Appendix 4

Road Closure Recommendations

Camas Analysis Area LSR EA
Road Closure Recommendations
Alternatives II & III

The following propsed actions will be accomplished under timber sale activities covered by this EA.
The recommendation to close these roads incorporated information from the Transportation Management Objectives developed in the East Fork Coquille Watershed Analysis.

Road No.	Miles Decom.	Miles Closed	Remarks	Management Objectives **
28-9-21.1	0.4		Block at jct with 28-10-12.0; remove stream crossing culvert.	1, 2, 3, & 4
28-9-23.1	0.2		Block at jct with 28-9-19.0	1, 2, & 4
28-9-27.0	0.5		Block at jct with 28-10-12.0; remove stream crossing culvert.	1, 2, & 4
28-9-28.0 B	0.3		Block at property line.	4
Spur Road (T28-R9-S29)	0.2		Block by action for 28-9-28.0 B action.	1 & 4
28-9-31.0	0.2		Block at jct with 28-10-31.2; remove stream crossing culvert.	2 & 4
28-9-31.1 A	0.0	0.30	Gate at jct with 28-8-18.0	1, 3, & 4
28-9-31.2	0.0	0.50	Gated by action for 28-9-31.1 A	1, 3, & 4
Spur Roads EA 28	0.3		Block at jct with 28-9-31.1 (28-9-31).	1 & 4
28-9-33.1	0.5		Block at jct with 28-9-33.0	1, 2, & 4
28-9-33.2	0.7		Block at jct with 28-9-33.0	4
Spur Road EA 6	0.3		Block at jct with 28-8-18.0 (28-9-33)	1 & 4
Spur Road EA 23	0.2		Block at jct with 28-9-20.0 (28-9-33).	1, 3, & 4
29-9-6.3	0.1		Block at jct with 28-8-18.0	3 & 4
Total	3.90	0.80		

Decom. = Decommission (Block and left in condition to self maintain. Remove stream crossing culverts ensure hydrological functions.)
Closed = Temporarily Closed (Roads blocked with a gate)

** 1 = Wildlife, 2 = Aquatic Conservation Strategy, 3 = Phytophthora lateralis control, 4 = Road Density

Open Road Density for Camas Creek Subwatershed:

Current Open Road Density: 3.64 mi/sq.mi.
New Open Road Density: 3.30 mi/sq.mi.

June 13, 2000
g:\cb\mra\t-sales\ea-s\camas_lsr\decom.123

Appendix 5

Density Management Thinning

June 8, 2000

Density Management Treatment

The Camas Analysis Area lies within Late-Successional Reserve (LSR) 261, which has been identified as one of three LSRs that have the highest priority for management actions (LSRA, 1998). This is due to the fact that it is large, forms a key link in the LSR network, and the land ownership pattern provides greater opportunities to either increase or develop large contiguous stands of interior late-successional habitat, as stated in the South Coast-Northern Klamath Late Successional Reserve Assessment (LSRA), page 63. The Camas Analysis Area contains 1,022 acres of stands that are less than 30 years of age, 1,800 acres of stands 30-49 years of age, 65 acres of stands 50-79 years of age, and 2,178 acres of stands greater than 80 years of age. The majority of the stands less than 80 years of age are managed stands that were established following timber harvest.

Table 21 in the LSRA (page 68) shows general priorities to be considered when treating stands in the LSR. High Priority stands are those less than about 30-years of age. Treatments of these stands would manage the density to accelerate the growth of trees by reducing the effects of competition. This is primarily accomplished through precommercial thinnings (PCT). In the Camas Analysis Area, approximately 70% of the acreage in this age class have been pre-commercially thinned. The remainder is either too young for treatment, has low stand density levels not requiring treatment, or is planned for PCT in the near future (62 acres). Therefore, in the analysis area, most all of the stands in this priority have already been, or are planned to be, treated. Medium Priority are stands those between 30 and 50 years of age. These stands are the focus of density management treatments in this EA.

Stand Definition

A timber stand is defined by Husch (1963) as "... an aggregation of trees having some unifying characteristic which occupies a specific area of land." For the purpose of this EA, a stand is defined as a contiguous grouping of trees with similar stand characteristics such as age and density. For the Camas Analysis Area LSR, the Interdisciplinary Team (IDT) considered combinations of tree age, stocking level, and topographic features to determine the extent of manageable/logical stands. Some stands used for analysis may contain all or portions of several Forest Operations Inventory (FOI) units. In all cases the reconfiguration of stand boundaries by the IDT resulted in a logical stand that was appropriate for analysis.

