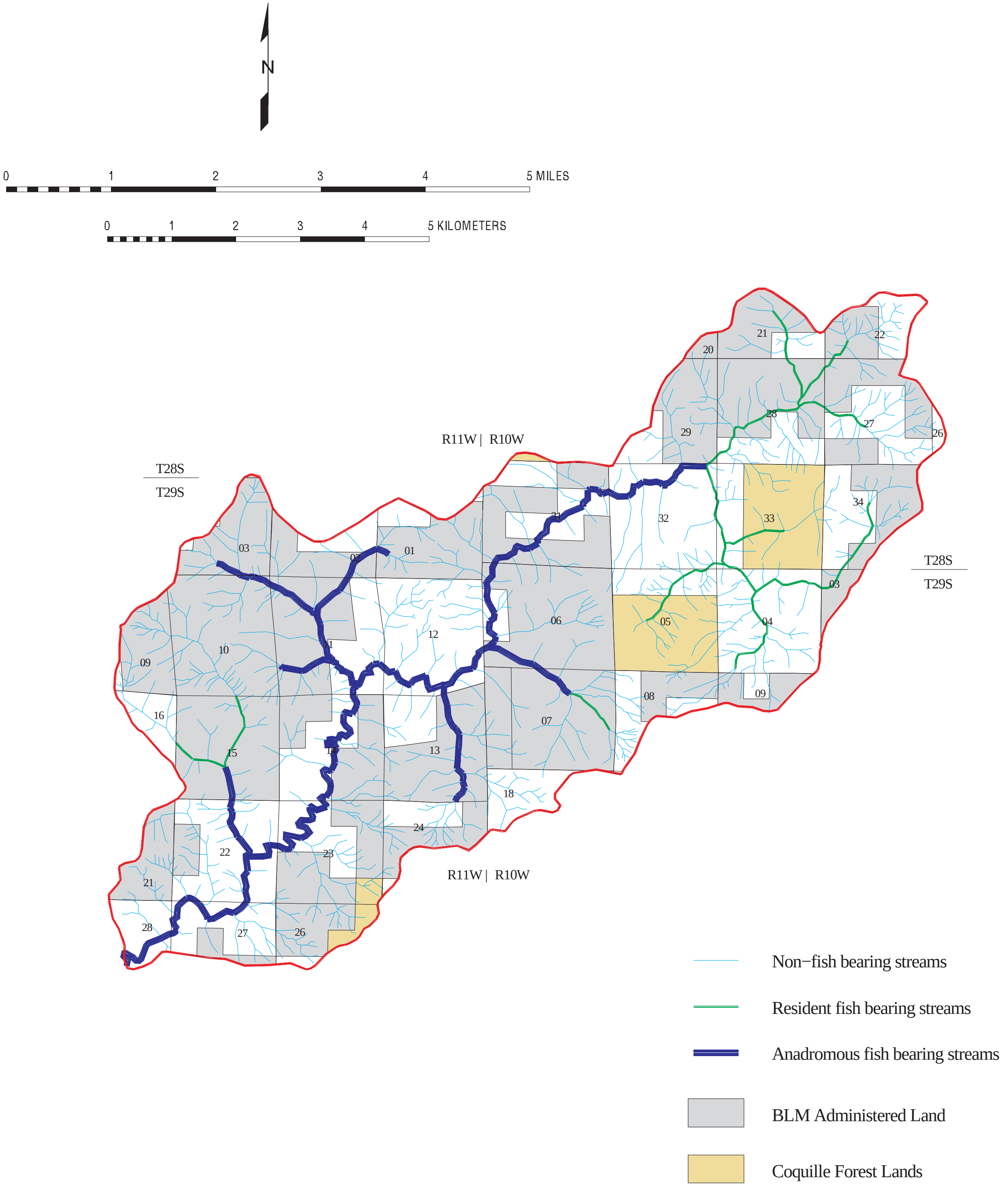
- Splash dams and water transport of logs scoured riparian vegetation and, in combination with stream-cleaning, eliminated large roughness elements (boulders, logs, beaver dams), resulting in habitat simplification, channel down-cutting, sedimentation, etc.

- Extensive riparian road networks encroached on streams, generating and routing sediment into streams, increasing downcutting, and disconnecting streams from floodplains. Additionally, the construction of roads and installation of culverts severed the connection between larger streams and tributaries, blocking passage for many organisms as well as blocking inputs of wood and boulders from debris torrents and landslides.

Fisheries

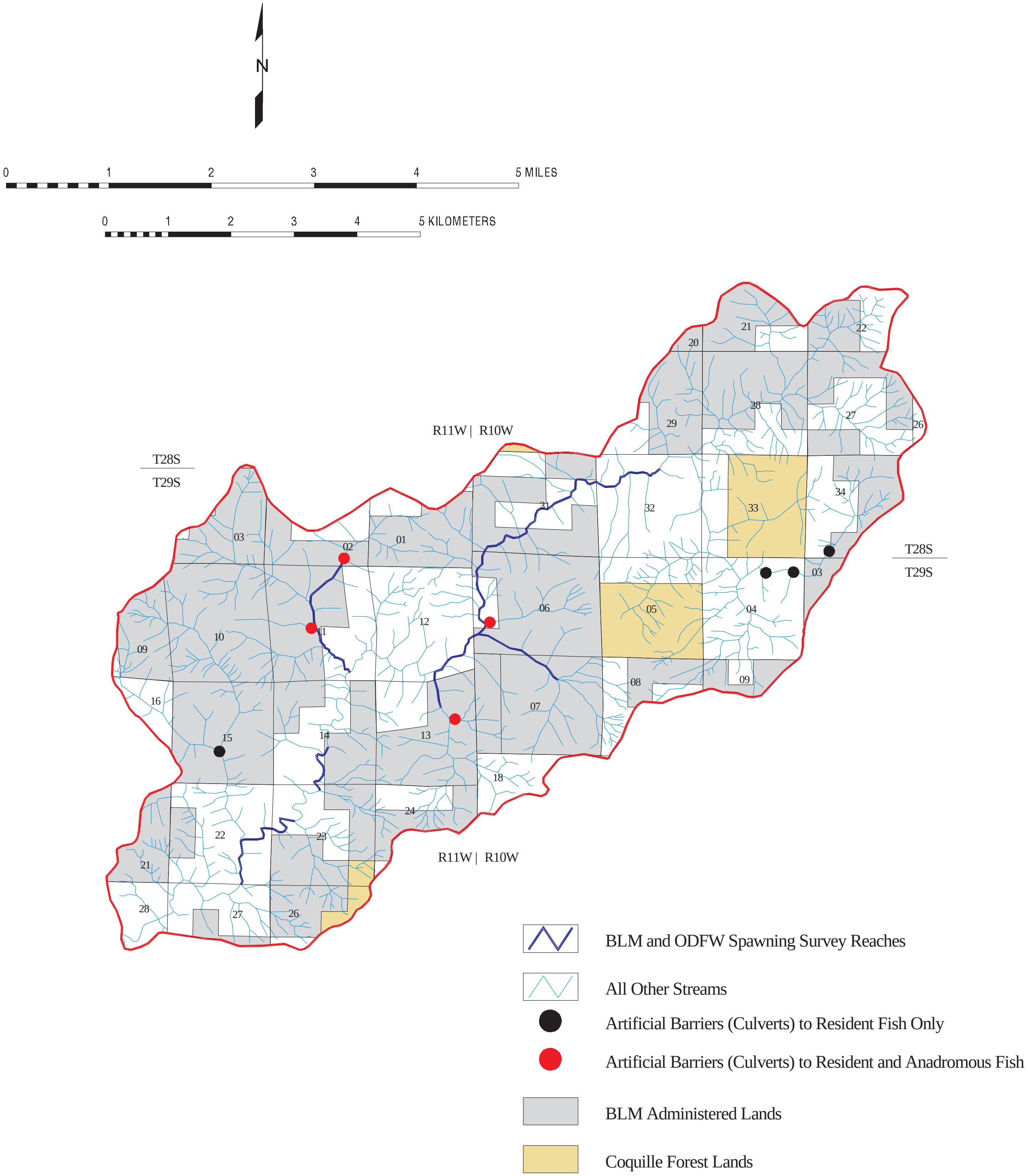
Distribution of Fisheries Habitat
The Big Creek watershed contains approximately 18 miles of anadromous fish and an additional 11.5 miles of resident fish use (Figure III.6-5). Anadromous spawning habitat is widely distributed in the watershed, along lower-gradient 3^{rd} to 5^{th} order stream reaches (Figure III.6-6). Additionally, coho salmon have been observed spawning in small (2^{nd} order) unnamed tributaries to Brownson and Big Creek. Use of small streams by coho is probably extensive in

Figure III.6−5 Anadromous and Resident Fish Presence



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

Figure III.6−6 Anadromous Spawning Reaches and Artificial Barriers (Culverts)



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

the drainage, but no data exists to support an estimate of the distribution of these fish in the watershed.

