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Crook County,  
Oregon

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# West Maurys Fuels and Vegetation Management Project

## Record of Decision

and

## Final Environmental Impact Statement

Responsible Official –

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Abstract:

This Final Environmental Impact Statement (EIS) describes the effects of implementing four alternatives to manage fuels and vegetation in the western portion of the Maury Mountains. The project area is located about 20 miles southeast of Prineville, Oregon and encompasses nearly 38,000 acres. Proposed fuels and vegetation treatments reduce the risk of stand loss due to overly dense stand conditions, increase the resistance of forest stands to insects and diseases, and change the distribution of fire regimes.

Alternative 2 is the preferred alternative and would treat fuels and vegetation on approximately 18,500 acres and commercially harvest 25.9 million board feet (MMBF). Alternative 1 is the no action alternative and does not treat any acres. Implementation of Alternative 2 would necessitate amending the Forest Plan. Alternative 3 was developed in response to key issues related to wildlife and water quality and would treat approximately 14,400 acres and harvest 16 MMBF. Alternative 4 was partially developed in response to key issues and would treat approximately 17,000 acres and does not include any commercial timber harvest.

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# Chapter 1

## Purpose and Need

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## **Changes Between Draft and Final EIS**

The description of the Proposed Action was rewritten for clarity.

The section on public involvement efforts has been updated to include information on the 45-day comment period.

# CHAPTER 1 - PURPOSE AND NEED

## Introduction

The Forest Service has prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EIS analyzes a proposal to use prescribed fire, commercial thinning, noncommercial thinning, grapple piling and hand piling in the west half of the Maury Mountains, on the Lookout Mountain Ranger District of the Ochoco National Forest. This EIS also analyzes three additional alternatives (including the No Action Alternative); the key issues associated with the proposal; and the direct, indirect, and cumulative effects of implementing any of the alternatives.

## Document Organization

The document is organized into four chapters and several appendices:

*Chapter 1. Purpose and Need for Action:* The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section details how the Forest Service informed the public of the proposal and includes how the public responded. This section also described the key issues utilized to formulate alternatives.

*Chapter 2. Alternatives, including the Proposed Action:* This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on key issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

*Chapter 3. Affected Environment and Environmental Consequences:* This chapter describes the affected environment, the current conditions of the resources involved, and the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by key issues and environmental topics.

*Chapter 4. Consultation and Coordination:* This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement. This section also provides a glossary of terms, literature cited, and index.

*Maps:* Maps provide spatial information relative to alternative treatments and resource information. All maps are located at the end of Chapter 4.

*Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental impact statement. They are located after the maps.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project file located at the Lookout Mountain Ranger District, Ochoco National Forest, Prineville, Oregon.

## Background

In 2000, the Ochoco National Forest conducted an assessment of the Maury Mountains, which included an extensive look at forest fuels and vegetation conditions, the relationships between those conditions and changes in fire hazard, insect and disease dynamics, wildlife habitat, and riparian health. Vegetation patterns and occurrence within the analysis area are different now than what existed historically. Changes to the health, structure, composition, distribution, and function of forest stands have altered the natural processes that maintain a viable ecosystem. This

has affected vegetative resiliency, wildlife habitat diversity and amount, water quality, visual quality, fuel loadings, and fire behavior.

On July 2, 2002, an initial proposed action and comment letter was sent to the project mailing list. This proposal included reducing fuel loadings only through the use of prescribed fire and noncommercial thinning. Based on the comments received and management recommendations from the Maury Mountains Watershed Analysis, a second proposed action was developed.

On February 6, 2003, a second letter addressing this adjusted proposed action and comment letter was sent to the project mailing list. This new proposed action included the use of prescribed fire with noncommercial thinning as in the July 2, 2002, proposed action. It also added the use of commercial thinning to achieve the objectives of altering stand structures to more closely resemble historic conditions and increasing forested stands' health and resiliency to insect and disease attack and to crown fire.

From the comments received during scoping, it was decided to present the analysis of the proposed project in an Environmental Impact Statement (EIS). The Notice of Intent to prepare an EIS was published in the Federal Register on January 16, 2004.

## **Project Location**

The West Maurys Project Area is located 20 miles southeast of Prineville, Oregon, and covers approximately 38,000 acres. It lies within portions of Township 17 South, Range 18 East, Sections 21-29 and 33-36; Township 17 South, Range 19 East, Sections 19-36; Township 17 South, Range 20 East, Sections 19-20 and 29-32; Township 18 South, Range 18 East, Sections 1-4, 9-12, 14, and 15; Township 18 South, Range 19 East, Sections 1-18; Township 18 South, Range 20 East, Sections 5-7; Willamette Meridian. Map 1 is a vicinity map that displays the project location.

The West Maurys project area falls within portions of the Bear Creek, Camp Creek, Prineville Reservoir, and Upper Crooked River Watersheds, which are part of the Upper Crooked River sub-basin and Deschutes River basin. Elevations range from 6,266 feet above sea level on Drake Butte (on the eastern edge of the project area) to 4,026 feet where Sherwood Creek crosses the National Forest boundary.

There are several tracts of private land (approximately 320 acres total) within the project area boundary.

## **Purpose and Need for Action**

The purpose and need is derived from evaluating current planning direction identified in Forest Plan Management Area goals and objectives and Forest-wide standards and guidelines which identify desired future conditions and comparing them against current conditions in the environment. This includes the desire to reduce stand densities and fuel loadings and reduce conditions favorable to insect and disease attack and wildfire damage. In addition, the Maury Mountains Watershed Analysis and the West Maurys Roads Analysis identified vegetation and road current conditions, desired conditions, and opportunities to move towards desired future conditions. Because of the emphasis in reducing the risk of stand loss due to overly dense stands coupled with the increased risk of stand replacement fire events, two areas have been identified as needing corrective measures; vegetation and fuels. An additional purpose and need is to provide wood products and opportunities for jobs as a byproduct of vegetation management in accordance with forest-wide standards and guidelines and management area goals and objectives in the Forest Plan. The following describes in more detail the elements needing change.



## Vegetation

**There is a need for moving the seral and structural conditions of forest stands towards their historic ranges of variability, maintaining and increasing late and old structured stands; increasing the resistance of forest stands to insects and disease; and maintaining and increasing broadleaf and shrub communities.**

- Move seral structural conditions toward the historic range of variability.
- Reduce excess stocking in stands dominated by trees less than 21 inches in diameter at breast height (dbh) to promote growth and development of large trees.
- Restore historic amount of stands dominated by large trees.
- Reduce the levels of mortality of existing limited large diameter trees within late and old structured stands by thinning understory trees.
- Maintain and restore broadleaf and shrub communities where they existed historically.
- Reduce insect and disease susceptibility and mortality in forested stands by thinning.
- Manage stocking within RHCAs to increase the number of large trees and shrub communities to promote long-term shading and channel stability.

According to the Maury Mountains Watershed Analysis, forested stands that occurred historically were more resilient to insects, disease, and wildfire on a landscape basis. Stands on drier sites tended to develop in clumps or groups of same age trees creating a mosaic of different age classes and canopy layers. The dominant disturbance factor was frequent, low-intensity fire that curtailed the survival of the majority of seedlings and saplings. Currently, more of the project area is covered by dense stands of smaller trees than was present historically. Stands dominated by large trees are fewer than were present historically. Species composition of forest stands has shifted from early seral (fire-resistant ponderosa pine and western larch) to late seral (grand fir and Douglas-fir). Upland slopes once covered by shrub and grass communities have converted to western juniper.

The vegetative conditions in the West Maurys project area were characterized with the Viable Ecosystems Model (Simpson et al. 1994) and used to compare seral structural conditions to the historic range of variability (HRV). The model focuses on relationships between combinations of vegetation structure and species composition, and habitat requirements for animals, insects, and plants. The Viable Ecosystems model stratifies the environmental gradient using plant associations. Excess stages include stands dominated by trees from 5 to 20.9 inches dbh, often with dense stocking in the understory. These stands need to have the smaller diameter trees removed to reduce competition between trees and to increase the vigor of the existing large diameter trees. This will move these stages towards the development of deficient stages dominated by large trees. The historic amount of area dominated by large trees is estimated to have ranged from 10,500 acres to 19,600 acres (amounts do not include western juniper plant associations). At present, there are approximately 800 acres dominated by late and old structure. Treatment of existing acres dominated by large trees is needed to reduce competition among trees to increase the health and vigor

Thinning Needed to Reduce Density Near Large Trees



of remaining trees, changing multi-canopied (multi-strata) stands to single canopied (single-strata) stands. This would lead to maintaining these stands longer into the future. Treatment in ponderosa pine communities with in-growth of fir would reduce the amount of shade-tolerant species to move stands towards early-seral species conditions.

A major factor of the overall health of the forest is the vigor of the trees and other forest vegetation. If the majority of the trees in a given area have densities that result in stagnated stands, they become vulnerable to insects and disease.

Competition from intermediate and suppressed trees in ponderosa pine stands reduces growth of dominant and codominant trees (Cochran 1993). This is important given the existing low amount of large trees and the time and growth needed to develop large structure.

While many vegetative conditions occur within RHCAs at this time, many have high stocking levels with multiple canopies and/or aspen or other deciduous vegetation at risk of replacement by conifers. Current stocking averages 360 trees per acre and ranges to more than 2,000 trees per acre. Stocking levels to maintain healthy stand conditions within RHCAs should be less than 200 trees per acre. At higher stocking levels, existing large trees are at risk of competition-related mortality factors. Broadleaf shrubs, trees, and ground vegetation are shaded out of the stand. Restoring riparian plant community diversity would result in maintaining vegetation, shade, and large wood to support riparian management objectives.

## Fuels

**There is a need for moving the distribution of fire regimes towards their historic ranges of variability, increasing the amount of low-intensity fire conditions, decreasing the amount of high-intensity fire conditions and a need to maintain low-intensity fire conditions where they already exist.**

- Move the distribution of fire regimes towards the historic range of variability.
- Decrease the area with conditions susceptible to high-intensity fire.
- Increase the area meeting conditions for low-intensity fire.
- Maintain existing areas with low-intensity fire conditions.
- Provide fuel breaks around stands and areas maintained with high fire intensity conditions.
- Provide fuel breaks to disconnect continuous areas of high fuel loadings.
- Reduce fire risk to large down wood.

Historically, the dominant fire regime in the Maury Mountains was a regime of low-intensity fire with an average fire return interval of less than 25 years. This was typical of the low-elevation, semi-arid, ponderosa pine-dominated forests of the American west. The frequent return interval of fire kept forest stands open and surface fuels light. In the absence of frequent, low-intensity fires, forested stands have developed multi-canopy conditions, increased stocking levels, increased ladder fuels, increased surface fuels, and have resulted in an increased abundance of fire-intolerant and shade-tolerant species. These changes in historic conditions have resulted in more forested stands being susceptible to high-intensity wildfire, increasing the potential for an unwanted loss of trees, soil productivity, wildlife habitat, property and other forest resources. High-intensity fire conditions also limit the suppression options available to firefighters, often forcing firefighters to employ suppression tactics with increased costs and lower success rates.

The desired condition for low-intensity fire regime ranges from approximately 14,791 to 27,655 acres with the existing condition at approximately 8,400 acres. There is a need to increase the amount of acres within the low-intensity fire regimes by reducing the surface and standing fuel loadings in fire adapted plant associations such as ponderosa pine. The desired condition for mixed-intensity fire regimes ranges from approximately 3,900 to 13,850 acres with the existing condition at approximately 14,105 acres. There is a need to reduce the amount of mixed intensity fire regimes by reducing surface and ladder fuels. The desired condition for high intensity fire regimes ranges from approximately 1,004 acres to 10,500 acres with the existing condition at approximately 4,200 acres.

Smaller diameter ladder fuels



Also, forested stands that currently have low-intensity fire conditions require periodic treatment to maintain those conditions. Without treatment, surface fuels accumulate, multiple canopy layers develop, fire-intolerant species become more abundant, and the potential for high-intensity fires increases.

Fuel loadings and stocking levels within RHCAs are higher than desired which could lead to high-intensity fire within RHCAs. There is a need to reduce fuel loadings to a level and distribution that allows fire to function as a natural disturbance while maintaining vegetation, shade, and large wood to support riparian management objectives.

It is not the purpose of this project to reduce the possibility of wildfire occurring in the West Maurys project area (this is not possible). It is the purpose of this project to decrease the possibility of high-intensity wildfire occurring across the West Maurys landscape.

## Forest wood products and seasonal jobs

**There is a need for providing wood products to contribute to the health of the local and regional economies (Forest Plan, pp. 4-31 to 4-32) consistent with Management Area and Forest-wide standards and guidelines and to provide opportunities for employment and income.**

The Multiple-Use Sustained Yield Act as amended by the NFMA directs the Forest Service to develop and administer the renewable surface resources of the National Forests for multiple use and sustained yield of products and services. Through the implementation of the Ochoco Forest Plan, management area allocations have been identified where the primary emphasis is to produce wood products for the local and regional economies. These management area allocations within the project area are General Forest (23,560 acres) and General Forest Winter Range (6,463 acres) and constitute approximately 30,000 acres of the 37,000 acre project area. In addition, other management area allocations, when meeting applicable standards and guidelines, can also produce wood products as a secondary result to meeting other objectives such as wildlife or scenic resources. Seasonal jobs associated with timber harvest would be supported through the sale of merchantable material consistent with General Forest and General Forest Winter Range goals and objectives. Noncommercial vegetation management needs can also produce the need for service contracts which produce seasonal jobs in the service contract sector.

## Proposed Action

The West Maurys Fuels and Vegetation Management project proposes to manipulate vegetation to increase the amount of late and old structured stands by removing understory trees, reduce stand densities in overstocked stands to increase resiliency to insect and diseases, and to focus treatments with the objective of moving conditions towards earlier seral or fire climax species such as ponderosa pine. Stands with high components of small-diameter, shade-tolerant species or ponderosa pine that would not normally be found in fire-adapted stands would receive high priority for treatment and would remove a portion of the smaller diameter trees. In addition, vegetation management would occur within RHCAs to promote deciduous vegetation and to promote development of large trees. This would enhance shading and riparian-dependent species habitat. Fuels treatments would be done to reduce hazardous conditions that if a wildfire occurred, would cause the unwanted loss of trees, soils, habitat, property, and other forest resources. Fuels treatments would be targeted in areas where low-intensity fire regimes would historically be found and in areas where the amount of fuel loadings present a hazard to residual stands. A byproduct of the proposed vegetation management activities would be timber sale(s) for larger diameter thinned trees and would support jobs associated with timber sale contracts. Seasonal jobs would also be supported by service contracts for the treatment of smaller diameter thinning and fuels treatment operations. Chapter 2 includes a complete description of the proposed action. Maps of the proposed activities are located at the end of Chapter 4. The West Maurys project would utilize a variety of tools to accomplish the tree density, species composition, and fuels management objectives and are described as follows:

**Commercial Thinning:** Approximately 7,763 acres of commercial thinning is proposed to allow increased growth of the residual trees, enhance forest health by removing trees damaged by insect or disease, and recover potential mortality resulting from inter-tree competition. Thinning would increase or maintain the dominance of ponderosa

Prescribed Fire - Underburning



pine and western larch by removing shade-tolerant species. Trees larger than 21 inches dbh would not be cut, either live or dead unless the tree is a safety hazard to operations or needs to be removed for road construction activities. Thinning would reduce the risk of mortality for the remaining large trees and speed the development of additional large trees, increasing the rate of development of late and old structured conditions. In a few selected cases, commercial thinning would occur within some RHCAs in order to maintain or enhance the growth of riparian hardwood species by reducing competition from conifers. There are three types of commercial thinning proposed with this project: individual tree selection, commercial thinning and improvement cutting. Three types of logging systems would be utilized to remove

commercial timber from harvest units: tractor, skyline, and light (see Appendix B Description of Activities).

**Prescribed Fire:** Approximately 13,974 acres of prescribed fire is proposed to reduce accumulations of forest fuels. This would include underburning to reduce fuels from commercial and noncommercial thinning (activity fuels), and underburning other stands to reduce naturally occurring fuels (natural fuels). Prescribed fire would be used to regenerate grass, forbs, and shrubs; and reduce the encroachment of grand fir, Douglas-fir, and western juniper into pine stands. Additionally, prescribed fire would be utilized in juniper stands to reduce the numbers of young junipers and restore the grass, forb, and shrub communities. The use of prescribed fire would also contribute to the return of more natural fire regimes found historically in the project area. Prescribed fire would occur within some RHCAs in order to reduce fuel loadings to approximate historic levels and to maintain or enhance the growth of riparian hardwood species by reducing competition from conifers. Hand line or natural features would be used to keep prescribed fire within treatment units. No heavy equipment will be used to construct fire lines. Prescribed burning would only be initiated when environmental factors are conducive to meeting burning and resource management objectives.

**Noncommercial Thinning:** Approximately 11,728 acres of noncommercial thinning is proposed to reduce the density of understory trees generally less than 9 inches dbh, in order to increase the growth and vigor of the remaining trees, reduce the risk of insects and disease, and lower the risk of high-intensity crown fire. Thinning would maintain or increase the dominance of ponderosa pine and western larch. Thinning would occur within selected RHCAs in order to maintain or enhance the growth of riparian hardwood species by reducing competition from conifers. Approximately 2,688 of the 11,728 acres of this noncommercial thinning would occur in juniper stands. In juniper stands, all younger trees would be cut and larger diameter junipers would be retained. This usually results in a return to the grass and shrub stage or maintains the large structural component but in more open stages. Juniper cutting increases the growth and development of grass and shrub cover.

**Thinning with Fire:** Approximately 2,114 acres of thinning with fire is proposed to reduce seedling and sapling conifer density. This is identified for stands with a large component of seedlings and saplings under a canopy of much larger trees. The purpose is to reduce stocking of seedlings and saplings to maintain earlier

Aspen Stand within a Conifer Stand



seral species and reduce the amount of overstocked stands in the future. This prescription works best when mid-story canopies are open with few ladder fuels present in the stand.

Aspen Treatments: Silvicultural prescriptions would be adjusted where aspen occurs to enhance aspen maintenance and regeneration. The project area contains numerous small aspen stands that are usually, but not always, associated with riparian areas. Aspen develop as clones where individual trees are short-lived and replaced by sprouts from the root system. Removing conifer encroachment in aspen stands would move conditions closer to historic characteristics normally found in aspen stands. In general, conifers younger than the mature aspen (100 years) would be cut within 50 feet of any aspen, including sprouts. Upland thinning treatments would benefit aspen by increasing moisture and light availability. The aspen clones would respond by producing more sprouts and expanding in area which will strengthen overall clone health.

Grapple Piling and Hand Piling: Approximately 3,833 acres of grapple piling is proposed to reduce concentrations of heavy surface fuels in commercial and noncommercial thinning units where prescribed fire alone is not feasible. Grapple piling is using a machine such as an excavator, with a grapple on an articulating arm, to pile forest fuels. No grapple piling would occur within RHCAs. Hand piling would be done in areas where heavy equipment use is not desirable. Hand piling is the use of manual labor to pile slash resulting from management actions. Hand piling would occur on approximately 79 acres.

## Connected Actions

Road Management Activities: Implementation of the proposed action would require the construction of approximately 14.9 miles of new permanent roads and the construction of 6.1 miles of new temporary roads. Newly constructed permanent roads would be used to access treatment units and would be closed after timber harvest and post-harvest activities were completed. Temporary roads are decommissioned at the completion of harvest activities within the unit. Approximately 22.6 miles of existing roads would be reconstructed to restore the road for timber hauling. Decommissioning of existing roads within or accessing treatment units would be done on approximately 10.2 miles of roads. All roads identified for decommissioning access units proposed for treatments and are connected to the vegetative treatment actions.

Maps have been developed to aid in the spatial location of proposed treatments. Map 3 Alternative 2 Commercial Treatments Only displays the locations and types of commercial harvest. Map 4 Alternative 2 All Treatments displays the commercial treatments and the types and locations of noncommercial and fuels treatments. Map 5 Alternative 2 Logging Systems Commercial Treatments displays the locations of the types of logging systems utilized to remove commercial timber and Map 6 Roads Alternative 2 displays the locations of the road management activities.

## Forest Plan Amendments

During the evaluation of the proposed action against current management direction, it was determined that certain treatments were not consistent with Forest Plan direction. The following is a discussion of the direction, the treatments considered inconsistent, the description and rationale for the three proposed Forest Plan amendments.

1. The Eastside Screens state that when LOS is currently below the historic range of variability (HRV), commercial harvest is not permitted. A Forest Plan amendment would be needed to implement the Proposed Action because commercial harvest is proposed in LOS stands and the amount of LOS is below the HRV. The Eastside Screens were intended to maintain options for future management of LOS and only apply to timber sales. The proposed commercial thinning is designed to reduce tree density and improve growth of the residual trees, enhance forest health, or reduce large tree mortality from inter-tree competition. Thinning would more quickly restore historic seral/structural stage conditions and improve growing conditions for larger trees than either no action or prescribed fire alone. Thinning also would contribute to decreasing the probability of crown fires. While there may be short-term decreases in stand densities, the longer-term maintenance of LOS into the future is desirable. No trees more than 21 inches dbh would be cut and removed in any area except for safety reasons or road construction.

There would be 157 acres of LOS treated with commercial harvest thinning. The existing amounts of LOS would not be reduced because the LOS stands that are treated would remain LOS after treatment. The LOS stands that are treated would generally change from multi-strata to single-strata conditions. These stands would continue to have an uneven-aged (uneven-sized) structure. There are currently 737 acres of LOS in 5-acre or larger patches in the project area.

2. The Eastside Screens include standards that when all the criteria for connective corridor habitat cannot be met then timber harvest should be deferred in connective corridors. Currently not all stands in connective corridors meet the canopy closure requirements and not all corridors meet the minimum width of 400 feet. Corridors do represent the best connections given the existing conditions resulting from physical restrictions such as ridges, meadows, and previous harvest practices. Timber harvest treatments in Alternative 2 in stands with canopy closures greater than 50 percent are designed to maintain existing large trees and promote development of additional large trees. Stand densities in the understory layers would be reduced to increase the health and vigor of remaining trees. Noncommercial activities are allowed in connective corridors under Eastside Screens.

There would be 232 acres of connective corridor treatment with commercial thinning and individual tree selection. Canopy closures in these stands would be reduced to below 50 percent but would still function as connective corridor habitat for species associated with more open conditions. Those species selecting for more dense conditions would be more affected by treatment. There are approximately 800 acres of connective corridors identified in the project area.

3. Current Forest Plan direction is contradictory. The Forest Plan describes that prescribed fire will normally not be applied in old growth, but where it can be supported by research, directives and desired condition, it can be utilized following appropriate environmental analysis (Forest Plan, p. 4-136). Additionally, when unacceptable damage to resources on adjacent lands or to the old growth resource could occur from insects or diseases, prescribed fire may be used to reduce stand densities and competition that will increase the resiliency of residual large diameter trees (Forest Plan, p. 4-152). However, under habitat management, the Forest Plan states that vegetation management would not be allowed until further research is available on the needs of the dependent species (Forest Plan, p. 4-251).

In two of the old-growth areas (Friday Creek (OG-D3-09) and Florida Creek (OG-D3-12), existing high densities of trees in the smaller diameters has created conditions where the mortality in larger trees is threatened because of increased competition among trees. Additionally, surface fuel loadings and ladder fuels create conditions for high fire hazard if a wildfire occurred within or adjacent to the area. During hot, dry, and windy conditions, wildfire would be difficult to stop and could result in stand replacement with a loss of old-growth habitat.

Prescribed fire would be utilized to reduce surface and ladder fuels and reduce seedling and sapling densities in Friday Creek and Florida Creek in the Old Growth Management Areas. This would result in 521 acres being treated. There are approximately 1,370 acres of allocated Old Growth Management Area within the project area.

Further information on these non-significant Forest Plan amendments can be found in Chapters 2 and 3 of this document.

## Forest Plan Direction

Guidance for management activities is provided by the 1991 Ochoco National Forest Land and Resource Management Plan (Forest Plan) as amended. The Forest Plan establishes goals, objectives, standards, and guidelines for each specific management area of the National Forest, as well as Forest-wide standards and guidelines. Management Areas and associated standards and guidelines are described in Chapter 4 of the Forest Plan. This project is tiered to the Final Environmental Impact Statement (FEIS) for the Forest Plan, as amended by the Revised Continuation of Interim Management Direction Establishing Riparian, Ecosystem, and Wildlife Standards for Timber Sales (Eastside Screens) and the Inland Native Fish Strategy (INFISH).

Goals and Objectives and Standards and Guidelines for each of the management areas in the West Maury project area are described below.

**MA-F6 Old Growth** – There are approximately 1,370 acres (4%) of the National Forest System (NFS) lands in the project area within four separate allocated old growth areas. Habitat will be provided for wildlife species dependent upon old-growth stands with pileated woodpecker as the management indicator species. The desired conditions for these areas are stands of mixed conifer and ponderosa pine with multi-layered canopy with shaded conditions and a large number of snags. Prescribed fire may be evident if natural fuels accumulate to dangerous levels, threatening the existence of the old-growth stand, or where vegetation manipulation is needed to maintain stand structure and species composition (Forest Plan, p. 4-58). Under standards and guidelines for the practice of Habitat Management, vegetative management will not be allowed, until further research is available on the needs of the dependent species (Forest Plan, p. 4-251). Under the standards and guidelines for the practice of Treatment of Natural Fuels, prescribed fire will normally not be applied in old growth, but where it can be supported by research, directives, and desired future condition, it might be utilized following appropriate analysis and NFMA/NEPA procedures (Forest Plan, p. 4-136). The Forest Plan (p. 4-58) also identifies that additional acres of pileated woodpecker “feeding areas” averaging 300 acres in size be located in areas adjacent to allocated old-growth stands.

In three of the old growth areas, existing high densities of trees is causing mortality in large trees because of increased competition. Additionally, surface fuel loadings and ladder fuels create conditions for high fire hazard if a wildfire occurred within or adjacent to the area. During hot, dry, and windy conditions, wildfire would be difficult to stop and could result in mortality of most, if not all, larger trees with a subsequent loss of old-growth habitat.

**MA-F13 Developed Recreation** – There are approximately 371 acres (1%) of the NFS lands in the Project Area in Antelope Reservoir Campground. The objective of this area is to provide safe, healthful, and aesthetic facilities for people to utilize while they are pursuing a variety of recreational experiences within a relatively natural outdoor setting (Forest Plan, p. 4-71).

The current stand is uneven-aged with scattered overstory ponderosa pine with a mixture of ponderosa pine and western juniper of varying size and age in the understory. Stocking density of both pine and juniper is high considering the low site potential. Competition related stress is apparent in shortened needles, lower crown ratios, and very low growth rates. Bark beetles including western pine beetle, mountain pine beetle, and red turpentine beetle are active in the area with recent mortality of some large pine.

**MA-F14 Dispersed Recreation** – This management area applies to small dispersed sites (less than 5 acres) located throughout the project area on NFS lands and are to provide and maintain a near-natural setting for people to utilize while pursuing outdoor recreation experiences (Forest Plan, p. 4-72). There are 54 individual dispersed recreation sites in the project area. These dispersed sites generally occur along roads, and many are concentrated near riparian areas and stream courses.

**MA-F18 Hammer Creek Wildlife/Recreation Area** – There are approximately 2,548 acres (7%) of the NFS lands in the project area. The objective of this area is to provide and maintain habitat diversity for a variety of wildlife species where open road density is minimal. In addition, the area also provides a scenic, semi-natural or natural-appearing setting for nonmotorized recreational opportunities. Riparian areas will be shady and comprise mixed trees and shrubs. Access roads to trailheads will be open. All other roads will be closed to motorized use and rehabilitated after management projects are complete (Forest Plan, p. 4-80). Existing forested stands are composed primarily of an overstory of large ponderosa pine with an understory of Douglas-fir trees. There are also open vegetation conditions dominated by juniper, mountain mahogany and other upland shrubs. On the periphery of the management area, vegetation management occurred in the 1970s, including overstory removal of many of the large diameter trees.

**MA-F21 General Forest Winter Range** – There are approximately 6,463 acres (17%) of the NFS lands in the project area. The objective of this area is to manage for timber production with management activities designed and implemented to recognize big game habitat needs (Forest Plan, p. 4-84). Currently, these areas have more forest cover than was found historically due to juniper and pine expansion into the shrub and grassland communities. Forage production is also limited by the density of young conifers.

**MA-F22 General Forest** – There are approximately 23,560 acres (62%) of the NFS lands in the project area. The objective of this area is to produce timber and forage while meeting the Forest-wide standards and guidelines for all resources. In ponderosa pine stands, management will emphasize production of high value (quality) timber (Forest Plan, p. 4-86). Many stands in this land allocation are currently over stocked, especially in the understory leading to conditions that do not favor long-term vigor and resiliency of desired large diameter trees.

**MA-F26 Visual Management Corridors** – There are approximately 3,221 acres (8%) of NFS lands in the project area. The objective for this area is to maintain the natural appearing character of the forest along major travel routes where management activities are usually not evident or are visually subordinate to the surrounding landscape. Forest Road 16 and 17 have been allocated as visual management corridors with a visual quality objective of partial retention. The outer boundary of this management area will generally not exceed 600 feet on either side of the road. Vegetation will appear manipulated and reflect a forest setting where stands of trees exist in multiple age classes in both uneven- and even-aged conditions, set in a more subdued background of rock outcrops, aspen clones, and native grass communities (Forest Plan, p. 4-94).

Visual Management corridors consist of a variety of species compositions and structures. Mixed conifer sites are found on the northern portions of the corridors where these roads are located next to streams. Douglas-fir, ponderosa pine, and western juniper sites form a mosaic in the remaining portions of the corridors. Many stands have high tree densities in the understory with increasing competition stress occurring in the large overstory trees.

**MA-F12 Eagle Roosting Areas** - There are approximately 124 acres (less than 1%) of NFS lands in the project area. The objective of this area is to provide winter roosting habitat for migrating bald eagles from December through April. The area will have uneven-aged stands which contain large trees at least 22 inches dbh and a few trees which are 36-40 inches dbh. Roost trees are generally 22 inches dbh and larger with an open structure allowing eagles to land easily. Roost trees in use will be preserved (Forest Plan, p. 4-70).

Forest cover has expanded and become denser compared to historic conditions on most of the eagle roosting areas. Multiple canopies have developed beneath the large overstory trees located in the draws increasing stand density to levels that impair vigor and health of the large trees. These trees are at increasingly higher risk of mortality due to competition related stress, bark beetles, dwarf mistletoe, and high-intensity fire.

**MA-F15 Riparian Areas and Riparian Habitat Conservation Areas (RHCAs)** – There are approximately 3,961 acres (10%) of NFS lands in the project area. The Inland Native Fish Strategy (INFISH) amended the Forest Plan and identified Riparian Habitat Conservation Areas (RHCAs). The objective of MA-F15 areas is to provide for streamside vegetation and habitat to maintain or improve water quality. The focus of management within RHCAs is to meet riparian management objectives. RHCAs on fish-bearing streams extend 300 feet from the edge of the stream’s active channel. RHCAs on non-fish bearing perennial streams extend 150 feet from the edge of the stream’s active channel. On ponds, reservoirs, and wetlands greater than 1 acre, the RHCAs extend 150 feet from the edge of the wetland or max pool elevation. RHCAs extend 50 feet from the edge of intermittent streams, wetlands less than 1 acre, and landslides.

Current stocking averages 360 trees per acre and ranges to more than 2,000 trees per acre within RHCAs. Stocking levels to maintain healthy stand conditions within RHCAs should be less than 200 trees per acre. At higher stocking levels, existing large trees are at risk of competition-related mortality factors. Broadleaf shrubs, trees, especially aspen, and ground vegetation are shaded out of the stand.



## Forest-wide Standards and Guidelines

### Resource – Forest Health

Maintenance of a healthy forest resource is important as it relates to the ability of the forest stands to meet the objectives of each management area. A major factor in the overall health of the forest is the vigor of the trees and other forest vegetation (Forest Plan, p. 4-151).

**MA-F6 Old Growth:** Generally, insects and diseases will not be controlled or suppressed. Exceptions, may occur when treatment is necessary to prevent unacceptable damage to resources on adjacent lands or to the old growth resource. Acceptable treatments are prescribed burning based on site-specific environmental analysis.

**MA-F18 Hammer Creek Wildlife / Recreation Area:** Generally, treatment of insect and disease conditions will not be a high priority, except when the ability of the forest resource to meet the area objectives is threatened. Treatments to prevent or control bark beetles and root diseases may be emphasized to meet visual objectives.

**MA-F12 Eagle Roosting Areas:** Meet the area objectives for providing roosting habitat for bald eagles. Emphasize reducing the risk of bark beetle infestation, through stocking level control, to maintain large diameter trees.

**MA-F13 Developed Recreation:** Prevent or suppress insect and disease outbreaks. Emphasize detection and prevention of bark beetle and root disease occurrences as these relate to providing a safe environment.

**MA-F14 Dispersed Sites:** Prevent or suppress insect and disease outbreaks. Emphasize detection and prevention of bark beetle and root disease occurrences as these relate to providing a safe environment.

**MA-F21 General Forest Winter Range:** Utilize all methods to prevent or suppress insect and disease outbreaks.

**MA-F22 General Forest Emphasis** will be on the prevention of stand and fuels conditions that provide favorable habitat conditions for pests to increase above endemic levels.

**MA-F26 Visual Management Corridors:** Treatment of bark beetles and root diseases are emphasized with strategies to improve aesthetics and safety also considered.

### Eastside Screens

The Revised Continuation of Interim Management Direction Establishing Riparian, Ecosystem, and Wildlife Standards for Timber Sales amended the Ochoco National Forest Land and Resource Management Plan in 1995. The direction only applies to the design and preparation of timber sales on eastside Forests and is often referred to as “Regional Forester’s Forest Plan Amendment #2” or as the “Eastside Screens.” The Eastside Screens contain guidelines for management of timber sales in late and old structured stands relative to the historical range of variability (ecosystem screen), wildlife corridors, snags, coarse woody debris, and goshawk management. All other noncommercial vegetative management treatments are exempt from the Eastside Screens. The riparian management guidelines were amended by the Inland Native Fish Strategy (1995). On June 11, 2003, the Regional Forester issued supplemental guidance for implementing Eastside Screens. The Regional Forester encouraged the consideration of Land and Resource Management Plan amendments in cases where the proposed treatments would move landscape conditions towards historic range of variability and provide single story late and old structure in the drier ponderosa pine and larch stands.

### Inland Native Fish Strategy

The Inland Native Fish Strategy (INFISH) was intended to be interim direction to protect habitat and populations of resident native fish and to provide for options for management. The INFISH delineated RHCAs where riparian-dependent resources receive primary emphasis. These RHCAs include traditional riparian corridors, wetlands,

intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems. These areas will be managed to maintain or restore water quality, stream channel integrity, channel processes, sediment regimes, instream flows, diversity and productivity of plant communities in riparian zones, and riparian and aquatic habitats to foster unique genetic fish stocks that evolved within the specific region. RHCA's run through and are overlaid on other allocations.

## **Local Assessments**

### **Maury Mountains Watershed Analysis**

In 2000, the Lookout Mountain Ranger District completed the Maury Mountains Watershed Analysis. The West Maurys Fuels and Vegetation Management project falls within the west half of the watershed analysis area. The watershed analysis compared existing resource conditions with desired future conditions. Additionally, the watershed analysis provided recommendations for treatments to meet desired conditions.

The Maury Mountains Watershed Analysis documents that almost all the plant communities in the area have changed due to human actions in the last 150 years. The amount of late and old structure stands have decreased, the amount of stands dominated by trees between 5-9 inches dbh has increased, and species composition has shifted from early and mid seral species such as ponderosa pine to mid and late seral species such as fir. Fire suppression has allowed understory layers to develop with a resulting increase in stand density and an increase in competition stress.

### **West Maurys Roads Analysis**

According to the Forest Service Road Management Policy published January 12, 2001, all NEPA decisions signed after January 12, 2002, which involve certain changes in the transportation system, must be informed by a roads analysis. A project-level roads analysis was completed for the West Maurys Fuels and Vegetation Management Project area. The roads analysis is an interdisciplinary process that provides the decision-maker with information on the needs, opportunities, and priorities for the road system. The roads analysis supports the need for an increased transportation system for accessing portions of the project area and identifies roads that are no longer needed.

## **Scope of Project and Decision Framework**

The scope of the project and the decision to be made are limited to: commercial thinning; noncommercial treatments; fuels reduction treatments; road management actions; aspen treatments associated with treatment units; mitigation measures to be employed; and monitoring within the project area. Chapter 2 details the designs of these actions. The project is limited to National Forest System lands within the project area.

The Responsible Official for this proposal is the Forest Supervisor of the Ochoco National Forest. After the Draft EIS was completed, a 45-day public comment period was held. The comment period began in August 2004. The Responsible Official will decide whether to:

- Select the proposed action, or
- Select an action alternative that has been considered in detail, or
- Modify an action alternative, or
- Select the no-action alternative, and
- Identify what mitigation measures and monitoring will apply.

The decision will be determined by comparing how each factor of the project purpose and need is met by each of the alternatives and the manner in which each alternative responds to the key issues. The alternative which provides the

best mix of prospective results in regard to the purpose and need, the issues, types and levels of effects and public comments, will be selected for implementation. In addition, the Responsible Official may consider other factors such as:

1. Would the density and species composition of forested stands be modified towards a balance of seral/structural stages as described by the historic range of variability? Would forested stands shift toward dominance by fire-tolerant species such as ponderosa pine and western larch?
2. Would the overall amount of Late and Old Structure (LOS) be maintained? Would the amount of single-strata LOS be increased? Would stand density be reduced to remove competitive stress on large trees? Would the management activities result in more large trees being maintained over time, as well as encourage the development of additional large trees?
3. Would stand densities, species composition, and structure be reduced to decrease the susceptibility to stand replacement (high intensity) wildfire? Would the amount of fuel loading be reduced? Would the number of acres that support non-lethal (low intensity) fire be increased?
4. Would the proposed management activities contribute to meeting Riparian Management Objectives (RMOs) contained in the Inland Native Fish Strategy (INFISH 1995)? Would the proposed management activities in RHCAs increase or maintain shade, accelerate development of large woody debris (LWD), and reestablish and rehabilitate aspen stands? Would road inactivation and decommissioning reduce the potential for surface erosion and sediment delivery?
5. Would the selected alternative provide economic benefits to communities such as jobs? Would commercial wood products be provided?

## Scoping and Public Involvement

The complete record of the public involvement process to date is available for review in the project file.

### July 2, 2002 - Proposed Action

The West Maurys Fuels and Vegetation Management Project was initially presented to the public in a letter dated July 2, 2002, that was sent to the project scoping mailing list. The letter described the purpose and need and the proposed action at the time. This proposed action only identified treatments for fuels reduction activities to be implemented through the use of prescribed fire, noncommercial thinning, and piling with the use of a grapple machine. Treatment acreages included 20,400 acres of prescribed fire, 10,630 acres of noncommercial thinning, 4,020 acres of juniper thinning and 2,080 acres of grapple piling within the noncommercial thinning units. Comments received from this initial public scoping included a concern that the use of prescribed fire would have unintended effects on the residual stands, especially on trees identified to be left after treatment, because existing stand densities were too high. They expressed a concern that commercial thinning should also be considered as a tool to reduce stand densities and alter stand structures to a level where prescribed fire would not cause undesired damage to leave trees.

During this initial analysis of current conditions in the project area and reviewing the Maurys Watershed Analysis, a second proposed action was developed. The Maurys Watershed Analysis identified desired vegetative conditions that provided for stand resiliency to insect and disease attacks, reduced risk of high intensity wildland fire, increased the amount of late and old structured stands by altering stand structures, reduced fuel hazards and reintroduced fire as a disturbance agent into fire adapted vegetative types. To achieve these desired conditions, commercial thinning was identified as a tool to remove larger diameter (9 to 21 inches dbh) trees in stands that are overly dense. These trees provide competition for resources and stress desirable large diameter trees. These smaller trees also contribute to fuel hazard by acting as a fire ladder from the ground into the larger diameter tree canopy.

### February 6, 2003 - Proposed Action

For these reasons, a second proposed action was developed and sent to the public on February 6, 2003. The purpose and need remained the same as the July 2, 2002, proposal and the proposed action was adjusted to include

commercial thinning treatments as well as the original prescribed fire, noncommercial thinning, and grapple piling treatments. Treatment acreages included 15,504 acres of prescribed fire, 6,396 acres of noncommercial thinning, 3,067 acres of juniper thinning, 3,751 acres of grapple piling within the commercial and noncommercial thinning units, and 8,413 acres of commercial thinning.

Six letters, two e-mails, and one telephone call were received.

- Several responders commended the commercial thinning activities proposed as a way to restore forest health and revitalize the local economy. Having a local source of ponderosa pine offsets freight costs, augments quality control, affords jobs, and creates market opportunities. It is one commenter's view that foreign producers are undercutting American pricing on raw materials and finished products.
- Other respondents lauded proposals to reduce the risk of catastrophic wildfires. Others stated the arbitrary constraint to retain all trees greater than 21" counters the goal to improve forest health.
- One commenter indicated that diseased and insect-damaged trees should be removed regardless of their diameter.
- Some citizens urged that a greater number of roads be decommissioned or closed than proposed. These people stated it was unclear to them what purpose the roads served. Conversely, others pointed out roads and their use as entry points to future management activities such as fire suppression and recreation,
- One respondent recommended more extensive management in the RHCAs.
- One commenter indicated that fuel reduction activities should be performed in conjunction with the harvesting operation.
- Another reiterated that healthy forests and healthy communities are equated.
- One person opposed commercial harvest for any purpose.
- One commenter urged that the timber harvest be economically viable.