Untreated Areas

The LSRA recommends that at least 10% of the resultant stand would remain untreated when performing density management thinning. No-treatment areas are to provide and retain specified processes and conditions (LSRA, page 82). Areas identified by the IDT to remain unthinned vary in characteristics and therefore contribute differently to the processes and conditions to be retained. Some areas already have a stand composition (species, density, and size) that is desirable. These areas currently exhibit some processes and conditions of late-successional stands and were left unthinned at this time. It may be necessary to consider future treatments in these areas to insure that they remain on this desirable trajectory. The unthinned patches also include untreated areas within the Riparian Reserves. These unthinned areas function to maintain microclimate conditions and contribute short-term coarse woody debris through suppression mortality.

Density Management Prescriptions:

"Density management prescriptions would be designed to produce stand structure and components associated with late-successional conditions, including large trees, snags, down logs, and variable-density, multi-storied, multi-species stands. By removing a portion of the stand, the remaining trees would be provided room to maintain or increase diameter growth rates. Trees cut but surplus to habitat needs would be removed for commercial use" (FRMP/FEIS, page E-7).

"The purpose of commercial thinning is to maintain or improve tree growth rates and vigor, manipulate species composition, and spatial arrangement. This treatment will usually be implemented via an economical commercial harvest operation" (LSRA, page 80).

Stand exams were completed in 1999 on all areas considered for treatment. This information was then modeled using the Stand Projection System (SPS) growth model to develop several treatment scenarios to be considered for each density management unit. The IDT selected the prescription that best balanced benefit and risk by considering blowdown potential, rate of attaining late successional conditions, and maintaining or increasing variability within and between stands.

The average trees per acre currently range from 158 to 385 in the stands proposed for density management treatments. The recommendation (action alternatives) is to thin the stands to Relative Densities of 25 to 40, which equates to cutting an average of 79 to 230 trees per acre. Thinning would primarily be from below, cutting the smaller diameter trees. This level of thinning would leave the remaining trees at a density that facilitates full site occupancy for growth, and promotes development of larger diameters, crown structures, and branches in a relatively short time (Hayes et. al, 1997). The development of larger trees would also enhance future snags and down wood recruitment. These treatments are consistent with the objectives established for the LSR.

Acceleration of Late-Successional Conditions

Silvicultural actions, including density management thinnings, can accelerate the development of desired late-successional stand characteristics (LSRA, page 77). It is possible to estimate the effects thinning will have on some stand characteristics (specifically tree diameter) over a period of time. During discussions at the Coos Bay District BLM (Jan, 2000), Dr. John Tappenier presented research indicating that trees 20 inches dbh at age 50 are more likely to become dominant old-growth trees. His data was derived by analyzing the growth rings of numerous old-growth stumps from harvested late-successional stands. Even though the stands proposed treatment are not naturally regenerated and have not been previously managed for late-successional development, the IDT used this benchmark for comparing various prescription scenarios. SPS modeling data shows that on average, only 29% of the trees in the proposed treatment units would reach a dbh of 20" at age 50 if left untreated. SPS runs also indicate that density management thinning will increase both the number and proportion of trees greater than or equal to 20" dbh at age 50 in these same stands. An application of fertilizer 2 years after treatment will most likely have the effect of further increasing the average tree diameters. A few stands may currently be in such a condition that attaining this goal after treatment is improbable.

Relative density (RD) is defined as "the actual density of trees in a stand relative to the theoretical maximum density (RD100) possible for trees of that size"(Hayes et al). Relative Density is a measure used to project when a stand would reach a density that limits diameter growth and exhibits suppression mortality . At this stage, stands may require manipulation to achieve late-successional conditions. Relative density was used to compare the effects various thinning prescriptions would have on stand characteristics such as trees/acre, basal area/acre, average diameter, and average height. For Douglas-Fir, a RD of 55 tends to result in the onset of suppression mortality. Thinning to a RD of 35 allows the site to be fully occupied, promotes maximum stand growth, and any understory will be shade tolerant species. A RD of 25 is considered a heavy thinning (residual stand is less than fully stocked), which maximizes individual tree diameter growth; subsequent thinning will promote diverse understory development. The IDT developed prescriptions that would balance maintaining the stand density at an optimal level for rapid tree growth, allow for some understory development, and limit the risk of blowdown. Future treatments will most likely be needed to further develop late- successional conditions. These treatments may include additional density management thinnings, and/or stand manipulation treatments such as snag creation, down log creation, and small openings.