Miles of anadromous fish distribution change yearly, based on habitat and flow conditions. For anadromous fish, access to spawning and rearing habitat in the watershed is thought to be limited by the following *natural* barriers or habitat conditions:

- *Mainstem Big Creek*: a boulder canyon (Sec. 32) and a ten-foot waterfall a short distance upstream from canyon
- *Fall Creek*: a long, steep cascade (Sec. 22)
- *Jones Creek*: summer low flows preclude rearing here; high gradient and poor habitat preclude spawning use.
- *Bear Pen Creek*: high gradient in Sec. 7.
- *Swamp Creek*: anadromous fish not present due to barrier in Big Creek

Additionally, access to habitat is limited for both anadromous and resident fish by several human-created barriers (culverts) (see Figure III.6-6).

<u>Abundance And Condition of Fisheries Habitat</u>

<u>Spawning & Incubation Habitat</u>

There have been no basin-wide assessments of available spawning habitat in the Big Creek watershed; furthermore, the amount and quality of available spawning habitat varies yearly according to flow conditions (depth and velocity). Limited spawning surveys conducted by the BLM and ODFW, (reports of file in the BLM, ODFW offices) indicate that spawning habitat exists and is used by anadromous fish along mainstem Big Cr., Brownson Cr., and its main tributary, Bear Pen Cr., Axe Cr., etc.(Figure III.6-6). As mentioned previously, small streams are probably used extensively for spawning by coho salmon as well as cutthroat trout.

1994 inventories conducted in Big, Brownson, Brownson Trib, Bear Pen, Fall, and Axe Creeks indicated that most gravel riffles (assumed to be used as spawning habitat) contained a moderate amount of sand, silt and organic matter (Table III.6-6). However, the amount and condition of gravels and riffles in the late summer (when the inventory was conducted) may not represent spawning conditions during the fall and winter, when higher flows clean fines from riffles and redistribute gravel beds. Furthermore, floods during November 18-19, 1996 contributed and redistributed a large amount of sediment. Subsequent cursory examination and anecdotal evidence following the flood suggest new gravel beds were created and that fish were spawning much higher in drainage network.

<u>Rearing Habitat</u>

In the Big Creek watershed, the structurally complex habitats important for salmonid rearing are limited or non-existent. For example, the average woody debris complexity score for most reaches surveyed in the analysis area was about 1.5, corresponding to very low wood abundance, creating little or no habitat complexity or complex flow patterns and ineffective at providing cover at moderate to high discharge. Additionally, complex pools (with wood score ≥ 4) were very rare; only one was found in the watershed.

In general, pool habitat is fairly common throughout the watershed. The percentage of habitat made up by pools in Big, Fall, Brownson, Brownson Trib, and Swamp Creeks was (respectively) 41, 29, 30, and 44 percent. In Axe and Bear Pen Creeks (where average gradient ranges from 4.4-5.5%), the percentage of habitat made up by pools is low (7% in Axe and 4% in Bear Pen).

Despite the absence of structurally complex areas, several areas exist which currently provide or have the potential to provide adequate rearing habitat. These "hot spots" include:

- *Bear Pen Creek*: contains most complex habitat of watershed streams according to 1994 habitat inventory. Middle reach meanders across wide floodplain, only slightly downcut. Well-shaded. Riparian area largely without roads. No culverts present.

- *Upper Fall Creek* (Sec. 15 SE 1/4, NE 1/4): riparian zone dominated by large conifer. Low gradient, lateral pools and undercut banks common. Numerous beaver dams. Excellent potential for trout.

- *Brownson Creek & Trib*: Low overall gradient, meanders across narrow floodplain (bounded by road). Well-shaded. Numerous beaver dam and lateral pools.

Amphibians & Invertebrates

Habitat

Despite the fact that most of the stream miles in the Big Creek watershed are composed of small (1st-3rd order) perennial and intermittent non fish-bearing streams, there is little or no information on invertebrate or amphibian habitat or communities in these systems.

Macroinvertebrate community samples may be used to assess habitat quality indirectly (Rosenberg and Resh 1993). Data from limited macroinvertebrate samples collected in spring and fall on Upper Big Creek in 1995 showed abundance in the riffle community sampled to be lower that might be expected in a standard riffle sample (2,400-3,900 organisms vs. 5,000-6,000)(Hynes 1970). However, sample richness, evenness, and diversity were fairly high, indicating that water and habitat quality was generally good (report on file in Myrtlewood Resource Area) . From these limited samples, it is difficult to generalize about macroinvertebrate habitat and communities throughout the watershed because of tremendous variation inherent in macroinvertebrate samples and among microhabitat conditions across the watershed. However, based on knowledge of habitat requirements for macroinvertebrates and amphibians combined with information about habitat changes stream ecosystems on Big Creek, we may assume that removal of structure from stream channels (reducing habitat diversity), increases in water temperature, and additions of fines from adjacent roads have reduced affected macroinvertebrates and amphibians similarly to fish.

Table III.6-6. Comparison of habitat conditions in Big Creek and selected tributaries against ODFW Habitat Benchmarks.

"Good" habitat conditions are based on values from surveys of reference areas with known productive capacity for salmonids and from the 65th percentile of values obtained in surveys of late successional forests. "Poor" habitat conditions are based on values associated with known problem areas and from lower 25th percentile of combined data for each region. "Moderate" conditions lie in-between.

=Good Habitat Conditions =Fair Habitat Conditions =Poor Habitat Conditions

Benchmark Critera	Big Creek								Fall Creek		
REACH	1	2	3	4	5	6	7	Trib A	1	2	3
Pool Area	48.1	53.69	54.4	47.1	20.99	12.63	1.53	1.5	.40.92	31.51	10.54
Pool Frequency (channel widths)	9.5	10.5	10.7	11.6	10.3	18.8	145.4	227	9.4	19.8	40.0
Residual Pool Depth (m)	0.686	0.789	0.740	0.740	0.625	0.520	0.270	0.30	0.54	0.45	0.50
Width-to-Depth Ratio	48.5	48.9	53.5	53.0	38.7	33.4	27.2	23.0	14.7	60.0	1.0
Silt, Sand & Organic Material	9	6	6	9	4	11	5	9	7	5	88
Gravel (% area)	51	58	43	44	25	42	38	40	45	44	12
Shade (reach average %)	77	83	80	84	91	93	94	93	92	89	84
LWD (pieces/100m)	2.6	1.8	1.6	1.6	4.6	5.6	1.9	20.1	7.5	7.8	8.6
LWD (volume/100m)	1.1	1.6	1.6	2.7	10.1	14.7	3.3	38.6	1.6	3.9	10.0
Riparian Conifers (#>20" DBH/1000 ft)	0	30	0	61	0	41	X	152	0	0	0
Riparian Conifers (#>35" DBH/1000 ft)	<1	<1	<1	0	<1	<1	X	2.5	0	0	X

Table III.6-6 (continued)