During the analysis of this second proposed action and in response to public comments, it was not known if there would be significant impacts from the proposed action. A determination was made by the Responsible Official to prepare an EIS to assess the effects of the proposed action.

#### January 16, 2004 - Proposed Action and Notice of Intent to Prepare an Environmental Impact Statement

On January 16, 2004, a Notice of Intent to Prepare an Environmental Impact Statement was published in the Federal Register (Vol. 69, No.11). This notice provided the public with a description of the proposed action, issues identified to date, and a description of Alternative 3 as developed to date. Comments were due by February 16, 2004.

#### February 4, 2004 - Revised Notice of Intent to Prepare an Environmental Impact Statement

The original notice of intent published on January 16, 2004, stated that there would be 7,650 acres of fuels treatments. This Federal Register Notice corrected that amount to 17,890 acres of prescribed fire for fuels treatments and thinning and adjusted the comment period to end on March 1, 2004.

Comments received include:

- One person was opposed to all aspects of the project except the proposed road decommissioning. This person felt that prescribed fire activities were harmful to the human environment, caused air pollution and damage to the soil resources, such as unwanted erosion. The person was also against commercial thinning and was more supportive of letting nature direct the course on public lands in the west.
- American Forest Resource Council supported the proposal, especially the use of commercial thinning to treat stands within the project area. They urged that commercial thinning be economical and that the use of helicopter logging be minimized and that no restrictions on diameter limits be implemented. They encouraged that an amendment (as referenced in the June 11, 2003, letter from the Region 6, Regional Forester) to the Eastside Screens be considered that would include the removal of trees 21 inches dbh and greater to better meet late and old structured stand objectives.
- Oregon Natural Resources Council provided many comments including those related to thinning in Late-Successional Reserves and in Matrix lands. These land allocations pertain to the Northwest Forest Plan which does not have jurisdiction over the Ochoco National Forest; therefore, these comments are outside the scope of the West Maurys project area. Additionally, they recommend focusing treatments in areas where the natural fire regime included frequent fire and in areas where several fire intervals have been

missed due to fire suppression and forest fuels have accumulated unnaturally. They requested protection of mature and old growth forests, including large, old, and fire resistant trees that provide shade and cool, moist conditions that help reduce fire danger. They advised environmental safeguards such as retaining key wildlife habitat features such as snags and large logs, protecting roadless areas, and avoidance of road building because logging roads cause water pollution and increase ignition risks.

- Ochoco Lumber Company supported the purpose and need to thin crowded stands to reduce mortality caused by insects and disease. They also supported the need to treat excessive forest fuels with thinning and slash abatement. They had concerns with the large amount of noncommercial thinning and the resultant slash created from the operations. They felt that the slash could provide a food source for insects and create a heavy fuel load unless treated. They supported the need for commercial thinning to promote large trees and reduce competition. They disagreed with the diameter limit of 21 inches dbh and felt it is a poor way to manage stands. They referenced the June 11, 2003, Region 6, Regional Forester letter that provided guidance for considering amendments to the Eastside Screens to better meet late and old structure objectives. They also felt it was extremely important to keep commercial vegetation management projects in the black. With no manufacturing facilities in Prineville, they felt that socio / economic factors need to be considered highly in the development of alternatives. They felt that logging and slash disposal methods needed to be kept simple and cost effective. They also felt that roads should only be decommissioned when they are in poor locations or contributing to excessive erosion or water quality problems, otherwise roads should be left open for administrative, recreational, and firefighting purposes.

#### Quarterly Schedule of Projects

The project was listed in the *Schedule of Projects for the Deschutes and Ochoco National Forests and the Prineville District of the BLM* since the Summer 2002 edition.

#### 45-day Comment Period

The 45-day comment period for the Draft EIS began on September 3, 2004 and closed on October 19, 2004. A total of 12 letters were received. Effects to goshawk habitat and Late and Old Structure stands were an overriding theme in several comment letters. Concerns related to maximizing goshawk habitat, designating alternate nest stands, maintaining existing nest stands, and the overall amount of treatments within post-fledging areas. Other comments associated with wildlife included concerns related to connectivity corridors, elk security habitat, snag retention, future snag recruitment, and management indicator species. Other comments related to socio-economic effects, job creation, NEPA process, range of alternatives, unit-by-unit soils analysis, noxious weed spread, cumulative effects (esp. related to livestock grazing), and water quality were also received. Appendix E contains a complete discussion of the comments received and how they were considered. All substantive comments received on the draft EIS, along with a response, are included.

## Identification of Issues

Issues are points of discussion, debate, or dispute about environmental effects that may occur as a result of the proposed action. Issues provide focus and influence alternative development, including development of mitigation measures to address potential environmental effects. Issues are also used to display differing effects between the proposed action and the alternatives regarding a specific resource element.

The ID Team sorted the comments received during initial scoping into categories to help issue tracking and response. The issues were sorted into three categories: Key issues, Analysis issues, and Issues not addressed in detail.

**Key issues** were used to develop alternatives and design criteria and resource protection measures. These are issues that cannot be resolved without some consideration of the trade-offs involved. Trade-offs can be more clearly understood by developing alternatives and displaying the relative impacts of these alternatives.

**Analysis issues** are other environmental components that were determined to be important and were considered during the analysis process. These issues provide the Responsible Official with information about the effects of the project.

**Issues not addressed in detail** are issues that were not considered during the analysis process. The Council on Environmental Quality (CEQ) regulations (40 CFR 1501.7) instructs agencies to “...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review...”

## Key Issues

The key issues are specific to the proposed action and the project area. Attributes and measures for each issue will help to evaluate how each of the alternatives addresses issues.

### Key Issue 1: Effects to Wildlife Habitat

**Issue Statement:** Vegetative treatments, including prescribed fire, may impact habitat effectiveness for a variety of wildlife species and / or habitat within the West Maurys Project area. Those habitats are associated with late and old structured (LOS) forested habitat dependent species, connectivity corridors, goshawk, elk, and pileated woodpecker.

#### Issue 1A. Late and Old Structure

There is a concern that treatments within late and old structured (LOS) stands would result in a change in structure and amounts of LOS across the landscape. Proposed treatments to reduce stand densities, increase resiliency and vigor of remaining stands and promote long-term LOS conditions may alter stands so that the LOS no longer functions as dense canopy or multi-strata forest habitat.

#### Current Condition

There are approximately 737 acres of LOS in 5-acre or larger patches within the project area. The project area is below the historic range of variability for LOS stands in both single canopy and multi-canopied stands. Many stands are overly dense with shade-tolerant, smaller diameter, and relatively young trees resulting from years of fire suppression. These trees and stand densities are not normally found in fire-dominated ecosystems and present potential fuel hazards threatening the long-term existence of the LOS stands. Table 1.1 displays the current levels of LOS by plant association group (PAG) compared with the Historic Range of Variability (HRV). All plant association groups are below (HRV) for all LOS categories except for juniper steppe and dry pine multi-strata which have a minimal range of zero percent.

**Table 1. Comparison of Plant Association Group with Historic Range of Variability of LOS**

Plant Association Group	Time Period	LOS Type	Current Condition (%)	HRV (%)
Dry Grand Fir	Current Level	Multi-Strata	1.4	8-15
		Single-Strata	2.8	18-38
		Total	4.1	26-53
Douglas-Fir	Current Level	Multi-Strata	1.1	11-19
		Single-Strata	3.3	33-54
		Total	4.4	44-73
Moist Pine	Current Level	Multi-Strata	1.1	0-9
		Single-Strata	3.3	50-86
		Total	4.4	50-95
Dry Pine	Current Level	Multi-Strata	0.5	0-7
		Single-Strata	1.1	25-59
		Total	1.6	25-66
Juniper woodland	Current Level	Multi-Strata	0.3	0
		Single-Strata	0.4	5-12
		Total	0.7	5-12
Juniper Steppe	Current Level	Multi-Strata	0.0	0
		Single-Strata	0.2	5-12
		Total	0.2	5-12

### **Measuring Factor**

The measuring factor would be the number of LOS acres treated and the resulting structural conditions after treatment.

### **Issue 1B. Connective Corridors**

There is a concern that commercial harvest within connectivity corridors would result in reduced canopy closure in dense stands. This may not promote habitat conditions that would facilitate species movement between areas and may make species vulnerable to predation and/or exposure. It may also block movement of species with limited mobility because of reduced densities of stands. The Eastside Screens identify that Old Growth management areas and LOS stands need to be connected. The Eastside Screens defines connectivity corridors as stands in which medium or larger diameter trees are common, and canopy closures are within the top one-third of site potential. In the West Maury project area, this means stands with more than 50 percent canopy closure.

### **Current Condition**

There is currently poor connectivity between Old Growth MAs and LOS stands. Poor connectivity is a function of deficient LOS, extensive overstory removal, and physical restrictions such as ridges, meadows, and other environmental conditions that result in major plant association changes. There are currently about 800 acres identified in connective corridors within the project area.

### **Measuring Factor**

The effects to connectivity corridors would be measured by the total amount of commercial harvest within the connectivity corridors and the resultant condition after treatment.

### **Issue 1C. Goshawk Habitat Treatments**

There is a concern that reducing stand densities will affect goshawk post-fledging habitat. Commercial thinning treatments would reduce goshawk preferred stand characteristics. The Eastside Screens stipulate that no timber harvest may occur within the 30-acre nest core areas. No harvest is proposed within core nest areas and will not be discussed further.

### **Current condition**

Goshawk core nest areas and post-fledging areas (PFA) are approximately 30 and 400 acres in size, respectively. There are 15 nest core and post-fledging areas within the West Maurys project area. Of these nesting territories, one had reproductive activity in 2004, six had confirmed nesting records during the period 2001 to 2003, six were confirmed as active nests in 1998 or 1999, and two were last confirmed as active nests during, or prior to, 1990. Post-fledging areas provide security for young birds to mature, learn hunting techniques from the adult, and eventually disperse to other areas outside of the home range. Preferred stand structures include intermingled crowns in 12-inch dbh and larger trees with patchy clumps of more dense stands, less dense stands, and small openings scattered throughout the stands. There are currently 5,817 acres of identified post-fledging habitat within the project area. In post fledging areas, harvest activities may occur but treatments should focus on retaining LOS stands and enhancing young stands toward LOS conditions.

### **Measuring Factor**

The measuring factor would be the number of acres of goshawk post-fledging habitat treated by treatment type and the resulting description of stand structure and composition.

## **Issue 1D. Elk Habitat Effectiveness, Security, and Calving Habitat**

There is a concern that commercial harvest, thinning, and fuels reduction activities would have a detrimental impact on elk habitat, including security and calving habitat within the project area. Satisfactory thermal cover is defined as at least 70 percent canopy closure on 40 foot tall trees. Marginal cover is defined as 40 percent canopy closure. Elk security habitat is defined as areas having a road density of less than 2 miles of open road per square mile.

### **Current condition**

Satisfactory thermal cover is limited within the West Maurys project area. The majority of the cover in this project area is marginal cover. Total cover amount is higher than considered optimal (60 percent of the area as forage to 40 percent of the area as cover), but quality of cover is less than optimal. Elk security habitat is limited in the project area. Elk calving habitat has been mapped and includes a mosaic of forest types intermingled with meadows and riparian woodlands. There are currently 3,410 acres of elk security habitat within the project area. There are 3,599 acres of mapped elk calving areas within the project. There are 15,441 acres of marginal and 3,098 acres of satisfactory cover in the project area.

### **Measuring Factors:**

Big Game habitat is assessed through the use of the Habitat Effectiveness Index model which incorporates quantity and quality of cover, and open road densities to determine the effectiveness of habitat over time.

- Habitat Effectiveness Index (HEI) for selected Management Areas.
- Amount of satisfactory and marginal cover treated and resultant condition.
- Amount of elk calving areas treated and resultant condition.
- Amount of elk security habitat treated and resultant condition.

## **Issue 1E. Old Growth Management Areas**

Fuels reduction treatments (prescribed fire) within two Old Growth Management Areas and all types of treatments in adjacent pileated woodpecker feeding areas would reduce stand densities and may impact the effectiveness of the old growth management area and the adjacent pileated woodpecker feeding areas. Pileated woodpeckers are a management indicator species for the Old Growth Management Areas on the Ochoco National Forest.

### **Current conditions**

There are four Old Growth Management Areas within the West Maurys project area totaling 1,370 acres. These areas range in size from 283 acres to 509 acres. In addition, there are “pileated woodpecker feeding areas” of approximately 300 acres located adjacent to each of the old growth areas. There is a total of 1,234 acres identified as pileated woodpecker feeding areas. In combination, these two systems comprise a “habitat area.” A multi-layered canopy with shaded conditions and a large number of dead snags per acre is considered “optimum” for old growth habitat. The feeding areas provide supplemental snags at relatively high levels, about 90 percent.

One Old Growth Management Area (Friday Creek) currently does not have the site capability of supporting habitat for pileated woodpeckers.

Within the project area, records of pileated woodpeckers use are limited. To date all pileated woodpeckers observed in the Maurys have been on north facing aspects on grand fir sites.

### **Measuring Factors:**

- The number of acres of Old Growth Management Area with prescribed fire treatments and the resultant condition.
- The acres of adjacent pileated woodpecker feeding area treated and the resulting description of stand structure and composition.



## Key Issue 2: Effects on Water Yield

Vegetation management can affect water yield by increasing the rate of water delivery to streams. Since peak flows now occur earlier than they did historically, water flow from higher elevations is “flashier” and can coincide with peak flows from lower elevations. Timber harvest and noncommercial vegetation treatment can increase water yields and change the timing of flows.

### Current conditions

Drainages in the project area normally have peak annual flows in March through April as a result of snowmelt. Peak annual flows as a result of rain-on-snow events in early winter have produced some of the highest flows in the project area over the last 50 years. Peak annual floods can also result from intensive convective thunderstorms that cause flash floods during the spring and summer. The probability of having a flash flood increases as the elevation and precipitation decrease primarily as a response to vegetation and ground cover. Forest canopy tends to buffer the intensity of thunderstorms at higher elevations. Peak flows are probably higher than historically due to loss of floodplain storage due to entrenched channels and soil loss, compaction, timber harvest, and road construction which cause flashier responses. This has been offset somewhat by increased understory canopy cover.

Equivalent Harvest Area (EHA) model – EHA will be used to evaluate the risk to water quality and stream bank stability. The Forest Plan (1989) assigned an EHA threshold of 35 percent to watersheds that flowed into the Crooked River between the Bowman Dam on Prineville Reservoir and the North Fork Crooked River. The threshold value identifies the upper limit that is compatible with watershed sensitivity, without incurring damage in a major storm event. The assigned threshold of 35 percent indicates low sensitivity. However, the high incidence of headcuts in some streams in the project area indicates that the watersheds are more sensitive. The EHA threshold should not be interpreted as a point above which detrimental impacts will occur but as a point above which detrimental impacts may occur, should a 10-year or greater storm or melt event take place (Anderson 1989).

Newsome and Gibson Creek drainages currently have a high percentage of headcuts indicating that the hydrologic system is not functioning properly. This is probably due to the loss of deciduous streamside vegetation from grazing and past timber harvest with little stream buffering. Reduced vegetative cover in RHCAs leads to increased bank instability and in conjunction with an intense rain events, stream headcutting would occur. Any increase in water yield in these drainages may increase the amount and rate of headcutting. A value of 20 EHA would indicate little to no potential increase in water yield.

### Measuring Factors

Effects to water yield will be measured by EHA percentages in all watersheds and in Newsome Creek and Gibson Creek drainages.

## Analysis Issues

Other issues and concerns were raised during scoping, both internally and externally, that did not result in different alternatives, but were considered during the analysis process.

**Wildlife** – In addition to the wildlife key issues, the following items will be analyzed and compared by alternative:

- Effects on Management Indicator Species’ habitats;
- Effects on Threatened, Endangered, Candidate, and Sensitive Species impacts;
- Effects on Resident and Migratory birds including nesting habitat;
- Treatments within the Bald Eagle Management Area; and
- Treatments within bald eagle winter roosting habitat.

**Non-native Invasive Plants (Noxious Weeds)** – Proposed management activities have the potential to introduce or spread existing populations of noxious weeds and invader species.

**Air Quality** – Proposed activities have the potential to affect air quality within the project area and airsheds for adjacent communities.

**Soils** – Proposed activities have the potential to affect soils through either compaction or surface disturbance.

**Cultural Resources** – Proposed ground-disturbing activities such as commercial thinning, noncommercial thinning, prescribed fire, and grapple piling have the potential to disturb sites and compromise the recovery of information.

**Recreation** – Antelope Reservoir campground (Developed Recreation MA-F13) contains densities of vegetation that does not promote longevity of large diameter trees consistent with Forest Plan direction for this management area.

**Economic and Social Analysis** – Comments have been received regarding designing alternatives to be economically viable and limiting the amount of costly logging systems.

**Grazing impacts** – The proposed activities may have an effect on available forage within grazing allotments.

## Issues not analyzed in detail

Several issues were not considered during the analysis process for a variety of reasons. These issues and the reason they were not considered are described below.

**PACFISH issues** – since the project area is not within the jurisdiction of this decision, no direction or standards and guidelines pertaining to PACFISH were utilized.

**Northwest Forest Plan** – several comments were raised regarding management within Late Successional Reserves and Matrix and adhering to standards and guidelines within the Northwest Forest Plan. The entire Ochoco National Forest is outside of the jurisdiction of the Northwest Forest Plan.

**Wildland Urban Interface** - Issues relative to prioritizing treatments within or near homes were not analyzed in detail because of the small amount of rural interface within or adjacent to the project area. No wildland urban interface occurs within the project area.

**Inventoried Roadless Areas** – Issues relating to management of Inventoried Roadless Areas were not relevant to this project because there are no Inventoried Roadless Areas within or adjacent to the project area. The nearest Inventoried Roadless area is approximately 20 miles to the northeast of the project area.

**Municipal watersheds** – Issues relating to treatments within municipal watersheds were not relevant to this project because there are no municipal watersheds within or adjacent to the project area.

# Chapter 2

## Alternatives Including the Proposed Action

## Changes between Draft and Final EIS

The alternative descriptions have been rewritten for clarity.

Summary information on key issues has been moved to the Comparison of the Alternatives section at the end of the chapter or has been moved to Chapter 3.

The description of activities section has been moved to Appendix B.

The data gap for heritage resources has been filled. Survey data is no longer incomplete and survey results have been incorporated into project design.

Removed the section on Sale Area Improvement Opportunities because opportunities were already included as part of the alternatives.

### Changes to Alternative 2

- Updated aspen treatments. Aspen treatments in Alternative 2 would occur on 72 acres (instead of 11). Commercial harvest activities would occur on 65 acres within RHCAs (60 within aspen stands).
- Based on field work, revised amount of road work needed to implement action alternatives.

	<b>Final EIS (miles)</b>	<b>Draft EIS (miles)</b>
Road Construction	14.9	6.6
Temporary Construction	6.1	5.2
Reconstruction	22.6	37.4

### Changes to Alternative 3

- Updated aspen treatments. Aspen treatments would occur on 61 acres (instead of 11). Commercial harvest activities would occur on 59 acres within RHCAs (54 within aspen stands).
- Based on field work, revised amount of road work needed to implement action alternatives.

	<b>Final EIS (miles)</b>	<b>Draft EIS (miles)</b>
Road Construction	6.9	3.3
Temporary Construction	3.8	4.3
Reconstruction	16.7	34.1

### Changes to Alternative 4

Removed 10.2 miles of Road Decommissioning that was inadvertently included in Draft EIS.

## **CHAPTER 2 – ALTERNATIVES INCLUDING THE PROPOSED ACTION**

### **Introduction**

The process used in developing the alternatives began with a review of the purpose and need for action by the interdisciplinary team. The team also relied on comments received during the scoping process and applicable direction in the Ochoco National Forest Land and Resource Management Plan (Forest Plan). This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among options to the decision maker and the public. In addition, the No Action Alternative (Alternative 1) also provides a baseline against which to measure the action alternatives.

### **Alternatives Considered but Eliminated from Detailed Study**

An alternative that considered noncommercial and prescribed fire treatments, and commercial thinning treatments to remove trees greater than 21 inches dbh was considered but eliminated from detailed study. Across the landscape within the West Maurys Project area, late and old structured habitat is below the historic range of variability. It was felt that maintaining all trees 21 inches dbh and above would maintain this important structural component across the landscape in both the short term and in some cases, the long term.

An alternative that considered noncommercial thinning and prescribed fire treatments with no new road building in the unroaded areas identified by Oregon Natural Resources Council (ONRC) was not considered, because it is similar to Alternative 4. No new roads were proposed for construction within ONRC unroaded area. There are no inventoried roadless areas within the project area as depicted in Appendix C, Ochoco Forest Plan.

An alternative to consider treatments on non-federal lands was not considered because there is only 320 acres of private land within the project area. Treatment of these non-federal lands would not result in any substantial change to the vegetative conditions or reductions in fuel loadings across the landscape. And, more importantly, the Forest Service does not have the authority to conduct activities on non-federal lands.

An alternative to remove or reduce grazing within the project area was not considered in detail because the grazing would not affect any removal of conifer species needed to reduce stand densities and fuel loadings and meet the purpose and need of the project. An environmental analysis of the grazing practices in the Maury Mountains is currently ongoing.

### **Alternatives Considered in Detail**

Alternatives were developed by the Responsible Official and Interdisciplinary Team to address the key issues. Four alternatives were analyzed in detail including the No Action Alternative. All action alternatives meet the purpose and need for action in varying degrees.

The data and information used to design the alternatives comes from field reconnaissance, satellite imagery, stand exams, and historic records. This data was summarized using a Geographic Information System (GIS), Viable Ecosystems modeling, and fuels modeling. Quantifiable measurements, such as acres and miles, and mapped unit boundaries used to describe the alternatives and effects are based on the best available information and are only estimates. All estimates were utilized similarly across the alternatives.

## **Alternative 1 – No Action**

Alternative 1 is the No Action alternative. This alternative serves as a baseline for comparison of the effects of all of the alternatives. There would be no change in current management direction.

There would be no stand density management treatments. Stands would continue to incur mortality and large diameter trees would continue to be at risk of loss due to competition among trees. Current levels of insects would probably increase due to the high-density conditions, leaving trees vulnerable to attack. LOS stands would remain multi-strata with dense stand conditions causing competition for resources among trees. Large diameter trees, such as ponderosa pine, would remain at a high risk of mortality.

There would be no fuels reduction treatments. Areas would continue to accumulate fuels with the potential for a wildfire causing unwanted damage to forested stands, wildlife habitat, soils, and water quality.

There would be no jobs supported with timber sale activities. There would be no seasonal jobs supported with service contracts for noncommercial thinning and fuels treatment contracts. There would be no economic benefit to the local or regional communities.

Routine activities such as road maintenance and suppression of unplanned fires would continue. Activities authorized under separate decisions would also continue. These activities include (1) continued grazing in the five allotments within the project area, (2) noxious weed treatments, (3) the Sherwood prescribed burn, and (4) headcut repair activities. Recreational use of the area would also continue including camping, hunting, and motorized and non-motorized uses.

## **Alternative 2 – Proposed Action**

Alternative 2 is the proposed action. This alternative was developed to respond to the purpose and need. Treatment activities focus on stands with the objectives of reducing stand densities, reducing surface and ladder fuels, and reducing the risk of stand loss due to high fuel loadings. In addition, this alternative has the objective to maintain existing desired fuel levels, increase forested stands' resiliency to insects and disease, and to treat forested stands to move towards late and old structured stand conditions.

No trees greater than 21 inches dbh, live or dead, would be cut except those necessary to be removed for safety reasons or road construction.

Stands selected for commercial and noncommercial vegetative treatment reflect several structural seral stages and mostly are focused in stands with a large component of pole and small sized (under 21 inches dbh) trees with dense stocking conditions. Most of these smaller diameter trees are shade-tolerant species that have increased in numbers in the absence of fire and would not normally be found at these high densities if fire suppression had not occurred over the last several decades. Many stands also contain large amounts of small diameter ponderosa pine under overstories of ponderosa pine and are a result of fire suppression. Reducing the stocking of the stands to the recommended stocking level allows remaining trees to capture most of the site resources without competition between trees. This reduced competition increases the rate of tree growth, both in diameter and height, increases trees' resiliency to insect and disease attacks, and increases the trees' ability to survive during adverse conditions such as drought. The objective of these treatments is to also move stands towards late and old structural stage conditions in a more rapid timeframe than would occur with no treatment. See Map 3 Alternative 2 Commercial Treatments Only and Map 4 Alternative 2 All Treatments for the locations of treatments associated with Alternative 2.

Commercial vegetative treatments on slopes less than 35 percent would be implemented with ground-based harvest systems and the activity fuels will either be treated with prescribed fire or grapple piling. On steeper slopes, such as those over 35 percent, a skyline harvest system would be employed for soil protection. In areas with concerns about using ground-based systems, horse yarding or mobile yarders would be used to reduce ground disturbance. See Map

5 Alternative 2 Logging Systems Commercial Treatments for locations of the different logging systems associated with commercial harvest.

Stands selected for fuels reduction activities are (1) stands that have undergone some type of management and fuels are present as a result (activity fuels), (2) stands that exhibit a high level of fuels resulting from the natural accumulations of material from mortality, or (3) stands that exhibit low-intensity fire conditions that require periodic treatment to maintain that condition. Increased natural fuel loadings have resulted from years of fire suppression allowing the brush component and shade-tolerant seedlings and saplings to increase creating a ladder for wildfire to reach into the crowns of larger trees. In addition, fire suppression has resulted in increased down wood levels, especially in the smaller diameter size classes and deeper duff layers. In the event of a wildfire, all these factors contribute to a higher intensity fire resulting in a decreased ability for successful fire suppression activities. Additionally, in areas of higher fuel loadings, uncontrolled fire could result in damage to residual trees. The objective of these treatments is to move stands towards conditions with lower fuel loadings to approximate conditions when fire occurred in lower intensities and higher frequencies.

In most cases, the objective of treatment in Alternative 2 is to approximate more historical structural stage conditions, species compositions, and fire regimes that would have resulted if fire suppression over the last several decades had not occurred. The resulting conditions would reflect fire-adapted systems with more open stands; less seedling, sapling and pole sized trees; and more large-diameter, fire-tolerant species such as ponderosa pine and Douglas-fir.

The proposed action includes road work. The locations of roads to be constructed, reconstructed, and decommissioned are displayed on Map 6 Roads – Alternative 2. Approximately 14.9 miles of roads would need to be constructed to reach stands identified for treatment. New system roads would be closed after timber harvest and associated activities were completed. New system road 1680152 would require installation of a stream crossing on the west fork of Shotgun Creek, a class III stream. Approximately 6.1 miles of temporary roads would need to be built to access commercial harvested areas. The temporary roads would be decommissioned after use. Approximately 22.6 miles of existing road would be reconstructed by doing spot rocking, erosion control measures, or brush clearing within the road prism to reduce resource impacts and improve safety. All currently closed roads to be reopened would be assessed for stream crossings to ensure that adequate crossing still exists. This is done before opening to ensure that a recent storm has not damaged a culvert. There are approximately eight stream crossings on Class IV streams and one stream crossing on a Class III stream where a closed road currently exists. Approximately 10.2 miles of roads currently accessing treatment areas have been identified as no longer needed (based on the Roads Analysis) and would be decommissioned.

The following is a listing of roads to be decommissioned. Further information, such as mileage, can be found in the Roads Specialist Report.

1600040	1600207	1640200	1700130	1750000	1750090
1600045	1600231	1680152	1700154	1750027	1750100
1600119	1620100	1700050	1700180	1750075	1750120
1600150	1640190	1700053	1700200	1750080	1750349

The following is a listing of newly constructed roads that would be closed at the conclusion of timber sale and associated treatments.

1600024S1	1610050S1	1700000S2	1700105S1	1700300S2	1750385S1
1600100S1	1610075S1	1700100S1	1700105S2	1700302S1	
1600200S1	1680152S1	1700100U1	1700200S1	1750130S1	
1600208S1	1680152S4	1700103S1	1700200S2	1750130S2	
1600250S1	1700000S1	1700103S2	1700300S1	1750380S1	

**Table 2-1. Alternative 2 Summary**

<b>Fuels Treatments and Reductions (acres)</b>	
Underburn Activity Fuels	7,662
Underburn Natural Fuels	4,198
Thin with Fire	2,114
Grapple Pile	3,833
Hand Pile	<u>79</u>
<b>Total</b>	<b>17,886</b>
<b>Commercial Harvest (acres)</b>	
Improvement Cut	29
Commercial Thin	1,521
Uneven-aged Management, Individual Tree Selection	<u>6,213</u>
<b>Total</b>	<b>7,763</b>
<b>Noncommercial Vegetative Treatments (acres)</b>	
Precommercial thinning	9,039
Juniper thinning	<u>2,688</u>
<b>Total</b>	<b>11,728</b>
<b>Logging Systems (acres)</b>	
Tractor	5,449
Skyline	2,111
Light (horse, mobile yarder, etc.)	<u>203</u>
<b>Total</b>	<b>7,763</b>
<b>TOTAL TREATMENT ACRES</b> (acres of fuels treatment in some cases will overlap with commercial and noncommercial vegetative treatments)	
	<b>18,508</b>
<b>TOTAL PROJECT AREA ACRES</b>	
	<b>37,974</b>
<b>Road Management (miles)</b>	
Road Construction	14.9
Temporary Road Construction	6.1
Road Reconstruction	22.6
Road Decommissioning	10.2
<b>Estimated Volume Associated with Commercial Harvest (million board feet)</b>	
	<b>25.9</b>
<b>Estimated Jobs Associated with Timber Harvest</b>	
	<b>411</b>
<b>Estimated Seasonal Jobs Associated with Noncommercial Thinning and Slash Treatments</b>	
	<b>18</b>

Note: Many of the acres in Table 2-1 are actually overlap acres. As an example, a commercial thinning unit may have precommercial thinning and grapple piling occurring within the same unit.

## Forest Plan Amendments Associated with Alternative 2

During the evaluation of the proposed action against current management direction, it was found that certain areas and treatments were not consistent with the Ochoco National Forest Land and Resource Management Plan (Forest Plan) as amended. Three Forest Plan amendments would be needed to implement Alternative 2. The three amendments are described below.

1. The Eastside Screens contain standards that indicate commercial harvest is not permitted when LOS is below the historic range of variability. The project area is below the HRV for both multi-strata and single-strata LOS. Because commercial harvest is proposed in LOS stands, a Forest Plan amendment is needed. The Eastside Screens were intended to maintain options for future management of LOS and only apply to timber sales. The proposed commercial thinning treatments are designed to reduce tree density and improve growth of the residual trees, enhance forest health, or reduce potential mortality resulting from inter-tree competition. Thinning would more quickly restore historic seral/structural stage conditions and improve growing conditions for larger trees than either no action or prescribed fire alone. Thinning contributes to the primary purposes of fuel treatment: decreasing the



probability of crown fires, decreasing the severity of the impacts, enhancing effectiveness and safety, and reducing costs. While there may be short-term decreases in stand densities and wildlife species dependent on those higher density stands would have reduced habitat, the longer-term maintenance of LOS into the future is desirable. Habitat for those species that are dependent on more open forest canopy conditions would be improved. No trees greater than 21 inches dbh would be cut and removed in any area except in isolated cases for safety reasons or for road construction.

There would be 157 acres of LOS treated with commercial harvest utilizing the individual tree selection harvest prescription. All LOS treated, would remain LOS after treatment though the majority of acres treated would change from multi-strata to single-strata conditions.

2. The Eastside Screens contain standards that indicate timber harvest should be deferred in connective corridors when all the criteria for connective corridor habitat cannot be met. Not all stands in connective corridors meet the canopy closure requirements and not all corridors meet the minimum width of 400 feet. Corridors do represent the best connections given the exiting conditions resulting from physical restrictions such as ridges, meadows, and previous harvest practices. Timber harvest treatments in Alternative 2 in stands with canopy closures greater than 50 percent are designed to maintain existing large trees and promote development of additional large trees. Treatments will help develop late and old structured condition in corridors and would improve connectivity in the long term. Stand densities in the understory layers would be reduced to increase the health and vigor of remaining trees. An amendment is needed to allow commercial harvest in connectivity corridors. No amendment is necessary to implement treatments such as noncommercial thinning in connective corridors.

There would be 232 acres of commercial thinning (individual tree selection prescription) in connective corridors. Canopy closures in these stands would be reduced below 50 percent.

3. Current Forest Plan direction related to old-growth management areas is contradictory. The Forest Plan describes that prescribed fire will normally not be applied in old growth, but where it can be supported by research, directives, and desired condition, it can be utilized following appropriate environmental analysis (Forest Plan, p. 4-136). Additionally, when unacceptable damage to resources on adjacent lands or to the old growth resource could occur from insects or diseases, prescribed fire may be used to reduce stand densities and competition that will increase the resiliency of residual large diameter trees (Forest Plan, p. 4-152). However, under habitat management, the Forest Plan (P. 4-251) states that vegetation management would not be allowed until further research is available on the needs of the dependent species.

The Friday Creek Old Growth Management Area (OG-D3-09) contains a mosaic of site potential ranging from juniper woodland to Douglas-fir. A small patch of late and old structure is present on the eastern side in the Douglas-fir plant association group. The remaining area has variable species composition and structure but does not contain sufficient large trees to meet the LOS criterion. The area contains both multi-strata and single-strata canopy conditions. Stocking of seedling, sapling, and poles was reduced as a result of (pre-1989) thinning activities prior to approval of the Forest Plan. Past thinning activities reduced ladder fuels but left excessive surface fuels. Stocking is high for the site potential with the result that growth is slow and trees are susceptible to bark beetle mortality. Loss of large trees would probably occur before additional trees grow larger than 21 inches dbh. An active goshawk nest is located on the northern edge near Friday Creek. Much of the area has been identified as a goshawk post-fledging area.

The Florida Creek Old Growth Management Area (OG-D3-12) contains site potentials identified as dry grand fir and Douglas-fir. The overstory is a mixture of ponderosa pine and Douglas-fir. Small patches meeting the LOS criterion for large trees occur within this old-growth management area. This stand is dense with three well-defined canopy layers. Due to the existing high density, mortality of large trees has been increasing in recent years. Surface fuel loading is variable but overall high levels coupled with ladder fuels create high fire hazard. Fire ignition within this area during hot, dry, windy conditions would be difficult to stop and would result in loss of old-growth habitat.

This amendment would allow 521 acres of prescribed fire old-growth management areas with the objective of reducing surface and ladder fuels. There would be 239 acres treated in Friday Creek and 282 acres treated in Florida Creek.

## Alternative 3

Alternative 3 was developed to respond to the key issues discussed in Chapter 1, while also meeting the stated purpose and need. To address wildlife issues, no treatments would occur in many of the stands with habitat for the identified species. In other stands, treatment prescriptions were adjusted to retain habitat for the identified species. In response to the water quality issue, the total amount of treatment has been reduced in the Upper Bear Creek watershed. Many of the stands deferred from treatment to meet wildlife issues also contribute to reducing impacts to water yield. This alternative focuses activities in stands with the objective to reduce stand densities, reduce hazardous fuels, and reduce the risk of stand loss due to high fuel loadings. Objectives also include maintaining desired fuel levels where they exist, increasing forested stands' resiliency to insects and disease, and moving towards late and old structured stand conditions.

No trees greater than 21 inches dbh, live or dead, would be cut except those necessary to be removed for safety reasons or road construction.

Alternative 3 was designed so that it complies with current Forest Plan direction. No Forest Plan amendments are needed.

Specific changes related to the key issues include:

**Issue 1A:** Late and Old Structure. No commercial treatments would occur within stands currently mapped as LOS in blocks of 5 or more acres.

**Issue 1B:** Connectivity Corridors. No commercial treatments would occur within connectivity corridors.

**Issue 1C:** Goshawk Habitat Treatments. No more than 50 percent of any designated post-fledging area would be commercially treated. No more than 60 percent of any designated post-fledging area would be treated including all treatment types. Harvest prescriptions in post-fledging areas would be modified to promote intermingled crowns in 12-inch or greater dbh trees with patchy clumps of more dense, less dense, and small openings scattered throughout the stands.

**Issue 1D:** Elk Habitat Effectiveness, Security, and Calving Habitat. No treatments would occur in stands currently providing high quality cover, which is defined as greater than 70 percent crown closure within elk security habitat.

**Issue 1E:** Old Growth Management Area. No treatments would occur in this management area. In the adjacent pileated feeding habitat area, no treatments would occur in suitable pileated woodpecker habitat within grand fir sites with more than 3 trees per acre greater than 21 inches dbh. Commercial treatment prescriptions in the pileated feeding habitat areas retain additional co-dominant trees in stands to maintain multi-strata and dense stand conditions. Stands would be managed for mid-seral species composition on grand fir and Douglas-fir sites.

There would be no treatments in an area of upper Pine Creek that currently contains suitable habitat for pileated woodpeckers. Pileated woodpeckers have been sighted in the area.

**Issue 2:** Water Yield. Approximately 800 acres of tractor and skyline units would not be harvested in the Headwaters Bear Creek subwatershed, which is part of the Upper Bear Creek watershed. To reduce the potential for increasing water yield, no commercial treatment would occur in the following units: 253, 384, 410.2, 411, 483, 533, 563, 569, 578, 591, 598, and 601.

Stands selected for commercial and noncommercial vegetative treatment reflect several structural seral stages but mostly are focused in stands with a large component of pole and small sized (less than 21 inches dbh) trees with dense stocking conditions. The objective of these treatments is to reduce hazardous fuel conditions, increase forested stands' resiliency to insects and disease, and move stands towards late and old structure conditions more rapidly than would occur with no treatment. See Map 7 Alternative 3 Commercial Treatments and Map 8 Alternative 3 All Treatments for the locations of treatments associated with Alternative 3.

Commercial harvest treatments on slopes less than 35 percent would be implemented with ground-based harvest systems and the activity fuels will either be treated with prescribed fire or grapple piling. On steeper slopes, such as those over 35 percent, a skyline harvest system would be utilized for soil protection. In areas with concerns about using ground-based systems, horse yarding or mobile yarders would be used to reduce ground disturbance. See Map 9 Alternative 3 Logging Systems Commercial Treatments for the locations of the logging systems for the commercial harvest units.

Stands selected for fuels reduction activities are (1) stands that have undergone some type of management and fuels are present as a result (activity fuels), (2) stands that exhibit a high level of fuels resulting from the natural accumulations of material, or (3) stands that exhibit low-intensity fire conditions that require periodic treatment to maintain that condition. The objective of these treatments is to move stands towards conditions with less fuel loadings to approximate conditions when fire occurred in lower intensities and higher frequencies.

Except for modifications related to key issues, the objective of treatment of stands in Alternative 3 is to approximate more historical structural stage conditions, species compositions, and fire regimes that would have resulted if fire suppression over the last several decades had not occurred. The resulting conditions would reflect fire-adapted systems with more open stands; less seedling, sapling, and pole sized trees; and more large-diameter, fire-tolerant species such as ponderosa pine and Douglas-fir.

The locations of roads to be constructed, reconstructed, and decommissioned are displayed on Map 10 Roads Alternative 3. Approximately 6.9 miles of specified roads would need to be constructed to reach stands identified for treatment. Newly constructed system roads would be closed after timber harvest and associated activities were completed. New system road 1680152 would require installation of a stream crossing on the west fork of Shotgun Creek, a class III stream. Approximately 3.8 miles of temporary roads would be constructed to access commercial harvest areas. The temporary roads would be decommissioned after use. Approximately 16.7 miles of existing road would be reconstructed. All currently closed roads to be reopened would be assessed for stream crossings to ensure that adequate crossing still exists. This is done before opening to ensure that a recent storm has not damaged a culvert. There are approximately 7 stream crossings on Class IV streams where a closed road currently exists. Approximately 8.8 miles of roads have been identified as no longer needed (based on Roads Analysis) and would be decommissioned.

The following is a listing of roads to be decommissioned. Further information can be found in the Roads Specialist Report.

1600040	1600231	1700050	1750000	1750090
1600045	1620100	1700053	1750027	1750100
1600119	1640190	1700130	1750075	1750120
1600150	1680152	1700180	1750080	1750349

The following is a listing of newly constructed roads that would be closed at the conclusion of timber sale and associated treatment activities.

1600024S1	1610075S1	1700100S1	1700105S1	1750130S1
1600100S1	1680152S1	1700100U1	1700105S2	1750380S1
1610050S1	1680152S4	1700103S1	1700300S2	

**Table 2-2. Alternative 3 Summary**

<b>Fuels Treatments and Reductions (acres)</b>	
Underburn Activity Fuels	6,071
Underburn Natural Fuels	3,234
Thin with Fire	1,364
Grapple Pile	2,621
Hand Pile	<u>80</u>
<b>Total</b>	<b>13,370</b>
<b>Commercial Harvest (acres)</b>	
Improvement Cut	29
Commercial Thin	1,502
Uneven-aged Management, Individual Tree Selection	<u>3,956</u>
<b>Total</b>	<b>5,487</b>
<b>Noncommercial Vegetative Treatments (acres)</b>	
Precommercial thinning	6,628
Juniper thinning	<u>2,477</u>
<b>Total</b>	<b>9,104</b>
<b>Logging Systems (acres)</b>	
Tractor	4,319
Skyline	931
Light (horse, mobile yarder, etc.)	<u>238</u>
<b>Total</b>	<b>5,487</b>
<b>TOTAL TREATMENT ACRES</b> (acres of fuels treatment in some cases will overlap with commercial and noncommercial vegetative treatments)	
	<b>14,404</b>
<b>TOTAL PROJECT AREA ACRES</b>	
	<b>37,974</b>
<b>Road Management (miles)</b>	
Road Construction	6.9
Temporary Road Construction	3.8
Road Reconstruction	16.7
Road Decommissioning	8.8
<b>Estimated Volume Associated with Commercial Harvest (million board feet)</b>	
	<b>16.0</b>
<b>Estimated Jobs Associated with Timber Harvest</b>	
	<b>254</b>
<b>Estimated Seasonal Jobs Associated with Noncommercial Thinning and Slash Treatments</b>	
	<b>14</b>

Note: Many of the acres above are actually overlap acres. As an example, a commercially thinning unit may have precommercial thinning and grapple piling occurring on the same acres.