Heterogeneity

Silvicultural actions prescribed in the Camas Analysis Area LSR EA are designed not only to accelerate growth rates, but also to maintain or increase diversity and heterogeneity within each stand and across the landscape. Although some stands may be thinned to the same relative density, stand characteristics such as trees/acre(tpa), basal area/acre, average dbh, and average height will vary greatly among stands. In both Alternatives II & III, the existing range of average trees/acre for all stands is 158 to 385. After the recommended treatment, the range of average trees/acre for all stands would be 60 to 155. Stand exam data shows that there is inherent variability in trees/acre and species composition within each stand. While the action alternatives would decrease the average trees/acre in the treatment areas, the variability of trees/acre within the stands would still exist. Also, selection of residual trees with less emphasis on tree spacing allows for the retention of minor conifer species and hardwoods.

Snags and Down Wood

All existing snags would be left standing, except where doing so would create a safety hazard. All existing down wood would be retained on site.

Snag Calculations:

It was determined that at least 2.5 snags per acre would be retained after completion of the density management thinning activities (see Attachment 1). These snags would be from existing snags and/or trees with broken tops.

The goal of the LSRA is to retain at least 3 snags per acre on the north-facing slopes and 1 snag per acre on the south-facing slopes upon completion of any density management treatment. The 2.5 snags per acre exceeds the amount recommended for south-facing slopes. The design feature requiring one tree per acre to be topped on north-facing units after treatment, combined with the 2.5 existing snags per acre, would bring the total to 3.5 snags per acre. This would exceed the amount recommended for north-facing slopes.

Stands would be examined within five years after treatment to assess attaining the desired future conditions for snags. If the stand is deficient in snags, sufficient snags will be created to equal or exceed the desired future condition.

Down Log Calculations:

In developing the down log recommendation, two components were addressed: 1) short-term down logs (decay Class 2), and 2) total down wood that is 4" diameter and larger in all decay classes.

Log volumes for decay Class 2 component found in young natural stands range from 13 to 64 ft^3 per acre (Spies et. al 1991). Design features include leaving one tree per acre on the ground after completion of thinning activities to provide for short-term down wood. One tree per acre provides approximately 46 ft^3. per acre (see Attachment 2). This falls within the range expected to be found in natural stands of this age for Class 2 component (as cited above).

The estimated amount of total down wood 4" and larger (all decay classes) after completion of density management thinning activities is 675 ft^3. per acre (see Attachment 2). This includes existing down wood and one tree per acre left for short-term (Decay Class 2) down wood. This amount of down wood is within the range of total down wood (4" diameter and larger, all decay classes) shown in Table 10 of the LSRA (525 to 1,979 cu.ft./acre). This amount would increase when considering incidental blowdown after treatment, tops from snag creation, and tops of trees left on site after treatment.

The design features for snags and down logs, along with the retention of existing components, meet the objectives set in the LSRA. The remainder of the thinned trees could be removed for commercial use.

Blowdown Risk

Risk of windthrow was looked at from both an individual tree and a treated unit perspective. The ratio between the total height of a tree (feet) and its diameter at breast height (feet) is considered an indicator of an individual tree's overall stability. This height/diameter ratio (h/d) information and the topographic position of the treated units were used to determine areas susceptible to blowdown. Most research associated with blowdown has dealt with stands of relatively large trees being exposed to strong prevailing winds through the action of clearcutting an adjacent area. In this situation, it is the residual timber along the north and east boundaries of clearcut units that are the most vulnerable to windthrow. Also, the lee side of recently exposed ridges are more prone to windthrow. Since, the EA is proposing only density management thinning which does not suddenly expose areas directly to the wind, prediction models do not necessarily apply. However, some concepts to managing blowdown risk can be applied. The IDT felt that the less windfirm lee sides of ridges that are generally perpendicular to the prevailing winds were still more prone to windthrow than the exposed windward sides (which tend to be more windfirm). Management practices on private lands adjacent to the proposed treated units were also considered when evaluating blowdown potential.

Favoring wind-firm species, increasing leave trees per acre, and leaving areas untreated are design features incorporated to manage blowdown risk. Six EA units were identified as having blowdown potential areas. Portions of EA Units 6 and 13 will have areas left untreated. Portions of Ea Units 14, 15, 16, & 29 will favor Douglas-fir as leave trees and/or increase leave trees per acre.

Douglas -fir Bark Beetle Infestation Risk

One scenario under consideration was to leave all the thinned (cut) trees on site, which would leave an average of 156 trees per acre on the ground. Another scenario is to cut and leave approximately 25% of the trees every 5 years over the next 20 years. This would leave on the average 42 trees per acre on the ground every 5 years. Cut tree diameters in both alternatives would range from 7" to 15" dbh, with the majority of cut trees being 10" dbh and larger.