Benchmark Critera REACH	Brownson Creek		Axe Creek	Bear Pen Creek	Swamp Creek	Jones Creek
	1	2	1	1	1	1
Pool Area	39.76	2.24	6.74	4.4	51.71	X
Pool Frequency (channel widths)	9.80	172.30	60.30	90.80	20.10	X
Residual Pool Depth (m)	0.71	N/A	0.48	0.45	1.29	.X
Width-to-Depth Ratio	30.2	1.0	16.90	31.6	22.80	X
Silt, Sand & Organic Material	42	X	14	15	54	X
Gravel (% area)	40	55	34	42	27	X
Shade (reach average %)	82	94	94	94	82	33
LWD (pieces/100m)	5.2	3.6	11.0	16.2	12.40	<1
LWD (volume/100m)	6.3	0.1	0.80	42.5	23.90	0
Riparian Conifers (#>20" DBH/1000 ft)	0	0	0	81	0	0
Riparian Conifers (#>35" DBH/1000 ft)	0	0	0	<1	0	0

Human-caused Barriers to Movement And Dispersal

Road density in the Big Creek watershed is high (up to 4.17 road miles/mi^{2}). Thus, many perennial streams throughout the watershed are crossed multiple times by roads. Roads and stream-crossing structures have been shown to function as barriers to the movement and dispersal of many fish and riparian wildlife species. Road crossings can inhibit fish passage because of blockage, deterioration, poor design (outfall barriers, excessive water velocities, disorienting turbulence, flow patterns, etc.) (Furniss et al. 1991). Culverts placed above the water level may allow entry only for larger fish with substantial jumping ability; entry by non- or poorly jumping organisms (i.e., juvenile salmonids, sculpin, herptiles, crustaceans, molluscs) is nearly impossible. Furthermore, lack of natural substrate in culvert bottoms may prohibit passage by organisms which require roughness, cover, and a precise microclimate. Currently, at least three culverts in the watershed are probable barriers to anadromous fish and at least five block movement of resident fish passage (see Figure III.6-6). Nearly every stream-crossing culvert in the watershed is a barrier to upstream migration of all other stream organisms due to disconnection of culvert outlet from the natural stream bottom and lack of natural substrate in the culvert-bottoms. Notable exceptions are located on Fall Creek, Brownson Creek and the main tributary to Axe Creek, where culverts have accumulated a substantial amount of gravel.

SYNTHESIS

Influences and Relationships

For a given number of spawners and seeding level, habitat conditions that set carrying capacity for rearing include stream productivity, abundance of certain habitat types (such as pools), and the quality of those habitats (i.e., complexity, water velocity and quality, depth, turbidity). The quality of spawning habitat is affected by substrate composition, cover, water quality and quantity. Successful incubation depends on extra- and intra-gravel chemical, physical and hydraulic variables, dissolved oxygen, water temperature, amount of fine sediment, etc. Access to suitable habitat for spawning and rearing may also be important in setting population levels.

In the Big Creek watershed, management activities over the last century have impacted the abundance and quality of each the above habitat factors, resulting in diminished system capacity to support fish populations.

- *Stream Productivity*

Stream productivity and fish production and survival are positively correlated (Meehan et. al. 1991, Konopacky 1984, McFadden and Cooper 1962) and abundance of food (macroinvertebrates) may override even cover in determining carrying capacity of juvenile salmonids in summer months (Christensen 1996). In the Big Creek watershed, management activities over the last century have reduced the input and retention of nutrients in Big Creek watershed streams. Intensive road-building in the drainage has likely increased sediment supply, modifed runoff, altered water and substrate quality, ultimately reducing macroinvertebrate populations. In reaches where macroinvertebrate communities are supported by inputs of organic material from riparian zones, removal of large wood from the channel has diminished the stream's capacity to retain the nutrients. Additionally, alteration of riparian vegetation during timber harvest or road-building has removed a major food source for macroinvertebrates. Typically, removal of streamside vegetation increases incoming solar radiation, causing concomitant increases in algae-dependent macroinvertebrate populations. However, fish production in Big Creek is not likely to increase because higher water temperatures are likely to outweigh benefits from the increased food supply. Finally, diminished salmon returns in the watershed have subsequently diminished the nutrient inputs associated with large numbers of salmon carcasses following the spawning season.

- *Habitat Abundance & Quality*

Pool abundance and quality is a major factor affecting abundance and survival of juvenile salmonids (Nickelsen et. al 1992a). Despite the fact that pool habitat is abundant in many streams in the analysis area, nearly all of the pools present are scour pools. Backwater, alcove, and beaver dam pools are very rare or absent in the watershed. Scour pools, unlike backwater, alcove and beaver dam pools, are erosional at high flows and therefore do not provide suitable winter rearing habitat for most salmonids. In particular, juvenile coho salmon avoid high velocity (scour) pools at high flows and instead utilize backwater, alcove and beaver dam pools (Nickelson et. al. 1992a and 1992b).

The removal of beaver and beaver dams throughout the watershed has reduced the abundance of an important habitat type for salmonids. Typically, proliferation of beaver and beaver dams may be closely linked to fish production and survival (Olson et. al. 1994) and beaver ponds are often used in high densities by coho salmon.   In fact, production of coho salmon smolts in many Oregon coastal streams is suspected to be limited by the availability of habitats created by beaver activity (Nickelson et. al. 1992b). In addition to providing complex pool habitat, beaver dams also trap sediments, help maintain summer base flows, reduce stream temperatures, improve riparian vegetation development by changing the water table, and reduce water velocities and scour (Olson et al 1994) (see Section III.3 Stream Channel). Thus, the elimination of beaver and beaver dams throughout the Big Creek watershed is likely a major cause in declines of salmon populations (particularly coho) from historic levels.

Although most stream data collected for the Big Creek watershed and subsequent management in analysis area focuses on larger streams (4^{th} order or greater), most of the stream miles in the watershed are made up of small streams. Because small streams are so numerous in the watershed and because they dissect the uplands, they are most likely to be affected by management.

Small streams are responsible for habitat quality and nutrient availability in larger tributaries downstream. Fishes such as coho salmon and cutthroat trout are often found spawning and rearing in these small perennial systems. Small streams also provide habitat for a variety of amphibian and invertebrate species. They typically contain considerable micro-habitat diversity, producing rich biotic communities supported by allochthonous inputs from the adjacent forests. These small upland systems often contain species not found in mainstems or lower reaches (Tew 1971). For example, in the adjacent Sandy Creek watershed, limited sampling in small streams produced greater caddisfly diversity than was present in mainstem Sandy Cr., including 7 species not found in the mainstem itself (BLM 1997b)

Persistence of these small-stream communities depends on stability of small stream channels (maintained by riparian vegetation, down wood), flow regime, and shade and detritus contributed by riparian vegetation.

There have been no systematic surveys of amphibian or aquatic invertebrate habitat in the Big Creek watershed. Typically, habitat conditions important for aquatic amphibians and invertebrates (which spend some or all of their life in the water) are similar to that of fishes: water temperature and chemical composition, water velocity, stream productivity, amount of solar radiation, and physical variables such as substrate composition, habitat complexity, availability of cover, etc. (Hynes 1973, deMaynadier et. al. 1996, Nussbaum et. al. 1983). Invertebrate diversity is usually closely associated with substrate diversity and complexity of flow patterns (Christensen 1996). It is therefore assumed that management activities affecting instream habitat, flow patterns or riparian vegetation affect small stream communities in much the same way as the larger systems.

- *Access to Habitat*

The presence of man-made barriers in the Big Creek watershed limits the ability of fishes and other species to access historic habitat. The capacity of aquatic and terrestrial species to access habitats and refugia may be an important factor in ensuring survival. Movement and dispersal may also be necessary to create and maintain genetic diversity. Formerly continuous populations that become reduced in size and isolated by barriers are more susceptible to genetic, demographic, and environmental changes (Shaffer 1982, Soule 1987).

Only four culverts in the watershed are barriers to salmonid species; however, nearly every other stream culvert is a barrier to passable by non-jumping aquatic organisms, including sculpin, crayfish, molluscs, and other invertebrates. Some adult amphibians are capable of overland travel and may be able to by-pass problem culverts; however, research indicates that roads may also significantly inhibit the movement of some salamander species (deMaynadier and Hunter 1995). For a Southern Torrent salamander, which is rarely found farther than one meter from a stream (Blaustein et. al. 1995, Bury pers. comm., Applegarth pers. comm), a road would likely serve as a nearly impassable barrier. Because many riparian areas in the Big Creek watershed are intersected by roads, maintenance of aquatic dispersal routes may not only important for aquatic species but may provide the only dispersal route for terrestrial ones as well.