## Alternative 4

This alternative was developed to address the purpose and need without the use of commercial harvest, and is similar to the proposed action that was developed in July 2002. This alternative focuses on activities that reduce hazardous fuels and the risk of stand loss due to high fuel loadings, maintain existing desired fuel levels, slightly increase forested stands' resiliency to insects and disease, and increase growth rates in smaller diameter stands. Because commercial harvest would not occur with this alternative, the Eastside Screens' ecosystem or wildlife standards do not apply.

Alternative 4 was designed so that it complies with current Forest Plan direction. No Forest Plan amendments are needed.

Generally, trees greater than 9 inches dbh would not be cut. In isolated cases of damaged or diseased trees, no trees greater 12 inches dbh would be cut.

Stands selected for treatment reflect several structural seral stages but mostly are focused in stands with a large component of pole and small sized (under 21 inches dbh) trees with dense stocking conditions. Many of these smaller diameter trees are young trees of shade-tolerant species that have increased in numbers in the absence of fire. Shade-tolerant species would not normally be found at these high densities if fire suppression had not occurred over the last several decades. Many stands also contain large amounts of small diameter ponderosa pine under overstories of ponderosa pine and are a result of fire suppression. Reducing the stocking of the stands allows remaining trees to capture most of the site resources but competition between trees in the larger diameters still remains.

Fuels reduction activities would occur in stands that have undergone some type of management and fuels are present as a result (activity fuels from noncommercial thinning) or that exhibit a high level of fuels resulting from natural accumulations. Increased natural fuel loadings have resulted from years of fire suppression allowing the brush component in some cases and seedlings and saplings to increase creating a ladder for wildfire to reach into the crowns of larger trees. In addition, fire suppression has resulted in increased down wood levels, especially in the smaller diameter size classes, and deeper duff layers. In the event of a wildfire, these factors contribute to a higher intensity fire resulting in a decreased ability for successful fire suppression activities. In areas of higher fuel loadings, uncontrolled fire could result in damage to residual trees. The objective of these treatments is to reduce fuel loadings to approximate conditions when fire occurred in lower intensities and higher frequencies. In stands with high densities of trees in the 9 to 21-inch dbh range, there would be a small incremental reduction of fuel loadings, especially in surface fuels, but ladder fuels and high crown closures would leave the stands susceptible to increased mortality resulting from wildfire. See Map 11 Alternative 4 All Treatments for locations of treatments associated with Alternative 4.

The objective of treatment in Alternative 4 is to move towards historical structural stage conditions, species compositions, and fire regimes that would have resulted if fire suppression over the last several decades had not occurred.

There would be no road work with this alternative.

**Table 2-3. Alternative 4 Summary**

<b>Fuels Treatments and Reductions (acres)</b>	
Underburn Fuels	11,603
Thin with Fire	2,114
Grapple Pile	2,638
Hand Pile	<u>79</u>
<b>Total</b>	<b>16,407</b>
<b>Commercial Harvest (acres)</b>	
<b>Total</b>	<b>0</b>
<b>Noncommercial Vegetative Treatments (acres)</b>	
Precommercial thinning	9,039
Juniper thinning	<u>2,688</u>
<b>Total</b>	<b>11,727</b>
<b>TOTAL TREATMENT ACRES</b>	
(acres of fuels treatment in will overlap with most noncommercial vegetative treatments)	<b>17,047</b>
Estimated Seasonal Jobs Associated with Noncommercial Thinning and Slash Treatments	<b>17</b>

Note: Many of the acres above are actually overlap acres. As an example, a noncommercial thinning unit may have grapple piling occurring and within the same unit.

## Design Criteria and Resource Protection Measures

These criteria and measures are an integral part of each of the action alternatives. They are listed here separately to avoid repeating them in each alternative description. The criteria and measures pertinent to commercial harvest and logging activities do not apply to Alternative 4.

### Soils

For tractor logging units, the leading end of logs would be suspended where practical during skidding to limit soil displacement. If slopes should exceed 35 percent on portions of the tractor units, winch lining would be required on a site-specific basis to minimize detrimental soil impacts.

Skid trails would be designated and approved prior to logging and would be located on already disturbed areas where possible. Where practical, skid trails would avoid ephemeral draws and scablands. Where not practical, skidding would be perpendicular to ephemeral draws. Skid trails, landings, and roads would be designed to limit the cumulative extent of activities. On previously undisturbed areas, limit heavy equipment (tractor logging and grapple piling) to 1-2 passes over the same ground.

In the following commercial harvest units, no net increase in soil compaction is allowed and activities are limited to existing compacted areas: 11, 20, 198, 204, 226, 254, 375, 390, 401, 429, 447, 483, 485, 495, 499, and 501. These units have low tillage potential and are currently at or above the 20 percent detrimental soil disturbance level.

After harvest activities are completed, soil monitoring will determine the levels of soil compaction and evaluate the need for soil tilling. Tilling is expected to occur in Units 81, 136, 166, 204, 226, 240, 242, 316, 351, 376, and 506.

To reduce ground disturbance and compaction, skidding equipment may be allowed to operate off of designated trails when the ground is sufficiently frozen (depth of 6 inches), there is sufficient snow cover (20 inches), or the ground is frozen to 4 inches and there is at least 12 inches of snow.

Grapple pilers are limited to operating on existing compacted areas or 1-2 passes on previously undisturbed areas to result in no new additional detrimental compaction.

### Wildlife

Seasonal restrictions would be used near goshawk nest sites. Restrictions on treatment activities (commercial harvest, noncommercial thinning, prescribed fire, and road work) would be employed from March 1 to September 30, generally within 1/2-mile of nests. Restrictions may be waived or shortened on a case-by-case basis, depending on nesting status, topographic features, movement of the fledged young out of the nest area, or other site-specific factors. In units where spring burning is prescribed, nest sites will be surveyed to determine occupancy prior to implementation of prescribed burning. If sites are occupied, burning of the nearest units may be deferred until fall, or where possible, burns may be designed to limit smoke drifting through nest areas and to limit human presence within proximity to nests (within 10 chains and/or 30-acre nest cores). In some cases, pretreatment may be utilized to reduce fuels in proximity to, and within nest sites outside of the nesting season. Seasonal restrictions apply to all treatments within the unit. For example, if a commercial harvest unit is also scheduled for noncommercial thinning and prescribed burning, seasonal restrictions would apply to all three types of activities.

- For Alternative 2, the seasonal restriction for goshawks applies to the following commercial harvest units: 62, 63.1, 72.1, 115, 125, 133, 134, 139.1, 139.2, 157, 162, 173, 228, 258, 261.1, 282.1, 285, 292, 296, 317, 318, 327, 324, 347, 350, 376, 382, 399, 416, 426, 429, 473, 478, 484.1, 484.2, 499 and 533. The restriction applies to the following noncommercial treatment units: 67, 83, 140, 256, 272, 283, 286, 322, 329, 332, 372, 431, 446, 458, 477, 482, 494, 510, 516, 519, 530, 552, and 560. The seasonal restriction also applies to road work on the following roads: 1600-024 temporary, 1610-075 NS1 temporary, 1610-075 NS2 temporary, 1700-105 temporary, 1750, 1750-100, 1750-120, and 1750-027. Log hauling would

also be seasonally restricted along roads: 1600-024, 1700-100 (south of 1700-150), 1700-160 (section 26), 1700-180 (west of 1750-500). Prescribed fire treatments would be restricted in the following units: 84.1, 84.2, 94, 111, 128, 176, 177, 188, 202, 239, 252, 288, 289, 293, 343, 344, 430, 446, 471, 479, 509, 514, 518, 519, 521, 525, 528, 543, 548, 549, 550, and 574.

- For Alternative 3, the seasonal restriction for goshawks applies to the following commercial harvest units: 62, 63.1, 72.1, 115, 125, 134, 139.1, 157, 162, 173, 228, 258, 261.1, 282.1, 292, 324, 347, 376, 429, 484.1, 478, and 499. The restriction applies to the following noncommercial treatment units: 67, 83, 140, 256, 272, 286, 322, 372, 431, 446, 458, 477, 482, 494, 510, 516, 519, 530, 552, and 560. The seasonal restriction also applies to road work on the following roads: 1600-024 temporary, 1610-075 NS1 temporary, 1610-075 NS2 temporary, 1700-105 temporary, 1750, 1750-100, 1750-120, 1750-027 and 1750-130. Log hauling would also be seasonally restricted along roads: 1600-024, 1700-100 (south of 1700-150), 1700-160 (section 26), 1700-180 (west of 1750-500). Prescribed fire treatments would be restricted in the following units: 84.1, 94, 111, 177, 188, 202, 252, 288, 343, 344, 430, 446, 471, 479, 509, 514, 521, 525, 528, 543, 549, and 550.
- For Alternative 4, the seasonal restriction for goshawks applies to the following noncommercial treatment units: 62, 63.1, 67, 72, 83, 115, 139.1, 139.2, 140, 162, 173, 256, 258, 261.1, 272, 282.1, 283, 285, 286, 292, 296, 317, 318, 322, 329, 332, 347, 350, 372, 376, 416, 426, 431, 446, 473, 477, 478, 482, 484.1, 484.2, 494, 499, 510, 516, 519, 530, 533, 552, and 560. Prescribed fire treatments would be restricted in the following units: 84.1, 84.2, 94, 111, 128, 176, 177, 188, 202, 239, 252, 288, 289, 293, 343, 344, 382, 399, 430, 446, 458, 471, 479, 509, 514, 521, 525, 528, 543, 548, 549, 550, and 574.

Seasonal restrictions would be used near raptor (owl and hawk) nest sites. Restrictions on treatment activities (commercial harvest, noncommercial thinning, prescribed fire, and road work) would be employed from March 1 to August 1 within 10 chains (660 feet) of active nests. A no-treatment buffer would be employed within 5 chains of active nests. Restrictions may be waived or shortened on a case-by-case basis, depending on nesting status, movement of the fledged young out of the nest area, or other site-specific factors. Monitoring would be conducted to confirm that nest sites are buffered, and to determine nesting success during each year of operations. The seasonal restriction applies to commercial harvest units 401, 576, and 594. The seasonal restriction applies to noncommercial treatment units: 6, 15, 17, 272, 516, 542, 554, and 580. Prescribed fire treatments would be restricted in the units 521, 571, 586, and 589. Road work will be restricted on road 1700-010, 1750-027, and 1755-001. Log haul would be restricted on Road 1600 (10 chains each side of spur 145), 1600-145, 1700-010, and 1755-001.

Seasonal restrictions would be implemented on units in proximity to the golden eagle nest. Activities would be restricted within 40 chains from March 1 to August 15. This restriction applies to units and activities as follows: timber harvest (and associated noncommercial thinning and fuels treatments) in units 79 and 82 (Alt 2, 3 and 4 (noncommercial thinning and fuels treatments only)) 50, 75 and 80 (Alt 2 and 4 (noncommercial thinning and fuels treatments only)); noncommercial thinning and fuels treatments in unit 47; natural fuels burning in units 48 and 97 (Alt 2, 3 and 4). Restrictions may be waived or shortened on a case by case basis, depending on nesting status and chronology, movement of the fledged young out of the nest area or other site-specific factors.

Snags would not be marked for removal, except for safety measures or road construction. Post-treatment monitoring would be completed to ensure that snags are retained at a level consistent with the Viable Ecosystems Guide as described in Table 2-4. Coarse woody debris levels would be retained at levels described in Table 2-5.

**Table 2-4. Snag levels by Plant Association Group, Viable Ecosystems Guide**

Plant Association Group	Snags < 20 inches DBH		Snags > 20 inches DBH	
	HRV low	HRV high	HRV low	HRV high
Dry Grand Fir	3.3	7.3	1.0	3.4
Douglas-fir	1.5	3.4	0.3	1.9
Moist Ponderosa Pine	1.1	2.4	0.2	1.5
Dry Ponderosa Pine	0	0.2	0	0.6

**Table 2-5. Coarse woody debris levels**

<b>Plant Association Group</b>	<b>HRV Low (linear feet)</b>	<b>HRV High (linear feet)</b>	<b>Trees per acre</b>
Dry grand fir	100	257	2-8
Douglas-fir	100	233	2-6
Moist ponderosa pine	55	167	1-5
Dry ponderosa pine	20	55	0-1

For treatments proposed within the Bald Eagle Management Area (BEMA), implement seasonal restrictions within 1/4-mile non-line-of-sight or 1/2-mile line-of-sight (1.0 mile for blasting) of known bald eagle nest sites between January 1 and August 31 as described in the Programmatic Biological Assessment for Deschutes and Ochoco National Forests and Prineville BLM. This condition may be waived in a particular year if nesting or reproductive success surveys reveal that bald eagles are not nesting or no young are present. These restrictions apply to the following units:

- Alternative 2 prescribed burning units – 501.2, 534, 541, and 589.
- Alternative 3 prescribed burning units – 589.
- Alternative 4 prescribed burning units – 534, 541, and 589.

Within the BEMA, use smoke management forecasts to minimize smoke entering into suitable habitat and to ensure that dissipation would be adequate.

Within the BEMA, all snags that are eagle perches within 500 meters (1650 feet) of nests or roost should be preserved. Before burning, slash would be pretreated and fuels would be pulled away from snags and ponderosa pine trees larger than 16 inches dbh within 500 meters of nest trees.

Within the BEMA, protect all existing nesting, roosting, and perch trees. Generally, these are any live trees or snags larger than 21 inches dbh. Before burning, pull fuels away from these trees.

For treatments proposed within bald eagle winter roosts, implement seasonal restrictions within 400 meters of roost sites from November 1 to April 30. These restrictions apply to the following units:

- Alternative 2 - commercial harvest units 8 and 21, and noncommercial treatment units 2, 6, 9, 15, 17, 20, 22, 25, and 27.
- Alternative 3 - commercial harvest units 8 and 21, and noncommercial treatment units 2, 6, 9, 15, 17, 20, 22, and 25.
- Alternative 4 - noncommercial treatment units 2, 6, 8, 9, 15, 17, 20, 21, 22, 25, and 27.

For treatments proposed within mapped elk calving areas, implement seasonal restrictions May 15 to June 30. This applies to units: 101.1, 101.2, 123, 148, 150, 193, 203, 204, 205, 212, 253, 258, 261.1, 261.2, 287, 294, 299, 300, 316, 317, 318, 329, 332, 351, 364, 382, 399, 448, 476, 504, 509, 554, and 565.

For treatments proposed within or adjacent to enclosures and spring developments, design treatments to promote or protect meadow and riparian hardwood habitat conditions (Forest Plan, p. 4-121); protect investments.

For treatment units within General Forest Winter Range and in Hammer Creek allocations, implement seasonal restrictions on thinning, fuels and related activities between December 1 and May 1. For road construction, reconstruction road closure and decommissioning within General Forest Winter Range, implement seasonal restriction between December 1 and May 1 of each year.

All terrain vehicles may not be used off of designated routes within the Old Growth Management Area. Off-highway vehicle use is restricted to over the snow use only from December 1 to March 30.



## Noxious Weeds

To reduce risk of noxious weed introduction, prescribed burning activities will be coordinated with livestock permittees. Project design that implements burning based on pastures as treatment units may facilitate this process.

Re-use of landings infested with noxious weeds would not occur, shade would be retained, and burning would be avoided within 100 feet of the infestation. Treatment units associated with infestations include: 11, 21, 27, 39, 72, 74, 84, 95, 96, 106, 121, 133, 139, 140, 179, 184, 190, 226, 253, 316, 317, 318, 326, 331, 362, 377, 384, 401, 407, 408, 418, 431, 432, 438, 439, 442, 443, 447, 453, 456, 459, 464, 467, 470, 472, 475, 476, 485, 488, 495, 503, 506, 514, 518, 519, 521, 522, 530, 548, and 566. Exceptions could be made through coordination with the district weed coordinator.

To reduce potential spread in high-risk areas during seed dispersal time, log haul from units associated with infestations would not occur August 1 to August 31. The appropriate timber sale contract provisions would be used. Provisions might include C5.12 (Use of Roads by Purchaser), C5.4 (General and Special Maintenance Requirements), and C6.315 (Sale Operation Schedule).

Avoid or minimize disturbance within or adjacent to existing noxious weed infestations to prevent their expansion.

Avoid weed-infested areas for camps, staging areas, landings or parking areas. This would most likely occur with infestations of Canada thistle along roadsides.

For noncommercial thinning and prescribed burning activities, no roads would be re-opened.

Conduct post-project survey to evaluate the effects of the project on noxious weeds. Pre-project surveys have been completed to document existing infestations.

Conduct a weed identification workshop for personnel preparing, implementing, and administering activities related to this project.

Note noxious weed infestations during any phase of implementation (marking and cruising, sale administration, road de-commissioning, and fuels treatments).

A noxious weed locator map would be provided to facilitate avoidance and monitoring.

Retain desirable herbaceous growth on road shoulders, cuts, fills, ditches, and drainages.

Water for prescribed or wildfire control, watering roads, or other activities would be obtained from weed-free sites.

If straw bales were needed for capturing sediment (road work), they would come from sources certified as weed-free.

As a prevention measure to reduce the potential for transport or spread of noxious weeds by road construction or logging equipment, the timber sale contract would include C(T)6.343 (Opt.2) provision. This provision requires: certification that equipment be clean of all plant or soil material that may result in the establishment or spread of noxious weeds; and notification of location where equipment was most recently used.

Mineral material (gravel and rocks) used for road and landing construction or reconstruction would be obtained from a weed-free source to reduce potential for weed spread. Ochoco NF material sources would be inspected to ensure materials are weed-free. Gibson pit (off of 1620-140) would not be used as a material source (infested with Canada thistle). Contracts would include provisions requiring that gravel and rock material is obtained from weed-free sources.

Road and log landing rehabilitation areas would be reseeded as part of the final sale contract work. Locally collected native grass species including pine grass (*Calamagrostis rubescens*) squirreltail (*Elymus elymoides*),

Sandberg bluegrass (*Poa secunda*), basin wild rye (*Leymus cinereus*) or native cultivars (commercial varieties of native grasses) including red fescue (*Festuca rubra*), blue wild rye (*Elymus glaucus*), and big bluegrass (*Poa ampla*). Supplemental forb species include vetch (*Vicia spp.*), yarrow (*Achillea millefolium*), flax (*Linum spp.*), and lupine (*Lupinus spp.*) would be seeded as a mixture at approximately 15 lbs per acre. All seed would be certified noxious weed-free by an approved testing laboratory, such as the Oregon State University Seed Lab.

## **Sensitive Plant Species**

To protect sensitive species associated with riparian areas, no slash piling or ground-based equipment would be used within RHCAs, or within 100 feet of areas identified as containing Peck's lily (*Calochortus longebarbatus* var. *peckii*) populations or habitat. Exceptions can occur on existing roads and crossings, or other areas (e.g. aspen) that have been coordinated with the District botanist. Potential habitat for Peck's lily occurs in units 594, 410.1, 495, 309, 476 (and 1600-300 road), 504, and 44. Locations of areas for protection would be identified prior to treatment by District Botanist.

Noncommercial thinning would not occur between April 1 and August 1 within Peck's lily populations or habitat. Known populations or habitat occur within units 44, 309, 410.1, 476 (and 1600-300 road), 495, and 504.

During spring burning, fires would not be ignited within 100 feet of Peck's lily populations or habitat. The district botanist will provide locations of populations and habitat.

To reduce impacts to unique scabland habitat (lithosol soils), and associated *Archnatherum hendersonii* and *A. wallowaensis* habitat, construction of temporary roads or landings on scabland (lithosol soil) habitats would be avoided. If such landings or roads are necessary then erosion control measures would be installed on both roads and landings through the use of crushed rock or other appropriate methods (Forest Plan, pp. 4-121, 4-197, 4-227, and Appendix D, pp. D-4, D-72, D-83, and D-93). Units proposed for treatment that may affect scablands include 10, 20, 29 (and 1680-152 road), 44, 240, 253, 254, 292, 317 (and 1700-100 road), 416, 426, 485 (and 1750-500 road), 580 (and 17 road), and 594. Locations of areas for protection would be identified prior to treatment by the District Botanist.

To reduce impacts to unique scabland habitat (lithosol soils), and associated *Archnatherum hendersonii* and *A. wallowaensis* habitat, slash would not be piled on scablands (Forest Plan, p. 4-131). Exceptions can occur on existing disturbed areas or other areas that have been coordinated with the district botanist. The district botanist will provide locations of populations and habitat. Units proposed for treatment that may affect scablands include 10, 20, 29 (and 1680-152 road), 44, 240, 253, 254, 292, 317 (and 1700-100 road), 416, 426, 485 (and 1750-500 road), 580 (and 17 road), and 594.

Vehicles, including ATVs, would not be operated on scabland or within areas identified as Peck's lily habitat. Potential habitat for Peck's lily occurs in units 594, 410.1, 495, 309, 476 (and Road 1600 300), 504, and 44. Units proposed for treatment that may affect scablands include 10, 20, 29 (and 1680-152 road), 44, 240, 253, 254, 292, 317 (and 1700-100 road), 416, 426, 485 (and 1750-500 road), 580 (and 17 road), and 594. Locations of areas for protection would be identified prior to treatment by District Botanist.

## **Scenery Resources**

To reduce long-term visual effects, tree marking paint would be used to designate trees to be harvested, as opposed to trees to be retained in partial retention corridors on Road 16 and 17. Or trees marked to be retained would have paint applied only on the side of the bole away from road.

## **Air Quality / Public Private Land Interface / Prescribed Fire**

Use signing and public notice when burning during hunting season or other times when public use of the area is high.

All prescribed burning operations would be coordinated with the Oregon State Department of Environmental Quality and the Oregon State Department of Forestry thru FASTRACS, the State of Oregon smoke management program. Anticipated weather conditions would be favorable for smoke dispersion.

Burn areas adjacent to private land will be patrolled before leaving the site following ignition and daily thereafter until the unit fire management officer determines there is no further threat to private land.

Hazard trees along private land boundaries, created by underburning activities, will be felled and left on site.

Prescribed fire crews will be instructed to avoid deliberate ignition adjacent to snags greater than 12 inches dbh and large woody debris.

## **Range Resources and Mining Resources**

Livestock fences, cattle guards, and other structural range improvements as designated by the District Range Conservationist would be protected and/or returned to their pre-treatment condition after any activities or operations are completed.

Logging, burning, and road closure activities would be coordinated with permittees/claimants as needed. Efforts will be made to minimize conflicts between livestock use/mining activities and logging, thinning, and burning activities.

## **Recreation Resources**

Burning would be coordinated with holders of special use permits, as needed. Efforts would be made to minimize conflicts between recreation permittees and burning activities.

In the Hammer Creek Wildlife/Recreation Management area, disturbed sections of system trails would be reconstructed to the existing (pre-harvest) condition or funds would be collected for reconstruction after harvest activities are complete. This includes replacing any trail markers that are removed as a result of management activities.

Commercial haul would be restricted on holiday weekends (i.e., Memorial Day, July 4th, Labor Day) and during the opening weekend of big game hunting seasons.

Treatments adjacent to management allocated dispersed recreation sites will be designed to compliment the recreational experience. This includes retaining visual screening where possible.

Avoid utilizing management allocated dispersed recreation sites for log decks, piling slash, storing road rock, or dumping borrow material.

Avoid allowing industrial (contactor) camps at management allocated dispersed campsites. If use is needed of the dispersed site to reduce additional impacts, coordinate with the Recreation Specialist.

Fuels usable by campers in Antelope Reservoir Campground will be stacked or piled. In management allocated dispersed sites, firewood will be left lying except at Pine Creek Camp where firewood will be hand piled within the actual camping area (approximately 2 acres).

Remove hazard trees from dispersed sites within harvest treatment units.

After timber harvest activities are complete, disturbed sections of system trails would be reconstructed to the existing (pre-harvest) condition or funds would be collected for reconstruction. This includes replacing any trail markers that are removed as a result of management activities. Under Alternative 2, portions of trails are only within Unit 253 (HSL). Under Alternatives 3 and 4, portions of trails are not within any commercial harvest unit.

## **Watershed Resources (including RHCAs)**

The active headcut on Gibson Creek just downstream from the 1620-130 road junction would be treated before harvest is accomplished in Units 166, 198, 226, 240, and 254.

The active headcut on Klootchman Creek would be treated before harvest is accomplished in Unit 253.

New industrial (contractor) camps in RHCAs would be avoided. Existing areas may be reused in order to facilitate obliteration.

Noncommercial thinning would not cause a reduction in shade on perennial streams (Class I, II, and III) with the exception of thinning to promote deciduous trees and shrubs. Thinning around hardwoods would be coordinated with the Fisheries Biologist or the Hydrologist.

Install cross drainage on the 1620 road, across from the headcut, on the drainage coming in from the west in Gibson Creek (section 27 downstream from 1620-140 road).

Ground-based machinery for commercial harvest operations would be avoided within RHCAs, including areas around springs. Exceptions would be evaluated on a case-by-case basis with the District Hydrologist or Fisheries Biologist. Exceptions include:

- Pulling cable (winch lining) from an existing road in an RHCA such as in Unit 445.
- Using a mobile yarder system to remove commercial trees in RHCAs. Use would be restricted to existing roads.
- Use existing roads as landings in RHCAs and rehabilitate existing skid trails that are contributing to resource damage.

All landings used in commercial harvest operations would be contoured, scarified, and seeded to increase infiltration and prevent surface erosion.

Use existing crossings at Class IV streams to reduce additional temporary road building.

Drive-through fords are limited to situations where bottoms are hard enough to support traffic, approaches are low gradient, and fish are not present during flows.

Temporary roads would be treated after use to provide long-term drainage needs, reduce potential for erosion, and eliminate travel to speed recovery (i.e. decommission). Treatments include constructing an earth berm entrance barrier, installing waterbars, scarification of the road bed, and grass seeding.

All temporary roads with grades greater than 5 percent would have drainage dips installed approximately 10 to 30 feet from the stream on each side before the road is used for timber hauling.

Newly installed culverts that would remain in place would be designed for peak flows and for fish passage at all life stages.

Newly constructed and reconstructed roads with stream crossings would have adequate relief drainage installed prior to reaching the stream channel. In some areas, sediment traps or other structures would be placed to catch sediment.

In channel work such as culvert replacement for Class I, II, and III streams, would be accomplished in accordance with “Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources, June 2000”. Culverts would be replaced between July 1 and October 31.

Hauling on roads would be limited when necessary during extended wet periods and during spring break up to minimize erosion and sediment delivery.

Stream crossing structures (culverts and fords) needed on newly constructed and reconstructed roads on Class IV streams would be installed when the channel is dry.

Dust abatement on haul roads would occur to help meet water quality standards. Water used for dust abatement would be obtained from sources identified in the May 1996 Ochoco National Forest Water Conservation Plan.

Adequate drainage would be established and maintained on newly constructed, reconstructed, and temporary roads.

Filter strips below drainage structures would be of sufficient size to catch sediment before runoff enters streams. If adequate filter strips were not available, slash, straw bales, rock aprons, or other filtering structures would be installed.

Hazard trees within RHCAs, which are required to be felled, would be left on site or managed for the attainment of Riparian Management Objectives for in-stream large wood.

Skid trails and temporary roads within 50 feet of the scab-conifer interface, which are used during harvest operations, would be located/designed to encourage the flow of water off of them and to reduce the concentration of flows.

Within RHCAs, effective ground cover would be established on landings and skid trails used for logging operations and on decommissioned and temporary roads. Methods to establish effective ground cover include scarification and grass seeding, or spreading slash.

Within RHCAs and when consistent with other management actions, slash would be placed on skid trails, temporary roads, and roads proposed to be closed. This would be done in conjunction with waterbarring when timber harvest or other activities are completed.

During implementation, newly found springs and streams requiring classification or existing streams needing reclassification, would be coordinated through the Hydrologist or Fisheries Biologist prior to marking. The appropriate RHCA widths would be applied based on the RHCA category.

The placement of new landings within RHCAs and ephemeral draws would be avoided. Existing landings that are reused would be rehabilitated. Rehabilitation would include installing drainage, scarification, or grass seeding...

Hand fire line in RHCAs would not occur within 10 feet of intermittent (Class IV) streams, and within 20 feet of perennial (Class I, II, and III) streams. Where it is necessary to limit fire spread near streams, surface fuels would be cleared without disturbing the soil.

Fire may be purposely ignited within RHCAs. Ignitions would create a mosaic of burned and unburned ground to maintain effective ground cover in riparian areas. Other ignitions, such as burning within meadow systems adjacent to creeks to retard conifer encroachment, will be coordinated with the District Botanist, Fisheries Biologist, Silviculturist, and/or Hydrologist.

Springs and landslide-prone area less than 1 acre will be protected by a slope distance of 50 feet (INFISH 1995). Unstable terrain and springs greater than 1 acre will be protected by a buffer of 150 feet (INFISH 1995). If there is any indication of recent landslide activity, the area will be evaluated by the geologist and the buffer may be increased. The following units are partially or entirely underlain by dormant landslide terrain.

- Skyline harvest units common to Alternatives 2 and 3 are: 139.1 and 157. In addition, Alternative 2 includes units: 133 and 139.2.
- Tractor harvest units common to Alternatives 2 and 3 are: 53, 78, 87, 148, 204, 376, 401, 429, 445, 448, 476, and 504. In addition, Alternative 2 includes unit 229.

## Heritage Resources

Discovery of or disturbance to a cultural/heritage resource site during treatment operations would require efforts be made to avoid any further disturbance. Consultation with the Oregon State Historic Preservation Office (SHPO) would occur prior to resuming activities and site-specific modification or mitigation would be determined.

Avoid and protect features, surface, and subsurface integrity of heritage sites in the identified units. This would be accomplished through layout and design for commercial harvest, non-commercial thinning, and activity fuels treatments.

Unit layout would be designed to protect heritage sites and features to allow for successful harvest operations (i.e. modify unit boundary, post area for no treatment). Logging equipment, landing sites, temporary roads, and skid trails would be restricted from site locations.

Noncommercial thinning would avoid adding fuels to site locations through unit layout and design; modification of the thinning prescription to remove fewer trees per acre, or by reducing the diameter size to 3-4 inches dbh with lop and scatter slash treatment; or removing thinning slash by hand away from heritage site locations.

Juniper thinning may be accomplished by chainsaw, girdling, or removing lower limbs along with lop and scatter slash treatment. In some cases, thinning slash may be left untreated when future risk for hot surface fire is not increased from current conditions. Site-specific conditions would be considered for best treatment options.

Fuels treatments would protect sensitive features such as wooden features and structure remains by avoidance. Specialists would coordinate with archaeologist prior to burning for site locations and to ensure sites are avoided. In some cases, sites may be burned with the appropriate low burning temperatures and short exposure times. Preparation for burning may include pulling slash away from sensitive features, use of black line, or use of fire line construction away from site boundary. Selected site types and environmental settings would be protected through low-intensity, short-duration fire prescriptions which are often met under spring-like burning conditions. No fire line would be allowed on heritage sites. Staging areas and use of ATVs would not be allowed on sites.

For units with grapple piles and heritage sites to protect, burning conditions need to be such that fire would not creep into areas to be protected. Surface artifacts and environmental settings would be protected through burning prescriptions with low-intensity, short-duration fire prescriptions which are often met under spring-like burning conditions. Staging areas and use of ATVs would not be allowed on sites.

During implementation, activities would be coordinated with the archaeologist to ensure that heritages sites are adequately protected. This includes coordination with the sale administrator, logging systems specialist, silviculturist, marking crew foreman, and burn boss.

- For Alternative 2, coordinate unit layout of the following commercial harvest units: 20, 44, 72.1, 81, 253, 300, 309, 351, 390, 401, 426, 429, 441, 445, 476, 483, 495, 504, 506, 533, 559, 563, 576, 580, and 594. Restrict machinery on sites within grapple piling units: 20, 253, 300, 351, 390, 429, 441, 483, 495, 504, 506, 533, and 563. Avoid hand piling on site in unit 309. Coordinate noncommercial thinning activities in units: 6, 15, 20, 27, 44, 72.1, 101.1, 180, 193, 212, 253, 256, 259, 272, 309, 390, 401, 421, 426, 431, 441, 445, 476, 483, 493, 495, 504, 506, 533, 542, 563, 557, 580, 582, and 594. Coordinate prescribed fire treatments in units: 9, 20, 24, 31, 44, 72.1, 81, 128, 176, 188, 228, 253, 300, 309, 392, 351, 390, 401, 426, 429, 430, 441, 445, 476, 495, 504, 506, 518, 519, 521, 533, 534, 541, 559, 563, 568, 571, 576, 580, 586, 589, 594, and 599.
- For Alternative 3, coordinate unit layout of the following commercial harvest units: 20, 44, 72.1, 81, 300, 309, 351, 390, 401, 429, 441, 445, 476, 495, 504, 506, 559, 576, 580, and 594. Restrict machinery on sites within grapple piling units: 20, 81, 287, 300, 351, 390, 429, 441, 495, 504, and 506. Avoid hand piling on site in unit 309. Coordinate noncommercial thinning activities in units: 6, 15, 20, 44, 72.1, 101.1, 180, 193, 256, 259, 272, 287, 309, 390, 401, 421, 441, 445, 476, 483, 484.1, 495, 504, 506, 542, 557, 580, and

594. Coordinate prescribed fire treatments in units: 9, 20, 24, 31, 44, 72.1, 81, 188, 228, 287, 300, 309, 351, 390, 392, 401, 429, 4430, 41, 445, 476, 484.1, 495, 504, 506, 518, 519, 521, 559, 568, 571, 576, 580, 586, 589, 594, and 599.

- For Alternative 4, coordinate noncommercial thinning activities in units: 6, 15, 20\*, 27, 44, 72.1, 81, 101.1, 180, 193, 212, 253\*, 256, 259, 272, 309, 390\*, 401, 421, 426, 441, 445, 476, 483\*, 495\*, 504\*, 506\*, 533\*, 542, 557, 563\*, 580, 582 and 594. \*Restrict machinery on sites within grapple piling units. Coordinate prescribed fire treatments in units: 9, 24, 31, 128, 176, 188, 228, 392, 430, 518, 519, 521, 534, 541, 559, 568, 571, 576, 586, 589, and 599.

Road construction activities would be planned to avoid and protect known site locations and features. Coordination during the planning stages has occurred between the road planner and archaeologist to avoid conflicts. Road construction specifications would be designed accordingly. Any physical road closure barriers would be designed and placed to avoid and protect heritage sites and features through coordination with the archaeologist during planning and implementation stages. Physical decommissioning activities would avoid and protect heritage sites (i.e. ripping would not be allowed on sites, drainage structures would be installed to prevent further erosion and meet heritage management objectives).

## Monitoring

Project monitoring focuses primarily on “implementation monitoring” to assure the selected alternative and mitigation measures are implemented as designed and achieve the desired results.

**Noxious Weeds** – Pre-project noxious weed surveys have been completed. Activity areas would be surveyed for noxious weeds when project activities are complete.

### Water Quality –

- Rates of flow, total suspended solids and turbidity would be monitored at a water quality station that was established at the Forest Service boundary on Newsome Creek in May 2004. Baseline data is currently being collected prior to activities associated with this environmental analysis.
- Temperature monitoring will be accomplished in identified stream reaches using temperature recorders. Between 1 and 2 selected reaches adjacent to precommercial thinning units will have pre- and post-treatment shade monitoring to verify that thinning and harvest guidelines are not reducing shade on perennial streams. In addition, pre- and post-shade monitoring will be accomplished on an aspen stand improvement project to determine the actual effect on shade.

### Wildlife –

- Monitoring of nest trees for reproductive activity prior to implementing activities would be done on a case-by-case basis, especially if activities are to be implemented during the seasonal restrictions and a waiver is needed.
- Monitoring of snag levels in selected harvest and prescribed burning units would be done to ensure minimum levels of snags are being maintained.

## Past, Present, and Reasonably Foreseeable Future Actions

Timber harvest and road construction activities have occurred across much of the project area in the past, except for the majority of the Hammer Creek Wildlife and Recreation Management Area. The implications of these actions will be discussed in Chapter 3 of this document under existing conditions for each resource.

**Sherwood Wildlife Burn** – In February 2004, a decision was made to authorize prescribed burning to improve forage quality for big game and other species in the Hammer Creek Wildlife and Recreation Management Area. This is scheduled to occur in spring and fall 2004, with the objective of reducing the amounts of seedling and sapling sized conifers, increasing herbaceous vegetation production for forage, and reducing fuel loadings to reduce the risk of future, high-intensity fires. The prescribed burning would occur in a mosaic pattern within the 1,300-acre project area.

**Stream Restoration work** – In February 2005, a decision was made to repair headcuts and complete riparian planting. These activities have been identified in areas where stream bank erosion is causing head cutting, increasing in-channel erosion, and lowering water tables. Headcut repair activities include installing step pool structures to reduce the flow rates, increasing the amount of riparian vegetation, and stabilizing stream banks to decrease overall sediment delivery in the long term. Additional work includes riparian planting. This stream restoration work is expected to occur in various locations throughout the project area. Areas identified include Gibson Creek (3 headcut repair structures), Klootchman Creek (4 headcut repair structures), and West Fork Shotgun Creek (2 headcut repair structures). The decision also authorized headcut repair work on Drake Creek, which is east of the project area.

**Noxious weeds** - The Ochoco NF noxious weed environmental assessment authorized treatments of existing noxious weed populations along Forest Service roads 16 and 17. Noxious weed species include diffuse, spotted, and Russian knapweeds and Canada thistle. Treatments include the use of chemicals, limited hand pulling, and biological control. Approximately 65 acres are identified as weed sites but the sites are not fully occupied by plants.

**Continued Allotment Grazing** – There are five allotments within the project area. For purposes of this analysis, grazing is assumed to continue in the project area at current levels. The Forest Service has recently developed a proposal to update all five Allotment Management Plans (AMPs) in the Maury Mountains area. At this time, the Forest Service is just beginning to analyze the effects of changing grazing practices. The proposal is considering activities that would improve riparian conditions based on recommendations in the Maury Mountain Watershed Analysis. The proposal also includes provisions related to the range utilization standards contained in the Grazing Implementation Monitoring Module (IIT 2000). The analysis to continue grazing in the Maury Mountains will be documented in an EIS.

**Routine and Annual Road Maintenance** – Road grading and blading would be done on Forest Roads 16, 1640, 17, 1700600 (to Antelope Reservoir). Replacement of Newsome Bridge on Forest Road 16 over the Crooked River would be completed in 2004. Repair of Pine Creek Bridge on Forest Road 17 over the Crooked River would be completed to improve the structural integrity of the bridge. There are also proposals to replace both the Pine Creek Bridge and Drake Creek Bridge (Forest Road 16 east) but neither has been funded at this time but could be funded within the next 5 years.

**Recreational activities** - The area is used for a variety of recreational activities such as hunting, OHV use, and dispersed camping. Recreational activities are expected to continue at current or slightly increased levels.



## Comparison of Alternatives

This section summarizes and compares the alternatives by how each responds to the purpose and need for stand density management, fuels treatments, and, key issues and associated measuring factors.