An insect infestation risk assessment (see Attachment 3) for the project area was completed by Dr. Donald Goheen, Entomologist/Plant Pathologist. The purpose of the trip was to consult with BLM managers about possible insect implications of cutting substantial numbers of Douglas-firs and leaving them on the ground. His conclusion was leaving cut trees on site in place would create perfect conditions for Douglas-fir beetle population to increase by providing large numbers of down trees of the proper size classes for brood population. There are Douglas-fir beetles in the area that potentially would infest the down trees and produce brood. Small endemic populations of these beetles survive in greatly weakened tress, especially in root disease centers such as laminated root rot which is found throughout the area. Beetles emerging from the down trees could be expected to kill substantial numbers of leave trees, and could kill trees in adjacent old-growth stands and on neighboring private properties as well. Mortality patterns would be unpredictable. By killing the largest Douglas-firs and Douglas-firs in groups, desired stand structure and required crown closure would be negatively impacted (Goheen, 2000).

Thinning dense stands can make them less susceptible to infestation. However, if large amounts of down wood greater than 8 inches in diameter (20 cm) is left on site following thinning, beetles will have abundant breeding sites and population may increase to damaging levels (Ross, 1997). Douglas-fir beetle infestation of green trees occurs when brood has emerged from a fairly substantial number of down trees. Based on past experience, the threshold appears to be at least 4 down Douglas-firs $\geq$ 10 inches diameter per acre (Goheen, 2000). The more down hosts there are and the larger the size of the down trees, the greater the likelihood that emerging beetles will infest green trees and the larger the number of trees that will likely be infested. A treatment leaving 25 - 230 trees/acre on the ground would result in epidemic population growth of Douglas-fir bark beetles that would attack and kill standing green Douglas-fir trees. The Douglas-fir bark beetles often show a preference for the largest Douglas-firs in a stand and also often cause concentrated mortality, killing all of the trees in patches that vary in size from ¼ to 2 acres. Most commonly, beetle-caused mortality of standing Douglas-firs will be concentrated fairly near the downed trees initially attacked by the beetles. However, Douglas-fir beetles are strong fliers, and in a certain percentage of cases (10 to 20 percent), they infest trees one to 5 miles away from where they emerge (Goheen, 2000).

<u>Fire Risk</u>

One scenario considered was to leave all thinned (cut) trees on site. There would be on average 156 trees per acre cut, which equates to approximately 118 tons/acre of residual material left on site (Worksheet # 3, Section Q of the Analysis File). This scenario would rate out as a High Fuel Hazard using the current Fuels Hazard Worksheet and would persist at this level for at least 10 years (Worksheet # 1, Section Q of the Analysis File). If ignition occurred in this fuel loading, it would likely create a stand replacement fire. A cured fuel load of 118 tons/acre would be completely impassable to firefighters, hampering suppression efforts without the use of large mechanized equipment.

Another scenario would be to cut and leave approximately 25% of the trees every 5 years over the next 20 years. First, thinning at this level would not sufficiently open the stand to promote growth within the next twenty years. Therefore, the treatments would be ineffective and objectives not met. If this was prescribed, it would still leave a total of 105 tons/acre of fuel loading on site after all entries (Worksheet # 3, Section Q of the Analysis File). This would still rate out as a High Fuel Hazard using the current Fuels Hazard Worksheet (Worksheet # 2, Section Q of the Analysis File). The risks would still be the same for this scenario relating to fuel hazards/wildfire risk.

Therefore, based on the issues for fire and insect risk, it was determined that removal of the thinned trees (except those left for down logs) would best promote the desired forest structure while minimizing risk to the stands in the LSR. Due to the issues raised concerning fire and insect risks, leaving thinned material on site would not be a viable alternative. However, the fire and insect risk assessments does support the action alternatives addressed in this EA.

<u>Literature Cited</u>

Goheen, D.J. 2000. Letter to Coos Bay District BLM, dtd March 4, 2000.

Hayes, J. P., S. Chan, W. H. Emmingham, J. C. Tappeiner, L. Kellogg, and J.D. Bailey. 1997. Wildlife response to thinning young forests in the Pacific Northwest. Journal of Forestry 95(8):28-33.

Ross, D.W. 1997. “Forest Health: Insects.” Preceedings from Symposium on Thinning in Westside Forests. Newport, Oregon; Adaptive COPE Program, April 1-2, 1997.

Spies, T.A. and J.F. Franklin. 1991. The structure of natural young, mature, and old-growth Douglas-fir forests of Oregon and Washington. In: Wildlife and Vegetation of Unmanaged Douglas-fir Forests. Aubry, K.A. and M.H. Brookes, Eds. PNW -GTR-285. pgs. 91-109