Barriers to the passage of certain aquatic organisms may have serious impacts on ecosystem process in small streams above barriers. These barriers could act as one-way valves allowing downstream movement of organisms, but no upstream movements. If a large number of organisms are flushed out of the headwater due to a high flow event, long-term population levels could be affected by the reduction of individuals and the lower genetic diversity. Amphibians, crayfish, and invertebrates make up a large portion of the biomass produced in aquatic systems, contribute to the maintenance of food webs by processing vegetation and leaf litter, and increase availability of nutrients to other organisms (Christensen 1996, Taylor et. al. 1996, Hynes 1970).

<u>Role in the 5th Field Watershed</u>

It is difficult to quantify the impact of the Big Creek watershed on the larger 5th field watershed due to lack of data on the 5th field scale. However, sufficient data exist to support the conclusion that the Big Creek watershed holds a higher value than other subwatersheds in maintaining salmonid survival in the greater Middle Fork Coquille system.

This determination is based on several factors:

- *Greater proportion of federal ownership*-relative to other watersheds in the M. Fork

Coquille basin, a greater proportion of the Big Creek watershed is federally owned. This enhances our ability to manage the system effectively for the protection and recovery of anadromous and resident fishes.

- *Lower intensity of stressors*-relative many low-gradient streams in the M. Fork Coquille system (such as the Lower Rock-Myrtle Cr. system), Big Creek and its tributaries receive less pressure from grazing, residential and agricultural development, and timber harvest.

- *Habitat quality and abundance*-streams in the Big Creek watershed contain a greater abundance of pools and higher pool frequency than many neighboring systems. Levels of silt and sand are substantially lower and gravels more abundant here than other surveyed streams elsewhere in the M. Fork Coquille system. The Big Creek watershed also contains a greater proportion of low-gradient stream miles than elsewhere. The high proportion of low-gradient stream miles combined with relatively high levels of beaver activity compared to elsewhere particularly enhance the importance of this watershed to survival of coho salmon in the basin.

- *Abundance of fish-bearing streams*-due to topographic characteristics of the Big Creek watershed, there are more fish-bearing stream miles here than in many other watersheds in the M. Fork Coquille basin. Although absence of natural barriers in the watershed increases the distribution of anadromous fish, there are also portions of the watershed inaccessible to anadromous fish, providing refuge for resident populations. Abundance of streams bearing both resident and anadromous fish increases available refugia for all populations in the case of stochastic events.

- *High spawning densities*-Unlike many other streams in the M. Fork Coquille basin where spawning activity is highly localized, spawning activity is distributed widely throughout the Big Creek watershed. In addition to providing greater abundance of spawning habitat, BLM spawning survey reaches in Big, Bear Pen, and Brownson Creeks appear to support higher densities of spawners than BLM survey reaches elsewhere in the basin, increasing the relative importance of Big Creek in the M. Fork Coquille system.

Aquatic Habitat-Management Objectives

Connectivity: Maintain and restore connectivity between and within streams for *all* aquatic species. Human-caused barriers and impediments to movement and dispersal, such as deteriorated or poorly designed culverts, should be removed or modified to allow *all* species access to historic habitat. Specifically, culverts should be placed in contact with the stream bed and designed to replicate natural stream-bottoms (i.e., to collect gravel throughout).

Emphasis on Processes: Restore the processes which create and maintain habitat for aquatic organisms. For example, the input of large wood and boulders onto floodplains and into stream channels via landslides and debris torrents is an integral part of creating and maintaining habitat for riparian and aquatic organisms. Currently, the input of these materials via landslides and debris torrents is typically blocked by riparian roads and culverts. The removal (when possible) of riparian roads and/or avoidance of road construction in riparian zones helps restore or maintain inputs of large material.

Protect Refugia: Portions of the watershed (such as Bear Pen, Brownson, and Axe Creek drainages) currently providing good-quality habitat for fishes, invertebrates, amphibians, and other aquatic species should receive priority in protection and restoration. In drainages where culverts are few or absent (such as Bear Pen and Axe Creeks) and stream ecosystem connectivity is relatively intact, management activities should avoid installation of structures such as roads and culverts which may restrict access of species to habitat.

Habitat Quality: "Any species-specific strategy aimed at defining explicit standards for habitat elements would be insufficient for protecting even the target species" (Standards and Guidelines, B-9). Projects to restore or improve habitat quality should focus on restoring conditions appropriate for all aquatic organisms. A specific management objective for habitat quality is twofold: (1) meet or exceed ODFW criteria for "good" fish habitat, and (2) conduct habitat improvement projects which create and maintain a diverse array of flow conditions and substrates to support diverse invertebrate and amphibian communities.

Cooperation: Opportunities exist for joint habitat-restoration projects in middle and lower Big Creek with private landowners and with the Coquille Watershed Association. Management should focus on establishing joint project-goals and sharing implementation and monitoring of subsequent projects.

Emphasis on Aquatic-Riparian Linkages: A dynamic linkage between riparian zones, floodplains, and streams is necessary for proper functioning of each element. Management activities should focus on creating and maintaining hydrologic and physical links between riparian and aquatic systems, including: placement of instream-structures which aggrade stream channels and route water onto floodplains, and placement of large wood that links stream channels to floodplains, stores sediments, and provides habitat for riparian and aquatic organisms.

AQUATIC AND RIPARIAN SPECIES

Analysis Questions:

What aquatic and riparian-associated species historically occupied drainages in the analysis area?

What aquatic and riparian-associated species are currently present, and how are they distributed?

What is the role of this analysis area within the larger 5th field watershed with respect to species viability?

What are the influences and relationships of aquatic and riparian associated species with other ecosystem processes and elements (e.g., sedimentation, vegetation, habitat), and what natural and management-related processes have the potential to reduce or limit the viability of these organisms?

What are population trends of sensitive aquatic organisms in the analysis area?

What are the management objectives for aquatic and riparian species in the analysis area?

What management actions (restoration, maintenance, protection, etc.) could be undertaken that would be maintain and/or restore the desired populations of aquatic species? (See Section IV - Recommendations)

Table III.6-7 contains the species and species functional groups or guilds found in the Big Creek watershed. Specific information about each species or groups with special management status follows the table. Although there have been no known recent extinctions, populations size and distribution have changed.

Table lists species that are obligate users of streams or riparian areas during their life cycle that are found or are likely found within the watershed. Species are grouped by guild to emphasize functional relationships.

<u>Fall Chinook Salmon</u>
The biology and life-history of chinook salmon have been summarized elsewhere (see Groot and Margolis 1995). The fall chinook salmon of the Big Creek watershed and the Coquille River basin are "ocean-type" and are part of a gene conservation group extending from Coos Bay to Elk River. Among the fall chinook populations in this group, the Coquille (and Coos) populations tend to be relatively small, with an age at maturity that is intermediate compared to other coastal populations (Nicholas and Hankin 1989, cited in ODFW 1995a).

Adult chinook return to Big Creek from the ocean in the early November and spawning occurs until late December. Peak spawning usually occurs from the second week of November through the first week in December. After emergence, chinook juveniles probably rear in Big Creek from three to six months before migrating to the estuary or ocean.

No data exist which support an estimate of historic or current chinook population levels in Big Creek. For management purposes, however, is assumed that population levels and trends in Big Creek have mimicked those of the Coquille basin (for which there is rough population data). According to cannery records, the Coquille commercial catch ranged from 1,000 to 19,000 fish annually from the 1890s to 1924 and then declined until the fishery was closed in 1957 (ODFW 1995a). ODFW fall spawning ground counts in the Coquille basin indicate that fall chinook increased steadily in abundance during the 1960s, then stabilized with no trend in the 1990s. While a stable or increasing fall chinook salmon population may be implied by current data, it should be noted that major impacts to the population may have occured in the era of splash-damming and large scale commercial harvest *before* spawning survey data was collected. Current population sizes in the basin cannot be accurately measured but are estimated to range from 1,800 to 7,500 (ODFW 1995). The relative contribution of Big Creek and its tributaries to the population cannot be measured.