**Table 2-6. Comparison of the Activities by Alternative**

	<b>Alternative 1 (No Action)</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4</b>
<b>Total Project Area (Acres)</b>	37,974	37,974	37,974	37,974
<b>Total Treatment Area (Acres)</b>	0	18,508	14,404	17,047
<b>Commercial Treatments (Acres)</b>	0			
Individual Tree Selection (HSL)	0	6,213	3,956	0
Commercial Thinning (HTH)	0	1,521	1,502	0
Improvement Cut (HIM)	0	29	29	0
<b>TOTAL</b>	<b>0</b>	<b>7,763</b>	<b>5,487</b>	<b>0</b>
<b>Noncommercial Thinning (Acres)</b>				
Precommercial Thinning (PCT)	0	9,039	6,628	9,039
Juniper Thinning (JUT)	0	2,688	2,477	2,688
<b>TOTAL</b>	<b>0</b>	<b>11,727</b>	<b>9,104</b>	<b>11,727</b>
<b>Fuel Treatments (Acres)</b>				
Prescribed Fire (Activity Fuels)	0	7,662	6,071	0
Prescribed Fire (Natural Fuels)	0	4,198	3,234	11,603
Thinning with Fire	0	2,114	1,364	2,114
Grapple Pile (Activity Fuels)	0	3,833	2,621	2,638
Hand Pile (Activity Fuels)	0	79	80	79
<b>TOTAL</b>	<b>0</b>	<b>17,886</b>	<b>13,370</b>	<b>16,407</b>
<b>Logging Systems (Acres)</b>				
Tractor	0	5,449	4,319	0
Skyline	0	2,111	931	0
Light (Horse, Mobile Yarder, etc.)	0	203	238	0
<b>TOTAL</b>	<b>0</b>	<b>7,763</b>	<b>5,488</b>	<b>0</b>
<b>Road Management (Miles)</b>				
Road Construction	0	14.9	6.9	0
Temporary Road Construction	0	6.1	3.8	0
Road Reconstruction	0	22.6	16.7	0
Road Decommissioning	0	10.2	8.8	0
<b>Estimated Volume from Commercial Harvest (million board feet)</b>	0	25.9 MMBF	16.0 MMBF	0
<b>Estimated Jobs from Timber Harvest</b>	0	411	254	0
<b>Estimated Jobs from Noncommercial Thinning and Slash Treatments</b>	0	18	14	17

**Table 2-7. Comparison of the Alternatives by Issue**

Issues	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
<p><b>Issue 1A - Late and Old Structure (Acres)</b></p>	<p>There are <b>737</b> acres of LOS currently in patches of 5 acres or more. Generally, stands are multi-strata. There are a total of <b>880</b> acres of LOS regardless of patch size.</p>	<p>Approximately <b>157</b> acres of LOS in patches 5 acres or more would be commercially harvested. Generally, LOS would change from multi-strata to single-strata but remain LOS after treatment. No trees over 21 inches dbh would be harvested. Noncommercial treatments would not affect LOS characteristics. There would be <b>86</b> acres of noncommercial thinning and <b>74</b> acres of prescribed burning.</p>	<p>No acres of LOS would be commercially harvested. Multi-strata LOS would remain multi-strata LOS. No trees over 21 inches dbh would be harvested. Noncommercial treatments would not affect LOS characteristics. There would be <b>89</b> acres of noncommercial thinning and <b>49</b> acres of prescribed burning.</p>	<p>No acres of LOS would be commercially harvested. Multi-strata LOS would remain multi-strata LOS. Noncommercial treatments would not affect LOS characteristics. There would be <b>230</b> acres of noncommercial thinning and <b>28</b> acres of prescribed burning.</p>
<p><b>Issue 1B - Connective Corridors (Acres)</b></p>	<p>There are approximately <b>800</b> acres in connective corridors. To be effective, canopy closure should be in the upper one third of the site potential or above 50 percent.</p>	<p>Approximately <b>232</b> acres of connective corridors with canopy closures above 50 percent would be commercially harvested. This would reduce canopy closure to 40-50 percent, reducing effectiveness of connective habitat. Noncommercial treatments would not affect connective corridor canopy closure. There would be <b>111</b> acres of noncommercial thinning and <b>70</b> acres of prescribed burning.</p>	<p>There would be no commercial harvest in connectivity corridors. All stands with canopy closures above 50 percent in the overstory canopy would remain in these conditions after treatment. Connective habitat effectiveness in the larger diameter trees would not be altered over the current condition. Noncommercial treatments would not affect connective corridor canopy closure. There would be <b>20</b> acres of noncommercial thinning and <b>39</b> acres of prescribed burning.</p>	<p>There would be no commercial harvest in connectivity corridors. All stands with canopy closures above 50 percent in the overstory canopy would remain in these conditions after treatment. Connective habitat effectiveness in the larger diameter trees would not be altered over the current condition. Noncommercial treatments would not affect connective corridor canopy closure. There would be <b>322</b> acres of noncommercial thinning and <b>87</b> acres of prescribed burning.</p>

Issues	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4	
<b>Issue 1C - Goshawk Habitat - Post Fledging Areas (Acres)</b>	There are currently 15 goshawk post fledging (PFA) areas ( <b>6,221</b> acres) within the project area.	Approximately <b>1,325</b> acres of PFAs would be commercially harvested. Commercial harvest would reduce canopy closure to 40-50 percent. Noncommercial treatments ( <b>630</b> acres) and prescribed fire ( <b>1,117</b> acres) would reduce hiding cover. Commercial harvest exceeding 50 percent of any one PFA and total treatment exceeding 75 percent of any one PFA, would likely result in unsuitable habitat conditions and displace goshawks. This occurs on 2 PFAs.	Approximately <b>807</b> acres of PFAs would be commercially harvested. Treatment prescriptions would be adjusted to promote intermingling of crowns in trees over 12 inches dbh and promote patchy clumps of more dense, less dense, and open areas. Noncommercial treatments ( <b>399</b> acres) and prescribed fire ( <b>573</b> acres) would reduce hiding cover. Commercial harvest would not exceed 50 percent on any one PFA and total treatment would not exceed 60 percent of any one PFA. All PFA remain suitable.	No PFA would be commercially harvested and no trees over 9 inches dbh would be cut. Existing dense stand conditions in the upper canopy levels would remain the same after treatment. Noncommercial treatments ( <b>1,659</b> acres) and prescribed fire ( <b>1,112</b> acres) would reduce hiding cover. Total treatment exceeding 75 percent of any one PFA, would likely result in unsuitable habitat conditions and displace pairs. This occurs on 3 PFAs.	
<b>Issue 1D - Elk Habitat Effectiveness, Security, and Calving Habitat.</b>					
	<b>Goal</b>	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4</b>
<b>General Forest (Summer Range) HEI</b>					
Cover (acres)		13,163	9,721	10,411	10,606
Open Road Density (mi. / sq. mi.)	3.0	2.59	2.33	2.33	2.59
HEI Value	28	35	42	43	38
<b>General Forest Winter Range HEI</b>					
Cover (acres)		3,473	2,215	2,388	2,433
Open Road Density (mi. / sq. mi.)	Winter – 1.0 Summer – 3.0	1.45	1.29	1.35	1.45
HEI Value	6	49	51	52	50
<b>Hammer Creek Wildlife and Recreation Area HEI</b>					
Cover (acres)		1,903	1,878	1,891	1,889
Open Road Density (mi. / sq. mi.)	Winter – 1.0 Summer – 3.0	0.43	0.43	0.43	0.43
HEI Value	6	46	46	46	46
<b>Calving and Security Habitat</b>					
Calving (acres)		3,599	1,399	1,055	1,230
Security (acres)		3,410	1,276	752	1,276

Issues	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
<p><b>Issue 1E – Old Growth Management Area and Associated Pileated Feeding Habitat</b></p>	<p>There are 4 <b>Old Growth Management</b> Areas (OGMA) and associated pileated woodpecker feeding habitats within the project area. Desired canopy closure is 60 percent.</p> <p><b>The upper Pine Creek drainage</b> contains an area with more than 600 acres of suitable pileated woodpecker habitat and is currently known to be occupied.</p>	<p><b>OGMA</b> – No commercial harvest or noncommercial thinning would be done. Prescribed burning would occur on <b>521</b> acres within 2 OGMA's. Some understory reductions in canopy cover would occur.</p> <p><b>Pileated Feeding Habitat</b> – Approximately <b>449</b> acres would be commercially harvested. This would reduce canopy closure to 40-50 percent. Habitat suitability would be reduced on treated acres. Noncommercial thinning and prescribed fire would occur on <b>443</b> and <b>37</b> acres respectively. This would reduce the density of trees in the understory and reduce the foraging substrate in the short term.</p> <p><b>Pine Creek drainage</b> This alternative commercially harvests <b>391</b> acres of suitable habitat in the upper Pine Creek drainage. These acres would no longer provide suitable habitat for pileated woodpeckers. Noncommercial thinning and prescribed fire impacts would be similar to those already described.</p>	<p><b>OGMA</b> – No commercial harvest, prescribed burning, or noncommercial thinning would be done.</p> <p><b>Pileated Feeding Habitat</b> – Approximately <b>116</b> acres would be commercially harvested. No commercial harvest is proposed in stands currently suitable for pileated woodpeckers (i.e. grand fir sites with more than 3 trees per acre greater than 21 inches dbh). Treatments promote developing pileated woodpecker habitat where it currently does not exist. Treatments retain co-dominant trees where possible. There would be no reduction in suitable habitat. Noncommercial thinning and prescribed fire would occur on <b>359</b> and <b>15</b> acres respectively. This would reduce the density of trees in the understory and reduce the foraging substrate in the short term.</p> <p><b>Pine Creek drainage</b> Commercial harvest would not occur and currently suitable habitat would be retained. Noncommercial thinning and prescribed fire impacts would be similar to those already described.</p>	<p><b>OGMA</b> – No commercial harvest, prescribed burning, or noncommercial thinning would be done.</p> <p><b>Pileated Feeding Habitat</b> – Noncommercial thinning and prescribed fire would occur on <b>890</b> and <b>7</b> acres respectively. This would reduce the density of trees in the understory, reduce susceptibility of trees to insect attack and reduce the foraging substrate in the short term.</p> <p><b>Pine Creek drainage</b> No commercial harvest in the upper Pine creek drainage. Noncommercial thinning and prescribed fire impacts would be similar to those already described.</p>

Issues	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
<b>Issue 2 – Water Yield</b>	Forest Plan threshold for these watersheds is the Equivalent Harvest Area (EHA) of 35. All watersheds are currently below this threshold.	The EHA for all watersheds remains below 35. The EHA for Newsome and Gibson Creek drainages remains below 20 percent. This alternative has the highest potential to increase water yield levels because it includes the most intensive vegetative treatments. Density management would reduce vegetative cover and increase the potential for higher water yields.	The EHA for all watersheds remains below 35. The EHA for Newsome and Gibson Creek drainages remains below 20 percent. The potential for increased water yield levels would be between Alternatives 2 and 4.	The EHA for all watersheds remains below 35. The EHA for Newsome and Gibson Creek drainages remains below 20 percent. This alternative has the least potential to increase water yield levels because it would reduce the least amount of vegetative cover.

**Table 2-8. Comparison of Alternatives by Management Area Treated**

Management Area	Total Acres within Project Area	Alternative	Harvest and Associated Treatments	Additional Noncommercial Treatments	Additional Fuels Reduction Treatments
Developed Recreation	371	No Action	0	0	0
		Alternative 2	104	16	25
		Alternative 3	104	16	13
		Alternative 4	0	79	67
Eagle Roosting Areas	124	No Action	0	0	0
		Alternative 2	5	50	8
		Alternative 3	5	50	0
		Alternative 4	0	50	8
General Forest	23,560	No Action	0	0	0
		Alternative 2	5,556	3,534	2,497
		Alternative 3	3,931	3,184	2,077
		Alternative 4	0	7,844	2,947
General Forest Winter Range	6,463	No Action	0	0	0
		Alternative 2	1,412	1,275	1,498
		Alternative 3	784	1,137	1,051
		Alternative 4	0	3,316	1,051
Hammer Creek Wildlife / Recreation Area	2,548	No Action	0	0	0
		Alternative 2	15	137	75
		Alternative 3	0	55	75
		Alternative 4	0	152	74
Old Growth	1,370	No Action	0	0	0
		Alternative 2	0	0	521
		Alternative 3	0	0	0
		Alternative 4	0	0	0
Visual Management Corridor	3,221	No Action	0	0	0
		Alternative 2	671	649	376
		Alternative 3	651	578	335
		Alternative 4		1,145	494
Riparian Habitat Conservation Areas	3,961	No Action	0	0	0
		Alternative 2	11	1,294	572
		Alternative 3	11	933	432
		Alternative 4	0	1,300	501
<b>TOTAL</b>	<b>37,973</b>	No Action	0	0	0
		Alternative 2	<b>7,763</b>	<b>5,660</b>	<b>5,000</b>
		Alternative 3	<b>5,487</b>	<b>5,021</b>	<b>3,553</b>
		Alternative 4	<b>0</b>	<b>12,586</b>	<b>4,641</b>

Note: RHCAs overlay other land allocations and are not mutually exclusive; therefore acres are not included in totals.

Highlighted blocks in Table 2-8 indicate differences between the alternatives. These differences in acres treated are a result of considering wildlife and / or watershed issues in Alternative 3 compared with Alternative 2 and not commercially harvesting in Alternative 4. The table also displays that the majority of treatments occurs within the General Forest and General Forest Winter Range where management area allocation goals and objectives and standards and guidelines provide an emphasis to produce timber and forage while meeting Forest-wide standards and guidelines. In addition, treatments in other land allocations are to meet the individual area goals and objectives and standards and guidelines in addition to the Forest-wide standards and guidelines for Forest Health. Riparian Habitat Conservation Area treatments are designed solely to enhance conditions by increasing the abundance and density of hardwoods and shrubs.

Conifer thinning increases growth and vigor in remaining trees. In treated stands in Alternative 2, stand conditions would be reduced to stocking levels that promote growth. In treated stands in Alternative 3, most stands would be reduced to stocking levels that promote growth except those stands associated with specific wildlife needs such as goshawk, pileated woodpeckers, and elk. In these cases, while conifer thinning would be done, stocking levels would be adjusted to retain more dense conditions that are favorable to these species. Fewer increases in growth and vigor would occur in these stands, although site disturbance would be similar to Alternative 2. In Alternative 4, no density management would occur in trees greater than 9 inches dbh. Most stands would realize small increments in increased growth and these increases would quickly be reduced as stands would continue to be under dense conditions.

Fire regime changes would reflect stand density management. Alternative 2 results in the most intensive stand treatments and would result in more stands changing to lower fire regimes than currently existing. Alternative 4 would result in the least reductions over current conditions with Alternative 3 in between Alternative 2 and 4.

Table 2-9 displays the vegetative treatments relative to the purpose and need to reduce stand densities to promote the health and vigor of residual trees. This is achieved by moving stands towards or within recommended stocking levels. Density treatments would be more intensive in Alternative 2 than Alternative 3 because prescriptions in Alternative 3 would be adjusted to retain wildlife habitat for species that favor dense stand conditions. Alternative 4 results in the least amount of acres at recommended stocking levels due to the lack of treatment of trees larger than 9 inches dbh.

**Table 2-9. Acres Treated to Reduce Stand Densities**

Condition and Risk	Total acres found in project area	Acres Remaining after Treatment			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4
Stands at high risk due to density (basal area greater than 115 sq. ft.)	10,695	10,695	5,916	7,965	10,321
Moderate risk (basal area greater than 75 sq. ft.)	10,561	10,561	5,386	7,490	9,690
Low risk at this time but stocking control will benefit long-term growth and vigor	2,470	2,470	747	875	1,275

Table 2-10 displays the changes in fire regime conditions due to vegetative treatments. Reductions in fire regime intensity occurred with all action alternatives. The majority of reductions would be realized with Alternative 2 with the least amount of reductions occurring with Alternative 4.

**Table 2-10. Changes in Fire Regimes due to Vegetation Treatments**

FIRE REGIME	Historical Range of Variability (acres)		Alternative 1 Current Condition	Alternative 2	Alternative 3	Alternative 4
	Low	High				
Low Intensity	14,791	27,655	8,408	12,142	11,467	10,655
Mixed Intensity	3,934	13,850	14,105	11,920	12,379	12,913
High Intensity	1,004	10,511	4,216	2,641	2,894	3,132

Alternative 2 supports the highest levels of jobs in total due to the most acreage treated and volume produced. Alternative 2 would result in approximately 25.9 million board feet in commercial timber products. Alternative 2 is estimated to support approximately 411 jobs associated with commercial timber harvest and 18 seasonal jobs associated with noncommercial thinning treatments. Alternative 3 proposes the next highest with Alternative 4 with the least amount of jobs. Alternative 3 is estimated to support 254 jobs and 14 seasonal jobs associated with

noncommercial thinning treatments. Alternative 3 would result in approximately 16.0 million board feet in commercial timber products. Alternative 4 also does not support any jobs in the logging sector, only in the service contract sector because it does not commercially harvest any acres. Alternative 4 is estimated to support 17 seasonal jobs associated with noncommercial thinning treatments.



# Chapter 3

## Affected Environment and Environmental Consequences

## **Changes between Draft and Final EIS**

The Heritage Resources section has been updated to reflect completion of surveys.

The Soils section was updated so that text, unit-by-unit table, and design criteria are consistent. An explanation of the regional soil standard was added.

The Wildlife section was updated based on public comments to include additional information on elk, Vaux's swift, cumulative effects related to livestock grazing, and information from Breeding Bird Surveys.

The Wildlife section was also updated to include a "new" goshawk PFA discovered through field observation of reproductive activity.

The cumulative effects sections were updated to reflect reasonably foreseeable stream restoration work.

# CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

## Introduction

This chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. The effects may be direct, indirect, or cumulative. The chapter is divided between Key Issues, Resource Conditions Relative to the Purpose and Need, and Other Environmental Resources.

Specialists' reports provide the basis for the conclusions discussed in this chapter. Specialists' reports were prepared for Botany, Water Quality, Soils, Aquatic Species, Fuels, Heritage Resources, Forest Vegetation, Wildlife, Roads, and Minerals and Geology. All of these specialists reports are contained in the project files; these reports have been incorporated by reference (40 CFR 1502.21) at the appropriate places in this Final EIS. The information in this chapter summarizes the affected environment, direct, indirect, and cumulative effects of the alternatives along with conclusions and supporting rationale. Further information on the specifics of the affected resources such as historical conditions, assumptions, methodologies, analyses, specific localized information, references, and technical documentation can be found in the individual specialists' reports in the project file.

## Key Issues

### Key Issue 1: Effects to Wildlife Habitat

Vegetative treatments, including prescribed fire, may impact habitat effectiveness for a variety of wildlife habitat within the West Maurys project area. Those habitats are associated with late and old structured (LOS) forested habitat dependent species, connectivity corridors, goshawk, elk, and pileated woodpecker.

#### Issue 1A. Late and Old Structure

There is a concern that treatments within late and old structured (LOS) stands would result in a change in structure and amounts of LOS across the landscape. Proposed treatments to reduce stand densities, increase resiliency and vigor of remaining stands and promote long-term LOS conditions may alter stands so that the LOS no longer functions as dense canopy or multi-strata forest habitat. Changes to LOS habitat will be measured by the number of LOS acres treated and the resulting structural conditions after treatment.

#### Affected Environment

All plant association groups within the West Maury project area have less late and old structure (LOS) than the historic range of variability as described in the Viable Ecosystems Management Guide except for juniper woodland multi-strata. Within Viable Ecosystems and this analysis, LOS includes E5, M5 and L5 seral/structural stages. Table 3-1 shows the distribution of late and old structure by PAG from satellite imagery data.

LOS acreage figures are based on accumulated pixel data from satellite imagery as interpreted within the VEM model and do not represent stands of LOS because pixels only represent 25 meters squared. Pixels indicating large structure (trees greater than 21 inches dbh) are scattered through out the project area. In the satellite imagery, areas that are dominated by dense understory canopies would not be identified as late and old (E5, M5, L5) even though there may be sufficient large trees to meet the LOS definition. To correct this situation, on-the-ground sampling of areas identified in the imagery with seral/structural stages containing large trees was done to augment the pixel data. With this conversion to large trees per acre, similar imagery was grouped to show stands of LOS that meet minimum acreage criteria.

**Table 3-1. Historic Range of Variability by Plant Association Group and Seral / Structural Stage**

Plant Association Group	Seral Structural Stage	Historic Range of Variability (Acres)	Existing Acres	Multi Strata	Single Strata	Number of Stands
Dry Grand fir	E5	714 – 1,152	233	95	138	18
	M5	595 – 1,486	0	0	0	
	L5	119 -- 892	0	0	0	
Douglas-fir	E5	3,125 – 4,509	364	122	242	15
	M5	451 – 1,353	2	0	2	
	L5	361 – 721	1	0	1	
Moist Pine	E5	0 – 715	0	0	0	2
	M5	0 – 858	2	0	2	
	L5	3,574 – 5,004	126	40	86	
Dry Pine	E5	0 -- 67	0	0	0	3
	M5	334 -- 902	2	0	2	
	L5	1,002 – 2,671	103	31	72	
Juniper Woodland	L5	369 -- 886	46	19	27	28
Juniper Steppe	L5	30 -- 72	1	0	1	0
Total Acres		10,674 – 21,288	880	307	573	

Table 3-2 displays the codes utilized to characterize the vegetative conditions in the project area.

**Table 3-2. Seral and Structure Definitions (Seral / Structural Stages)**

Structure Class	Species Composition		
	Early	Mid	Late
Grass, forb, shrub (trees may be present but not dominant)	E1	M1	L1
Seedling, sapling (less than 4.9 inches dbh)	E2	M2	L2
Pole (between 5 and 8.9 inches dbh), high density	E3a	M3a	L3a
Pole, low density	E3b	M3b	L3b
Small (between 9 and 20.9 inches dbh), high density	E4a	M4a	L4a
Small, low density	E4b	M4b	L4b
Medium/large (21 inches dbh and larger), high density (LOS)	E5a	M5a	L5a
Medium/large, low density (LOS)	E5b	M5b	L5b

Codes E5, M5 and L5 constitute late and old structured stands. Multi-strata stands, stands with greater than 55 percent canopy closure, are coded as “a” while single-strata stands, stands with less than 55 percent canopy closure, are coded as “b”.

In the West Maury Project Area most LOS is located in upper Florida Creek, the Hammer Creek drainage and the east side of Pine Creek. Currently, more of the project area is covered by dense stands of small trees than was present historically. Stands dominated by large trees are much fewer than were present historically. The amount of area dominated by large trees is estimated to have ranged historically from 10,500 acres to 19,600 acres (acreages do not include western juniper plant associations). At present, there are approximately 880 acres dominated by large structure, although more acres still contain a component of large diameter trees. Species composition of forest stands has shifted from early seral (fire resistant Ponderosa pine) towards late seral.

LOS within the project area occurs in small patches of 5 to 40 acres. There are approximately 737 acres of LOS in these size patches. These patches often occur close together in larger stands that can be identified as a complex of LOS. The patchiness of the LOS often is due to different site conditions such as changes in aspect, inclusions of non-forest areas or rock outcrops. Previous fire disturbance and management activities have created gaps between LOS patches. LOS complexes may include early, mid, or late seral large trees and may have a single canopy or multiple canopies in adjacent patches although most of the LOS is multi-strata and densely stocked.

From 1960 to about 1995, management direction of major timber sales within these drainages concentrated on harvest of large trees. However, most stands still have a component of large trees that can be maintained and augmented over time. Some areas nearly meet the large tree criteria for LOS and present opportunities for expanding the size of existing LOS patches and developing new LOS by reducing the amount of smaller diameter trees and encouraging growth.

Most large trees within LOS in the project area are at risk due to high understory stocking levels and the resulting competition stress. These trees are often highly susceptible to insect and disease problems. On the other hand, monitoring in stands where similar treatments have been implemented has shown increased diameter growth rates of large residual trees.

Conditions on an additional 23,000 acres are such that development and improvement of late and old structure can be accelerated by thinning now (this figure combines the high, medium, and low risk ratings found in Table 3-20). Within the 23,000 acres, 16,000 acres have significant pine overstory at risk due to overstocked conditions (includes stands with 3 or more trees per acre larger than 21 inches dbh). Currently, there are 5,000 acres that have stocking levels conducive to growth and maintenance of large trees; these stands would not benefit from treatment at this time.

Information from stand exams indicate that the number of large diameter trees (over 21 inches in dbh) in existing LOS ranges up to 21 trees per acre. Mortality of large diameter trees has accelerated to such an extent that some currently mapped LOS stands soon may no longer qualify as LOS. Most existing LOS is multi-strata with early to mid-seral species mixtures in the overstory. The understory tends to be a mix of mid- to late-seral species.

Growth measurements in stands on better sites with basal area less than 80 square feet showed typical diameter growth on dominant trees of 2.5 inches per 10 years. At this growth rate, trees that are 12 inches dbh may become 21 inches dbh trees within 40 years. In dense stands (basal area greater than 80 square feet), growth is typically less than 1.2 inches dbh per 10 years. Twelve-inch trees would require at least 75 years to become larger than 21 inches dbh. With constant growth, basal area increases which causes reduced growth rates on individual trees and increases competition stress leading to higher bark beetle susceptibility.

### **Direct, Indirect, and Cumulative Effects of No Action**

No treatments would occur within LOS stands. LOS stands would remain dense with high risk of competition-related mortality, especially of the large tree component. Mortality of large diameter trees has accelerated to such an extent that some currently mapped LOS stands soon may no longer qualify as LOS. Review of the annual aerial surveys for insect and disease occurrence showed several LOS stands with current bark beetle activity. LOS stands would remain at high risk of severe wildfire due to high canopy closure, ladder, and ground fuels. Multiple canopy layers would continue to develop and the amount of multi-strata forest conditions would increase unless set back by disturbance agents such as insects, disease, or fire. Concurrently, the amount of single-strata conditions would decrease over time. In dense stands (basal area greater than 80 square feet), growth is typically less than 1.2 inches diameter per 10 years. Twelve-inch trees would require at least 75 years to become larger than 21 inches dbh. With constant growth, basal area increases causes reduced growth rates on individual trees and increases competition stress leading to higher bark beetle susceptibility. Projections indicate that at 20 years multi-strata LOS would remain below HRV in Douglas-fir PAG and become below HRV in the moist and dry ponderosa pine PAG. At 20 years, single-strata LOS would remain below HRV in all of these PAGs. Only in the grand fir PAG, would multi-strata LOS develop enough to reach the low end of HRV.

Other planned activities that could affect LOS stands within the project area include the Sherwood Prescribed Burn and Juniper Thinning Project. That project is designed to protect LOS structure in treated stands. The area to be treated under that project includes 65 acres of mapped LOS. Past harvest actions and their resultant effects have been taken into consideration in the description of the affected environment and current condition. Estimations of future levels of LOS are based on current vegetation characteristics, including stand age, density, and growth.

In the event of a wildfire, those stands with high densities and ladder fuels would probably be consumed if wind and humidity conditions fueled the fire. Because there is such a small amount of LOS within the project area, and that it

is distributed in several areas, it is unlikely that all LOS would be lost. However, the rate of future development of LOS would be severely reduced in those stands that are approaching LOS conditions.

## Direct and Indirect Effects of Alternative 2

This alternative would treat approximately 157 acres of LOS with commercial harvest, noncommercial thinning, and fuel treatment. The majority of commercial treatment would be within the General Forest Management Area and reflects the desired conditions identified for this management area. Desired conditions include managing forested stands to improve vigor and health of the residual trees and to improve growth rates. This alternative would treat an additional 86 acres of LOS with noncommercial or juniper thinning outside of commercial harvest units. Prescribed burning would be employed on 74 acres of LOS where no cutting would be proposed.

No trees greater than 21 inches in diameter at breast height (dbh) would be cut. All existing large diameter trees would remain. All snags would remain, except those posing a safety hazard or would need removal for road construction. Commercial treatments are designed to maintain large trees by changing LOS from multi-strata to single-strata conditions although these stands would continue to have an uneven-aged (uneven-sized) structure. Harvest prescriptions retain the historic characteristics of LOS with groups of younger and older trees intermingled throughout the stands maintaining structural diversity. Treatments are designed to reduce understory canopy layers, thus reducing competition stress in the older, larger overstory. Many large trees, both inside and outside LOS complexes, exhibit low vigor from long-term competition stress. Large trees in treated LOS would persist longer than in untreated LOS. Due to the number of large trees, treated LOS would retain basal areas at the high end of recommended stocking which means that the effects of treatment would not last as long or produce as much growth as stands with lower densities.

**LOS Stand after Select Tree Harvest**



Commercial harvest treatments would generally change multi-strata LOS to single-strata LOS as the thinning of the 9 to 20.9-inch dbh trees would result in canopy closures less than 55 percent. While the canopy closure percents do change in the LOS stands, there would be no change in the amounts of LOS after treatment. In areas of LOS where there are high densities of trees over 21 inches dbh, fewer understory trees (9-20.9 inches dbh) would be left and these areas would appear single-storied. In areas of lower densities of large diameter trees, more understory trees would be left and these stands' appearance would remain multi-storied. Noncommercial thinning and prescribed burning in commercially treated units would have additional smaller diameter (9 inches dbh and smaller) seedlings, saplings and pole-sized removed or burned, with an average resultant spacing of approximately 18 feet to 30 feet depending on the density of large diameter trees. More variability of spacing would result with prescribed burning.

All stands would remain LOS after commercial harvest.

Noncommercial thinning and prescribed burning outside of commercial harvest units would not remove any trees over 9 inches dbh in the LOS stands and would result in an average spacing in the smaller diameter trees of approximately 18 feet to 30 feet depending on the density of large diameter trees. More variability of spacing would result with prescribed burning. There would be little change from the current condition in numbers and spacing of trees larger than 9 inches dbh.

All stands would remain LOS after noncommercial thinning and prescribed burning.

Wildlife species dependent on stand conditions with higher canopy closures, such as pileated woodpeckers, would have reductions in suitable habitat in this alternative. Species dependent on more open canopy conditions, such as white-headed woodpeckers, would have increases in habitat. This alternative would alter the current condition and trends within LOS stands. The longevity of existing large diameter trees would be expected to improve on sites that cannot sustain high conifer tree density and the recruitment of large ponderosa pine trees in treated stands would be expected to accelerate. The relative abundance of future large fir trees would be reduced in treated stands as ponderosa pine in these stands would be preferentially left.

By 20 years, 40 percent more LOS would develop as a result of Alternative 2 compared to Alternative 1 (No action).

Tables 3-3 and 3-4 display the amount of existing LOS treated by alternative, by plant association group and management area in the Ochoco Forest Plan.

**Table 3-3. Treatments within LOS Stands by Alternative and Treatment Type**

Alternative	Harvest and Associated Treatment Acres	Noncommercial Thinning and Associated Fuels Treatments	Prescribed Burning acres	Total Acres Treated
Alternative 2	157	86	74	317
Alternative 3	0	89	49	138
Alternative 4	0	230	28	258

**Table 3-4. Treatment within LOS Stands by Plant Association Group and Alternative**

Plant Association Group	Number of stands	Existing Acres	Treated Acres			Percent of LOS Acreage Treated		
			Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 2	Alt. 3
Dry Grand Fir	18	202	117	20	88	58%	10%	44%
Douglas-fir	15	174	41	30	11	24%	17%	6%
Moist Ponderosa Pine	2	23	22	5	22	100%	22%	100%
Dry Ponderosa Pine	3	30	30	16	30	100%	53%	100%
Juniper Woodland	28	308	107	67	107	35%	22%	35%
<b>Totals</b>	<b>66</b>	<b>737</b>	<b>317</b>	<b>138</b>	<b>258</b>	<b>43%</b>	<b>19%</b>	<b>35%</b>

### Forest Plan Amendment

Alternative 2 requires a site-specific Forest Plan amendment. The Eastside Screens include standards that when LOS is currently below the historic range of variability, then commercial harvest is not permitted. Because commercial harvest treatment is proposed in LOS in both multi-strata and single-strata structural conditions when below the historical range of variability, a Forest Plan amendment is needed to implement these actions in Alternative 2. The amendment was described in Chapter 2. The Eastside Screens were intended to maintain options for future management of LOS and only apply to timber sales. No regeneration harvest is proposed in Alternative 2. The proposed thinning treatments are designed to reduce tree density and improve growth of the residual trees, enhance forest health, or reduce potential mortality resulting from inter-tree competition. Thinning would more quickly restore historic seral/structural stage conditions and improve growing conditions for larger trees than either no action or prescribed fire alone. Thinning contributes to the primary purposes of fuel treatment: decreasing the probability of crown fires, decreasing the severity of the impacts, enhancing effectiveness and safety, and reducing costs. While there may be short-term decreases in stand densities and wildlife species dependent on those higher density stands would have reduced habitat, the longer-term maintenance of LOS into the future is desirable. After treatment, all 157 acres of LOS would remain LOS, but would have reduced canopy closures and stand densities. No trees over 21 inches dbh would be removed except in instances for safety or road construction.

### Factors to consider

**Timing** – The Ochoco Land and Resource Management Plan has been in effect since 1989 and is tentatively scheduled to begin the revision process in 2006. These amendments are proposed in the second decade of the plan

period and therefore are less likely to be significant. The proposed treatments would take place with the implementation of this alternative within the next 1-5 years.

Location and Size – Approximately 157 acres would be treated out of the 737 acres of currently mapped LOS within the project area of 37,974 acres. All LOS treated, would remain LOS after treatment though the majority of acres treated would change from multi-strata to single-strata conditions and these stands would continue to have an uneven-aged (uneven-sized) structure. All treatments retain options for future management of LOS. No commercial treatments are proposed within the Old Growth Management Area.

Goals, Objectives, and Outputs – There would be no change in the long-term relationships between the levels of goods and services projected by the Forest Plan Final EIS and the impacts of implementing this alternative because of the few acres being treated and the objectives of the treatments (to maintain LOS in the long-term).

Management Prescription – The amendment applies only to this project area and alternative and would not apply to future decisions within the project area. The amendment does not alter the desired future condition of the land or resources or the anticipated goods and services to be produced because of the small amount of acreage to be treated and that options for future management of LOS are being maintained.

### **Direct and Indirect Effects of Alternative 3**

Stands identified as LOS would not be commercially treated in Alternative 3. This alternative would treat 89 acres of LOS with noncommercial thinning. Prescribed burning would be employed on 49 acres of LOS where no cutting is proposed (Table 3-3).

The effects of no commercial harvest would be similar to Alternative 1 and Alternative 4. The effects of stand density from noncommercial thinning alone would be similar to Alternative 1 because densities would not be reduced sufficiently to allow continued growth and vigor of the overstory large diameter trees. This would reduce the rate of development of potential LOS and limit the expansion of some LOS stands.

Noncommercial thinning would not remove any trees over 9 inches dbh in the LOS stands and would result in an average spacing in the smaller diameter trees of approximately 18 feet to 30 feet depending on the density of larger diameter trees. There would be little change from the current condition in numbers and spacing of trees larger than 9 inches dbh. More variability of spacing would result with prescribed burning.

All LOS before treatment would remain LOS after treatment, with more stands remaining multi-strata than in Alternative 2 but slightly less than Alternative 1.

Wildlife species dependent on stand conditions with higher canopy closures, such as pileated woodpeckers, would have less reduction in suitable habitat in this alternative than in Alternative 2. There would be no commercial harvest so those stands with canopy closures above 55 percent in trees over 9 inches dbh would not be treated. Species dependent on more open canopy conditions, such as white-headed woodpeckers, would have less increase in habitat compared with Alternative 2 but more than in Alternative 4. This alternative would alter the current condition and trends within LOS stands to some degree. The longevity of existing large diameter trees would be expected to be improved on sites that cannot sustain high conifer tree density. The recruitment of large diameter trees would be expected to be accelerated but not as quickly as Alternative 2.

By 20 years, 16 percent more LOS would develop as a result of the Alternative 3 compared to Alternative 1 (No action).

### **Direct and Indirect Effects of Alternative 4**

Stands identified as LOS would not be commercially treated in Alternative 4. This alternative would treat 230 acres of LOS with noncommercial thinning. Prescribed burning would be employed on 28 acres of LOS where no cutting is proposed (Table 3-3).



The effects of no commercial harvest would be similar to Alternative 1 and Alternative 3. The effects of stand density from noncommercial thinning alone would be similar to Alternative 1 because densities would not be reduced sufficiently to allow continued growth and vigor of the overstory large diameter trees. This would reduce the rate of development of potential LOS and limit the expansion of some LOS stands.

Noncommercial thinning would not remove any trees over 9 inches dbh in the LOS stands and would result in an average spacing in the smaller diameter trees of approximately 18 feet to 30 depending on the density of the larger diameter trees. There would be little change from the current condition in numbers and spacing of trees larger than 9 inches dbh. More variability of spacing would result with prescribed burning.

All LOS before treatment would remain LOS after treatment, with more stands remaining multi-strata than in Alternative 2 but slightly less than Alternative 1.

Wildlife species dependent on stand conditions with higher canopy closures, such as pileated woodpeckers, would have smaller reduction in suitable habitat in this alternative. There would be no commercial harvest so those stands with canopy closures above 55 percent in trees over 9 inches dbh would not change. Species dependent on more open canopy conditions, such as white-headed woodpeckers, would have less increase in quality habitat. This alternative would alter the current condition and trends within LOS stands slightly. The longevity of existing large trees would be expected to be improved slightly on sites that cannot sustain high conifer tree density, and the recruitment of large ponderosa pine trees in treated stands may be accelerated. The low intensity of treatments in this alternative would result in a lesser effectiveness in promoting stand development and open forest structural condition than would occur within commercially treated stands in Alternative 2.

**Table 3-5. Comparison and Projection of Multi- and Single-Strata LOS by Alternative (from pixel data)**

Plant Association Group	Time Period	LOS Type	Alt. 1	Alt. 2	Alt. 3	Alt. 4	HRV
Dry Grand Fir	Current Level or Immed. Post Treatment	Multi-Strata	1.6%	1.1%	1.4%	1.6%	8-15%
		Single-Strata	2.3%	3.1%	2.8%	2.4%	18-38%
		Total	3.9%	4.2%	4.2%	4.0%	26-53%
	20 years Post Treatment	Multi-Strata	8.1%	8.5%	8.2%	8.3%	8-15%
		Single-Strata	4.4%	9.9%	7.4%	5.0%	18-38%
		Total	12.5%	18.4%	15.6%	13.2%	26-53%
	50 years Post Treatment	Multi-Strata	18.5%	20.1%	19.0%	19.1%	8-15%
		Single-Strata	6.5%	16.8%	11.9%	8.0%	18-38%
		Total	25.0%	36.8%	30.9%	27.1%	26-53%
Douglas-Fir	Current Level or Immed. Post Treatment	Multi-Strata	1.4%	1.0%	1.1%	1.3%	11-19%
		Single-Strata	2.7%	3.4%	3.3%	3.0%	33-54%
		Total	4.1%	4.4%	4.4%	4.3%	44-73%
	20 years Post Treatment	Multi-Strata	7.0%	7.7%	7.1%	7.1%	11-19%
		Single-Strata	5.1%	9.3%	5.9%	5.3%	33-54%
		Total	12.1%	17.0%	13.0%	12.4%	44-73%
	50 years Post Treatment	Multi-Strata	16.7%	19.1%	17.4%	16.9%	11-19%
		Single-Strata	7.5%	15.8%	8.4%	8.0%	33-54%
		Total	24.3%	34.9%	25.8%	24.9%	44-73%
Moist Pine	Current Level or Immed. Post Treatment	Multi-Strata	0.6%	0.4%	0.5%	.5%	0-9%
		Single-Strata	1.2%	1.7%	1.6%	1.5%	50-86%
		Total	1.8%	2.1%	2.1%	2.0%	50-95%
	20 years Post Treatment	Multi-Strata	3.5%	3.2%	3.1%	3.2%	0-9%
		Single-Strata	3.7%	5.7%	5.1%	4.3%	50-86%
		Total	7.2%	8.9%	8.2%	7.5%	50-95%
	50 years Post Treatment	Multi-Strata	9.6%	9.3%	8.9%	9.6%	0-9%
		Single-Strata	5.7%	10.5%	9.4%	6.0%	50-86%
		Total	15.3%	19.8%	18.3%	15.6%	50-95%
Dry Pine	Current Level or Immed. Post Treatment	Multi-Strata	0.5%	0.3%	0.3%	.5%	0-7%
		Single-Strata	1.1%	1.8%	1.8%	1.6%	25-59%
		Total	1.6%	2.1%	2.1%	2.1%	25-66%
Juniper woodland	Current Level or Immed. Post Treatment	Multi-Strata	0.3%	0.2%	0.2%	.2%	0%
		Single-Strata	0.4%	0.9%	0.8%	.8%	5-12%
		Total	0.7%	1.1%	1.0%	1.0%	5-12%
Juniper Steppe	Current Level or Immed.	Multi-Strata	0.0%	0.0%	0.0%	0%	0%
		Single-Strata	0.2%	0.3%	0.3%	.3%	5-12%

Plant Association Group	Time Period	LOS Type	Alt. 1	Alt. 2	Alt. 3	Alt. 4	HRV
	Post Treatment	Total	0.2%	0.3%	0.3%	.3%	5-12%

Table 3-5 displays the current levels of LOS for all PAGs and the projected levels for the dry grand fir, Douglas-fir, and moist ponderosa PAGs and compares them to the HRV for each LOS category by alternative. The dry ponderosa pine, juniper woodland and juniper steppe PAGs were not projected but would show increased LOS development with time although at a slower rate in Alternative 1 (No Action). They would also show similar results for Alternatives 2, 3, and 4. Alternative 1 LOS development in these PAGs would be slow.

### Cumulative Effects of the Action Alternatives

There are no other planned activities that would affect LOS stands within the project area. Past harvest actions and their resultant effects have been taken into consideration in the description of the affected environment and current condition under Alternative 1. Past harvest actions reduced the amount of LOS throughout the project area. Estimations of future levels of LOS are based on current vegetation characteristics, including stand age and density. The projections displayed in Table 3-5 assume that no significant wildfire event occurs. In the event of a wildfire, stand replacement would likely occur in those stands with high canopy closures, ladder fuels, and high surface fuel loadings in the area of the fire. Replacement of LOS in those stands would likely take more than 200 years to develop. Livestock grazing would have no cumulative effect on LOS characteristics since the activity would not impact the abundance of large diameter trees, the amounts of snags, or coarse woody debris. There are approximately 320 acres of private land within and adjacent to the project area. These parcels have had previous selective harvest but are predominately scattered overstory ponderosa pine with medium to high densities of understory trees. LOS habitat is limited on private lands in the project area because of past timber harvest; it is likely that LOS will continue to be limited on private lands.

### Issue 1B. Connective Corridors

There is a concern that commercial harvest within connectivity corridors would result in reduced canopy closure in dense stands. This may not promote habitat conditions that would facilitate species movement between areas and may make species vulnerable to predation and/or exposure. It may also block movement of species with limited mobility because of reduced densities of stands. The Eastside Screens identify that Old Growth management areas and LOS stands need to be connected. The Eastside Screens defines connectivity corridors as stands in which medium or larger diameter trees are common, and canopy closures are within the top one-third of site potential. In the West Maury project area, this means stands with more than 50 percent canopy closure.

Changes to connective corridors will be measured by the total amount of commercial harvest within the connective corridors and the resultant condition after treatment.

### Affected Environment

Connective habitat has been mapped outside of designated old growth to meet the requirements of the Eastside Screens in providing connections between large blocks of old forest to facilitate movement between such habitat blocks. There are at least two, and where possible, three connective corridors between all allocated old-growth stands and old-growth/LOS stands larger than 100 acres. This habitat has been designed to connect to the adjacent East Maury project area. The Maury Mountains are a small, isolated forest 21 miles long by 5 miles wide, surrounded by dissimilar vegetation types. The landform is dominated by a ridge through the middle running east to west. Stream courses and the corresponding denser vegetation generally run north and south. Most dry grand fir plant associations are found on the north slope in a band approximately 3 miles wide. Drier plant associations dominated by ponderosa pine and western juniper are on the south slopes and near the National Forest boundary. Consequently, connectivity is geographically limited. Fourteen connective corridors have been located between existing LOS complexes. Several of the connective corridors do not currently meet all the criteria in the Eastside Screens because of the factors described above. The Forest Vegetation Analysis Report contains a more detailed description of vegetative conditions in each connective corridor.

While most sites within the project area are capable of producing greater than 50 percent canopy closure, sustainability of this high density is not probable over the long term. At 50 percent canopy closure, most stands in the project area are susceptible to a number of insect and disease problems capable of causing severe mortality and consequent loss of crown closure. Riparian corridors generally have the highest productivity potential (and are expected to provide the best connective habitat) were more severely damaged by defoliation during the 1992 western spruce budworm epidemic than adjacent stands.

### **Direct, Indirect, and Cumulative Effects of No Action**

No treatments would occur within connective corridors in this alternative. Connective corridors would remain densely stocked but would be slow to develop large trees. Those stands not meeting LOS or high canopy closure would continue to grow and eventually approach characteristics in the future. No reduction in ladder or surface fuels would increase the potential for high-intensity wildfire. Some stands would remain at high risk of severe wildfire due to high canopy closure, ladder, and surface fuels. Multiple canopy layers would continue to develop and the amount of multi-strata forest conditions would increase unless set back by disturbance agents such as insects, disease, or fire. Concurrently, the amount of single-strata conditions would decrease over time.

The structural complexity and canopy closure within mapped connective corridors would be retained, at least in the short term. On wetter sites, the abundance of snags and down logs and the development of multiple canopy layers would continue on the current trend. Dense stands would increase the cover component within connective habitat on these sites. On drier sites, large structure ponderosa pine and larch would decline in vigor due to competition from the developing understory, resulting in a gradual loss of large live tree habitat and an increase in large snag habitat in the short term. This could also negatively affect connective habitat, in the long term, through loss of cover on sites with heavy infestations.

There are no other reasonably foreseeable future activities that would affect connective corridor habitat within the project area. The effects of previous management activities, such as timber harvest, have been incorporated into the development of the connective corridor strategy and LOS habitat. In the event of a high intensity wildfire, some stands, because of their high densities and multi-strata conditions, would likely incur substantial mortality and no longer be able to function as corridor habitat. Livestock grazing would not affect the attributes of connective habitat such as canopy cover and abundance of large diameter trees.

### **Direct and Indirect Effects Alternatives 2, 3, and 4 (Prescribed burning only)**

Natural fuels burning would be prescribed within connective corridors under all action alternatives. It is not anticipated that prescribed fire would result in substantial changes in seral/structural condition. However, trees up to 1-inch dbh and fine fuels in the understory would be reduced, which could also affect visual cover and climatic moderation within the corridors. The primary objective of fuels management would be to reduce or maintain surface fuels at less than 5 tons/acre in the less than the 3-inch diameter class. Some loss of large woody debris and snags, along with a limited amount of mortality to trees greater than the 1-inch diameter class may occur where there are accumulations of fuel. It is anticipated that the level of retention post treatment would still provide adequate cover and structure to facilitate travel by most species that would use these corridors.

### **Direct and Indirect Effects of Alternative 2**

No trees over 21 inches would be harvested. Treatments would focus in stands with canopy closures greater than 50 percent and more than three trees over 21 inches dbh. Treatments would maintain existing large trees and promote development of additional large trees through reduced density and competition. Treated portions of corridors would continue to be dominated by medium to large trees but have fewer trees less than 21 inches dbh. Canopy closure in treated portions of corridors would be reduced to less than 50 percent to allow growth. Stands dominated with smaller diameter trees (less than 9 inches dbh) would benefit from noncommercial thinning to increase growth rates. This would promote development of larger diameter trees in shorter time frames.

Within these areas of treatment, the vertical complexity and canopy closure within mapped connective corridors would be reduced in the short term. It is anticipated that the level of retention post treatment should still provide

adequate cover and structure to facilitate travel by most species that would use these corridors. Some species that select for open forest conditions may find the habitat more favorable after treatment. Conversely, those species which favor more dense habitats and multi-storied conditions may not find the habitat as conducive for dispersal. Additionally, treated habitat within the corridors may be less desirable for species that have limited mobility or that are vulnerable to predation. For these species this alternative would compound the effects of the fragmentation that has occurred in the past, particularly the fragmentation between blocks of old-growth habitat. Where these treatments occur within young stands, thinning designed to promote development of large trees would likely improve habitat conditions within the corridors in the long term, and may benefit the health of residual overstory trees where they are present. Most LOS stands have potential to expand in size in a relatively small timeframe. Silvicultural treatments including harvest and noncommercial thinning can accelerate growth and development of large trees within existing LOS stands and in the connecting corridors.

Table 3-6 displays the acres and types of treatment within connective corridors by alternative.

**Table 3-6. Acres Treated within Connective Corridors**

	Total Acres Within Corridors	Harvest and Associated Treatment Acres	Noncommercial Thinning and Juniper Thinning Acres	Prescribed Burning acres	Total Acres Treated
Alternative 2	800	232	111	70	413
Alternative 3	800	0	20	39	59
Alternative 4	800	0	322	87	409

**Forest Plan Amendment**

Alternative 2 would require a Forest Plan amendment. The Eastside Screens include standards that when all the criteria for connective corridor habitat cannot be met then timber harvest should be deferred in connective corridors. Not all stands in connective corridors meet the canopy closure requirements and not all corridors meet the minimum width of 400 feet. Corridors represent the best connections given the existing conditions resulting from physical restrictions such as ridges, meadows and previous harvest practices. Timber harvest in Alternative 2 in stands with canopy closures greater than 50 percent are designed to maintain existing large trees and promote development of additional large trees. Stand densities in the understory layers would be reduced to increase the health and vigor of remaining trees. Noncommercial activities are allowed in connective corridors under Eastside Screens.

Approximately 232 acres of commercial harvest would occur within connective corridor habitat in Alternative 2.

**Factors to consider**

Timing – The Forest Plan has been in effect since 1989 and is tentatively scheduled to begin the revision process in 2006. These amendments are proposed in the second decade of the plan period and therefore are less likely to be significant. The proposed treatments would take place with the implementation of this alternative within the next 1-5 years.

Location and Size – Approximately 232 acres would be treated out of the 800 acres within the connective corridor habitat acres. All treatments retain options for future management of connective corridors. Treatments would maintain existing large trees and would promote the development of additional large trees.

Goals, Objectives, and Outputs – There would be no change in the long-term relationships between the levels of goods and services projected by the Forest Plan Final EIS and the impacts of implementing this alternative because of the few acres being treated and the objectives of the treatments (to maintain LOS in the long term).

Management Prescription – The amendment applies only to this alternative in this project area and would not apply to future decisions. The amendment does not alter the desired future condition of the land or resources or the anticipated goods and services to be produced because of the small amount of acreage to be treated and that options for future management are being maintained.

### **Direct and Indirect Effects of Alternatives 3 and 4**

These alternatives would not commercially harvest stands within corridors. Current conditions of canopy closure and large diameter trees would remain. Noncommercial thinning and associated fuels treatments would focus in the understory in the smaller diameter trees. Prescribed fire would reduce surface fuels and smaller diameter trees. In areas of current high densities of trees, prescribed fire without pre-thinning could result in more residual damage to larger diameter trees because of the presence of ladder fuels and the increased intensity during burning operations. Alternative 3 would treat 20 acres with noncommercial thinning and 39 acres with prescribed fire. Alternative 4 would treat 322 acres with noncommercial thinning and 87 acres with prescribed fire. Competition in trees over 9 inches dbh would continue at existing levels, with possible mortality continuing to occur in the larger diameter trees due to continued competition. Negligible gains would be made in growth and development of large trees and treatments. Vertical complexity and canopy closure would favor those species that select for multi-structure stand conditions. Alternative 4 treats more acres than Alternative 3 with noncommercial thinning and prescribed fire treatments, but like Alternative 3, the negligible increases in growth rates would not decrease the risk of mortality to large diameter trees and sustaining connective corridors over the long-term.

It is anticipated that the level of retention post treatment would still provide adequate cover and structure to facilitate travel by most species that would use these corridors. Those species which favor more dense habitats and multi-storied conditions would likely find the habitat conducive for dispersal. Additionally, habitat within the corridors may be more desirable for species that have limited mobility, that are vulnerable to predation, or that are sensitive to climatic conditions, at least in the short term. Where these treatments occur within young stands, thinning designed to promote development of large trees would likely improve habitat conditions within the corridors in the long term. Both alternatives would protect the existing connective habitat values of down-wood and canopy closure where large trees are present.

### **Cumulative Effects of Alternatives 2, 3, and 4**

There are no other reasonably foreseeable future activities that would affect connective corridor habitat within the project area. The effects of previous management activities, such as timber harvest, have been incorporated into the development of the connective corridor strategy and LOS habitat. In the event of a high-intensity wildfire in the project area, the stands currently functioning as connective habitat, because of their high densities and multi-strata conditions, would likely incur substantial mortality and would not likely function as corridor habitat after a wildfire. Livestock grazing would not affect the attributes of connective habitat such as canopy cover and abundance of large diameter trees.

LOS habitat is limited on private lands in the project area because of past timber harvest. Connective habitat between old-growth blocks have been mapped around private lands.

### **Issue 1C. Goshawk Habitat Treatments**

Treatment activities to reduce fuel loadings, decrease stand densities, and promote more open LOS stands may reduce goshawk post-fledging habitat. Goshawk core nest areas and post-fledging areas (PFAs) are approximately 30 and 400 acres in size, respectively. There are 15 goshawk territories with nest core and PFAs mapped within the West Maurys project area. Of these nesting territories, seven had confirmed nesting records during the period 2001 to 2004; six were confirmed as active nests in 1998 or 1999; and two were last confirmed as active nests during 1990 or earlier. Core nest areas provide security for incubating and raising nestlings. The Eastside Screens stipulate that no timber harvest may occur within the 30-acre nest core areas and harvest is not proposed within core nest areas. Post-fledging areas provide security for young birds to mature, learn hunting techniques from the adult, and eventually disperse to other areas outside of the home range. Preferred stand structures include intermingled crowns in 12-inch dbh and larger trees with patchy clumps of more dense stands, less dense stands, and small openings scattered throughout the stands. Commercial thinning treatments would reduce stand densities below optimal levels. In PFAs, harvest activities may occur but treatments focus on retaining LOS stands and enhancing young stands toward LOS conditions. The changes to goshawk habitat will be measured by the number of acres of PFA treated by treatment type and the resulting description of stand structure and composition.

## **Affected Environment**

Goshawks use mixed-conifer stands with relatively high canopy closure and mid to large size trees. Patchy crown density and horizontal diversity of forest conditions are important components of habitat for goshawks. Stands characterized by a sparse overstory of young to mature pine, with some Douglas-fir, may not provide suitable nesting habitat. There may not be sufficient canopy closure for suitable nesting habitat, but they may provide foraging opportunities. Where such stands are dominated by a dense understory of young to mid-level pine and Douglas-fir, these stands could be thinned to improve goshawk foraging habitat. There are currently 6,221 acres of mapped post-fledging habitat within the West Maurys Project area. There are approximately 14,500 acres of suitable goshawk habitat in the project area.

Currently, trees greater than 9 inches dbh dominate approximately 95 percent of all PFAs. Sixty eight (68) percent of the area has 3 or more trees per acre larger than 21 inches dbh. Seventeen (17) percent of the PFAs have more than 10 trees per acre greater than 21 inches dbh. Currently 134 acres (2%) meet LOS conditions. Crown closure varies. PFAs located on south aspects and drier sites tend to be more open with crown closure averaging around 40 percent. PFAs on north aspects have higher average crown closure (50-60%). Nonforest, steppe, and low-density woodland sites are found within 2,355 feet (radius of 400 acre circle) of all known nest stands in the project area. PFAs on 3,494 acres (58%) have basal area greater than 80 square feet per acre and more than 200 trees per acre indicating high risk to overstory and mid-canopy trees to bark beetle mortality and to high-intensity fire events. Historically, less area within these PFAs was in forest or woodland cover and stands with forest/woodland cover were less dense. Stands dominated by groups of large trees were more common. The proportions of western juniper, Douglas-fir, and grand fir have increased.

### **Direct, Indirect, and Cumulative Effects of No Action**

No treatments would be implemented. This alternative would maintain the existing acres of mixed conifers and canopy closure, at least in the short term. Lack of treatment of the mid-story trees in these stands would perpetuate development of the co-dominant canopy layer of fir and interlocking crown structure, at least in the short term. These features are important components of nesting habitat. On the other hand, existing canopy gaps and patches of open forest would become reduced as understory conifers fill in. The continuation of over-stocking in the understory of these stands may render them less suitable for goshawk foraging due to dense understory canopies. Shrub and herbaceous understory important to some prey species may be lost as the understory conifer density increases. These features are important components of foraging habitat. This alternative would maintain the suitability of all existing habitat for goshawks within the PFAs and would not result in displacement of goshawk from existing occupied territories at this time.

No treatment in overstocked stands would likely result in slowing the advancement of some of these stands toward LOS. Stand density would increase resulting in increased competition stress, reduced growth and vigor, increasing mortality due to bark beetle, increased loss of large overstory trees, and increasing risk of stand replacement due to high-intensity fire.

There are no other current or reasonably foreseeable future activities that would affect goshawk habitat within the project area. The effects of previous management activities, such as timber harvest, have been incorporated into the existing condition description and evaluation of habitat. Livestock grazing would not impact the conifer component of the goshawk stands. Impacts currently occurring to the shrub and herbaceous understory would continue providing no change to the current condition for habitat for prey species. In the event of a high intensity wildfire, this current goshawk habitat, because of the high densities and multi-strata conditions, would likely incur substantial mortality and no longer be able to function as goshawk habitat. However, the effect of such disturbances on crown closure in the long term is dependent on the type, severity, and extent of the event(s).

### **Direct and Indirect Effects of Alternatives 2, 3, and 4 (Prescribed burning only)**

All action alternatives would implement underburning of natural fuels outside of thinning units within PFAs. Burning treatments within the PFAs are designed to protect large woody material and overstory trees. Snags and

down wood may be consumed by prescribed fire. This should be partially offset by the creation of snags and down wood due to fire-killed trees. The effect of fire on snag retention would likely result in a higher number of hard snags, with a concurrent reduction in soft and hollow snag habitat. Burning also has the potential to remove large snags where they are present prior to treatment, while increasing the relative abundance of smaller snags that result from effects of the fire. Prescribed burning should also stimulate production of herbaceous vegetation for several years after the fire, and shrubby vegetation 3 to 15 years after treatment. These changes in conditions would likely provide foraging habitat for some species that would be prey for goshawk, while potentially altering nesting habitat for some species.

**Direct and Indirect Effects of Alternative 2**

Treatments within PFAs are to maintain and develop large trees and to reduce the risk of catastrophic loss of large trees. Harvest and associated noncommercial thinning in treated areas would reduce basal areas to approximately 60 square feet per acre (higher where the density of large trees is high) in high risk areas. Within treated stands, crown closures would range from 40 to 50 percent with small areas greater than 50 percent. Trees larger than 21 inches dbh would not be harvested. Intermingling tree crowns would occasionally occur and canopy gaps would increase. Understory thinning (harvest or juniper thinning) would occur on 18 acres of LOS within goshawk PFAs. This thinning is intended to improve longevity of dominant and co-dominant trees, and would create more open space for flight below the overstory canopy, which is desirable in foraging habitat for goshawks. Stand density would remain higher within RHCAs associated with treated units, maintaining areas of intermingling branches and multi-strata conditions. Juniper cutting would create open grass and shrub dominated areas. Prescribed burning would reduce seedling and sapling stocking, increase height to canopy distance and reduce ground fuels. Grapple piling would reduce ground fuels. Harvest and noncommercial thinning would allow increased growth of residual trees, increasing the development of additional large trees and reduce losses to bark beetles. Reduced stand density would allow increased development, growth, and diversity of ground vegetation. Total treatment area under this alternative would be 49 percent of total PFA acres. Commercial harvest exceeding 50 percent of any individual PFA would likely remove excessive amounts of hiding cover and has the potential to displace the existing pair of birds, this occurs within two PFAs. Total treatment of any PFA exceeding 75 percent would result in canopy closure reductions in excess of recommended levels and could render them unsuitable. This occurs on three PFAs (including the two that exceed 50% timber harvest). Timber harvest within PFAs was designed to meet long-term, landscape objectives for increasing LOS rather than short-term habitat needs for goshawks. This alternative would reduce the suitability of habitat for nesting on 1,325 acres within the PFAs in the short term (21% of the total PFA acres). This alternative also has the potential to reduce suitability of three occupied territories due to extensive treatments within individual PFAs. Table 3-7 displays the treatments by PFA.

**Table 3-7. Acres of Treatment within Goshawk Post Fledging Areas (Alternative 2)**

Site Number	Acres in PFA	Harvest and other Treatment (acres)	% Harvest	Noncommercial Thinning and Fuels Treatments (acres)	Prescribed Burning (acres)	Total area Treated (acres and %)	
0937 PFA	418	72	1-25	1	232	305	50-75
0938 PFA	402	81	1-25	63	174	318	50-75
0940 PFA	355	0	0	0	0	0	0
0941 PFA	398	0	0	166	94	260	50-75
0944 PFA	439	113	25-50	9	0	122	25-50
5028 PFA	480	124	25-50	27	104	255	50-75
5029 PFA	417	0	0	43	201	244	50-75
5030 PFA	418	272	>50	81	5	358	75-99
5031 PFA	404	0	0	0	0	0	0
5032 PFA	408	1	0	6	0	7	1-25
5081 PFA	392	84	1-25	33	28	154	25-50
5082 PFA	446	159	25-50	20	114	293	50-75
5084 PFA	418	160	25-50	90	165	415	75-99
5091 PFA	421	0	0	40	0	40	1-25
5107 PFA	406	259	>50	51	0	310	75-99
<b>Totals</b>	<b>6,221</b>	<b>1,325</b>	<b>21</b>	<b>630</b>	<b>1,117</b>	<b>3,072</b>	<b>49</b>

The effects of the combined treatments (including fuel treatments) would reduce the risk of loss of the residual forest canopy due to high-intensity fire over the next 40 to 50 years. Approximately 2,800 acres with high stocking levels would remain untreated (also containing multiple canopies, clumpiness, and intermingling branches). This alternative would reduce the suitability of habitat for nesting on 1,066 acres within the PFAs in the short term (20% of the total PFA acres). This alternative would reduce the suitability of habitat for nesting on 1,325 acres within the PFAs in the short term (21% of the total PFA acres). These acres represent approximately 9% of the currently suitable goshawk habitat in the project area. Total treatments in this alternative (harvest, noncommercial thinning and prescribed burning) occur on 3,072 acres or 21 percent of the suitable goshawk habitat in the project area.

## **Cumulative Effects of Alternative 2**

Past management activities have altered the amount, quality, and distribution of suitable goshawk habitat on the landscape. Generally, goshawk PFAs have been mapped outside of intensively harvested areas. As a result, PFAs may occur in several patches rather than as a continuous block of forested habitat. Areas that were harvested in the past with prescriptions that included overstory retention provide greater opportunities to recruit larger and more contiguous patches of suitable habitat in the future than previously harvested areas without overstory retention. Harvest activities included in Alternative 2 would further alter the quality of suitable goshawk habitat and reduce canopy cover in three PFAs which could render them unsuitable.

On private, forested land within or adjacent to the project area, past timber management has reduced the abundance of overstory trees, snags, and large down logs. These actions have limited the suitability of these timberlands for occupancy by nesting goshawk. However, due to the proximity of goshawks nesting on NFS lands, goshawks may forage on privately-owned forests with sufficient forest canopy. Goshawk PFAs have only been mapped within the National Forest boundary. Therefore, some of the PFAs are less contiguous, or less concentric around the nest stand than they might be if they were not adjacent to private land.

The Sherwood prescribed burn of 1,300 acres authorized under a separate decision, primarily within the Hammer Creek Wildlife and Recreation management area would be implemented during calendar year 2004 and 2005. The project occurs within PFA area 0940. The Sherwood prescribed burn includes measures to reduce the potential for disturbance to nesting goshawks and to retain large diameter trees and structural diversity within the PFA.

There are no other reasonably foreseeable future activities (including livestock grazing) that would affect goshawk habitat within the project area. The effects of previous management activities, such as timber harvest, have been incorporated into the existing condition description and evaluation of habitat. In the event of a high-intensity wildfire, this current goshawk habitat in untreated stands, because of the high densities and multi-strata conditions, would likely incur substantial mortality and no longer be able to function as goshawk habitat. In treated stands with reduced densities, it is less likely that stand replacement would occur and goshawk habitat would remain, though at possibly reduced densities. The effect of such disturbances on crown closure in the long term is dependent on the type, severity, and extent of the event(s).

## **Direct and Indirect Effects of Alternative 3**

This alternative would treat timber stands within PFAs with a prescription designed to maintain or promote habitat conditions preferred by goshawks. No commercial treatment acreage would exceed 50 percent of an individual PFA. Treated areas would be thinned from below to improve forest conditions. Stand level residual basal areas and crown closure would remain higher than in Alternative 2 (approximated 70 to 80 sq. ft. per acre). In order to maintain growth, treated stands would need future thinning sooner. The effects of the combined treatments (including fuel treatments) would still reduce the risk of loss of the residual forest canopy due to high-intensity fire over the next 40 years to 50 years but not as much as in Alternative 2. Trees larger than 21 inches dbh would not be harvested. The prescription for stands to be treated is intended to improve habitat by removing understory trees, with the result of having more open space for flight below the overstory canopy, and enhanced longevity of dominant trees and growth of co-dominant trees. Treated areas would retain a higher basal area and level of interlocking crowns and dense patches than would occur under Alternative 2. Management of forest stands within



PFA in this alternative is based on Management Recommendations for the Northern Goshawk in the Southwestern United States (Reynolds et al. 1992). Total treatment area would be 28 percent of total PFA acres.

**Table 3-8. Acres of Treatment within Goshawk Post Fledging Areas (Alternative 3)**

Site Number	Existing Acres	Harvest and other Treatment (acres)	% Harvest	Noncommercial Thinning and Fuels Treatments (acres)	Prescribed Burning (acres)	Total area Treated (acres and %)	
0937 PFA	418	70	1-25	0	88	158	25-50
0938 PFA	402	76	1-25	50	35	161	25-50
0940 PFA	355	0	0	0	1	0	0
0941 PFA	398	0	0	76	94	170	25-50
0944 PFA	439	113	25-50	9	0	113	25-50
5028 PFA	480	124	25-50	27	56	207	25-50
5029 PFA	417	0	0	43	39	82	1-25
5030 PFA	418	188	1-25	36	3	227	50-60
5031 PFA	404	0	0	0	0	0	0
5032 PFA	408	1	0	6	0	7	1-25
5081 PFA	392	84	1-25	33	28	145	25-50
5082 PFA	446	105	1-25	20	109	234	50-60
5084 PFA	418	0	0	54	120	174	25-50
5091 PFA	421	0	0	40	0	40	1-25
5107 PFA	406	46	1-25	5	0	51	1-25
<b>Totals</b>	<b>5,817</b>	<b>761</b>	<b>13%</b>	<b>394</b>	<b>573</b>	<b>1,728</b>	<b>30</b>

This alternative does not propose commercial harvest on more than 50 percent of any PFA or total treatment area on more than 60 percent of any PFA. This alternative would maintain the suitability of habitat for nesting on the 807 acres harvested within the PFAs (12% of the total PFA acres) by leaving dense clumps scattered throughout treated stands. These acres represent approximately 5 percent of the suitable goshawk habitat in the project area. Total treatments in this alternative (harvest, noncommercial thinning and prescribed burning) occur on 1,779 acres, or 12 percent of the suitable goshawk habitat in the project area. This alternative should not affect suitability of any existing occupied territories. This alternative is not expected to reduce hiding cover excessively or result in displacement of existing pairs.

Growth and development of large trees would be less in Alternative 3 due to higher residual basal area and denser clumpiness but greater than Alternative 4. The effects of reduced density on stand growth and vigor would decrease sooner than in Alternative 2. The effects of the combined treatments (including fuel treatments) would still reduce the risk of loss of the residual forest canopy due to high intensity fire over the next 40 to 50 years but not as much as in Alternative 2. Untreated portions of PFAs would have a range of densities, diameter distributions and crown closures.

### Cumulative Effects of Alternative 3

Past management activities' impacts would be the same as Alternative 2.

On private, forested land within or adjacent to the project area, past timber management has reduced the abundance of overstory trees, snags, and large down logs. These actions have limited the suitability of these timberlands for occupancy by nesting goshawk. However, due to the proximity of goshawks nesting on NFS lands, goshawks may forage on privately-owned forests with sufficient forest canopy. Goshawk PFAs have only been mapped within the National Forest boundary; therefore, some of the PFAs are less contiguous, or less concentric around the nest stand than they might be if they were not adjacent to private land.

The Sherwood prescribed burn of 1,300 acres authorized under a separate decision, primarily within the Hammer Creek Wildlife and Recreation management area would be implemented calendar years 2004 and 2005. The project occurs within PFA area 0940. The Sherwood prescribed burn includes measures to reduce the potential for disturbance to nesting goshawks and to retain large diameter trees and structural diversity with the PFA.

There are no other reasonably foreseeable future activities (including livestock grazing) that would affect goshawk habitat within the project area. The effects of previous management activities, such as timber harvest, have been incorporated into the existing condition description and evaluation of habitat. In the event of a high intensity wildfire, this current goshawk habitat in untreated stands, because of the high densities and multi-strata conditions, would likely incur substantial mortality and no longer be able to function as goshawk habitat. In treated stands with reduced densities, it is less likely that stand replacement would occur and goshawk habitat would remain, though at possibly reduced densities. The effect of such disturbances on crown closure in the long term is dependent on the type, severity and extent of the event(s).

**Direct and Indirect Effects of Alternative 4**

This alternative would not commercially treat any stands within goshawk post fledging areas. Only noncommercial thinning, grapple piling and prescribed fire would occur. Stand level residual basal area, canopy closure and clumpiness would remain high. Treated areas would retain a higher basal area and level of interlocking crowns and dense patches than would occur under Alternative 2 or 3. Opportunities to enhance goshawk habitat development or longevity or overstory trees are limited under this alternative due to restricted ability to reduce stocking levels in trees greater than 9 inches dbh. There would be a marginal improvement in growth rates that would last five to fifteen years in the smaller diameter trees. The effects of the combined treatments (including fuel treatments) would slightly reduce the risk of loss of the residual forest canopy due to high intensity fire over the next 20-30 years but would be the least effective of the action alternatives. Approximately 2,800 acres with high stocking levels would remain untreated (also containing multiple canopies, clumpiness, and intermingling branches).

**Table 3-9. Acres of Treatment within Goshawk Post Fledging Areas (Alternative 4)**

Site Number	Existing Acres	Harvest and other Treatment (acres)	% Harvest	Noncommercial Thinning and Fuels Treatments (acres)	Prescribed Burning (acres)	Total area Treated (acres and %)	
0937 PFA	418	0	0	3	302	305	50-75
0938 PFA	402	0	0	121	198	319	75-99
0940 PFA	355	0	0	0	1	1	0
0941 PFA	398	0	0	165	94	259	50-75
0944 PFA	439	0	0	58	0	58	1-25
5028 PFA	480	0	0	123	132	255	50-75
5029 PFA	417	0	0	43	39	82	1-25
5030 PFA	418	0	0	325	3	328	75-99
5031 PFA	404	0	0	0	0	0	0
5032 PFA	408	0	0	0	0	0	0
5081 PFA	392	0	0	116	28	144	25-50
5082 PFA	446	0	0	141	115	256	50-75
5084 PFA	418	0	0	214	200	414	75-99
5091 PFA	421	0	0	40	0	40	1-25
5107 PFA	406	0	0	310	0	310	75-99
<b>Totals</b>	<b>5,817</b>	<b>0</b>	<b>0</b>	<b>1,659</b>	<b>1,112</b>	<b>2,771</b>	<b>44</b>

This alternative would maintain the suitability of habitat for nesting within 12 of the 15 PFAs in the project area, and would not harvest any acres within the PFAs. This alternative treats more than 75 percent of the acres within three existing occupied territories, creating the potential for impacts to suitability of these PFAs for occupancy in the short term. This alternative has the potential for short term displacement of three goshawk pairs due to the amount of treatments proposed. Recovery of crown closure would occur relatively soon under this alternative, and these three territories should return to full suitability within 20 years.

Growth and development of large trees would be less than in the other action alternatives due to higher residual basal area across the project area. The effects of reduced density on stand growth and vigor would fade relatively quickly under this alternative. Untreated portions of PFAs would have a range of densities, diameter distributions and crown closures. This alternative would not reduce the suitability of habitat for nesting through treatment of midstory and co-

dominant trees (commercial harvest) within the PFAs. However, the prescription for noncommercial thinning allows cutting of trees up to 12 inches dbh. This could yield enough canopy removal to result in short term reduction in the suitability of habitat for nesting on 1,659 acres within the PFAs (26% of the total PFA acres). These thinned acres represent approximately 9 percent of the suitable goshawk habitat in the project area. Total treatments in this alternative (noncommercial thinning and prescribed burning) occur on 2,771 acres, 19 percent of the suitable goshawk habitat in the project area.

#### **Cumulative Effects of Alternative 4**

Past management activities' impacts would be the same as Alternative 2.

On private, forested land within or adjacent to the project area, past timber management has reduced the abundance of overstory trees, snags, and large down logs. These actions have limited the suitability of these timberlands for occupancy by nesting goshawk. However, due to the proximity of goshawks nesting on NFS lands, goshawks may forage on privately-owned forests with sufficient forest canopy. Goshawk PFAs have only been mapped within the National Forest boundary; therefore, some of the PFAs are less contiguous, or less concentric around the nest stand than they might be if they were not adjacent to private land.

The Sherwood prescribed burn of 1,300 acres authorized under a separate decision, primarily within the Hammer Creek Wildlife and Recreation management area would be implemented calendar years 2004 and 2005. The project occurs within PFA 0940. The Sherwood prescribed burn includes measures to reduce the potential for disturbance to nesting goshawks and to retain large diameter trees and structural diversity with the PFA.

There are no other reasonably foreseeable future activities (including livestock grazing) that would affect goshawk habitat within the project area. The effects of previous management activities, such as timber harvest, have been incorporated into the existing condition description and evaluation of habitat. In the event of a high intensity wildfire, this current goshawk habitat in untreated stands, because of the high densities and multi-strata conditions, would likely incur substantial mortality and no longer be able to function as goshawk habitat and closely approximates the possible effects of Alternative 1. In the event of a high intensity wildfire, this current goshawk habitat in untreated stands, because of the high densities and multi-strata conditions, would likely incur substantial mortality and no longer be able to function as goshawk habitat. In treated stands with reduced densities in the smaller diameter trees, it is still likely that stand replacement would occur and goshawk habitat would not remain. The effect of such disturbances on crown closure in the long term is dependent on the type, severity and extent of the event(s).

#### **Issue 1D. Elk Habitat Effectiveness, Security, and Calving Habitat**

There is a concern that commercial harvest, thinning, and fuels reduction activities would have a detrimental impact on elk, including Habitat Effectiveness Index (HEI), security cover, and calving habitat within the project area. Satisfactory thermal cover is defined as at least 70 percent canopy closure on 40 foot tall trees. Marginal cover is defined as 40 percent canopy closure. Elk security habitat is defined as areas having a road density of less than 2 miles of open road per square mile. The changes to elk habitat will be measured by (1) HEI for selected Management Areas; (2) amount of satisfactory and marginal cover treated and resultant condition; (3) amount of elk calving areas treated and resultant condition; and (4) amount of elk security habitat treated and resultant condition.

#### **Affected Environment**

Long-term records indicate that elk were absent from the Ochoco National Forest in 1936 (Bailey 1936). Anecdotal information indicates elk did inhabit the Ochoco National Forest in the mid to late 1800's but were probably extirpated by over-hunting and habitat losses due to heavy grazing pressure. Since that time, elk populations have made steady increases in populations and are found throughout the Ochoco National Forest. Further information regarding Oregon Department of Fish and Wildlife management unit goals can be found in the Wildlife Report and is incorporated by reference. The population dynamics exhibited on the National Forest are influenced by hunting pressure and adjacent land management, and are not exclusively determined by habitat conditions on the National Forest. Habitat conditions may not be the primary factor limiting elk populations on the Ochoco National Forest.

Mortality rates due to hunting and disturbance to animals on the public land are factors that also limit the elk population on the National Forest. Bull/cow ratios are most significantly affected by hunting activities and it is hard to determine the effect from management activities. However, the abundance, quality, and distribution of escapement cover and the density of open roads are factors that likely affect survival of animals during hunting seasons.

The HEI for elk was used to analyze and describe the existing habitat condition within the West Maury project area, and the effects of the alternatives. HEI is the total habitat effectiveness for the project area and includes variables for cover quality and quantity along with open road density. Table 3-10 displays percent cover, road density, overall HEI value and the goal for each management area for which standards apply. Percent cover is the percent of the management area within the project area in marginal and satisfactory thermal cover combined.

Because of the importance of open road density in determining use of areas by elk, this analysis includes evaluation of impacts to security habitat. For this analysis, security habitat is as areas that have an open road density of less than 2 miles per square mile. Potential impacts to mapped elk calving areas are also described. Elk calving areas were mapped prior to this analysis, and include areas with known use by elk during calving season, or expected use based on habitat conditions.

### **Direct, Indirect, and Cumulative Effects of No Action**

No satisfactory cover or marginal cover would be treated under this alternative, and no roads would be closed. Percent cover and HEI would remain at the current levels for a period of time. The percent cover would increase over time with the gradual development of additional cover as the canopy of untreated stands continue to close. At the same time the development of understory vegetation would gradually increase the risk of future loss of cover to fire, insects and disease. The year-round open road density is expected to remain at approximately the current level. The winter open road density is expected to remain at current density of 1.45 miles/square mile in general Forest Winter Range and 0.43 miles/square mile in Hammer Creek Wildlife and Recreation Area. General Forest road density would not be reduced, and would remain at 2.59 miles/square mile.

This alternative would maintain the current condition of all existing habitat for big game animals, including elk, in the short term. Stands that currently provide marginal cover would continue to close in and over time more satisfactory (thermal) cover would develop as canopy closure increases. This would improve the cover quality index. The cover quantity index (% cover) would not be improved under this alternative. Over time, forage would become more limiting as stands close and the deviation of forage to cover ratios from what is thought to be optimal (60% forage to 40% cover) would increase. This would correspond to a continual decrease in the cover quantity index. The road density would not be reduced under this alternative and the road density indices would not be improved. There would be no initial increase in HEI in any management area, and HEI is expected to continually decrease until one or more disturbance events restore forage availability and abundance.

There is a 1,300 acre wildlife burn planned for the Sherwood Creek drainage, scheduled for 2004 and 2005. This burn would reduce surface fuels and seedlings and saplings, and improve wildlife forage by stimulating the growth of grass, forb, and shrub species. The objective of the project is to enhance big game forage while retaining current cover acres. This would increase the palatability and forage production for several years after the burn.

Livestock grazing would not alter the components of elk cover or security habitat. Livestock grazing would not alter the amount of acres calculated in the cover to forage ratios in the HEI model. Livestock grazing does have an impact on the amount of available forage and could alter the forage availability and quality. Livestock grazing would reduce the biomass of available forage and may also improve the palatability of the forage by repeatedly stimulating in new growth and by removing dead and dying growth. With utilization standards being met, grazing would result in re-sprouting of new vegetation later in the season, dependent on precipitation amounts, and also encourage higher quality forage later in the season. In the Maurys, elk habitually utilize the lower elevation private land pastures where forage is plentiful. Available forage, especially in the upland areas, would not be a limiting factor for elk populations even with livestock grazing within the project area. This alternative would not reduce cover or improve forage on NFS lands, and should not alter trends in the use of private land by elk.

This alternative would not result in disturbance to elk from human activity associated with project implementation. Cover within elk security habitat would be retained until natural disturbance reduces it. Elk calving habitat would continue the trend of increasing density of coniferous cover and decreasing condition of riparian hardwoods and other forage species. However, it would also continue to the trend of decreasing conditions of riparian hardwoods and other forage species which are additional habitat components of calving areas.

**Table 3-10. Existing Cover, Road Density and HEI Values**

Management Area (MA)	Cover % of MA	Road Density mi./sq. mi	HEI	HEI Goal (2nd Decade)
General Forest	56	2.59	35	28
General Forest Winter Range	54	1.45	49	6
Hammer Creek WL and Rec	74	0.43	46	6

**Direct and Indirect Effects of Alternatives 2, 3, and 4 (Prescribed burning only)**

Action alternatives would implement prescribed natural fuels burning in satisfactory and marginal cover. It is anticipated that canopy closure would not be measurably reduced by underburning alone. Prescribed burning would increase the palatability and production of forage for several years after the burn. Canopy closure reductions that would result in changes to cover are expected to be the result of harvest or thinning treatments. The effects of the action alternatives would be the reduction of existing cover primarily through harvest and thinning treatments, not with prescribed burning.

**Direct and Indirect Effects of Alternative 2**

Within General Forest, this alternative would reduce satisfactory cover by 885 acres and reduce marginal cover by 2,557 acres. Total cover acres in General Forest would be reduced by 3,442 acres, resulting in 20 percent reduction in percent cover. The net result is a 6 percent improvement in the cover quantity index and no change to the cover quality index. Within General Forest Winter Range, this alternative would reduce satisfactory cover by 218 acres, and reduce marginal cover by 1,040 acres. Total cover acres in General Forest Winter Range would be reduced by 1,258 acres, resulting in a 20 percent reduction in percent cover. The net result is a 2 percent decrease in the cover quantity index and no change to the cover quality index. Within Hammer Creek Wildlife and Recreation area, this alternative would reduce satisfactory cover by 11 acres, and reduces marginal cover by 14 acres. Total cover acres in the Hammer Creek area would be reduced by 25 acres, resulting in no decrease of percent cover and no change to the cover quantity or quality indices.

Alternative 2 would reduce open road density within General Forest (MA-F22) from 2.59 to 2.33 miles/square mile and would reduce open road density within General Forest Winter Range (MA-F21) from 1.45 to 1.29 miles/square mile. This improves the road density index by 5 percent in General Forest and by 3 percent in General Forest Winter Range. The road density would remain 0.44 miles/square mile in the Hammer Creek Wildlife and Recreation Area. Combined with the cover effects described above, HEI would be increased from 35 to 42 in General Forest, increased from 49 to 51 in General Forest Winter Range. There would be no change to HEI in the Hammer Creek Wildlife and Recreation Area.

This alternative would commercially harvest 846 acres within elk calving areas, non-commercially thin 363 acres, burn natural fuels on 190 acres within mapped elk calving areas. These, and associated treatments would be seasonally restricted from May 15 to June 30.

Areas with a road density of less than 2 miles/square mile have been identified as potential elk security habitat. This alternative commercially harvests 435 acres in elk security habitat. This alternative proposes non-commercial thinning in 447 acres, and natural fuels burning in 394 acres in elk security habitat.

This alternative would alter the current condition of habitat for big game animals, including elk. Acreage of stands that currently provide marginal and satisfactory cover would be reduced in General Forest and General Forest Winter Range management areas. The percentage of total cover comprised of satisfactory cover would be reduced; however, the cover quality index would not change. The cover quantity index (% cover) would be improved under

this alternative in General Forest, but would be reduced in General Forest Winter Range. Forage to cover ratios would be closer to optimal (60% forage to 40% cover) in General Forest, but further from optimal in General Forest Winter Range. The road density would be reduced under this alternative and the road density indices would be improved in General Forest and General Forest Winter Range. There would be an initial increase in HEI in General Forest and General Forest Winter Range.

This alternative could result in disturbance to elk from human activity associated with project implementation. Cover within elk security habitat would be reduced on up to 23 percent of the elk security area. Elk calving habitat would be treated (39% of the area) to reduce density of coniferous cover which could improve the condition of riparian hardwoods and other forage species where they occur, but it would also reduce security cover for animals using the calving areas. This could result in displacement of elk to private lands during periods of high human use on NFS lands. Therefore, there is some potential for increased damage to crops and fences on private lands. However, this alternative increases forage availability on NFS lands, which could attract elk to the Forest during periods of lessened human use, or to areas with limited access on federally managed lands.

Restrictions on disturbance activities would be restricted within General Forest Winter Range and Hammer Creek Wildlife and Recreation Area as described in the Design Criteria and Resource Protection Measures in Chapter 2. Within General Forest, work would be restricted on roads that are closed during the annual winter range seasonal closure.

Table 3-11 summarize the types and acres of treatments by alternative.

**Table 3-11. Summary of Acres of Treatment in Elk Security and Calving Habitat by Alternative**

Treatments	Alternative 2		Alternative 3		Alternative 4	
	Security Habitat	Calving Habitat	Security Habitat	Calving Habitat	Security Habitat	Calving Habitat
Existing Acres	3,410	3,599	3,410	3,599	3,410	3,599
Commercial Harvest	435	846	73	629	0	0
Noncommercial thinning and Associated Treatments	447	363	412	236	880	1,039
Prescribed Burning	394	190	267	190	396	191
<b>Totals</b>	<b>1,276</b>	<b>1,399</b>	<b>752</b>	<b>1,055</b>	<b>1,276</b>	<b>1,230</b>

### Direct and Indirect Effects of Alternative 3

Alternative 3 would not treat any stands that currently provide high quality cover in stands with canopy closures above 70 percent.

Within General Forest, this alternative would reduce satisfactory cover by 482 acres and reduce marginal cover by 2,270 acres. Total cover acres in GF would be reduced by 2,752 acres, resulting in a 12 percent reduction in percent cover. The net result is an 8 percent improvement in the cover quantity index and no change to the cover quality index. Within General Forest Winter Range, this alternative would reduce satisfactory cover by 102 acres, and would reduce marginal cover by 983 acres. Total cover acres in General Forest Winter Range would be reduced by 1,085 acres, resulting in 17 percent reduction in percent cover. The net result is a 2 percent improvement in the cover quantity index and no change to the cover quality index. Within Hammer Creek Wildlife and Recreation area, this alternative would reduce satisfactory cover by 5 acres, and reduce marginal cover by 7 acres. Total cover acres in Hammer Creek area would be reduced by 12 acres, resulting in no change to percent cover and no change to the cover quantity or quality indices.