Table III.6-7 Aquatic and Riparian Species of Ecological Concern in the Big Creek Analysis Area.

Species listed have been found in the watershed or incorporate the watershed in their home range. [1]Species without specific legal or management status but are of concern due to role in ecosystem function. [2]At risk of extinction according to Nehlson et. al. (1991).

Species Group/Guild	Common Name	Scientific Name	Habitat Association	Pop'l Trend	Status
herbivorous	Beaver	*Castor canadensis*	Loti, lentic, riparian	unknown	ecological concern[1]
insectivorous	Chinook salmon (fall)	*Oncorhynchus tshawytscha*	Lotic	stable	ecological concern[1]
insectivorous	Coho salmon	*O. kisutch*	Lotic, lentic	decreasing	Proposed T&E At risk of extinction[2]
insectivorous/piscivorous	Coastal cutthroat trout	*O. clarki*	Lotic, lentic	decreasing	At risk of extinction[2]
insectivorous	Winter steelhead	*O. mykiss*	Lotic	decreasing	Proposed T&E At risk of extinction[2]
omnivore	Pacific Lamprey	*L. tridentata*	Lotic (channel margins)	decreasing	State Sensitive-Vulnerable
insectivorous/piscivorous	Pacific Giant Salamander	*Dicamptodon tenebrosus*	Lotic, lentic, riparian, springs/seeps	unknown	ecological concern[1]
insectivorous	Southern Torrent Salamander	*Rhyacotriton variegatus*	Lotic (channel margins), springs/seeps	unknown	State Special Status-Critical
insectivorous	Dunn's Salamander	*Plethodun dunni*	Riparian, springs/seeps	unknown	ecological concern[1]
scraper/herbivore (tadpole) insectivorous (adult)	Tailed Frog	*Ascaphus truei*	Tadpole: Lotic Adult: Lotic, riparian	unknown	Bureau Tracking State Sensitive-Vulnerable

collector-gatherer/omnivore (tadpole)	Red-legged Frog	*Rana aurora*	Tadpole: Lotic (channel margins) lentic, springs/seeps Adult: Lotic, lentic, springs/seeps, riparian	unknown	Bureau Tracking State Sensitive-Vulnerable
insectivorous (adult)	Foothills Yellow-legged Frog	*Rana boylei*	Tadpole: Lotic (channel margins) Adult: Lotic (channel margins), riparian	unknown	Former Fed'l Candidate 2 Bureau Tracking
scraper-herbivore	Beers's false water penny beetle	*Acneus beeri*	Larvae: Lotic (cobble, rubble) Adult: unknown	unknown	Former Fed'l Candidate 2 Bureau Tracking
scraper-herbivore	Burnelli's false water penny beetle	*Acneus burnelli*	Larvae: Lotic (cobble, rubble) Adult: unknown	unknown	Former Fed'l Candidate 2 Bureau Tracking
insectivorous	Montane bog dragonfly	*Tanypteryx hageni*	Larvae: Lentic, springs,/seeps Adult: riparian	unknown	Bureau Tracking
scraper-herbivore	Denning's Agapaetus caddisfly	*Agapaetus denningi*	Larvae: small springs Adult: riparian	unknown	Bureau Tracking

Coho Salmon

The coho salmon of Big Creek and the Coquille basin belong to a gene conservation group ranging from the coastal lake region between the Siuslaw River and Coos Bay to Cape Blanco (ODFW 1995). Adult coho return to Big Creek and its tributaries in early November and spawn until mid-January, with peak activity in late December. Juvenile coho probably spend one summer and one winter in the Big Creek subwatershed before migrating to the ocean.

No data exist which support an estimate of current or historic coho population levels in the Big Creek watershed. Spawning ground surveys conducted from 1992-1996 by BLM and ODFW (reports on file in MRA and ODFW) indicate that spawning escapement in the survey reach exceeded the ODFW target of 42 fish/mile. As with chinook, is assumed that coho population levels and trends in the Big Creek watershed have mimicked those of the Coquille basin (for which there is rough population data). Standard spawning ground surveys of coho conducted throughout the Coquille basin since 1958 show a clear decline in spawning escapement (ODFW 1995). From 1985 to 1995, the population of adult wild coho salmon within the Coquille basin was below the minimum escapement goal of 16,380 (42 fish/mile) for eight of ten years.

Winter Steelhead

The steelhead trout of the Big Creek watershed and Coquille River are part of a gene conservation group extending from the Umpqua to the Lower Rogue Rivers. There have been few or no genetic studies conducted on steelhead in this region and as a result, there is an absence of genetic information on steelhead in the Coquille and surrounding basins (ODFW 1995b).

Steelhead enter and spawn in Big Creek from mid-January through the first week in April. The spawning period for steelhead is quite protracted, but peaks have been observed one each in February and in March (depending on rainfall events).

Typically, the only information gathered on spawning winter steelhead is collected incidentally during coho salmon spawning surveys. As a result, current population size and carrying capacity of adult and juvenile winter steelhead in the Coquille River are unknown (ODFW 1992), but are likely below the spawning population escapement goal of 10,000 fish. Based on angler catch records, winter steelhead populations in the Coquille River were below their 20-year average during seven out of ten years from 1981-1990 (Nickelson et. al. 1992c), suggesting a downward trend in the winter steelhead population of the Coquille River. The BLM has conducted steelhead spawning surveys in Big Creek and elsewhere, but there is insufficient information to estimate the watershed or basin population and the data suggest no trend in escapement.

Other Fish Species

No data is available from which to assess the population status of other fishes (sculpins, Cyprinids, lamprey) in the Big Creek watershed. Anecdotal information suggests that the numbers of spawning resident and sea run cutthroat trout (ODFW 1992) are below historic levels. Speckled dace populations are suspected to be above historic levels or at least more widely distributed due to water temperature increases within the watershed.

Beaver

Stream surveys in the 1970s noted that beaver and dams were abundant throughout the watershed, suggesting that populations must have increased following this initial trapping period in the early 1900s. However, in the 1970s and '80s, beaver dams were suspected to increase turbidity, cause massive siltation of spawning beds, and create barriers to anadromous fish passage and were actively removed by dynamite or mechanical means. As a result, current beaver populations are much reduced from historical levels.

Influences and Relationships

Salmonids

A variety of natural factors (described below) limit population levels of resident and anadromous salmonids in the Big Creek watershed. Management activities in the watershed affect salmonid production and survival when they alter the frequency or magnitude of these natural factors.

During all freshwater life stages, the major factors determining salmonid production and survival are water quality, habitat quality and availability, and food abundance. Incubation success is particularly affected by flow extremes, temperature, silt levels, and predation. Immediately after hatching, a large percentage of mortality is due to physiological stress during the conversion from yolk feeding to exogenous food sources and the establishment of territories. For the remainder of freshwater rearing, major factors regulating abundance change seasonally. In summer months, food availability and temperature-caused physiological stress are major limiting factors. During the winter, when fish switch from active feeding and growth to conserving energy, availability of suitable winter habitat limits abundance.

The effects of specific management practices on watershed and channel processes have been described in detail elsewhere in this analysis. In general, these practices directly affect fish production and survival when they alter the levels or timing of peak and base flows, route sediment into streams, simplify channels, limit habitat complexity, reduce food supply, and increase stream temperatures.

In the freshwater environment, the effects of management activities on salmonids may not be equal across all species. Resident trout and coho salmon may be particularly susceptible to limiting factors in the freshwater environment because they spend a greater portion of their life-cyle in freshwater than do chinook. Based on the relatively low survival rates from coho fry to smolt when compared to chinook (Sandercock 1991), it is apparent that the freshwater environment plays a major role in the fluctuation of coho abundance. In the Big Creek analysis area, management activities over the last century have differentially affected habitat required by coho salmon for life-stages where highest mortality rates are typically observed. For example, survival during the critical period immediately after emergence is dependent on the availability of low velocity areas and the ability of coho fry to establish territories within them (Sandercock 1991) but management activities in the analysis area have eliminated channel-margin habitat and complex pools which provide refuge for fry. Additionally, activities resulting in channel downcutting, the disconnection of streams from floodplains, and removal of beaver dams have eliminated off channel and floodplain habitats required by coho for winter rearing. Elimination of winter rearing habitat is proposed as the major factor limiting coho production in coastal streams (Nickelsen et al 1992a).