Alternative 3 would reduce open road density within General Forest (MA-F22) from 2.59 to 2.33 miles/square mile, and would reduce open road density within General Forest Winter Range (MA-F21) from 1.45 to 1.35 miles/square mile. This improves the road density index by 5 percent in General Forest and by 2 percent in General Forest Winter Range. The road density within the Hammer Creek Wildlife and Recreation Area would not change and

would remain at 0.43 miles per square mile. Within General Forest, road work would not be restricted except on roads that are accessed through winter range on roads that are not designated open during the seasonal closure. Road density improvements combined with the cover effects described above, result in HEI being increased from 35 to 43 in General Forest, and increased from 49 to 52 in General Forest Winter Range. The HEI would not change within the Hammer Creek Wildlife and Recreation Area.

This alternative would commercially harvest 629 acres within elk calving areas, non-commercially thin 236 acres, burn natural fuels on 190 acres within mapped elk calving areas. These, and associated treatments would be seasonally restricted from May 15 to June 30.

Areas with a road density of less than 2 miles/square mile have been identified as potential elk security habitat. This alternative commercially harvests 73 acres in elk security habitat. This alternative proposes non-commercial thinning in 412 acres, and natural fuels burning in 267 acres in elk security habitat.

This alternative would alter the current condition of habitat for big game animals, including elk. Acreage of stands that currently provide marginal and satisfactory cover would be reduced (in GF and GFWR). In GF and GFWR the percentage of total cover comprised of satisfactory cover would be reduced; however, the cover quality index would not change. The cover quantity index (% cover) would be improved under this alternative in GF and in GFWR. Forage to cover ratios would be optimal (60% forage to 40% cover) in GF and near optimal in GFWR. The road density would be reduced under this alternative and the road density indices would be improved in GF and GFWR. There would be an initial increase in HEI in GF and GFWR.

This alternative could result in disturbance to elk from human activity associated with project implementation. Cover within elk security habitat would be reduced on up to 9% of the elk security area. Elk calving habitat would be treated (29% of the area) to reduce density of coniferous cover which could improve the condition of riparian hardwoods and other forage species where they occur, but it would also reduce security cover for animals using the calving areas. This could result in displacement of elk to private lands during periods of high human use on NFS lands. There is some potential for increased damage to crops and fences on private lands. However, this alternative increases forage availability on NFS lands, which could attract elk during periods of low human use, or to areas with limited access to NFS lands.

Restrictions on disturbance activities would be restricted within General Forest Winter Range and Hammer Creek Wildlife and Recreation Area as described in the Design Criteria and Resource Protection Measures in Chapter 2. Within General Forest, work would be restricted on roads that are closed during the annual winter range seasonal closure.

#### **Direct and Indirect Effects of Alternative 4**

Within General Forest, this alternative would reduce satisfactory cover by 885 acres and reduce marginal cover by 1,672 acres. Total cover acres in General Forest would be reduced by 2,557 acres, resulting in 11 percent reduction in percent cover. The net result is an 8 percent improvement in the cover quantity index and no change to the cover quality index. Within General Forest Winter Range, this alternative would reduce satisfactory cover by 218 acres, and reduce marginal cover by 822 acres. Total cover acres in General Forest Winter Range would be reduced by 1,040 acres, resulting in a 17 percent reduction in percent cover. The net result is a 2 percent increase in the cover quantity index and no change to the cover quality index. Within Hammer Creek Wildlife and Recreation area, this alternative would reduce satisfactory cover by 11 acres, and reduces marginal cover by 3 acres. Total cover acres in Hammer Creek area would be reduced by 14 acres, resulting in no decrease of percent cover and no change to the cover quantity or quality indices.

Alternative 4 would not reduce open road density within General Forest or General Forest Winter Range. This alternative would not improve the road density indices in either allocation. Based on the cover effects described above, HEI would be increased from 35 to 38 in General Forest, increased from 49 to 50 in General Forest Winter Range. The HEI for the Hammer Creek Wildlife and Recreation Area would not change.

Seasonal restriction on harvest, thinning, fuels and related activities would be implemented between December 1 and May 1 in General Forest Winter Range and in Winter Range management areas. Within winter range road



construction, reconstruction and inactivation would be restricted between December 1 and May 1 of each year. Within General Forest, road work would not be restricted except on roads that are accessed through winter range on roads that are not designated open during the seasonal closure.

This alternative would not commercially harvest any acres within elk calving areas, but would non-commercially thin 1,039 acres, burn natural fuels on 191 acres within mapped elk calving areas. These, and associated treatments would be seasonally restricted from May 15 to June 30.

Areas with a road density of less than 2 miles/square mile have been identified as potential elk security habitat. This alternative would not commercially harvest any acres in elk security habitat. This alternative proposes non-commercial thinning in 880 acres, and natural fuels burning in 396 acres in elk security habitat.

Table 3-12 summarizes the current acres and acres treated by alternative and the resulting amounts of cover and road densities by management area.

**Table 3-12. Alternative Comparison of Elk Habitat Effectiveness, Security Habitat, and Calving Habitat**

	Goal	Existing Condition		Alt. 2 Treatments	Alt. 3 Treatments	Alt. 4 Treatments
<b>General Forest (Summer Range)</b>						
Cover (acres)		Marginal	11,032	2,557	2,270	1,672
		Satisfactory	2,131	885	482	885
		Totals	13,163	3,442	2,752	2,557
Cover (acres) after Treatment		13,163		9,721	10,411	10,606
Open Road Density (mi. / sq. mi.)	3.0	2.59		2.33	2.33	2.59
Percent Cover	15	56		36	44	45
HEI Value	28	35		42	43	38
<b>General Forest Winter Range</b>						
Cover (acres)		Marginal	3,045	1,040	983	822
		Satisfactory	428	218	102	218
		Total	3,473	1,258	1,085	1,040
Cover (acres) after Treatment		3,473		2,215	2,388	2,433
Open Road Density (mi. / sq. mi.)	Winter – 1.0 Summer – 3.0	1.45		1.29	1.35	1.45
Percent Cover	7	54		34	37	37
HEI Value	6	49		51	52	50
<b>Hammer Creek Wildlife and Recreation Area</b>						
Cover (acres)		Marginal	1,364	14	7	3
		Satisfactory	539	11	5	11
		Total	1,903	25	12	14
Cover (acres) after Treatment		1,903		1,878	1,891	1,889
Open Road Density (mi. / sq. mi.)	Winter – 1.0 Summer – 3.0	0.43		0.43	0.43	0.43
Percent Cover	8	74		74	74	74
HEI Value	6	46		46	46	46
<b>Calving and Security Habitat</b>						
Calving Habitat (acres)		3,599		1,399	1,055	1,230
Security Habitat (acres)		3,410		1,276	752	1,276

This alternative would alter the current condition of habitat for big game animals, including elk. Acreage of stands that currently provide marginal and satisfactory cover would be reduced in General Forest and General Forest Winter Range. The percentage of total cover comprised of satisfactory cover would be reduced; however, the cover quality index would not change. The cover quantity index (% cover) would be improved under this alternative in both General Forest and General Forest Winter Range. Forage to cover ratios would be optimal in General Forest

and closer to optimal (60% forage to 40% cover) in General Forest Winter Range compared to Alternative 1. The road density would be reduced under this alternative and the road density indices would be improved in General Forest and General Forest Winter Range. There would be an initial increase in HEI in General Forest and General Forest Winter Range.

This alternative could result in disturbance to elk from human activity associated with project implementation. Cover within elk security habitat would be reduced on up to 14 percent of the elk security area. Elk calving habitat would be treated (39% of the area) to reduce density of coniferous cover which could improve the condition of riparian hardwoods and other forage species where they occur, but it would also reduce security cover for animals using the calving areas. This could result in displacement of elk to private lands during periods of high human use on NFS lands. There is some potential for increased damage to crops and fences on private lands. However, this alternative increases forage availability on NFS lands, which could attract elk to the Forest during periods of low human use on NFS lands.

### **Cumulative Effects of Alternatives 2, 3, and 4**

There is a 1,300-acre wildlife burn planned for the Sherwood Creek drainage, scheduled for 2004 and 2005. This burn would reduce surface fuels and seedlings and saplings, and improve wildlife forage by stimulating the growth of grass, forb, and shrub species. The objective of the project is to enhance big game forage while retaining current cover acres. This would increase the palatability and forage production for several years after the burn.

Livestock grazing would not alter the components of elk cover or security habitat because grazing does not affect conifer cover. Livestock grazing would not alter the amount of acres calculated in the cover to forage ratios in the HEI model. The acres would still provide cover or forage. Livestock grazing reduces the amount of forage and may improve the palatability of the forage by repeatedly removing dead and dying growth and stimulating new growth. With utilization standards being met, grazing would result in re-sprouting of new vegetation later in the season, dependent on precipitation, and also encourage higher quality forage later in the season. In the Maurys, elk frequently utilize the lower elevation private land pastures where forage is more palatable. Available forage, especially in the upland areas, would not be a limiting factor for elk populations even with livestock grazing.

On the majority of the privately owned timberland, large overstory trees have been removed through past timber harvest. This has reduced satisfactory cover on private lands in the project area. On the other hand, many second growth or residual stands (left over from overstory removal) and juniper stands have not been thinned on private land resulting in marginal cover in those areas. Where intensive timber management and/or juniper removal has occurred on private lands, forage is available to big game as well as livestock. On private lands, hay cropping provides seasonal forage areas of high quality. Private land access restrictions often provide more security to big game than the adjacent public lands.

Past management practices in the project area have been incorporated into the analysis of the current conditions of marginal and satisfactory cover, elk security habitat, elk calving habitat, and road densities. Past timber harvest in the project area removed cover through regeneration, overstory removal, and intermediate timber harvest treatments. There are no other current or planned vegetation management activities in the project area that would impact elk habitat.

### **Issue 1E. Old Growth Management Areas**

Fuels reduction treatments (prescribed fire) within two Old Growth Management Areas and all types of treatments in adjacent pileated woodpecker feeding areas would reduce stand densities and may reduce the effectiveness of the old growth management area and the adjacent pileated woodpecker feeding areas. Pileated woodpeckers are a management indicator species (MIS) for the Old Growth Management Areas on the Ochoco National Forest. The changes to Old Growth Management areas and pileated woodpecker feeding areas will be measured by (1) the acres of Old Growth Management Area treated, and (2) the acres of pileated woodpecker feeding habitat treated and the resulting description of stand structure and composition. This section first describes effects within the old growth management areas and then describes effects within the pileated woodpecker feeding habitat areas.

## **Affected Environment**

There are two Old Growth Management Areas within the project area that would be left untreated. The Sanford Spring area (OG-D3-11, 293 acres) has lower density, low surface fuel levels and currently healthy stand conditions. The allocated old growth area in Hammer Creek (OG-D3-08, 510 acres) is very dense and at high risk to insect and fire disturbance. Much of this area meets the LOS criterion for large trees. Historically, a range of density conditions occurred in late and old structure and maintaining some dense stands is appropriate.

OG-D3-09 (283 acres) located in Friday Creek contains a mosaic of site potential ranging from juniper woodland to Douglas-fir. A small patch of late and old structure is present on the east side in Douglas-fir PAG. The remaining area has variable species composition and structure but does not contain sufficient large trees to meet the LOS criterion. The area contains both multi-strata and single-strata canopy conditions. Stocking of seedling, sapling and poles is reduced due to early 1980s thinning. This has resulted in reduced ladder fuels but excessive surface fuels. The site potential for the area is low and would not support the stand densities needed for pileated woodpeckers in the long-term. Stocking is still high for the site potential with the result that growth is slow and trees are susceptible to bark beetle mortality. Loss of large trees would probably occur before additional trees grow larger than 21 inches. An active goshawk nest is located on the northern edge near Friday Creek. Much of the area has been designated as goshawk post fledging habitat.

OG-D3-12 (285 acres) is located in the Florida Creek drainage. Site potential has been identified as mostly dry grand fir and Douglas-fir. The overstory is a mixture of ponderosa pine and Douglas-fir. Small patches meeting the LOS criterion for large trees occur within this allocated Old Growth Management Area. This stand is very dense with three well-defined canopy layers. Due to the existing high density, mortality of large trees has been increasing in recent years. Surface fuel loading is variable but overall high levels coupled with ladder fuels create high fire hazard. Fire ignition within this area during hot, dry, and windy conditions would be difficult to stop and would result in loss of old-growth habitat.

### **Direct, Indirect, and Cumulative Effects of Alternatives 1, 3, and 4**

No prescribed fire or other activity would occur in any allocated old growth area. Fuel loadings would continue to increase and the consequent hazard would remain. This action would maintain the existing acres of fir-dominated understories and canopy closure, at least in the short term. Lack of treatment of the understory in these stands would perpetuate development of fir understory conditions with a positive effect on the pileated woodpecker habitat abundance and quality. Over time, high stand densities may lead to declining stand health due to insects and disease, although this may also benefit the pileated woodpecker by increasing its foraging base. Extensive mortality due to insects and disease could also increase the risk of high intensity fire in the future. The effect of such disturbances on pileated woodpecker habitat in the long term is dependent on the type, severity and extent of the event(s). Loss of vigor and resulting mortality would increase with no net increase in LOS. The potential for loss of three of the allocated old growth stands (all except Sanford Spring) to fire during extreme weather is high. There are no other current or reasonably foreseeable future activities that would impact the characteristics of Old Growth Management Area in the project area. Continued livestock grazing would not change coarse woody debris or snag levels and would not change large or small diameter tree densities. Therefore, grazing would not have an impact on pileated woodpecker habitat within old growth management areas.

### **Direct, Indirect, and Cumulative Effects of Alternative 2**

Prescribed fire would reduce small surface fuels and stocking of seedlings and saplings. The prescription would maintain large down wood, large trees, and snags and would reduce disturbance to the nesting goshawk in Friday Creek (OG-D3-09) by being conducted outside of the nesting and fledging season. Due to existing stand densities and the long interval since the last underburn, there is some risk of damage to individual large trees and small groups of trees. This is not expected to result in the loss of old growth attributes that currently exist. Mortality of individual understory trees would slightly improve overall growth conditions of remaining trees. Pileated woodpecker reproductive habitat would be managed at minimum levels because of the low site productivity and the subsequent reduction in small diameter trees contributing to closed canopy levels.

More mortality from prescribed fire would be expected in Florida Creek (OG-D3-12) in comparison with Friday Creek due to the higher density and larger amount of excess seedling, saplings and poles. This would result in an immediate reduction in surface fuels only to be replaced when the fire-killed trees fall. In studies of similar stand conditions it was found that a single prescribed burn would not reduce long-term fire hazard but would need to be followed by additional treatments. Only one treatment is authorized under this alternative.

The prescribed burn activities would not alter the area from its original intent of providing old growth habitat for dependent species. However, the prescribed burning would reduce small diameter trees needed to provide the multi-canopy layers desired in reproductive habitat for pileated woodpeckers. However, natural fire played a role in these ecosystems and returning fire would provide an opportunity for more natural processes and functions to occur within the old growth management area.

Table 3-13 displays the proposed treatments within the Old Growth Management Areas.

**Table 3-13. Prescribed Fire Treated Acres by Old Growth Management Area**

Old Growth Management Area	Total Acres	Prescribed Burning acreage		
		Alternative 2	Alternative 3	Alternative 4
Sanford Spring (OG-D3-11)	293	0	0	0
Hammer Creek (OG-D3-08)	509	0	0	0
Friday Creek (OG-D3-09)	283	239	0	0
Florida Creek (OG-D3-12)	285	282	0	0
<b>Total</b>	<b>1370</b>	<b>521</b>	<b>0</b>	<b>0</b>

### Forest Plan Amendment

The implementation of Alternative 2 would require a Forest Plan amendment. Current direction is contradictory. The Forest Plan describes that prescribed fire would normally not be applied in old growth, but where it can be supported by research, directives and desired condition, it can be utilized following appropriate environmental analysis (Forest Plan, p. 4-136). Additionally, when unacceptable damage to resources on adjacent lands or to the old growth resource could occur from insects or diseases, prescribed fire may be used to reduce stand densities and competition that will increase the resiliency of residual large diameter trees (Forest Plan, p.4-152). However, under habitat management, the Forest Plan (p. 4-251) states that vegetation management would not be allowed until further research is available on the needs of the dependent species.

In two of the old growth areas (Friday Creek and Florida Creek), existing high densities of trees in the smaller diameters has created conditions where the mortality in larger trees is threatened because of increased competition among trees. Additionally, surface fuel loadings and ladder fuels create conditions for high fire hazard if a wildfire occurred within or adjacent to the area. During hot, dry and windy conditions, wildfire would be difficult to stop and could result in stand replacement with a loss of old growth habitat.

Prescribed fire treatments are proposed within two Old Growth Management Areas (Friday Creek and Florida Creek) for Alternative 2. Additionally, one old growth management area (Friday Creek) has site conditions that would not support pileated woodpecker habitat in the long term. This site does not have the productive conditions that would promote the multi-canopied stands needed for pileated woodpecker reproductive habitat and also be resistant to insect or disease attacks resulting from overstocked conditions. Alternative 2 would still provide habitat for pileated woodpeckers, but at a minimal level. This old growth area (Friday Creek (OG-D3-09)) is approximately 283 acres in size. Approximately 239 acres would be prescribed burned to reduce fuel loadings and stand densities to reduce competition. Florida Creek (OG-D3-12) would also utilize prescribed fire to reduce fuel loadings and stand densities to provide more assurance of maintaining old growth in the long-term. Approximately 282 acres of the 285 total would be treated in Florida Creek.

Alternative 2 Amendment – Treat using prescribed fire in Friday Creek and Florida Creek in the Old Growth Management Area. This would result in 521 total acres being treated. Both areas would be maintained as pileated woodpecker indicator species habitat, with Friday Creek being capable of providing habitat at minimal levels.

### **Factors to consider**

Timing – The Forest Plan has been in effect since 1989 and is tentatively scheduled to begin the revision process in 2006. These amendments are proposed in the second decade of the plan period and therefore are less likely to be significant. The proposed treatments would take place with the implementation of this alternative within the next 1-5 years.

Location and Size – Alternative 2 – Approximately 521 acres of the Old Growth Management Area would be burned. Activities are designed to promote old growth characteristics and resiliency in the long term and to reduce surface and some ladder fuels to reduce the risk of high-intensity wildfire. All activities retain options for future management of Old Growth Management Areas.

Goals, Objectives, and Outputs – There would be no change in the long-term relationships between the levels of goods and services projected by the Forest Plan and the impacts of implementing the alternative because of the few acres being treated and the objectives of the treatments (to maintain old-growth characteristics over time).

Management Prescription – The amendment applies only to this alternative of this project and would not apply to future decisions within the project area. The amendment applies to a one-time use of prescribed fire in the Florida and Friday Creek Old Growth Management Areas. The amendment does not alter the desired future condition of the land or resources or the anticipated goods and services to be produced because of the small amount of acreage to be treated and that options for future management are being maintained.

## **Pileated Woodpecker Feeding Habitat Area**

The Forest Plan stipulates that an area of 300 acres within a 1,000-acre block surrounding allocated Old Growth Management Areas be established to provide pileated woodpecker feeding habitat.

### **Affected Environment**

Approximately 1,200 acres have been designated as pileated woodpecker feeding habitat associated with each allocated Old Growth area. Forty-two percent (781 acres) of the designated feeding habitat is in the dry grand fir plant association group. The remaining area occurs on Douglas-fir, ponderosa pine, and juniper sites. Two of the allocated Old Growth Management Area blocks are not located in or near dry grand fir sites so the feeding habitat includes ponderosa pine and juniper sites.

The pileated woodpecker prefers closed canopy, late to old-growth, fir-dominated habitat. They prefer stands with old growth, grand fir, abundant snags, down logs, and canopy closures of at least 60 percent. The abundance of snags greater than 20 inches dbh is a good predictor of pileated woodpecker habitat. Pileated woodpeckers favor Douglas-fir and western larch, but use other species as foraging substrate; and snags at least 15 inches dbh are preferred. Pileated woodpeckers also forage on down logs. There is limited records of pileated woodpeckers using the project area. To date, all observations of pileated woodpeckers in the Maurys have been on north facing aspects on grand fir sites.

Historically, it was unlikely that pileated woodpecker feeding habitat would have occurred in concentrated blocks of 300 acres within this landscape. Stand conditions that included the larger structure, late seral species with high canopy closure would have ranged from 583 to 1,249 acres distributed across approximately 25,000 acres in small stands. Approximately six percent (124 acres) of the feeding habitat area currently meets LOS criteria. Hollow grand firs are rare because late seral, large grand fir have not developed in this project area. Some younger stands containing grand fir exhibit low levels of stem disease that may eventually produce hollow trees.

Stand exam data show that 446 acres meet or exceed the desired levels for snags greater than 21 inches dbh and 725 acres meet levels for snags greater than 9 inches. Snag density ranges from 0 to 14.2 dead trees per acre. Snag levels are generally plentiful, ranging up to 6 dead trees per acre larger than 21 inches dbh and up to 20 dead trees per acre between 9 and 21 inches dbh. Juniper steppe, juniper woodland, and non-forest sites (136 acres) would not typically produce pileated woodpecker foraging snags.

Stand basal area ranges from 35 square feet per acre on juniper sites to 146 square feet per acre on mixed conifer sites. Stand structure on most sites is composed of large ponderosa pine and scattered large Douglas-fir over mid-canopy understories of ponderosa pine or mixed conifer.

Stands proposed for treatment are currently at high risk of mortality in the late and old structure due to insect and disease factors. These stands are classed as high-intensity fire regime due to high stand density, multiple canopies, ladder fuels, and high fuel loading.

**Direct, Indirect, and Cumulative Effects of No Action**

No treatments would occur in pileated woodpecker feeding habitat. Stands would continue to increase in densities at a slow rate, risk of mortality would increase as densities increase and trees compete for limited resources, and risk of high-intensity wildfire would increase. Habitat for pileated woodpeckers would be maintained on the existing acres of fir-dominated understories. Current levels of canopy closure would be maintained in the short-term. Lack of treatment of the understory in these stands would perpetuate development of fir understory conditions which increases pileated woodpecker habitat abundance and quality. Over time, high stand densities may lead to declining stand health due to insects and disease, although this may also benefit the pileated woodpecker by increasing its foraging base. Extensive mortality due to insects and disease could also increase the risk of high-intensity fire in the future. The effect of such disturbances on pileated woodpecker habitat in the long term is dependent on the type, severity, and extent of the event(s) but could result in stand replacement with loss of habitat.

There are no additional current or reasonably foreseeable future activities that would have an impact on pileated woodpecker feeding habitat. Livestock grazing would not have an impact on large diameter trees, coarse woody debris, canopy closure or any other components of pileated woodpecker feeding habitat. This alternative would maintain the suitability of all existing habitat for pileated woodpeckers in the short term. Over time, the suitability for nesting is expected to decline on sites that cannot sustain high densities of conifers. As trees on such sites succumb to insect invasion they would provide a foraging substrate for a variety of woodpeckers, including the pileated.

Table 3-14 displays the types and amounts of treatment within the pileated feeding habitat areas.

**Table 3-14. Summary of Treatments in Pileated Woodpecker Feeding Habitat Areas**

Pileated Feeding Habitat		Alternative 2			Alternative 3			Alternative 4	
Site Number	Acres	Harvest	Noncom. Thinning and fuel treatments	Rx Fire	Harvest	Noncom. Thinning and fuel treatments	Rx Fire	Noncom. Thinning and fuel treatments	Rx Fire
D308	302	37	166	0	12	69	0	202	0
D311	328	148	110	4	98	160	4	258	4
D312	301	187	38	22	6	27	0	225	2
D309	303	77	129	11	0	103	11	205	1
<b>Totals</b>	<b>1,234</b>	<b>449</b>	<b>443</b>	<b>37</b>	<b>116</b>	<b>359</b>	<b>15</b>	<b>890</b>	<b>7</b>

**Direct and Indirect Effects of Alternative 2**

With the implementation of this alternative, harvest and related treatments would maintain the longevity of large structure on 449 acres. Treated stands would have a residual basal area between 60 and 90 square feet per acre. Canopy closure would range from 40 to 50 percent with small areas exceeding 50 percent. The harvest prescription calls for preferential retention of ponderosa pine and larch, but grand fir and Douglas-fir would also be retained as individuals or clumps within these stands. Immediately after treatment, the canopy closure may be reduced to less than 50 percent, which would reduce the suitability of these stands as foraging habitat for pileated woodpeckers. Canopy closure is expected to partially recover as trees expand their crowns in response to the release from competition that results from the thinning. Thinning of mid-story trees would promote the development of large

structure trees over time, ultimately providing a source of recruitment for large snags and down logs. Reducing competition from below is also likely to improve the longevity of existing large trees in the overstory. Thus, this treatment could facilitate the development of pileated woodpecker habitat in the long term, but the current habitat suitability (quality) for pileated woodpeckers would be reduced in treated areas.

This alternative also proposes noncommercial thinning (and associated fuels treatment) on an additional 443 acres in the pileated feeding habitat area. Noncommercial and juniper thinning outside of harvest areas but within pileated feeding habitat would occur in the following units: 67, 100, 101.2, 101.2, 118, 193, 212, 372, 379, 398, 458, 472, 510, 557 and 582. Thinning would reduce the density of suppressed trees in the mid and understory. This would reduce susceptibility to invasion by insects, and remove foraging substrate for woodpeckers. However, thinning of these small trees would help to promote the development of larger trees in the stand. Though the treatment would reduce the suitability of stands as habitat for pileated woodpeckers, it could also facilitate the development of higher quality foraging and/or nesting habitat in the long term. The prescription calls for preferential retention of ponderosa pine and larch. Grand fir and Douglas-fir would be retained as individuals or clumps scattered within these stands, especially on north and east facing slopes and in draws.

There would be an additional 37 acres of fuel treatment outside of thinning units within the pileated feeding habitat. Burning would occur in units 94, 380, 403, 412, 415, and 436. This would reduce surface fuels and smaller diameter ladder fuels. Some canopy closure reductions would occur but not to the extent with commercial and noncommercial thinning.

Alternative 2 would maintain the habitat for pileated woodpeckers in untreated stands on 305 acres of pileated feeding habitat area. The habitat suitability for this species would be reduced on the 929 acres treated within pileated feeding habitat area. There is a total of 1,234 acres of pileated feeding habitat area within the project area associated with the allocated Old Growth Management Areas.

Upper Pine Creek area - An area in the upper Pine Creek drainage (General Forest Management Area) would be harvested on 470 acres where current suitable habitat is available for pileated woodpeckers (units 258, 261.2, 282.2, 285, 294, 296, 300, 317, 318, 350, 365, 382, 399, 405, and 410.2). This area is currently being utilized by pileated woodpeckers. There would be 65 acres of noncommercial thinning and associated fuel treatments (units 236, 241, 261.2, 329, and 332). There would be 225 acres of prescribed burning (units 380, 412, and 415). Alternative 2 would reduce the suitability of this habitat for pileated woodpeckers. Alternative 2 is consistent with current direction.

### **Direct and Indirect Effects of Alternative 3**

Grand fir sites with more than 3 trees per acre greater than 21 inches dbh would not be treated in order to maintain existing habitat conditions. Stands with canopy closure greater than 50 percent and basal area greater than 100 square feet would not be treated. Harvest would occur on 116 acres that have less than 3 trees per acres greater than 21 inches. Residual basal area would range from 60 to 70 square feet per acre and canopy closure would be reduced to 40 to 50 percent on treated stands. An area in the upper Pine Creek drainage would not be harvested because suitable habitat is available for pileated woodpeckers (units 258, 261.2, 282.2, 285, 294, 296, 300, 317, 318, 350, 365, 382, 399, 405, and 410.2). This area would provide suitable habitat in the short term, for the low quality pileated woodpecker habitat currently designated at the Friday Creek Old Growth Management Area (OGMA-09). The Pine Creek area provides better habitat for pileated woodpeckers than OGMA-09. The following harvest units overlap pileated feeding habitat: 62, 63.1, 72.1, 126, 136, 139.1, 203, 347, 393, 393.1, 393.2, 563 and 569.

Harvest units within mapped pileated feeding habitat would be marked to retain additional co-dominant fir trees. Stands would be managed for mid-seral species composition on ponderosa pine and Douglas-fir sites. This prescription is designed to promote the development of pileated woodpecker habitat in pileated feeding habitat areas where it does not currently exist, or to maintain it where it is present. The strategy of this alternative would also focus on developing habitat for this species on sites that have the highest potential to sustain higher tree density and mixed species composition (grand fir sites). Sites which are less capable of developing and maintaining habitat for pileated woodpeckers (ponderosa pine and Douglas-fir sites) would not be managed at excessive densities, but would be managed to retain fir along with pine and larch. This would provide foraging opportunities even though nesting/roosting cover would be reduced in these stands.

This alternative also proposes noncommercial thinning (and associated fuels treatment) on an additional 359 acres in the designated pileated feeding habitat areas. Noncommercial or juniper thinning outside of harvest areas but within pileated feeding habitat would occur in the following units: 67, 100, 101.1, 118, 126, 193, 372, 379, 398, 458, 510 and 557. Thinning would reduce the density of suppressed trees in the midstory and understory. This would reduce susceptibility to invasion by insects, and thus remove foraging substrate for woodpeckers. However, thinning of these small trees would help to promote the development of larger trees in the stand. Though the treatment would reduce the suitability of stands as habitat for pileated woodpeckers, it could also facilitate the development of higher quality foraging and/or nesting habitat in the long term.

There would be an additional 15 acres of fuel treatment outside of thinning units within the pileated feeding habitat. This would result in reductions of surface fuels and smaller diameter ladder fuels. Slight canopy closure reductions would occur but not to the extent with commercial and noncommercial thinning.

This alternative would maintain the suitability of habitat for pileated woodpeckers in untreated stands on 744 acres of pileated feeding habitat. The habitat suitability for this species would be reduced, at least in the short term, on 490 acres treated within pileated feeding habitat. There is a total of 1,234 acres of pileated feeding habitat areas within the project area associated with the allocated Old Growth Management Areas.

Upper Pine Creek area - There would be no treatments within this area. Current habitat suitability would be maintained in the short term. There would be no long-term designation of this area as an allocated Old Growth Management Area or as a pileated woodpecker feeding habitat area.

#### **Direct and Indirect Effects of Alternative 4**

No commercial harvest would occur with this alternative but trees 9 inches dbh and smaller would be thinned. Treated stands would remain dense with canopy closure typically remaining above 50 percent.

Commercial harvest prescriptions to promote the development of pileated woodpecker habitat in pileated feeding habitat where it does not currently exist would not be implemented under this alternative. This alternative proposes noncommercial thinning (and associated fuels treatment) on 890 acres in the designated pileated feeding habitat. Noncommercial thinning would reduce the density of suppressed trees in the understory. This would reduce susceptibility to invasion by insects, and thus remove foraging substrate for woodpeckers. Suitable habitat would be retained where it currently exists, though foraging substrate would be reduced. Noncommercial prescriptions would help to move stands that do not currently have optimal conditions for pileated woodpecker feeding habitat toward suitable habitat conditions, but not as rapidly as would occur under Alternative 3. The most rapid response to move stands that do not currently have optimal conditions for pileated woodpecker feeding habitat would be in Alternative 2 where commercial and noncommercial thinning would promote growth. Thinning of these small trees would slightly promote the development of larger trees in the stand. Therefore implementation of this alternative could facilitate the development of higher quality foraging and/or nesting habitat in the long term. The following units are within mapped pileated feeding habitat: 62, 63.1, 72.1, 126, 136, 139.1, 205, 347, 393, 393.1, 393.2 and 563.

There would be an additional 7 acres of fuel treatment outside of thinning units within the pileated feeding habitat area in units 94 and 403. Fuel treatments would be more difficult because stands would still be consistently multi-strata canopies with ladder fuels and ground fuels to treat. Prescribed fire treatments would result in more damage to residual trees because of surface fuel loadings and ladder fuels that would not be removed with commercial thinning operations and subsequent noncommercial thinning activities. However, this would create additional foraging substrate after activities occurred.

This alternative would maintain the current level of suitability of habitat for pileated woodpeckers in untreated stands on 337 acres of pileated feeding habitat. The suitability for this species would be retained, though foraging substrate would be reduced on 897 acres treated within pileated feeding habitat.

Upper Pine Creek area - There would be noncommercial thinning in suitable pileated woodpecker habitat in the upper Pine Creek drainage. This area provide substitute habitat, in the short term, for the low quality pileated woodpecker habitat currently designated at the Friday Creek Old Growth Management Area (OGMA-09). This



noncommercial thinning would not substantially alter the suitability of the area for use by pileated woodpeckers, as overstory canopy closure would be maintained and potential foraging substrate would remain. Though a slightly lesser abundance of foraging substrate would be retained in upper Pine Creek than under Alternatives 1 and 3, the resiliency of the overstory trees would be improved slightly compared to Alternatives 1 and 3 but would be substantially improved in Alternative 2. The following noncommercial thinning units are in upper Pine Creek: 258, 261.2, 282.2, 285, 294, 296, 303, 317, 318, 350, 365, 382, 399, 405 and 410.2.

### **Cumulative Effects of Alternatives 2, 3, and 4**

Alternatives 3 and 4 would maintain the suitability of all existing habitat for pileated woodpeckers in the short term. Over time, the suitability for nesting is expected to decline on sites that cannot sustain high densities of conifer trees. As trees on these sites succumb to insect invasion, they would provide a foraging substrate for a variety of woodpeckers, including pileated woodpeckers. Alternative 2 would provide long-term habitat by reducing competition in the large diameter trees and promoting the development of large diameter trees where they currently do not exist.

Past regeneration, overstory removal, and intermediate harvest treatments have reduced overall suitable pileated woodpecker habitat in the project area. See the Wildlife Report (pp. 16-18) for more specific details on acreage figures by treatment type. In the future, it is expected that thinning treatments would continue to remove true fir from forested stands. The resulting stands would have more pine and larch, more open forest conditions, and single stratum stand structure; historically, these types of stand were more prevalent. This would reduce the quality of pileated woodpecker habitat in the long term, though total reproductive habitat would increase as dominant tree size becomes larger. At the same time, stands that have developed densities and species compositions that are not sustainable due to site capability, would be brought closer to a sustainable level with future management actions. At the project-area scale, the abundance and distribution of pileated woodpecker habitat would move closer to the HRV. Habitat for pileated woodpeckers would be concentrated on sites that are more likely to sustain such stand densities and species distributions, and would be eliminated from sites that are less likely to sustain it in the long term. On privately owned timberland in the project area, past timber management has reduced the abundance of overstory trees, snags, and large down logs. These actions have limited the suitability of these timberlands for occupancy by pileated woodpeckers.

There are no other currently or reasonably foreseeable future activities which would impact pileated feeding habitat area within the project area. Livestock grazing would not have an impact on large diameter trees, coarse woody debris, canopy closure, or any other components of pileated woodpecker feeding habitat. Past activities have been incorporated into the description of the current levels of habitat.

## **Key Issue 2: Water Yield**

Vegetation management can affect water yield by increasing the rate of water delivery to streams. Since peak flows now occur earlier than they did historically, water flow from higher elevations is “flashier” and can coincide with peak flows from lower elevations. Timber harvest and noncommercial vegetation treatment can increase water yields and change the timing of flows.

Stream surveys have identified numerous headcuts in the project area making the streams susceptible to increased flows. Headcuts were treated in Preemption Creek in 2003-2004 and are planned on Rickman Creek in 2005 or 2006. Previously, headcut repair work was accomplished on Klootchman, Gibson, and Newsome Creeks. Newsome and Gibson Creek drainages currently have a high percentage of headcuts indicating that the hydrologic system is not functioning properly. This is likely due to the loss of deciduous streamside vegetation from grazing and past timber harvest with little stream buffering. Reduced vegetative cover in RHCA's leads to increased bank instability and in conjunction with an intense rain event, stream headcutting would occur. Any increase in water yield in these drainages would increase the amount and rate of headcutting. An Equivalent Harvest Area (EHA) value of 20 would indicate little to no potential increase in water yield.

Effects to water yield will be measured by EHA percentages in all watersheds and in Newsome and Gibson Creek drainages.

## Affected Environment

Drainages in the project area normally have peak annual flows in March through April as a result of snowmelt. Peak annual flows as a result of rain-on-snow events in early winter have produced some of the highest flows in the project area over the last 50 years. Peak annual floods can also result from thunderstorms that cause flash floods during the spring and summer. The probability of a flash flood increases as the elevation and precipitation decrease. Forest canopy tends to buffer the intensity of thunderstorms at higher elevations. Peak flows are probably higher than historically due to loss of floodplain storage due to entrenched channels and soil loss, compaction, timber harvest, and road construction. This has been offset somewhat by increased understory canopy cover.

Historically, base flows were probably higher. Prior to European settlement, frequent fires maintained lower evapotranspiration and interception rates and water storage in wetlands and beaver ponds contributed to higher base flows. Stream entrenchment has reduced storage potential in alluvial aquifers. Upland storage has been lost due to road construction, erosion, and compaction. Increases in base flow from removing trees tend to be short term (5 to 10 years) and tend to return to pre-disturbance levels as other vegetation such as grasses and shrubs utilize the increase.

Equivalent Harvest Area (EHA) is used to evaluate the risk to water quality and stream bank stability. The EHA is a model that estimates the area which when harvested (or any treatment which reduces vegetation) produces hydrological effects similar to 1-acre of clearcut. The Forest Plan assigned an EHA threshold of 35 percent to watersheds that flowed into the Crooked River between the Bowman Dam on Prineville Reservoir and the confluence of the North Fork Crooked River. The threshold value identifies the upper limit to determine forest plan consistency. The high incidence of headcuts in the project area indicates that the watersheds are sensitive and a threshold of 25 percent was utilized to identify potential areas of concern, especially in drainages at the subwatershed and drainage scale. The EHA threshold should not be interpreted as a point above which detrimental impacts will occur but as a point above which detrimental impacts may occur, should a 10-year or greater storm or melt event take place (Anderson 1989).

The EHA model was developed to evaluate third, fourth, and fifth field order drainages. Stream order is a term used to characterize the branching of streams from the top of the drainage. A first order stream is an unbranched tributary. Second order streams are initiated by the confluence of two first order streams; third order streams start at the confluence of two second order streams, etc. While the model was developed to evaluate third through fifth order drainages, most of the studies of water yield and peak flow have been based on much smaller (first and second order) drainages (Anderson 1989). Headwater streams are sensitive to increases in flows due to faster delivery of water, less opportunity for channel storage, and greater chance of flow synchronization. Therefore, water yield effects resulting from proposed treatments analyzed by the EHA model should also reflect effects to the second and third order drainages.

The EHA model does not measure direct effects; it is based on the principal that reduced canopy closure would reduce interception and evapotranspiration and would increase snow accumulation. Increases in water yield are nearly always higher on north slopes than on south slopes. Snowmelt rates are dependent on elevation and aspect. At the elevations found in the project area, the snowmelt rate decreases with increases in canopy density, with the reduction being greatest in units with southerly aspects.

It is estimated that about 85 percent of the forested land in the project area has been at least lightly harvested in the past. The model evaluated all timber harvest in the project area over the last 26 years. Overstory removal and regeneration harvest that occurred more than 26 years ago is still affecting water yield, but should have substantially recovered and the effects are less than a 1 percent EHA. This is less than the accuracy of the model and if roads were included, only sections that were in forested plant associations could be evaluated and roads in units would have to be removed from the calculation so the area was not double counted. The primary effects of roads are increased runoff efficiency resulting from extension of the drainage system and erosion from the road surface, cut and fill slopes. Natural fuels treatment normally only kills seedlings and saplings and without connected noncommercial thinning, does not remove enough of the canopy to affect the EHA.

The probability of an event (flood) occurring can be increased by increasing the runoff efficiency of a drainage by road construction, increasing the snow pack through unit size and distribution, increasing snow melt rate through reducing canopy closure, or increasing the amount of water available by removing vegetation. Measurable increases in flow should start showing up when the EHA reaches about 20 percent (Hibbert 1965) and should be roughly proportional to the percentage of the area above that value.

Table 3-15 displays the percentage of forested Plant Association Groups (PAGs) on National Forest System (NFS) and private lands within the affected subwatersheds.

**Table 3-15. Percentage of NFS and Private/Other Lands Within the Project Area**

	Forest Service (acres)*	Private/Other (acres)*
<b>Upper Crooked River Watershed</b>		
Drake Creek Subwatershed	5,632 (94%)	337 (6%)
Twin Buttes Subwatershed	1,493 (96%)	59 (4%)
Pine Creek Subwatershed	5,258 (95%)	270 (5%)
Conant Creek Subwatershed	186 (21%)	696 (79%)
Newsome Creek Subwatershed	9,234 (91%)	876 (9%)
<b>Prineville Reservoir Watershed</b>		
Sanford Creek Subwatershed	716 (31%)	1,606 (69%)
<b>Bear Creek Watershed</b>		
Little Bear Creek Subwatershed	1,160 (72%)	450 (28%)
Upper Bear Creek Subwatershed	1,597 (77%)	478 (23%)
Headwaters Bear Creek Subwatershed	8,924 (92%)	810 (8%)
<b>Camp Creek Watershed</b>		
Indian Creek Subwatershed	4,379 (91%)	427 (8%)

\* Area does not include juniper associations because of the small amount of water yield increase resulting from juniper thinning, the increase in infiltration, the decrease in overland flow, and the decrease in flow volume (Svejcar 2004).