Interspecific competition in freshwater habitats may also limit the abundance of some salmonid species. For example, although cutthroat and steelhead trout prefer pools with overhead cover, in the presence of coho salmon, they may be excluded from these habitats (Hartman 1965, Bugert 1985, Glova 1986). The effects of interspecific competition for habitat may be exacerbated by management activities which limit habitat abundance and complexity, or that introduce coho into sections of streams normally accessible only to resident fish. Typically, complex pools support higher densities and diversity of fish species. Management activities in the analysis area such as stream cleaning or riparian harvest that reduced or removed instream structure have limited the capacity of watershed streams to support diverse communities of salmonids.

Other Fish Species

Information has not been collected on non-salmonid species in the watershed and it is therefore difficult to identify population trends and the major factors affecting abundance and survival. It is likely that non-anadromous species such as lamprey, sculpin and the Cyprinids in the analysis area have been particularly affected by management activities since these species occupy freshwater throughout most or all of their lifetimes.

Based on knowledge of habitat requirements for these species, it routinely assumed that management activities affecting abundance and diversity of habitat for salmonids have also affected habitat conditions for other species. For example, ammoecetes of Pacific Lamprey spend 5 years in freshwater, rearing in depositional areas in pools and along channel margins. It is probable, therefore, that management activities in the analysis area which have increased scour and downcutting have reduced the abundance of low-velocity depositional areas required by lamprey.

Beaver

In the absence of hunting pressure, beaver abundance is regulated by the density of available territories, and the density of territories is limited by available food (Payne 1984). It is not known whether beaver population levels in the analysis area are limited by hunting/trapping pressure or habitat and food conditions. It is possible that the lack of “velocity checks” (provided by down wood in the stream channel) throughout the watershed precludes dam-building.

Trends

Insufficient data exist to assess fish population trends and to quantify the impact of Big Creek salmon stocks on the health of the larger 5^{th}-field watershed (the Coquille Basin). It is assumed that population dynamics in Big Creek generally mimic those at the larger scale of the Middle Fork Coquille and Coquille Rivers. A comparison of current and historical conditions indicate that, at the 5^{th} -field scale, coho salmon and steelhead stocks have declined in recent years, while chinook salmon appear to be somewhat stable. Protection of aquatic and riparian habitats on public lands and restoration initiatives on both public and private lands will likely assist in the recovery of anadromous and resident fish stocks, if ocean conditions and fish harvest management are concurrently favorable.

Implementation of the Aquatic Conservation Strategy of the Northwest Forest Plan should improve habitat conditions for most aquatic and riparian-associated species on federal land. Because the State Forest Practices Act provides limited protection during private timber harvest and road building activities, aquatic and riparian habitats will likely continue to fragment and degrade.

Management Objectives

The objective of management in the Big Creek watershed should focus on providing habitat conditions for self-sustaining populations of native anadromous and resident species.

For chinook salmon, which spend only a short time in fresh water, it is extremely difficult to conduct meaningful assessments of population sizes and trends at the watershed scale based on numbers of returning adults (spawning) because inter-annual and between-population variation are typically great (Healey et. al. 1984). Management objectives should therefore focus on *establishing and measuring* conditions known to maximize chinook production and survival (abundant, clean gravel/cobble beds for spawning and incubation, presence of marginal areas and complex pools for rearing) and *preventing or minimizing* conditions known to cause widespread mortality of eggs, alevin, and fry (instability of gravel beds, lack of velocity checks, sedimentation).

For coho salmon and steelhead trout, which may spend several years in the Big Creek subwatershed, freshwater rearing conditions may play a dominant role in regulating abundance and survival. Management objectives should therefore focus on *establishing* and *measuring* freshwater rearing conditions known to maximize production and survival of these fishes (abundant, clean gravel beds for spawning and incubation, presence of low-velocity, complex in-channel and off-channel pools, good water quality and sufficient food supply) and *preventing* or *minimizing* conditions known to reduce survival and abundance (instability of gravel beds, sedimentation, low abundance of suitable rearing pools, high stream temperatures, etc.). Attainment of this objective means reaching minimum summer seeding (rearing) levels of approximately 1 coho parr/m^2 /pool (Nickelson et. al. 1992).

Cutthroat trout spend their entire life-history in the analysis area. Specific habitat objectives for chinook and coho salmon and steelhead trout should benefit cutthroat trout as well. In particular, activities which increase habitat complexity will subsequently reduce interspecific competition between cutthroat trout and the dominant competitor, coho salmon. In addition, management should focus on maintaining connectivity to historic small-stream habitat and refugia for native trout (through the removal of barrier culverts and protection of small streams). Finally, introduction or release of coho salmon above historic, natural barriers in the watershed (such as on Fall and Big Creek) should be discouraged to protect resident trout populations above.

Little is known about the habitat requirements of other fish species in the watershed, such as the sculpin, Cyprinids, and Lamprey. In general, management actions which maintain or improve water quality and increase habitat complexity and food abundance should benefit these species as well.

III.7 CORE TOPIC - HUMAN USES

<u>Analysis Questions:</u>

What are the cultural resources within the analysis area?

What the <u>tribal uses and treaty rights</u> within the analysis area?

What are the <u>dominant human uses</u> within the analysis area?

What are the <u>transportation management objectives</u> for BLM roads within the analysis area?

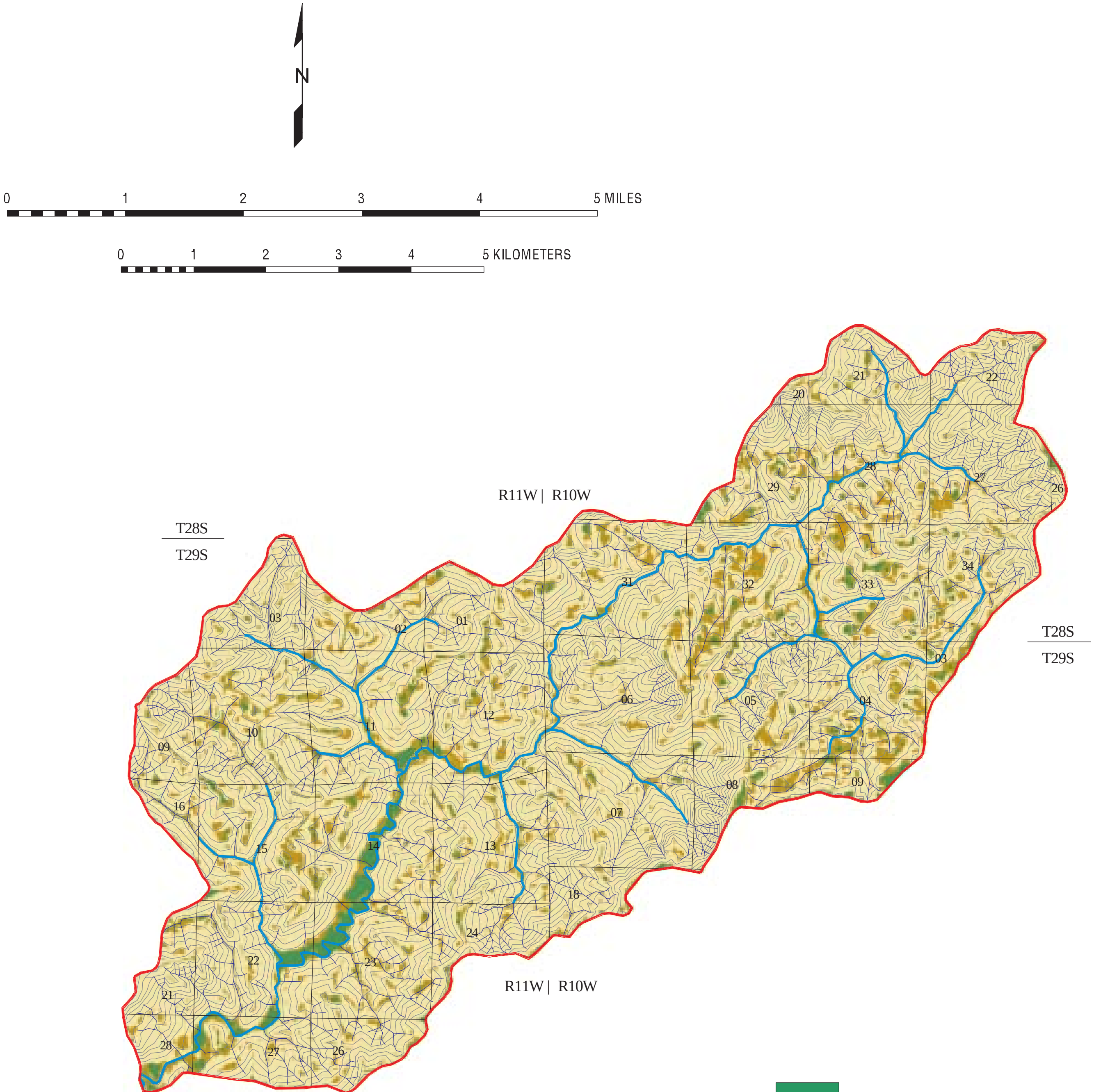
CULTURAL RESOURCES

The Big Creek analysis area has been the location of both prehistoric and historic cultural activities. In historic times, the focus of prehistoric activities probably was the Middle Fork Coquille River, into which Big Creek flows. The river provides an important transportation link between the southern Oregon coast and Camas Valley, both vital areas for prehistoric resource acquisition. As well as allowing access to gathering and hunting areas, the river and tributary streams also provided their own suite of fish and shellfish resources.

Archeological surveys of lands within the Coast Range have located relatively few prehistoric cultural resources. While several other criteria also are seen as important, the great majority of recorded prehistoric sites in the Coast Range have been found on relatively flat land forms (Toepel and Oetting 1992). According to their model, slopes greater than 20% hold little potential to contain recoverable prehistoric cultural resources. Applying this model, Figure III.7-1 illustrates that most relatively flat land forms with high (#10% slope) or moderate (11% to 20% slope) potential for prehistoric sites are the relatively small alluvial river and stream terraces. In the Big Creek watershed, these terraces are located along the lower reaches of the creek, with the majority extending from its mouth to the vicinity of the confluence with Brownson Creek. In contrast, most upland areas are deeply dissected with steep slopes. As expected in the Tipple and Oetting model, the majority of recorded prehistoric sites in this analysis area are located on the flat alluvial terraces.

While the steep topography is typical of this part of the Coast Range, this area also contains unusual topography; substantial areas of hummocky, marshy ground containing many small bogs are found in the northeastern half of the watershed. This area also extends into the adjacent Sandy Creek subwatershed. These areas were examined, but did not locate any evidence of prehistoric use. However, the presence of this unusual topography suggests the possibility of differing prehistoric land use patterns in these areas from that of the adjacent deeply dissected land forms.

Figure III.7−1 Prehistoric Site Potential Based on Slope



High Potential (Slopes < 10%)

Moderate Potential (Slopes 11%–20%)

Low Potential (Slopes > 20%)

Hydrology

100 Ft. Contours

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

Many of the historic activities centered along major waterways. The Middle Fork Coquille River has been a travel route between the Coos Bay vicinity and Roseburg from the late 19th century, and today State Highway 42 is one of the major travel routes to and from the coast. As elsewhere in the Coast Range, logging opportunities first drew Euro-Americans to settle along the Middle Fork Coquille River, and many of the known historic resources on upland BLM lands are remnants of early lumbering and homesteading. Prior to the use of trucks, lumbering relied on river transport to deliver logs to the downstream mills. In 1924, the Middle Fork Boom Company built three splash dams on the Middle Fork Coquille River. These operated through 1939, due in part to the persistent channel "maintenance" activities of the Port of Coquille (Beckham 1990). One of these splash dams was near the subwatershed, along the river.

Recorded Native American Cultural Resources
One village site has been recorded near this subwatershed, on an alluvial terrace along the Middle Fork Coquille River. As well, one upland hunting camp has been recorded adjacent to a meadow along the ridge marking the subwatershed boundary. Undoubtedly, these known prehistoric sites represent only a fraction of the localities used by Native Americans during their residence of several millennia. Fishing, hunting and gathering all would have been important resource acquisition activities conducted at these places.

Recorded Euro-American Cultural Resources
Known early historic cultural activities in this subwatershed are represented by homesteads. Several cabins are reported on private land on the alluvial terraces along Big Creek. A paleontological site also is recorded in a roadcut along a ridge top in the subwatershed.

NATIVE AMERICAN TRIBAL USES AND TREATY RIGHTS

As elsewhere in southwestern Oregon, modern Native American concerns in the analysis area center around three general issues; land transfer, resource acquisition and heritage protection.

Land Transfer
In United States Court of Claims testimony (Federal Supplement 1945:945), anthropologist John P. Harrington described the boundaries of the traditional territory of the Coquille Indian Tribe as extending throughout the entire Coquille River watershed (Hall 1995:26). In 1996, Congress created the “Coquille Forest”, composed of fifty-four hundred acres of BLM land in the vicinity of this subwatershed. Four parcels of Coquille Forest land are partly or completely within this analysis area (in T. 28 S.,R.10 W, Section 30; T. 28 S., R. 11 W., Section 33; T. 29 S., R 10 W., Section 5; and T. 29 S., R. 11 W., in Sections 23 & 26). (Figure I-4)

Resource Acquisition
The Coquille Indian Tribe signed two treaties with the United States. On September 20, 1851, they ceded the lands from the mouth of the Coquille River to the Summit of the Coast Range, then south to the Rogue River watershed. On August 23, 1855, they ceded the entire Coquille River watershed to the United States. Although the United States Senate never ratified either treaty, the land transfer became an accomplished fact when members of the Coquille Indian Tribe

were forcibly removed to the Siletz Reservation in 1856.

The existence and extent of Native American rights to “usual and accustomed” places for modern resource acquisition (hunting, fishing and gathering) on public lands is an issue which continues to be addressed in legislative and judicial forums. The District is engaging in consultation with the Coquille Indian Tribe concerning the activity plans of both organizations. As well, regular meetings are underway concerning Coquille Forest transition planning. Coordination of planned activities affecting resource utilization locations will be possible as a result of such contacts.

Heritage Protection

Federal legislation aimed at protection and preservation of significant archeological sites addresses one facet of tribal interests in cultural heritage protection. However, the identification of land important as a “traditional cultural property” (or a “sacred site”) may not be based on physical evidence of past use, and therefore could involve properties in this analysis area which otherwise are not known to have cultural importance. At this time, the Coquille Indian Tribe has not specified public lands which contain such resources in this subwatershed. Ongoing consultations with the tribe in connection with specific activity plans and the Coquille Forest transfer also should clarify any concerns about such localities.

DOMINANT HUMAN USES

Timber Production

Approximately 60% of the analysis area is managed for timber production, leaving 40% reserved from harvest (primarily BLM lands only), and perhaps <3% in residential, agriculture, or grazing. Intensive forestry management often includes short rotation ages (40 to 60 years), site preparation after harvest (burning or mechanical), planting to desired species, removal of undesirable species, and thinning (precommercial and commercial) to obtain optimal spacing for volume production. Herbicides are commonly used on private lands for site preparation and to control undesirable tree and brush species.

The level of harvest activity can be expected to increase on private lands as their second generation forests reach rotation age. Activity on BLM lands can be expected to be stable over the next few decades, but at a reduced level than the 1970's and 1980's. due to the management direction in the RMP.