## Direct, Indirect, and Cumulative Effects of No Action

No increase in the cumulative water yield or peak flows would occur as a result of this alternative or additional reasonably foreseeable future actions. EHA from past harvest would continue to recover as canopy cover increases. All watersheds and subwatersheds are at low risk during the period being evaluated except for the Twin Buttes subwatershed, Drake Creek subwatershed, and Headwaters Bear Creek subwatershed. These subwatersheds are at a higher risk due to past timber harvest.

In Newsome and Gibson Creek drainages, vegetation would continue to increase and EHA would continue to decrease. Existing EHA levels are below 20 percent. See Table 3-16 for estimations of EHA into the future based on vegetative recovery.

The majority of the project area has fuel loadings and stand densities that are contributing to the potential high fire intensity. Over time, without disturbance, fuel loading in stands would continue to increase, which would result in a larger risk of high-intensity fire. In the long term, there is potential for indirect effects associated with the higher fuel loadings that would carry a high-intensity wildfire. If a large-scale, high-intensity fire occurs, reductions in ground cover and canopy cover would cause increase the EHA commensurate with the size and intensity of the fire. Water yields would increase with a high probability of increased erosion and subsequent sedimentation. It is difficult to predict the time, or the scale and intensity at which such an event might occur, but it is probable that it would be larger and more intense than what happened historically due to increased ladder fuels and higher fuel loadings.

Cattle would continue grazing in the allotments in the project area. The Forest Service is currently analyzing a proposal to update five Allotment Management Plans (AMPs) in the Maurys. The AMP updates are expected to result in changes to livestock grazing. Upward trends in riparian condition are expected to continue due to changes

in the range utilization standards in the Grazing Implementation Monitoring Module (IIT 2000). These utilization standards are used to determine when livestock are to be removed from pastures. It is expected that proposed changes such as moving water troughs out of riparian areas, fencing or enlarging exclosures at springs, and developing more water sources in the uplands will result in improved channel condition. Livestock grazing has little effect on EHA; their primary influence on EHA is on stream bank condition which is one of the factors used to determine what the channel response will be to changes in flow.

Insect, disease, and wind throw can reduce canopy but the concentration and area impacted are usually small and dispersed in the watersheds in the project area and were not included in the model. Other management activities that remove trees that do not affect EHA are: removing hazard trees from developed campgrounds, removing hazard trees adjacent to system roads, juniper thinning in low precipitation zones, and the Christmas tree program. These activities would not remove enough vegetative cover to cause any increases in water yield.

Future riparian planting and headcut repair activities would occur on Gibson, Klootchman, and West Fork Shotgun Creeks within the project area. The Drake Creek headcut repair activities would occur east of the project area. Riparian planting and headcut repair activities, as with livestock grazing, primarily affect channel stability and influence what the channel response will be to changes in stream flow. Headcut repair activities immediately reduce the risk of higher flows destabilizing the stream channel. Riparian planting provides a longer term, self-maintaining treatment for stabilizing stream channels; however, riparian planting activities are not effective at increasing channel stability until vegetation becomes established which usually takes 4 to 5 years.

There are no other past, present, or reasonably foreseeable future actions that would result in a measurable effect on EHA.

## **Direct and Indirect Effects of Alternative 2**

Commercial treatments and noncommercial thinning would reduce ladder fuels and reduce the number of stands at high risk from insects and disease. Equivalent Harvest Area (EHA) from past harvest would continue to recover. All watersheds and subwatersheds in the project area are at low risk during the period being evaluated except for the Twin Buttes subwatershed, Drake Creek subwatershed, and Headwaters Bear Creek subwatershed listed in Table 3-17 due to past harvest practices. The following watersheds were evaluated at the 25 percent level.

**Twin Buttes Subwatershed** – This subwatershed consists of a number of small drainages that flow directly into the Crooked River. On the National Forest, most of this subwatershed is located east of Drake Creek on Keeney and Tom Vawn Creeks. The area that is in the West Maury Project area is small and is on a drainage that has not had any treatment since the 1960's. With the treatment of unit 18, there would be negligible effects on the Crooked River. Delaying treatment until 2006 would allow the EHA for the subwatershed to fall below 35 percent.

**Drake Creek Subwatershed** – Most of this subwatershed is east of the project area. The subwatershed has high sensitivity based on headcutting. Harvesting the units proposed under this alternative would increase the time the subwatershed was at moderate risk from 1 to 2 years. The EHA for the Shotgun Creek Drainage, which is in the project area, remains below 25 percent in this alternative. The headcut just below the proposed crossing on the 1680-152S4 road on the West Fork of Shotgun Creek and the one below the crossing on the 1680-150 road on the East Fork are the primary concerns.

**Bear Creek Watershed** - Harvesting the units proposed under this alternative would increase the time the watershed was at moderate risk from 0 to 4 years. Until it fills, Antelope Reservoir has a major buffering affect on flows in Beaver Creek. Harvest in the Headwaters Bear Creek Subwatershed is responsible for most of the potential increased flow to the watershed.

**Headwaters Bear Creek Subwatershed** - Harvesting the units proposed under this alternative would increase the time the subwatershed was at high risk to 4 years and moderate risk from 2 to 3 years. Headcuts on Klootchman and Preemption Creek have been treated. Additional headcuts on Klootchman Creek are expected to be treated in 2005 or 2006. Channel stabilization is scheduled on Rickman Creek in the near future. EHA analysis on the Klootchman

Creek Drainage indicates it is at low risk. Until it fills, Antelope Reservoir has a major buffering affect on flows in Beaver Creek.

Newsome Creek and Gibson Creek Drainages – Stream surveys found numerous headcuts in these drainages. Harvest in these drainages in the 1960's has substantially recovered based on growth rates for vegetation. There are several small headcuts on lower Newsome Creek, those that are active are above most of the harvest activity and harvest treatments would not affect the several small headcuts. The active headcut on Gibson Creek just downstream from the 1620-130 road junction would be treated prior to harvest of units 166, 198, 226, 240, and 254. Cross drainage would be installed on the 1620 road across from the headcut, on the drainage coming in from the west in Gibson Creek (section 27 downstream from 1620-140 road). EHA levels for Alternative 2 would be higher than those in Alternatives 3 or 4. EHA levels remain below 20 percent.

The Upper Crooked River, Bear Creek, Camp Creek, and Prineville Reservoir Watersheds are under the Forest Plan EHA threshold of 35 percent. Table 3.16 below shows the changes to the EHA by watershed, by alternative, and by year.

### **Direct and Indirect Effects of Alternative 3**

Commercial treatments and noncommercial thinning would reduce ladder fuels and reduce the number of stands at high risk from insects and disease. EHA from past harvest would continue to recover as canopy cover increases. All watersheds and subwatersheds in the project area are at low risk during the period being evaluated except for the Twin Buttes subwatershed, Drake Creek subwatershed, and Headwaters Bear Creek subwatershed listed in Table 3-17 due to past harvest practices. Effects are similar as Alternative 2 except for the differences described below:

Twin Buttes Subwatershed – Same as Alternative 2.

Drake Creek Subwatershed – Same as Alternative 2.

Bear Creek Watershed – Harvesting the units proposed under this alternative would increase the time the subwatershed was at moderate risk to 2 years. This would be 2 years less than Alternative 2 and 2 years more than Alternative 4. Until it fills, Antelope Reservoir has a major buffering affect on flows in Beaver Creek. Harvest in the Headwaters Bear Creek Subwatershed would be responsible for most of the potential increased flow to the watershed.

Headwaters Bear Creek Subwatershed - Harvest would increase the time the subwatershed was at high risk to 1 year and moderate risk from 2 to 5 years. Due to sensitivity to increased flows, 800 acres of tractor and skyline harvest units were dropped in the Headwaters Bear Creek Subwatershed in Alternative 3. This resulted in a 25 percent reduction in new EHA affects. The following units were dropped: 253, 384, 410.2, 411, 483, 533, 563, 569, 578, 591, 595, 598, and 601. Headcuts on Klootchman and Preemption Creek have been treated. Additional headcuts on Klootchman Creek are expected to be treated in 2005 or 2006. Channel stabilization is scheduled on Rickman Creek in the near future. EHA analysis on the Klootchman Creek Drainage indicates it is at low risk. Until it fills, Antelope Reservoir has a major buffering affect on flows in Beaver Creek.

Newsome Creek and Gibson Creek Drainages – Stream surveys found numerous headcuts in these drainages. Harvest in these drainages in the 1960's has substantially recovered based on growth rates for vegetation. There are several small headcuts on lower Newsome Creek, those that are active are above most of the harvest activity proposed and harvest would not affect the headcuts. The active headcut on Gibson Creek just downstream from the 1620-130 road junction would be treated prior to harvest of units 166, 198, 226, 240 and 254. Cross drainage would be installed on the 1620 road across from the headcut, on the drainage coming in from the west in Gibson Creek (section 27 downstream from 1620-140 road). EHA levels would be slightly lower than levels in Alternative 2 but slightly higher than levels in Alternative 4. EHA levels remain below 20 percent.

The Upper Crooked River, Bear Creek, Camp Creek, and Prineville Reservoir Watersheds are under the Forest Plan EHA threshold of 35 percent.

## Direct and Indirect Effects of Alternative 4

Noncommercial thinning would slightly reduce ladder fuels and slightly reduce the number of stands at high risk from insects and disease. EHA from past harvest would continue to recover as canopy cover increases. All watersheds and subwatersheds in the project area are at low risk during the period being evaluated, except for the Twin Buttes subwatershed, Drake Creek subwatershed, and Headwaters Bear Creek subwatershed listed in Table 3-17 due to past harvest practices. Effects are similar to Alternative 1 except for the differences described below:

Twin Buttes Subwatershed – Same as Alternative 1.

Drake Creek Subwatershed – Same as Alternative 1.

Bear Creek Watershed – Same as Alternative 1.

Headwaters Bear Creek Subwatershed – Noncommercial thinning would increase the time the subwatershed was at moderate risk from 2 years to 3 years. Headcuts on Klootchman and Preemption Creek have been treated. Additional headcuts on Klootchman Creek are expected to be treated in 2005 or 2006. Channel stabilization is scheduled to occur on Rickman Creek in the near future. EHA analysis on the Klootchman Creek Drainage indicates it is at low risk. Until it fills, Antelope Reservoir has a major buffering affect on flows in Beaver Creek.

Newsome Creek and Gibson Creek drainages – Stream surveys found numerous headcuts in these drainages however, noncommercial thinning activities would not result in measurable increased flows. EHA levels remain below 20 percent.

## Cumulative Effects of Alternatives 2, 3, and 4

All watersheds would continue to recover as past harvest areas increase in canopy cover. Stands with high tree densities and high fuel loadings would be treated to reduce the risk of a high-intensity wildfire. Alternative 2 reduces stand density more than Alternatives 3 and 4; therefore, the risk is lower in Alternative 2. It is expected that in the event of a wildfire, the reduction of ladder fuels and less dense stands would contribute to less mortality in large trees and tree canopy cover would not be affected to the extent as in Alternative 1.

Timber harvest (not occurring in Alternative 4) and noncommercial thinning can reduce interception and evapotranspiration, increase snow accumulation, and change snow melt rate and timing. Prescribed fire can reduce interception by burning surface fuels and vegetation; reduce evapotranspiration by killing or burning grasses, shrubs, and small trees; and change the timing and rate of snowmelt. These increases would be partially offset by increased uptake by remaining trees and vegetation. The reduction in interception and evapotranspiration and rate of snowmelt resulting from prescribed spring and fall burning should not result in any measurable increase in flows due to the low intensity of the burn.

Harvest treatments on private lands below the National Forest boundary have been similar to those on the National Forest. The only known harvest currently taking place on private lands in affected subwatersheds is on Sherwood Creek. It is reasonably foreseeable that timber harvest on private land will occur in the future. Based on the projected EHA on Forest Service administered lands, past harvest on private lands, the percent of forested PAGs on private lands, and subwatershed configuration (subwatersheds with multiple tributaries flowing into the Crooked River have less affect than a self contained subwatershed such as Pine Creek), two subwatersheds were determined to be of concern: Sanford Creek and Headwaters Bear Creek. With the maximum EHA on Sanford Creek Forest Service administered land, under any of the action alternatives, at 12.4 percent and mixed ownership below the Forest boundary, there is low risk of enough harvest on private lands occurring to produce a measurable increase in flow before substantial recovery of harvest proposed under the West Maury EIS. While less than 10 percent of the Headwaters Bear Creek Subwatershed is on private land, it is a concern because of projected EHA on the National Forest. There is little likelihood of harvest on the private land at this time because the owner is currently running a guide service on his land.

Riparian planting will not begin stabilizing stream banks for at least 4 to 5 years, until vegetation becomes established.

Livestock would continue grazing in the allotments in the project area. The Forest Service is currently analyzing a proposal to update the five AMPs in the Maurys Mountains area. The AMP updates are expected to result in changes to livestock grazing. Upward trends in riparian condition are expected to continue due to changes in the range utilization standards in the Grazing Implementation Monitoring Module (IIT 2000). These utilization standards are used to determine when livestock are to be removed from pastures. It is expected that proposed changes such as moving water troughs out of riparian areas, fencing or enlarging exclosures at springs, and developing more water sources in the uplands will result in improved channel condition. Livestock grazing has little effect on EHA; their primary influence on EHA is on stream bank condition which is one of the factors used to determine what the channel response will be to changes in flow.

Table 3-16 displays the EHA levels that would occur with the implementation of the alternatives, including No Action, in the four watersheds within the project area. Additional information at the subwatershed and drainage level is provided in the Water Quality Report.

If one of the action alternatives with commercial harvest is selected, it is assumed the timber sale would be offered in 2005. EHA calculations assume all harvest activities, in Alternatives 2 and 3, would take place between 2005 and 2007 and noncommercial and fuels treatments would be completed by 2012 for all action alternatives. Natural fuels treatment is assumed to not remove sufficient canopy to produce a measurable increase in water yield.

**Table 3-16. EHA Percents by Watershed, Year, and Alternative**

Watershed	Alternative	2004	2005	2006	2007	2008	2009	2010	2011	2012
<b>Upper Crooked River</b>	1	21.4	19.4	17.8	16.8	16.1	15.5	15.0	14.5	14.0
	2		20.2	19.3	19.0	18.3	17.7	17.1	16.5	15.9
	3		20.0	18.9	18.4	17.7	17.1	16.5	15.9	15.4
	4		19.4	18.0	17.1	16.6	16.1	15.7	15.2	14.6
<b>Prineville Reservoir (Sanford Creek)</b>	1	2.0	1.8	1.8	1.7	1.7	1.5	1.5	1.4	1.4
	2		5.4	9.1	12.4	12.4	12.1	11.7	11.3	10.7
	3		4.7	7.5	10.3	10.3	10.0	9.8	9.3	8.9
	4		1.8	2.0	2.1	2.2	2.4	2.5	2.4	2.2
<b>Bear Creek</b>	1	23.9	23.0	21.9	20.7	19.0	17.3	16.0	15.4	14.7
	2		<b>25.6</b>	<b>26.9</b>	<b>28.1</b>	<b>26.4</b>	24.5	22.8	21.8	20.8
	3		24.8	<b>25.4</b>	<b>25.9</b>	24.2	22.4	20.9	20.0	19.1
	4		23.0	22.2	21.4	20.1	18.8	17.7	17.0	16.2
<b>Camp Creek</b>	1	13.4	12.9	12.4	12.0	11.5	11.0	10.6	10.1	9.6
	2		13.2	13.0	12.8	12.4	11.9	11.4	10.8	10.4
	3		13.2	13.0	12.8	12.4	11.9	11.4	10.8	10.4
	4		12.9	12.4	12.0	11.6	11.1	10.7	10.2	9.7
<b>Newsome Creek Drainage</b>	1	18.4	15.8	14.5	13.9	13.4	12.8	12.3	11.9	11.4
	2		17.2	17.3	18.1	17.6	17.1	16.5	15.8	15.1
	3		16.7	16.2	16.5	16.1	15.6	15.1	14.6	14.0
	4		15.8	14.7	14.4	14.1	13.7	13.4	12.9	12.4
<b>Gibson Creek Drainage</b>	1	5.4	5.3	5.1	5.0	4.9	4.8	4.7	4.5	4.5
	2		9.4	13.5	17.4	17.3	17.1	16.5	15.6	14.8
	3		9.1	12.8	16.5	16.4	16.2	15.8	15.2	14.4
	4		5.3	5.8	6.3	6.8	7.3	7.7	7.4	7.1

No watersheds resulted in levels exceeding Forest Plan standards and guidelines (35%). Only Bear Creek Watershed indicates levels above the 25 percent level and only for a few years in Alternatives 2 and 3. Table 3-17 displays the watersheds and subwatersheds related to the EHA categories that are above thresholds.

**Table 3-17. Comparison of the Alternatives for Number of Years in EHA Category**

Watershed	Alternative	Years EHA > 35%	Years EHA > 30% (mod sensitivity)	Years EHA > 25% (high sensitivity)
Twin Butte Subwatershed	1	1	2	5
	2	1	2	6
	3	1	2	6
	4	1	2	5
Drake Creek Subwatershed	1	-	-	1
	2	-	-	2
	3	-	-	2
	4	-	-	1
Bear Creek	1	-	-	0
	2	-	-	4
	3	-	-	2
	4	-	-	0
Headwaters Bear Creek Subwatershed	1	-	-	2
	2	-	4	7
	3	-	1	5
	4	-	-	3

## Resource Conditions Relative to the Purpose and Need

### Vegetation

The Maury Mountains Watershed Analysis (2001) included an extensive look at forest vegetation conditions, and the relationships between those conditions and changes in fire hazard, insect and disease dynamics, wildlife habitats, and riparian health. Vegetation patterns and occurrence within the project area are different now than what existed historically. Changes to the health, structure, composition, distribution, and function of forest stands have altered the natural processes that maintained a stable ecosystem, such as fire and natural erosion. These have affected watershed resiliency, wildlife habitat diversity and amount, water quality, visual quality, the availability of forest products, and fuel loadings and fire behavior.

Currently, more area is covered by dense stands of small trees than was present historically. Stands dominated by large trees are fewer than were present historically. Species composition of forest stands has shifted from early seral to late seral. Upland slopes once covered by shrub and grass communities have converted to juniper and ponderosa pine.

The Viable Ecosystems model provides a process to apply ecosystem concepts to project-level planning. This system compares existing vegetation with site potential (or biophysical environment). The model focuses on relationships between combinations of vegetation structure and species composition, and habitat requirements for animals, insects, and plants. The Viable Ecosystems model stratifies the environmental gradient using plant associations. The Viable Ecosystems Management Guide (Draft) (Simpson et al. 1994) was used within the Maury Mountains Watershed Analysis to characterize and compare seral structural conditions to HRV and contains a description of Viable Ecosystems and analysis methods and tools used to conduct the analysis.

Plant associations are a land classification based on the probable plant community that would develop in the absence of disturbance influences (Johnson 1992). Between 1992 and 1994 plant associations were mapped for the entire Ochoco National Forest. For the Viable Ecosystem model, the plant associations have been grouped according to similar disturbance regimes creating seven plant association groups (PAGs) in the project area.



Non-forest (including riparian) plant associations occur within the project area and were also grouped into upland grass, scabland grass, meadows, and rock. Non-forest PAGs were not analyzed by composition because the plant succession and disturbance processes have not been described to date. Table 3-18 displays the acres by PAG within the West Maury Project Area.

**Table 3-18. Plant Association Groups (PAG)**

Plant Association Group	Acres
Dry Grand fir	5,947
Douglas-fir	9,017
Moist Ponderosa Pine	7,148
Dry Ponderosa Pine	6,678
Western Juniper Woodland	7,382
Western Juniper Steppe	603
Non-forest	1,199
Total	37,974

Each PAG is characterized by seral structural stages, successional processes and disturbance regimes. Seral/structural stages are defined by species composition, size/structure, and canopy closures.

Seral stages are determined by percent species composition of shade intolerant species and organized into three stages: E (early), M (mid), and L (late). The structural stage classification is based on the largest structural class that forms 30% or more of the canopy closure. There are five structural stages: 1 (grass/forb/shrub), 2 (seedling and sapling, trees less than 4.9 inches dbh), 3 (pole, trees between 5 and 8.9 inches dbh), 4 (small, trees between 9 - 20.9 inches dbh), and 5 (medium and large, trees greater than 21 inches dbh). The existing canopy closure is defined by the "a" or "b" seral/structural stage coding. Multi-story or "a" stands are those stands with a canopy closure greater than 55 percent. Single-story or "b" stands are those stands with a canopy closure less than 55 percent. Further discussions on how Historical Range of Variability is derived and the detailed information for each plant association group can be found in the December 17, 2004, Forest Vegetation Analysis Report. Table 3-19 displays the definitions of the seral / structural stages.

**Table 3-19. Seral / Structural Matrix and Definitions (Seral Structural Stages)**

Structure Class	Species Composition		
	Early	Mid	Late
Grass, forb, shrub (trees may be present but not dominant)	E1	M1	L1
Seedling, sapling (less than 4.9 inches dbh)	E2	M2	L2
Pole (between 5 and 8.9 inches dbh), high density (a)	E3a	M3a	L3a
Pole, low density (b)	E3b	M3b	L3b
Small (between 9 and 20.9 inches dbh), high density (a)	E4a	M4a	L4a
Small, low density (b)	E4b	M4b	L4b
Medium/large (21 inches dbh and larger), high density (a)	E5a	M5a	L5a
Medium/large, low density (b)	E5b	M5b	L5b

## Affected Environment

In most plant association groups, large structural stages are deficient (structure code 5). The grass, forb, shrub stage (E1) is also deficient in the dry ponderosa pine, juniper woodland, and juniper steppe groups. Excess stages in most groups include pole and small trees especially in dense stands (stands with average diameters of 5 to 20.9 inch diameters with more than 55 percent crown closure).

The consequences of this imbalance include less large tree habitat for those species with this requirement and less shrub and grassland habitat. Dense stands increase the rate of loss of large trees due to competition-related stress.

The risk of uncharacteristically severe fire intensity is high. The landscape is less resilient to intense precipitation events resulting in less water storage and more erosion.

Using the Viable Ecosystems model to assess the landscape vegetation, the Maury Mountains Watershed Analysis identified silvicultural treatments aimed at adjusting seral/structural stages from outside the HRV to within (or closer to) the HRV.

There are two primary processes that affect the movement of one seral structural stage to another. Species composition changes tend to favor shade-tolerant species and move stages from early seral to late seral. Growth moves stages from small structure to larger structural stages. Although some insects and disease disturbances are species' specific and can move early seral to mid or late seral, natural disturbance processes (including fire, insects and diseases, and flooding) tend to move stages backward from mid or late seral to early seral. The magnitude of movement depends on the intensity of the disturbance. Some disturbances, such as low-intensity fire, may not affect the dominant stand character, but serve to maintain the existing stage.

Successional and structural change through time was estimated using the Viable Ecosystems model. This model accounts for multi-directional change (multiple pathway succession) through time, but does not include future disturbances. The model includes density dependent growth effects because denser stands grow more slowly.

Canopy closure data from satellite imagery was used to apply growth rates in two categories (more and less than 55% canopy closure) within dry grand fir, Douglas-fir, and moist ponderosa pine PAGs. These growth rates directly correspond to rates of change in structure in the Viable Ecosystem seral/structural stages. Canopy closures less than 55 percent received an average 20 percent growth rate bonus over stands which have canopy closures greater than 55 percent. This estimate corresponds with density and spacing studies (Oliver 1979, Barrett 1982, Cochran 1993, and Cochran 1999) where growth rate increases from thinning varied between 15-25 percent depending on stand density and little gains were realized when canopy closure was not reduced below 50-60 percent. Where thinning prescriptions are modified to retain higher stocking levels a lower growth rate has been applied.

Proposed thinning treatments are designed to reduce tree density and improve growth of the residual trees, enhance forest health, or recover potential mortality resulting from inter-tree competition. Stands proposed for treatment include a combination of commercial harvest, noncommercial thinning, prescribed fire, or grapple piling.

Numerous studies have shown increased growth and vigor of remaining trees following density management treatments (Oliver 1979; Barrett 1981 and 1982; Larson 1983; and Cochran 1999). Other studies have shown reduced susceptibility to many insects and diseases that are density related (Roth and Barrett 1985, and Filip 1990). Further studies show moderated fire hazard and lower crown fire potential as a result of thinning and fuel treatment (Omi 2002 and Pollet 2002).

## **Direct and Indirect Effects of No Action**

This alternative would create no immediate changes in the seral structural distribution in any PAG. The proportion of dense young stands (3a and 4a) structures would continue to increase, large overstory trees would continue to decline. Although growth would occur that may increase the number of large trees, overtime competition related mortality increases the amount of dead and down wood in these same stands. Growth would be slower on individual trees increasing the time to develop into large trees. Increased ground and ladder fuels and high crown closure would maintain a high risk of intense fire behavior. At the same time, increasing and sustained high stand density would reduce the amount of ground vegetation that is important for soil protection and forage. The seral structural stages do not move materially toward HRV and would not meet the purpose and need for this project.

Based on stand development assumptions, the number of seral/structural stages within HRV would change over time. In 20 years, an estimated 20 seral structural stages would be within HRV, 19 would be above HRV, and 21 would be below HRV. The proportion of dense stand conditions would be increased from present conditions. Projection to 50 years shows a continued increase in the proportion of dense stand conditions outside HRV but some larger structure stages begin to meet HRV. It is unlikely that the high proportion of dense stand conditions could be

maintained for 50 years. It is more likely that many of these stands would be replaced through large scale, intense fire events.

## **Cumulative Effects of No Action**

There are no other reasonably foreseeable future activities that would result in changes to vegetation seral structure conditions within the project area. All effects of previous activities have been incorporated into the current condition and description of vegetation. Maintaining current stand densities, ladder fuels, and surface fuels continue the conditions that perpetuate the risk of stand loss in the event of high intensity wildfire. While wildfire behavior is dependent on weather conditions and start location, fuel continuity contributes to a higher risk of stand loss should a wildfire occur under adverse conditions such as high wind speeds, low moisture conditions and in high fuel loadings.

## **Direct and Indirect Effects of Alternative 2**

In Alternative 2, stands proposed for treatment contain a mosaic of seral structural stages and include a large proportion of pole and small size trees and dense “a” stocking conditions. Most stands also contain varying amounts of large structure from scattered groups of large trees to areas meeting LOS criterion.

This alternative reduces the proportion of dense stands and increases the open condition, allowing increased growth rates and faster development of large structure. Treatments would decrease stand density by reducing understory trees, reduce ladder fuels, reduce ground fuels, and lower canopy closure. These changes would result in higher growth rates, lower incidence of insect and disease mortality, faster development of large trees, and reduced risk of high-intensity fire.

Treatments in stands with large trees would improve health and vigor of the large tree component increasing the potential longevity of such trees. Treatments would reduce the risk of loss of LOS to severe fire events. Juniper cutting in pine and juniper plant association groups would restore grass and shrubland improving habitat for certain wildlife species and would increase soil cover and protection on these more erosive sites.

In 20 years, an estimated 23 seral structural stages would be within HRV, 17 would be above HRV, and 20 would be below HRV. In all PAGs, the proportion of open small-sized stands will remain higher than in Alternatives 1 and 3 allowing continued growth and development of large structure at a higher rate. By 50 years, without further disturbance, dense stand conditions would reduce growth slowing the development of large structure. Within the Dry Grand Fir PAG, four of six large structural categories would meet or exceed HRV. Density control between 20 and 50 years would need to be continued in order to maintain progress.

The projected amounts within, above, or below HRV are based on stand development assumptions for the various seral structural stages. The 20 and 50-year time intervals were chosen to demonstrate development over time. These projections indicate that all alternatives move toward the HRV for the first 20 years after harvest. Between 20 and 50 years after harvest, the larger structure stages continue to increase throughout the project area. The smaller structural stages tend to decline below the HRV. Individual plant association group trends are more clearly detailed in the Forest Vegetation Analysis Report. The dry ponderosa pine and western juniper PAGs would follow similar trends although at a slower rate.

Figures 3.1 to 3.6 compare the changes to seral structural stages by plant association group and alternative and provide a visual description of the effects of the alternatives. The lines on the graphs also depict the HRV and display how the alternatives immediately move seral structural stages from the existing condition (Alternative 1) with treatments by each alternative.

### **Direct and Indirect Effects of Alternative 3**

In Alternative 3, the same stands were identified for treatment; however, individual units were deferred at this time relative to the wildlife or water yield key issues. In addition, prescriptions in stands proposed for treatment were also adjusted to address key issues.

This alternative defers treatment on many stands with dense “a” conditions especially where large trees are present. Alternative 3 treats fewer acres, so fewer acres would experience decreased stand density, reduced ladder fuels, reduced ground fuels, and lower canopy closure. Modified prescriptions in some stands would result in less growth and hazard reduction. Alternative 3 would result in higher growth rates, lower incidence of insect and disease mortality, faster development of large trees, and reduced risk of high-intensity fire but at a lower level than Alternative 2 but higher than Alternative 4. Development of LOS will be less than in Alternative 2. Alternative 3 would be similar to Alternative 2 in juniper thinning and prescribed fire treatments. Alternative 3 would produce approximately 40 percent less open structural conditions than Alternative 2.

In 20 years, an estimated 23 seral structural stages would be within HRV, 17 would be above HRV, and 20 would be below HRV (similar to the Proposed Action). However, the proportion of dense, small-sized stands will remain higher than in Alternative 2 but lower than Alternative 1. Some thinned stands would still have accelerated growth but at a lower rate than the proposed action. Large-tree mortality in dense stands would reduce the amount of large structure. More stands would need density control to improve growth and reduce the risk of wildfire. By 50 years, in the Dry Grand Fir PAG three of six large structural categories would meet or exceed HRV.

The projected amounts within, above, or below HRV are based on stand development assumptions for the various seral structural stages. The 20 and 50-year time intervals were chosen to demonstrate development over time. These projections indicate that all alternatives move toward the HRV for the first 20 years after harvest. Between 20 and 50 years after harvest, the larger structure stages continue to increase throughout the project area. The smaller structural stages tend to decline below the HRV. Individual plant association group trends are more clearly detailed in the Forest Vegetation Analysis Report. The dry ponderosa pine and western juniper PAGs would follow similar trends although at a slower rate.

The changes to seral structural stages by alternative are shown for each Plant Association Group in Figures 3-1 to 3-6.

### **Direct and Indirect Effects of Alternative 4**

In Alternative 4, the same high-density stands were identified for treatment as Alternative 2; however, no commercial treatments would occur and treatments would focus on noncommercial thinning, grapple piling, and prescribed fire treatments.

The result of this alternative would be a slight to no improvement in growth rates leading to LOS development and a shorter duration of improved growth rates. The risk of loss of LOS would remain relatively high due to dense stand conditions and loss of individual tree vigor. Fuels hazards relative to ladder fuels, high crown closure, and increasing mortality would remain high. Over time the proportion of dense stand conditions would increase, increasing the risk of larger uncharacteristic fires.

While noncommercial thinning reduces stocking and improves growth rates on residual trees, stands with additional proposed harvest in Alternatives 2 and 3 have high stocking of trees between 9 and 21 inches dbh. Increasing the noncommercial thinning diameter to include the larger excess trees would create fuel loadings too high to reduce with prescribed burning, increase costs of grapple piling or other fuels treatments.

Long-term results would be similar to the Alternative 1. In 20 years, an estimated 20 seral structural stages would be within HRV, 19 would be above HRV, and 21 would be below HRV. The proportion of dense stand conditions would be increased from present conditions. Projection to 50 years shows a continued increase in the proportion of dense stand conditions outside HRV but some larger structure stages begin to meet HRV. It is unlikely that the high

proportion of dense stand conditions could be maintained for 50 years. It is more likely that many of these stands would be replaced through large scale, intense fire events.

The projected amounts within, above, or below HRV are based on stand development assumptions for the various seral structural stages. The 20 and 50-year time intervals were chosen to demonstrate development over time. These projections indicate that all alternatives move toward the HRV for the first 20 years after harvest. Between 20 and 50 years after harvest, the larger structure stages continue to increase throughout the project area. The smaller structural stages tend to decline below the HRV. Individual plant association group trends are more clearly detailed in the Forest Vegetation Analysis Report. The dry ponderosa pine and western juniper PAGs would follow similar trends although at a slower rate.

Figures 3.1 to 3.6 compare the changes to seral structural stages by plant association group and alternative and provide a visual description of the effects of the alternatives. The lines on the graphs also depict the HRV and display how the alternatives immediately move seral structural stages from the existing condition (Alternative 1) with treatments by each alternative.

Further more detailed information on projections by specific PAG and seral / structure stages can be found in the Forest Vegetation Analysis Report and is incorporated by reference.

### **Cumulative Effects of Alternatives 2, 3, and 4**

There are no other reasonably foreseeable future activities that would affect seral structural stages within the project area. The effects of previous management activities, such as vegetation management, have been incorporated into the existing condition description and evaluation of seral structural conditions. In the event of a high-intensity wildfire, there would be less risk of stand loss in Alternative 2 because of the density and fuel reduction treatments. Alternative 3 would be similar to Alternative 2 in the areas that would have similar treatments, but in those stands with fewer density treatments, the risk of stand loss would be higher than Alternative 2. Alternative 4 provides even less thinning and does not treat trees larger than 9 inches dbh. Under Alternative 4 high stand densities would remain and the risk of stand loss in the event of a wildfire approaches Alternative 1 more than any other action alternative. Where wildfire occurs, the intensity would be highly dependent on current weather conditions at the time of fire start.

Figure 3.1 Dry Grand Fir Changes to Seral Structural Stages by Alternative in Relation to HRV

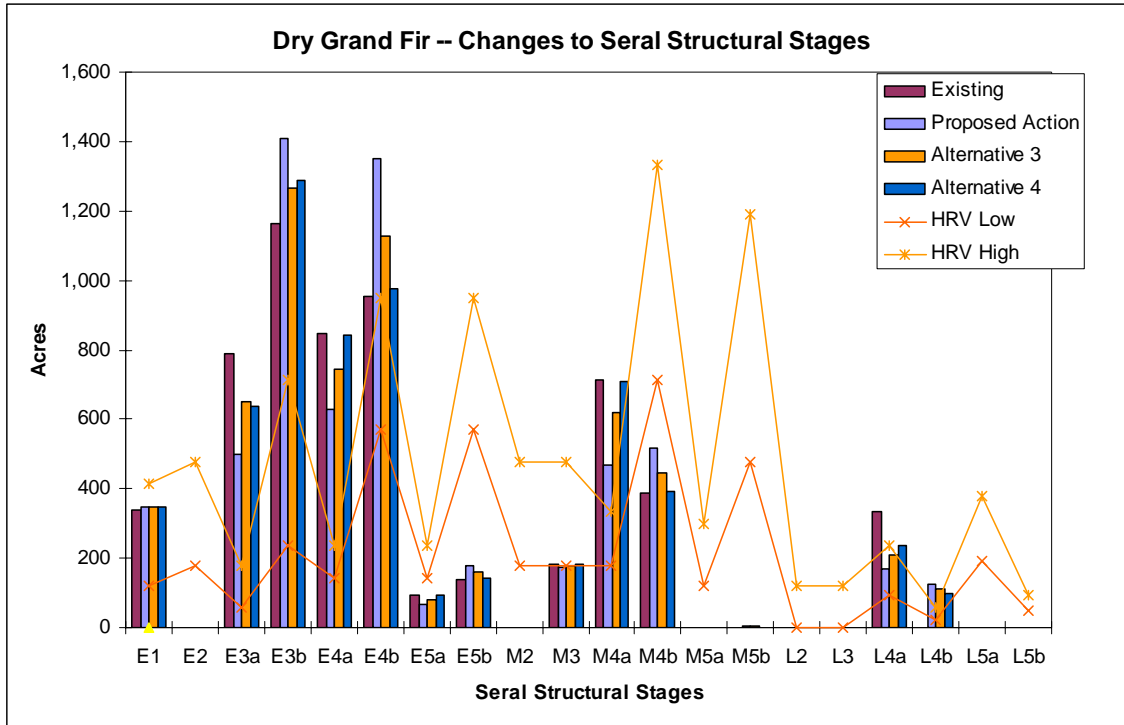


Figure 3.2 Douglas-fir Changes to Seral Structural Stages by Alternative in Relation to HRV

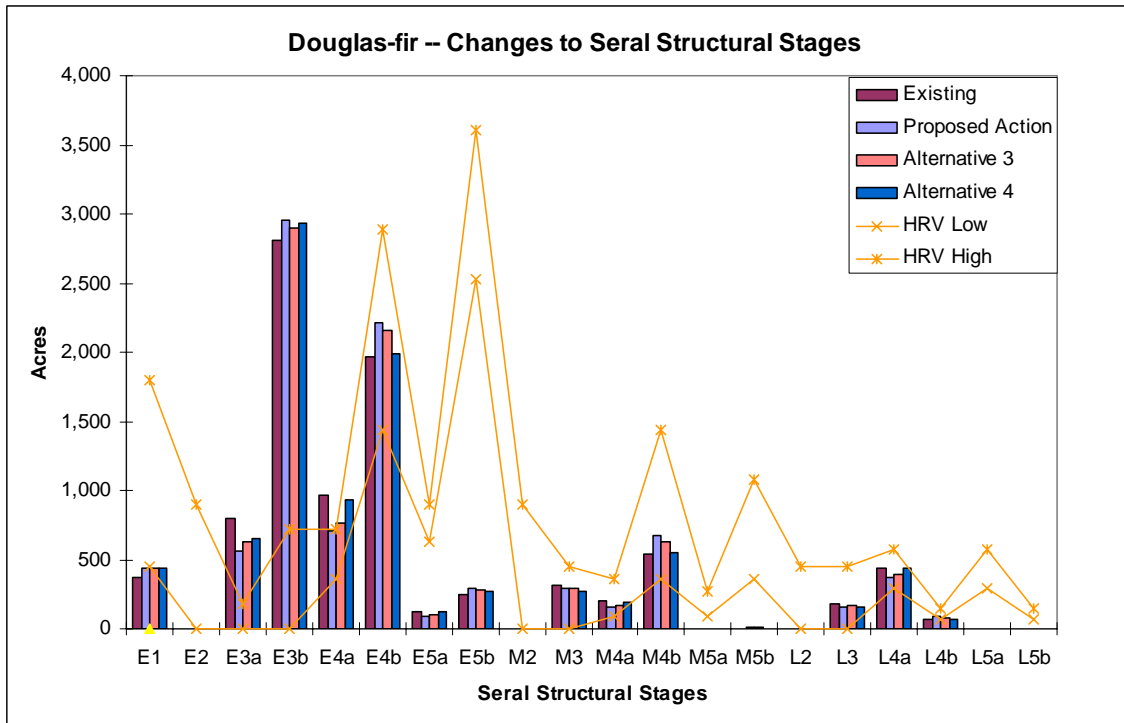


Figure 3.3 Moist Ponderosa Pine Changes to Seral Structural Stages by Alternative in Relation to HRV

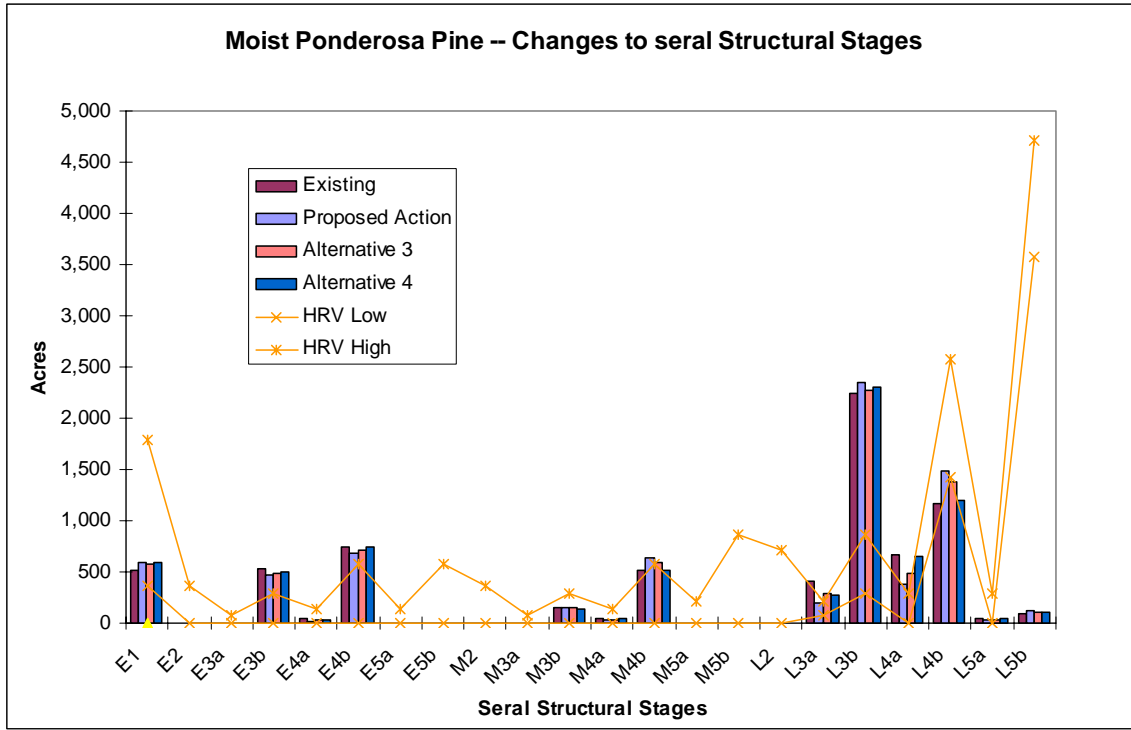


Figure 3.4 Dry Ponderosa Pine Changes to Seral Structural Stages by Alternative in Relation to HRV