Special Forest Products

One of the most common special forest products harvested in the analysis area was cedar boughs, especially Port-Orford cedar. Understory Port-Orford cedar trees adjacent to roads or on easily negotiable terrain have been heavily pruned by bough pickers. This results in trees with approximately a 25% live crown and three to four inch stubs along the tree bole. Harvest of Port-Orford cedar boughs has been prohibited on BLM lands for the past 2 - 3 years, however, some illegal picking still occurs.

The amount of other products such as brush, mushrooms, or berries currently being harvested cannot readily be determined. Historically, except for Port-Orford cedar bough harvest, effects of removing these products have not been obvious. It could be anticipated that harvest levels might be somewhat higher than elsewhere due to its proximity to Highway 42, but how much in unknown.

Domestic Water Sources

Research located approximately 22 residences along Big Creek which use either surface water or wells as their source for drinking water. The locations of these sites are generally on tributary streams of Big Creek (Figure III.2-5).

Recreation

While most of the recreational opportunities throughout the analysis area are dispersed (hunting, fishing, sightseeing, collecting special forest products, etc.), a system of mountain bike trails have been constructed in the Jones Creek drainage. Initially built in the early 1990's, these trails utilize existing roads and ridges on BLM, Coquille Forest, and private lands. Concern has been raised as to the proximity of one segment of trail and the resulting increase in human activity to a grassy-type meadow containing special habitat. Use and their impacts are being monitored.

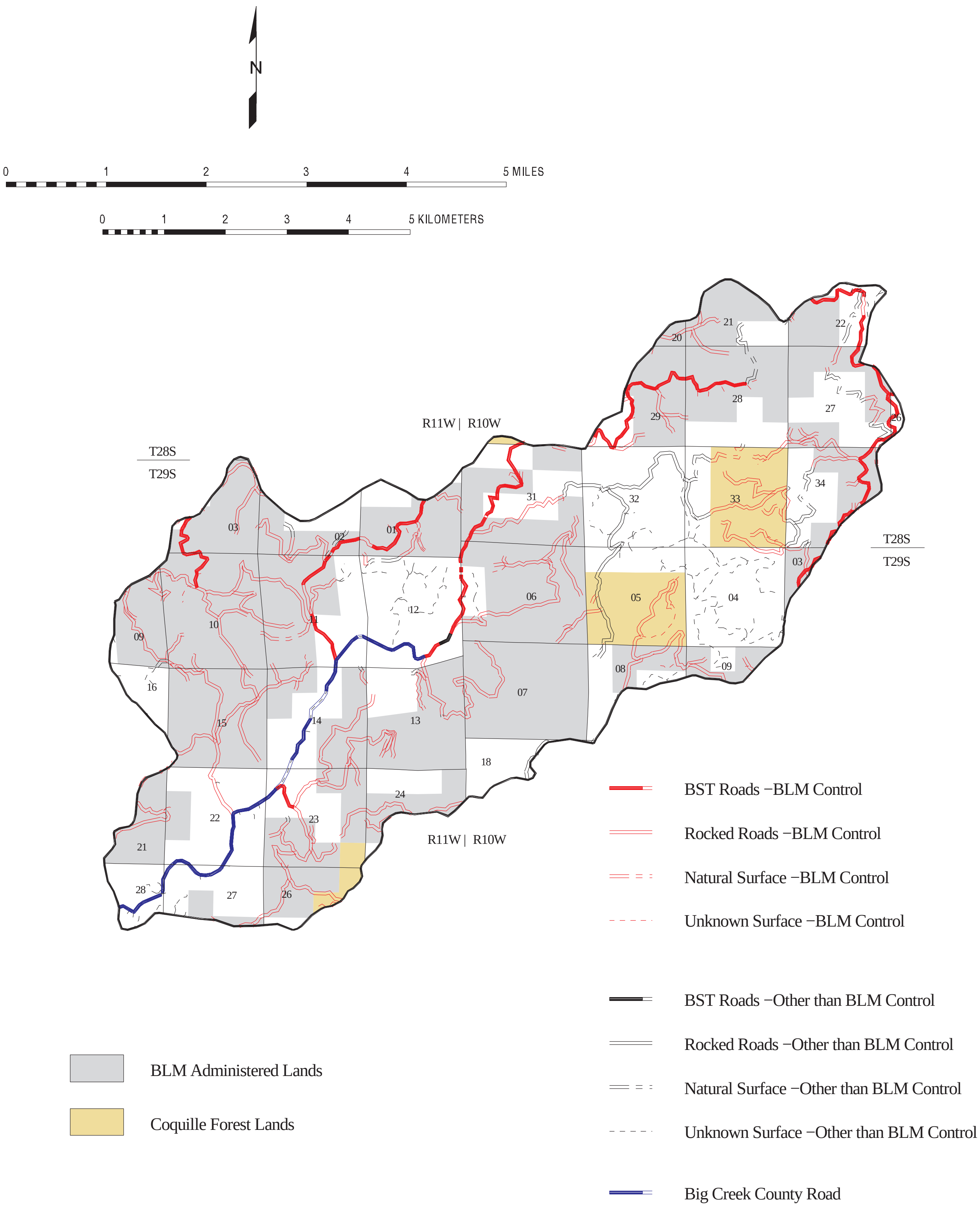
Transportation

Big Creek County Road is located adjacent to Big Creek and is the main road into this portion of the analysis area (Figure III.7-2). The road system is similar to others throughout Western Oregon in that the roads used to access the area were constructed along main streams. Midslope roads were constructed to access the ridge top network and access into adjacent drainages. These county, BLM, and private roads are used by multiple users for commercial, residential, and recreational purposes and form the backbone of the transportation system.

The road system is a complex matrix of various road users and owners; county, BLM, private timber companies, and individuals. The BLM has constructed roads on private lands through a variety of access agreements and private timber companies have constructed roads on BLM lands under ‘reciprocal’ right-of-way agreements. These agreements grant access rights to the BLM and the other party to cross each others land. These rights must be incorporated into any decision concerning road management.

The transportation system in the Big Creek analysis area is comprised of approximately 108 miles of road. The BLM controls 73.2 miles of road within the watershed constituting 68% of the total. These BLM roads are used to access approximately half the land within the watershed. At least 68 miles (63%) are surfaced either with crushed rock or a bituminous oil (asphalt) treatment. The remaining miles are natural surfaced or are private roads and the status is unknown. These figures, shown in Table E-1, Appendix E, have been derived from GIS, and while not complete (some data is missing, primarily on private lands), it does give the most precise and up-to-date information available.

Figure III.7−2 Transportation Theme by Control and Surface Type



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

As described in detail in Section III.6 Species & Habitat - Aquatic, at least one splash dam was constructed for the purpose of transporting logs downstream

Rock Quarries

There is one large rock quarry operated by Georgia Pacific West Corp. in the very northeast corner of the analysis area (NW¼ SW¼ Sec. 26, T. 28 S., R. 10 W.). At least two other areas have been quarried to produce rock for specific road construction projects. BLM had a site adjacent to Elk Creek Ridge Road in the NE¼NW¼ Sec. 10, T. 29 S., R. 11 W. and Georgia Pacific West Corp. had a location adjacent to Road No. 29-11-28.0 Seg. K in NE¼NE¼ Sec. 32, T. 28 S., R. 10 W.

The rock source for these quarries is the massive sandstone member of the Tyee formation, commonly found throughout the Coquille basin.

TRANSPORTATION MANAGEMENT OBJECTIVES

The BLM road system was evaluated for its present and future uses using a Transportation Management Objective (TMO) process. The TMO process applies only to roads controlled by the BLM, as management of those roads lies within the Bureau's jurisdiction. Road management is guided by the desire to reduce the impacts from a large road network on the ecosystem, maintain a network adequate enough to meet the needs of land management, and to reduce road maintenance expenditures. The checkerboard land ownership pattern significantly complicates transportation management due to the right of access for landowners and the fact that different landowners often own alternating parts of the same road. In addition, roads adjacent to streams and midslope roads which often have the most impact of the aquatic resources are the main access roads into and through the analysis area. Most of the roads which present the best opportunity for closure or restricted vehicular access are the shorter, mostly ridge top roads which access only BLM lands.

Recommendations for Bureau roads can be found in Appendix E and background TMO information is on file in the Coos Bay District office.