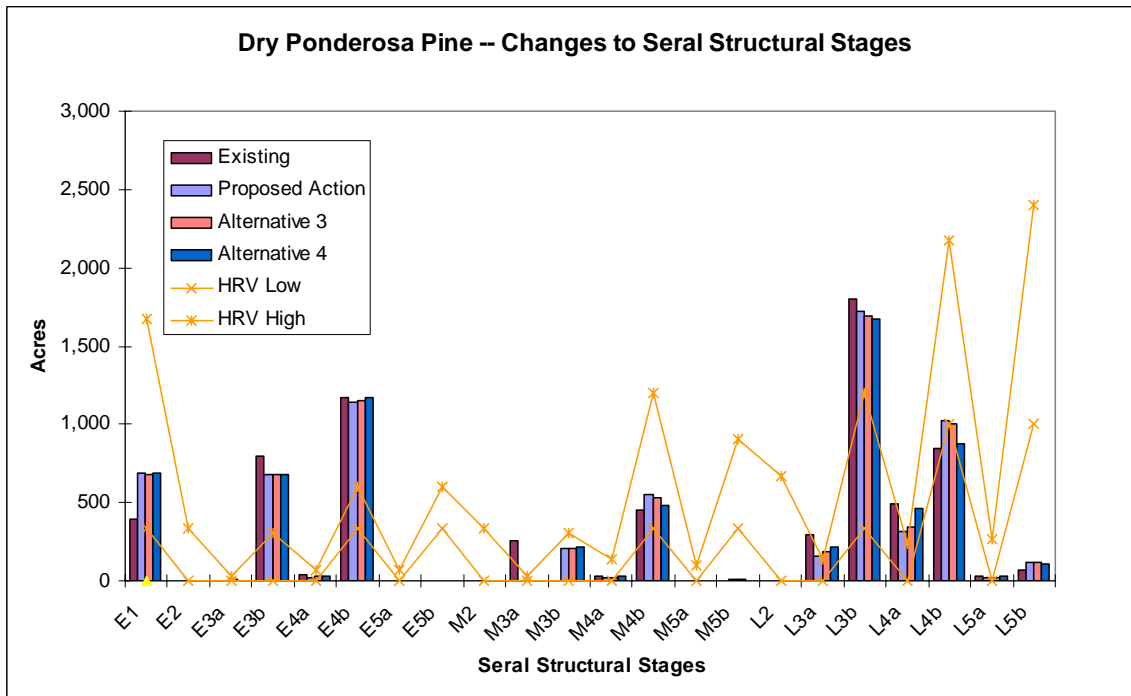


Figure 3.5 Juniper Woodland Changes to Seral Structural Stages by Alternative in Relation to HRV

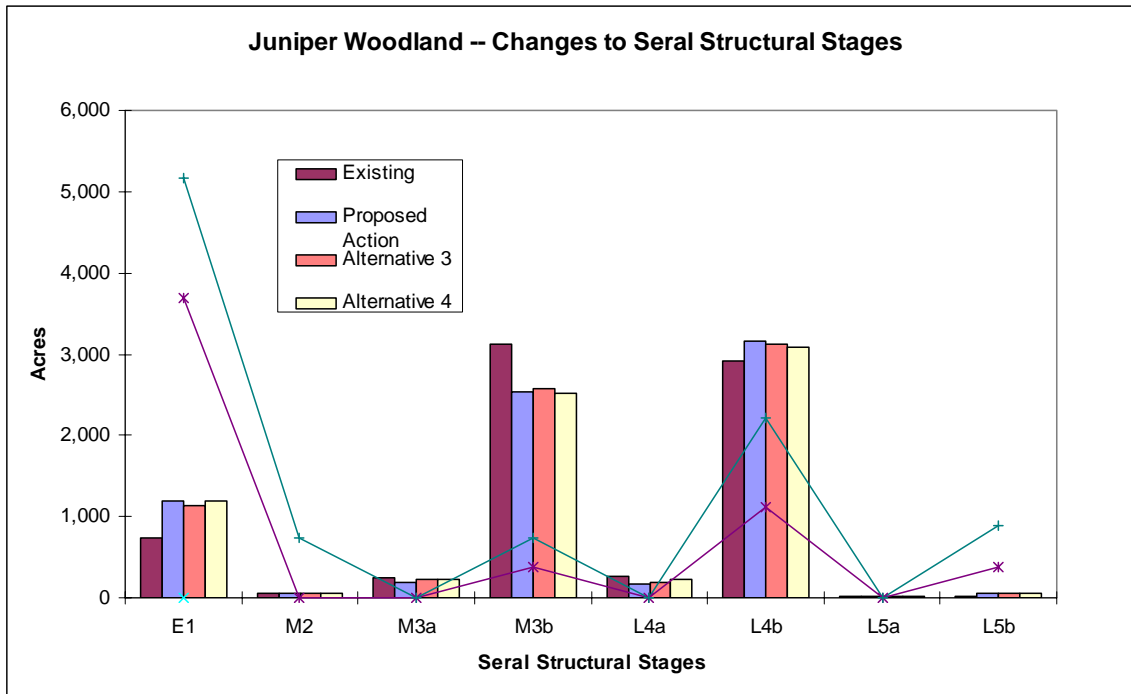
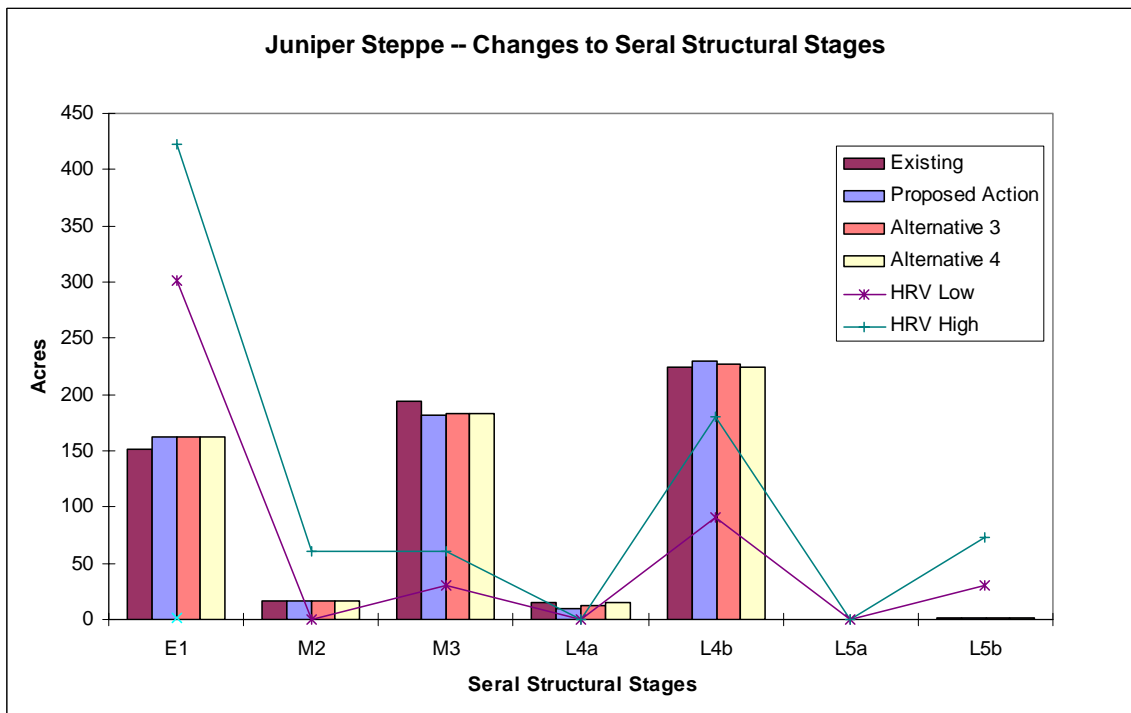


Figure 3.6 Juniper Steppe Changes to Seral Structural Stages by Alternative in Relation to HRV





## Forest Health (Insects and Disease)

A major factor of the overall health of the forest is the vigor of the trees and other forest vegetation. If the majority of the trees in a given area have densities that result in stagnated stands, they become vulnerable to insects and disease. Competition from intermediate and suppressed trees in ponderosa pine stands reduces growth of dominant and co-dominant trees (Cochran 1993). This is important given the existing low amount of large trees and the time and growth needed to develop large structure. Table 3-20 illustrates the amount of area at risk within the project area and compares level of treatment by alternative. It also displays the number of acres resulting in recommended stocking levels necessary to increase growth rates. Juniper thinning or fuels treatments are not included in the acreage figures in the Table 3.18 because these treatments only increase growth rates minimally and are more of a tool to reduce fuel loadings or remove younger juniper trees.

**Table 3-20. Comparison of Alternatives to Forested Stand Conditions and Risk**

Condition and Risk	Total acres found in project area	Acres Remaining after Treatment			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4
Stands at high risk due to density (basal area greater than 115 sq. ft.)	10,695	10,695	5,916	7,965	10,321
Moderate risk (basal area greater than 75 sq. ft.)	10,561	10,561	5,386	7,490	9,690
Low risk at this time but stocking control will benefit long-term growth and vigor	2,470	2,470	747	875	1,275

Treatment of stands at high risk would provide the greatest return in terms of growth and vigor and the highest potential for development of LOS structure. Treatment prescription adjustments in Alternative 3 in wildlife emphasis areas would not result in the same increased growth rates as Alternative 2. Treating only trees 9 inches dbh and smaller in Alternative 4 would result in increased growth rates in the smaller diameter trees and low risk stands but would not improve long-term growth or reduce risk substantially to large diameter trees since competition at the larger diameters would remain. Not all at risk stands are proposed for treatment because it is important to maintain a diverse landscape.

A variety of disturbance agents exist or were known to exist within the project area. The more readily apparent are bark beetles, dwarf mistletoes, western spruce budworm, and root diseases. The following summarizes the current condition and effects of the alternative treatments on the major disturbance agents identified. Further detailed information can be found in the December 17, 2004, Forest Vegetation Analysis Report and is incorporated by reference.

### Bark Beetles

Aerial insect and disease surveys for years 1996 through 2003 show numerous active mortality centers due to bark beetle feeding. Stand exams and field reconnaissance also identified bark beetle activity and susceptible stand conditions.

Mountain pine beetle (*Dendroctonus ponderosae*) and western pine beetle (*Dendroctonus brevicomis* Leconte) occur in the project area. Ponderosa pine is a susceptible host in overstocked stands. Bark beetle mortality is symptomatic of over-stocked stand conditions that create competition stress and reduce tree vigor (Schmid et al. 1994). Thinning has been shown to be effective in reducing bark beetle susceptibility in stands. Table 3-21 compares alternative treatments by level of bark beetle activity.

Also occurring in the project area are bark beetles such as Douglas-fir beetle (*Dendroctonus pseudotsugae*) and the fir engraver beetle (*Scolytus ventralis*). These insects are secondary pests because they attack trees that are

weakened and stressed. Factors such as drought, defoliation, overstocking, and disease can result in outbreaks of these insects that can cause severe mortality within a stand. Since 1992 increased mortality of Douglas-fir and grand fir due to these bark beetles has been observed.

**Table 3-21. Comparison of Alternative Treatments to Level of Bark Beetle Activity**

Level of activity	Acres Affected	Alt. 1	Alt. 2	Alt. 3	Alt. 4
High activity and mortality	501	0	319	163	319
Low to moderate activity	15,050	0	4,727	4,009	3,702
<b>Totals</b>	<b>15,551</b>	<b>0</b>	<b>5,046</b>	<b>4,172</b>	<b>4,021</b>

### Direct and Indirect Effects of Alternative 1

No treatments would occur in Alternative 1. The amount of overstocked stand conditions contributing to bark beetle infestation would remain and would increase with time. Trees would continue to die from bark beetle feeding contributing to snag habitat and foraging opportunities for wildlife but also higher fuel loads and loss of old growth trees.

### Direct and Indirect Effects of Alternative 2

Commercial and noncommercial thinning treatments would reduce susceptibility to future attacks by bark beetles. These treatments reduce stocking to levels that allow individual trees to grow and increase vigor sufficiently to withstand bark beetle attack. Stocking control would help maintain the existing large tree component that is deficient in many areas.

### Direct and Indirect Effects of Alternative 3

Fewer thinning treatments would occur in this alternative so fewer acres would have reduced susceptibility to bark beetle infestation. Most treatments dropped from Alternative 3 are located in the most densely stocked stands with the highest risk of mortality. In addition, modified thinning prescriptions within goshawk post-fledging areas would maintain higher stocking levels so conditions conducive to forest pathogen related mortality would return sooner. Thinned areas of relatively low basal area that contain clumps of ponderosa pine whose diameters are adequate for bark beetle attack will continue to be at risk (McCambridge and Stevens 1982).

### Direct and Indirect Effects of Alternative 4

In this alternative, noncommercial thinning treatments would slightly reduce the amount of area highly susceptible to future bark beetles attacks. Stocking would remain above recommended levels in most stands and would not result in sufficient growth to reduce individual tree susceptibility to bark beetle attack.

## Dwarf Mistletoes

Ponderosa pine dwarf mistletoe (*Arceuthobium campylopodum*) decreases tree vigor, reduces growth, and increases susceptibility to other pathogens. Infections in trees of the upper canopies spread readily to trees in the lower canopies. Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) causes growth loss, reduced wood quality, topkill, and mortality.

Dwarf mistletoes accelerate the movement to mid and late seral species compositions by reducing the vigor of infected early seral species and increasing the competitive edge of later seral (shade tolerant) species. Dwarf mistletoes cause branch structure to broom creating nest and hiding sites for many animals. Some animals forage on dwarf mistletoe plants.

Dwarf mistletoe management can be directed at either prevention or reduction. The most effective treatment for dwarf mistletoe control is to remove infected overstory trees. However, removing large trees would not meet the

purpose and need to promote growth and development of large trees. Where harvest (HIM, HSG, HSL) or noncommercial thinning is planned, stocking control can effectively reduce some growth loss, improve vigor, and reduce re-infection (Roth 1985). Treated stands would have a better chance of developing more large structure that is currently deficient. Table 3-22 shows the amount of area with dwarf mistletoe infection where the risk of dwarf mistletoe damage would be reduced.

**Table 3-22. Area Affected by Dwarf Mistletoe Treated by Alternative**

Dwarf Mistletoe Severity	Acres Affected	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Severe infections, 2 or more species, most trees infected	2,805	0	1,086	626	967
Moderate to light infections, 1 or 2 species infected	15,465	0	5,620	3,934	5,111
Totals	18,270	0	6,706	4,560	6,078

### Direct and Indirect Effects of Alternative 1

No thinning would occur. Dwarf mistletoes in untreated stands would continue to spread and cause growth loss and contribute to mortality. Development of large structure would be slowed. Stands not treated would contribute to higher risk of intense fire.

### Direct and Indirect Effects of Alternative 2

Approximately 36 percent of infected stands would be thinned in this alternative. Dwarf mistletoe would not be eradicated from these stands but reduced. More open stands would reduce the spread of mistletoe. Growth rates would improve allowing height growth to outpace mistletoe infection.

### Direct and Indirect Effects of Alternative 3

This alternative would treat 25 percent of infected stands. Higher stocking levels required in Goshawk post fledging areas means treatments would be less effective in reducing mistletoe infection and spread.

### Direct and Indirect Effects of Alternative 4

In this alternative approximately 34 percent of infected stands would be noncommercially thinned. Thinning would not remove infected trees larger than 9 inches dbh resulting in rapid re-infection and spread of the disease. Noncommercial thinning would allow some growth to occur but would not result in a long-term reduction in dwarf mistletoe.

## Western Spruce Budworm

The western spruce budworm (*Choristoneura occidentalis*) is a defoliating insect which predominately feeds on Douglas-fir, grand fir and western larch. From 1990 through 1992, budworm defoliation in stands within the grand fir and Douglas-fir plant association groups resulted in high levels of damaged or killed Douglas-fir and grand fir. The widespread trend toward species compositions dominated by Douglas-fir and grand fir (mid and late seral stages) has contributed to more frequent and severe epidemics. Large amounts mortality as a result of budworm epidemics contributes to high fuel loadings and fire hazard, with high risk of severe wildfire.

In the summer of 1992, all areas within the project area with a component of Douglas-fir and/or grand fir had visible defoliation and topkill. No budworm defoliation has been found since the summer of 1992. Foliage recovery has been rapid. However, trees with topkill have lost much potential for height growth and remain susceptible to bark beetle attack. In addition, habitat conditions that promoted an epidemic population of budworm remain.

Basic management strategies focus on damage prevention by reducing stand density to maintain vigor, and favoring early seral species such as ponderosa pine and western larch. The risk of future western spruce budworm damage is decreased in stands with an early seral species composition and stocking control (Brookes, 1985). Treatments also reduce the area of risk of future defoliation epidemics and may reduce the overall potential for the build-up of defoliator populations (Carlson 1989).

### **Direct and Indirect Effects of Alternative 1**

No thinning would occur. Factors that effect stand susceptibility would still occur. These factors are:

- Dense stands of Douglas-fir and grand fir with large amounts of foliage on which to feed;
- Mature, multi-storied host stands experience more damage since larvae drop down after depleting their food supply. If they land on foliage of an intermediate crown, they have a better opportunity to complete their life cycle. Budworm predation also decreases in multi-story canopies.
- Trees stressed by overstocking and competition are less vigorous, making them more susceptible to insect attacks and less able to recover from defoliation.
- Large continuous blocks of host species support large budworm populations.

### **Direct and Indirect Effects of Alternative 2**

Harvest and noncommercial thinning included in this alternative would reduce the amount of host species (Douglas-fir and grand fir) and favor retention of ponderosa pine and western larch. Thinning, both commercial and noncommercial, would reduce dense stand and multiple canopy conditions that contribute to budworm habitat and improves tree vigor and the ability to recover from defoliation.

### **Direct and Indirect Effects of Alternative 3**

Fewer dense multi-strata stands would be thinned in this alternative which would maintain a larger amount of budworm habitat. Fewer damaged trees would be cut.

### **Direct and Indirect Effects of Alternative 4**

In this alternative, noncommercial thinning would slightly reduce stand density, but would not measurably reduce host species. In some stands, noncommercial thinning may accelerate the development of host species when smaller ponderosa pine or western larch would be removed.

## **Root Diseases**

Armellaria root disease fungus (*Armellaria* sp.) is common in the area and is found in most plant association groups. Hosts include most tree species found in the project area. However, ponderosa pine appears most affected (especially large, old trees). The fungus causes mortality, wood decay, and growth reduction. It often infects and kills trees already weakened by competition, other pests, or climatic factors. It can infect healthy trees and increase their susceptibility to attacks by other fungi or insects (especially ponderosa pine with western pine beetle). Vigorously growing trees can be infected but can often confine the fungi and limit the extent of the infection (Hadfield 1986).

Although root disease was detected on only 800 acres during stand exams, it is a common component of forest communities and occurs in most stands.

Where maintenance and development of large structure are desired, treatment includes reducing competition stress by stocking control and favoring resistant conifer components of the stand (Filip 1990). This can reduce the spread of root disease so that existing large trees persist longer and more large trees can develop.

Susceptibility to root rot and stem decays increase with later seral species. Root rots and stem decays in late-seral stands contribute to the character and improve the quality of certain wildlife habitats requiring late-seral conditions.

In order to move towards HRV for late-seral stages in the Viable Ecosystem Model guidelines, not all stands with high levels of root rot and other insect and disease conditions are proposed for treatment at this time. Table 3-23 displays the acreage by alternative where the risk of root and stem disease damage will be reduced. A higher risk of mortality from root disease remains in stands not treated.

**Table 3-23. Area Affected by Root Disease Treated by Alternative**

Root Disease	Alternative 1	Alternative 2	Alternative 3	Alternative 4
806 acres	0	279	160	240*

Noncommercial thinning in Alternative 4 would not be an effective treatment to reduce root rot risk because it could accelerate the development of late-seral species compositions which are more susceptible to root disease.

### Cumulative Effects of Alternative 1

Stand densities would remain high. In the event of a wildfire, those stands with high densities and ladder fuels would be at a greater risk of stand loss and high rates of mortality. Continued grazing in the project area would have little cumulative effect on forested vegetation because cattle would not directly or indirectly cause mortality in trees.

### Cumulative Effects for Alternatives 2, 3, and 4

For all discussions with effects of the action alternatives, there are no additional reasonably foreseeable future actions that would affect vegetative conditions within the project area. Previous vegetation management has been incorporated into the description of the existing condition. Since more acres are treated in Alternative 2 than the other action alternatives and those acres treated are treated more intensely, resultant growth rates would be increased and the risk of mortality to large diameter trees would be reduced. Alternative 3 treats similar acres as Alternative 2, but the intensity of density control is less to maintain high canopy closures for specific wildlife species that favor dense conditions. Both surface and ladder fuels would also be reduced to a greater extent in Alternative 2 than in Alternative 3 and to a much lesser extent in Alternative 4. In the event of a wildfire, stand loss would be at highest risk in stands that did not have extensive treatments therefore Alternative 4 would retain the greatest risk to stand loss from wildfire.

Continued grazing in the project area would have little cumulative effect on forested vegetation because cattle would not directly or indirectly cause mortality in trees. None of the action alternatives propose regeneration harvests where cattle could potentially cause reforestation failures.

## Fuels Management and Fire Regimes

### Affected Environment

The Maury Mountains Watershed Analysis (2001) included an extensive look at forest fuels and vegetation conditions, and the relationships between those conditions and changes in fire hazard, insect and disease dynamics, wildlife habitat and riparian health. Vegetation patterns and occurrence within the analysis area are different now than what existed historically.

Douglas C. Ingram, an early Ochoco National Forest ranger, described forest conditions in the Maury Mountains in his 1918 Land Classification Report:

*“This district is peculiar in that it consists of a timbered ridge extending west and east and entirely surrounded by an open sagebrush country. The south slopes, which comprise fully 2/3 of the area, are quite openly timbered, being covered principally with yellow pine, with here and there very good juniper on the open ridges. Some small fir timber is found in the canyons. The fire risk on the south slopes is not great, owing to the open character of the timber and the absence of undergrowth. Conditions are very much different on the north slopes which are very much steeper, heavily timbered and the greater portion*

*covered with down timber and undergrowth. Fires starting in these north slopes spread rapidly and are quite difficult to control.”*

Fire regimes describe the role fire plays in an ecosystem in terms of fire frequency and fire intensity (Agee 1993). In the low intensity fire regime, in which fire occurs frequently, fire intensity is generally low because there is less fuel to support a fire. In the mixed intensity and stand replacement (high intensity) fire regimes, in which fire occurs less frequently, fire intensities tend to be higher because there is more time between fires for surface fuel and ladder fuels to accumulate. Table 3-24 displays fire regimes and the effects of fire in those fire regimes on vegetation.

**Table 3-24. Fire Regime Intensity and Vegetative Effects**

Fire Regime	Average Frequency	Effects on Vegetation
Low Intensity	15 years	More than 70% of the basal area or more than 90% of the canopy cover that existed prior to the fire still remains after the fire.
Mixed Intensity	50 years	Fires of intermediate effects, often resulting from a mosaic of varying conditions.
High intensity (Stand Replacement)	115 years	Less than 20% of the basal area or less than 10% of the canopy cover of the overstory remains after the fire.

Historically, the dominant fire regime in the Maury Mountains was a regime of low-intensity fire with an average fire return interval of less than 25 years. As fuel loadings and stand densities have increased, mostly due to fire exclusion, forest conditions have become more susceptible to high-intensity fires; the number of acres in the moderate and high-intensity fire regimes has increased, while the number of acres in the low-intensity fire regime has decreased. The historic range of the low-intensity fire regime in the West Maurys project area is estimated at 14,791 acres to 27,655 acres. The amount of the West Maurys project area currently in the low-intensity fire regime is 8,408 acres.

Each fire regime has a historic range of variability (HRV) (Powell 2000). The historic range of fire regimes is linked to the seral/structural stages of plant association groups (Hall 1989, and Johnson and Clausnitzer 1992) as described in the Viable Ecosystems Management Guide (Simpson et al. 1994) for the Ochoco National Forest. The HRVs described in Viable Ecosystems are based on U.S. Geological Survey land survey notes from the 1870’s, fire histories, the 1915 Forest Establishment Report for the Ochoco National Forest, stand exams, scientific publications and journals, and the professional judgment of forest botanists, silviculturalists, and fire ecologists.

Table 3-25 displays fire regime HRVs and their current distribution in the West Maurys project area. The importance of HRV is not in any specific number but in how much of one regime exists relative to other regimes.

**Table 3-25. Historic Range of Variability of Fire Regimes and Current Condition Acreages**

Fire Regimes	Historical Range of Variability (acres)		Current Condition - Alternative 1 (acres)
	Low	High	
Low Intensity	14,791	27,655	8,408
Mixed Intensity	3,934	13,850	14,105
High Intensity	1,004	10,511	4,216

Note: This table only includes forested acreage and does not include acres of non-forest or juniper stands.

A hazard is something in an environment that could cause the loss of something else in that environment. Forest fuels are considered hazardous if, when they burn in a wildfire, they cause the unwanted loss of trees, soils, habitat, property, or other forest resources. Fuels are also considered hazardous if their volume and continuity forces firefighters to employ suppression tactics that are less safe than other tactics. Therefore, the primary purpose of fuels reduction is to reduce the intensity of future wildfires and to reduce fuels to levels where they are not a hazard to forest resources when they burn.

Fuels are arranged horizontally and vertically. Vertical fuels are called “ladder” fuels; these are trees in the forest understory which provide a ladder for fire to move from the forest floor to the forest overstory. In the semi-arid, low-elevation, historically pine-dominated forests of the West Maurys project area, frequent low-intensity fires kept forest stands open, and ladder fuels to a minimum. When fire is kept out of forest stands, ladder fuels increase and stands become more dense, which increases the likelihood of high-intensity wildfire, which kills the entire stand.

Horizontally arranged fuels are called “surface” fuels. The amount of surface fuels on a site is referred to as a fuel load, and is measured in tons per acre. The greater the fuel load, the more intensely a fire can burn. Fuel size also relates to fire intensity; small diameter fuels (less than 3 inches dbh) are the primary influence on surface fire rate-of-spread and flame lengths. The guideline on the Ochoco National Forest for surface fuels is to manage for an average fuel load of less than 5 tons per acre for fuels less than 3 inches dbh (Forest Plan, p. 4-156). Large diameter fuels (greater than 3 inches dbh) are the primary influence on fire duration; the guideline for large fuels is to manage for less than 10 tons per acre.

Ladder fuels and surface fuels are factors of fire regimes, which describe the role fire plays in an ecosystem in terms of frequency and intensity. Reducing ladder fuels and surface fuels increases the likelihood of low-intensity fires, and decreases the likelihood of high-intensity (stand replacement) fires, moving forest stands from one fire regime to another.

Surface fuels consist of “natural fuels” which accumulate naturally, and “activity” fuels which are a product of commercial and noncommercial thinning activities. Natural fuels and activity fuels in the West Maurys project area would be reduced with prescribed fire, either by underburning, or by piling the fuel and burning the piles. Ladder fuels would be reduced by thinning trees with chainsaws and then underburning to treat the slash (branches and small trees), or by underburning alone (thinning with fire). However, with the exception of junipers, underburning alone is not an appropriate tool for reducing trees more than 3 inches dbh, because the amount of heat required to kill these trees would cause unacceptable damage to the overstory. Underburning also prunes the lower branches of larger trees, increasing the distance from the forest floor to the crowns of those trees, making them less susceptible to high-intensity wildfire.

By reducing ladder fuels and surface fuels, the proposed activities would:

- Reduce the potential for crown fire, reduce the potential for crown scorch (which kills trees by scorching their needles with convective heat), reduce the potential for radiant heat damage to cambium (the inner bark of trees, where diameter growth occurs), and reduce the potential for radiant heat damage to soils and tree roots (Saveland and Nuenschwander 1989);
- Reduce suppression costs;
- Increase firefighter safety by reducing potential fire intensity (rate of spread and flame length) which reduces a wildfire’s resistance to control. Low fire intensities allow for direct fire line construction (close to the edge of a fire), which is a safer suppression tactic than indirect fire line construction.

Mechanical thinning creates a potential short-term increase in hazard in exchange for a long-term reduction in hazard. Although the threat of high-intensity fire is greatly reduced by thinning, the slash created by thinning is a potential hazard until it is treated by burning. High fuel moisture in green slash makes it unavailable to burn, unless a wildfire occurs under extreme conditions (Rothermel et al. 1986). After the slash has dried out and turned red, it is available to burn. Should a wildfire occur during this time, the additional heat generated by the increased fuel load has the potential to cause undesired effects to the surrounding stand, soils, and other resources. This hazard is mitigated by either lopping (cutting) the slash to reduce the height of the fuel bed under 24 inches, or by piling the slash; both treatments reduce fire intensity. In units that have been lopped, after 2 or 3 years the slash gets further compacted by winter snows and can be burned with a low-intensity underburn without causing undesired fire effects. This delay also allows for the redistribution of nutrients from the slash back into the soil (Graham et al. 1999).

## Direct, Indirect, and Cumulative Effects of No Action

Currently, the percent of forested area within the low-intensity fire regime is below HRV (see Table 3-26), and the amount within the mixed-intensity fire regime is approaching the upper limits of its historic range. Under the no-action alternative, the amount of forested acres within the mixed and high-intensity fire regimes are expected to increase as fuel accumulates faster than it decomposes and the number of trees per acre in the understory increases. These changes would increase the risk of landscape-scale crown fire, and associated severe effects to fish and wildlife habitat, soil productivity, late and old structured habitat, and air quality.

There is 1,300 acres of prescribed burning planned for the Sherwood Creek drainage. The Sherwood burn is scheduled to be completed in 2004. This burn will reduce surface fuels, seedlings, and saplings, and improve wildlife forage by stimulating the growth of grass, forb, and shrub species. Changes in fire regimes as a result of this project would not be discernable at the landscape scale.

Livestock grazing in the project area could reduce the surface fuel layer needed to carry fire through the stand during low-intensity burning conditions. Livestock grazing does not affect potential fire intensity in closed canopy, multi-storied stands with heavy surface fuel loading. Livestock grazing does not affect the distribution of fire regimes in the West Maurys project area because grazing does not alter stand structure and density.

Most accidental human-caused fires in the West Maurys project area are caused by hunters, and because they occur in the fall are insignificant in size (usually less than 1/10 acre) and effect. Smoke from prescribed fires can impact hunter camps, especially in the late evening/early morning hours as smoke pools in drainages and other low spots.

There are no other planned activities that would affect the distribution of fire regimes in the project area.

## Direct and Indirect Effects of Alternatives 2, 3, and 4

All alternatives reduce fuel loadings and stand densities to move conditions from mixed and high fire regimes to low and mixed fire regimes, respectively. Alternative 2 treats more acreage with commercial harvest, non-commercial thinning, fuel reduction activities, and prescribed fire than Alternative 3. Alternative 4 treats trees 9 inches dbh and smaller and only slightly reduces ladder fuels in stands with multiple canopy layers. The anticipated changes in fire regime acreage are depicted in Table 3-26.

**Table 3-26. Effects of Vegetative Treatments on Fire Regime by Alternative**

FIRE REGIME	Historical Range of Variability (acres)		Alternative 1 Current Condition	Alternative 2	Alternative 3	Alternative 4
	Low	High				
Low Intensity	14,791	27,655	8,408	12,142	11,467	10,655
Mixed Intensity	3,934	13,850	14,105	11,920	12,379	12,913
High Intensity	1,004	10,511	4,216	2,641	2,894	3,132



**Table 3-27. Comparison of Effects on Stand Condition and Risk of High-Intensity Fire by Alternative**

Stand Condition and Risk Reduction by Alternative	Effective Treatment Acres: probability of high-intensity fire is reduced and low-intensity fire is maintained (percentage is of total acres)			
	Total Acres	Alt. 2	Alt. 3	Alt. 4
High risk stands: closed canopy, abundant ladder fuels, heavy surface fuel loads, have missed two or more fire cycles	10,695	4,779 45%	2,730 26%	374 3%
Moderate risk stands: closed canopy, surface and ladder fuels are increasing, have missed one or two fire cycles	10,561	5,175 49%	3,071 29%	871 8%
Low risk stands: open stands that need thinning and burning to maintain low intensity conditions	9,320	3,652 39%	2,972 32%	2,954 32%
Total Effective Treatment	30,576	13,606	8,773	4,199

Note: The number of acres in each stand description category described above are derived from stand exam data. The number of acres in each fire regime category are derived from pixel-based data from satellite imagery, and updated to reflect in-growth. While there is a direct correlation between stand condition and fire regimes, due to the techniques used for gathering the data, the acre figures do not match.

Note: This table does not include non-forest acres or juniper stands being treated with cutting or prescribed fire. Alternatives 3 and 4 do not include 600 acres of prescribed fire in designated old growth.

Table 3-27 compares the effects of the alternatives on forested stands. These effects are summarized below.

- Forested stands that have a high risk of high-intensity wildfire have closed canopies, abundant ladder fuels, and heavy surface fuel loads. In most cases, these stands are a mosaic of mixed and high-intensity conditions.
- Forested stands at moderate risk have missed one or two maintenance fires; surface and ladder fuels are increasing, and canopies are closing. These stands are a mosaic of all fire intensity conditions.
- Low risk stands are mostly open, with generally low surface fuels loads, and ladder fuels are seedling/sapling size. These stands need thinning and burning to maintain low intensity conditions.

### Direct and Indirect Effects of Alternative 2 and 3

Alternatives 2 and 3 would commercially thin trees from 9 inches to 21 inches dbh, noncommercially thin trees less than 9 inches dbh, and prescribed fire. This combination of treatments would reduce the potential for high-intensity fire by decreasing crown density (making crown fire less probable), would increase canopy base height (requiring longer flame lengths to initiate tree torching), and would reduce surface fuels (reducing flame lengths of surface fires).

Alternatives 2 and 3 would increase the proportion of forested area within the low-intensity fire regime, reduce the proportion of forested area within the high-intensity fire regime, and maintain low-intensity fire conditions in those areas where they already exist. These changes are a result of reductions in surface fuels, ladder fuels, and stand density, and an increase in the proportion of fire-resistant Ponderosa pine.

Alternative 2 would move more acres with mixed and high-intensity fire conditions into a low-intensity fire condition than Alternative 3; fewer acres after treatment would support a crown fire. Alternative 2 would move the distribution of fire regimes across the landscape closer to the historic range found in the West Maurys project area than Alternative 3.

### Direct and Indirect Effects of Alternative 4

Alternative 4 would use noncommercial thinning of trees less than 9 inches dbh and prescribed fire. This combination of treatments would maintain low-intensity fire conditions where they exist. This combination of

treatments lowers the risk of high-intensity wildfire in mixed and high-intensity stands. Treating the fuels generated by noncommercial thinning in closed canopy stands will be more expensive, and potentially more damaging to the stand.

It is expected that stands would be treated with prescribed fire approximately every 10 years following treatment to maintain low-intensity conditions, mimicking natural fire cycles. Projections of post-treatment conditions of similar projects, in similar forest types, with silvicultural and fuels prescriptions similar to Alternative 2, found over 70 percent of treated stands remaining in a low-hazard condition 30 years after treatment. A comparative study, following only noncommercial thinning in multi-storied, heavily-stocked stands, found that only 13 percent of treated acres rated low intensity after treatment, and only 3 percent of treated acres rated low intensity 30 years after treatment. This study was conducted in ponderosa pine and dry mixed conifer forests similar to those in the West Maurys project area (Fiedler et al. 2001).

## **Cumulative Effects of Alternatives 2, 3, and 4**

There is a 1,300-acre wildlife burn planned for the Sherwood Creek drainage, scheduled for 2004. This burn would reduce surface fuels, seedlings, and saplings, and improve wildlife forage by stimulating the growth of grass, forb, and shrub species. Changes in fire regimes as a result of this project would not be discernable at the landscape scale.

Livestock grazing could reduce the surface fuel layer needed to carry fire through open stand during low-intensity burning conditions. Livestock grazing does not affect potential fire intensity in closed canopy, multi-storied stands with heavy surface fuel loading. Livestock grazing does not affect on the distribution of fire regimes because grazing does not alter stand structure and density.

Most accidental human-caused fires in the West Maurys are caused by hunters, and because they occur in the fall are insignificant in size (usually less than 1/10 acre) and effect. Smoke from prescribed fires can impact hunter camps, especially in the late evening/early morning hours as smoke pools in drainages and other low spots.

There are no other planned activities that would affect the distribution of fire regimes in the project area.

## **Forest Wood Products and Seasonal Jobs**

### **Affected Environment**

For the purposes of describing socio-economics effects on the economy, the economy was considered to be all of central Oregon. The effects to the local economies are based on the estimated number of jobs created.

The bulk of the area and communities potentially influenced by actions on the Ochoco National Forest lie within Deschutes, Crook, and Jefferson, the southern most part of Wheeler, eastern most part of Grant, and the northern most sections of Klamath and Lake Counties (Zone of Influence or Zone). The major population centers within the Zone are: Prineville (7,356), Bend (52,029), Redmond (13,481), and Madras (5,078) (U.S Department of Commerce, Bureau of Census, Decennial Census of Population and Housing, 2001). The total population for the 5-county area during the 2000 Census totaled 234,235. Populations and change for the region and by each individual county are displayed in Table 3-28.

Future population projections mimic that of the past decade. Deschutes, Crook, and Jefferson Counties are expected to continue with aggressive growth, where as the more rural counties, Wheeler, Grant, and Lake, are projected to grow quite slowly, if at all.

**Table 3-28. Central Oregon Population Growth**

County	Population		Change	Percent
	1990 Census Data	2000 Census Data		
<b>Jefferson</b>	13,676	19,009	5,333	39
<b>Deschutes</b>	74,958	115,367	40,409	53.9
<b>Crook</b>	14,111	19,182	5,071	35.9
<b>Wheeler</b>	1,380	1,550	170	11
<b>Grant</b>	7,855	7,950	95	1.2
<b>Klamath</b>	57,702	63,755	6,053	10.5
<b>Lake</b>	7,176	7,422	245	3.3
<b>Totals Central and South Central Oregon</b>	176,907	234,235	57,328	32

Sources: U.S. Bureau of the Census, Vital Records, Oregon Health Division.

## Jobs

According to the 2000 Census, estimated civilian labor force is:

- Crook, 7,525, up 12 percent since the 1990 census;
- Deschutes, 57,614, up 40 percent since the 1990 census,
- Jefferson, 8,570, up 31 percent since the 1990 census,
- Wheeler, 598, up 14 percent since the 1990 census,
- Klamath, 28,753, up 6 percent since the 1990 census;
- Grant, 4,051, down 4 percent since the 1990 census, and
- Lake, 3,371, down 9 percent since the 1990.

The labor force in Oregon as a whole increased 18 percent. In Crook County the three largest sectors were trade (1,640), lumber and wood products (1,510), and government (1,180). Since then, with the closure of additional sawmills employment in the lumber and wood products sectors is closer to 1,000. In Deschutes County the three largest sectors were Finance/Insurance/Real-estate (14,170), trade (13,080), and government (6,900). In Jefferson County the three largest sectors were government (2,460), trade (1,250), and lumber and wood products (1,150). In Wheeler County the three largest sectors were government (200), trade (50), and finance/insurance/real-estate (20). In Klamath County the three largest sectors were finance/insurance/real-estate (5,580), trade (5,510), and government (5,400). In Grant County the three largest sectors were government (1,101), trade (500), and finance/insurance/real-estate (430). In Lake County the three largest sectors were government (940), trade (500), and lumber and wood products (290). (U.S Department of Commerce, Bureau of Economic Analysis 2001).

Unemployment rates in the individual counties were:

- Crook, 9.1 percent;
- Deschutes, 6.4 percent;
- Jefferson, 6.5 percent;
- Wheeler, 10 percent;
- Klamath, 8.7 percent;
- Grant, 12.1 percent; and
- Lake, 10.1 percent.

The unemployment rate in Oregon as a whole was 5.7 percent (U.S Department of Commerce, Bureau of Census, Decennial Census of Population and Housing, 2001). Since then the economies have generally weakened. However, as of December 2004, unemployment rates were the lowest in 4 years in Deschutes, Jefferson, and Crook Counties; and the lowest in 2 years in Klamath County. In Grant and Lake Counties, the unemployment rate has continued to increase. The unemployment rate in Oregon as a whole was 6.8 percent (Labor Trends, February 2005).

The economies of Deschutes and Jefferson Counties are the most robust in the Zone. In Deschutes County although there has been an increase in the number of jobs created, the huge increase in the labor force (up 40%) has negated much of this success, at least in terms of the unemployment rate. Because of their diversity both economies are expected to remain strong. On the other hand, the economies of Klamath and Crook Counties lag behind Oregon as a whole. Klamath County has a heavy reliance on lumber and wood products and agriculture, both of which are highly seasonal. Crook County has low overall economic diversity which is dominated by one manufacturing sector industry (lumber and wood products) and one wholesale trade sector company (Les Schwab). Future projections call for continued growth and diversification of their economies. Wheeler (little agricultural economy), Grant (heavy reliance on lumber and wood products), and Lake (heavy reliance on lumber and wood products, and agriculture) Counties' economies, due to their small size and lack of diversity, have had their economies lag substantially behind Oregon's as a whole. Future projections call for continued slow growth in these three economies (U.S Department of Commerce, Bureau of Census, County Business Patterns, 2001; Oregon Employment Department, 1992).

Although the past decade has seen a significant reduction in employment within the lumber and wood products industry, the lumber and wood products industry is still an important contributor to the local economies. In Crook County (2000), 1,510 people were employed in the lumber and wood products industry. This accounted for 25 percent of all wage and salary employment in the county, and represented the third highest paying job in the county. Since then, the remaining sawmills have closed and the number of wood product jobs has decreased to around a 1,100. Most of these jobs are located in the logging and secondary wood products sectors. In Deschutes County, 4,770 people were employed in the lumber and wood products industry. This accounted for 10 percent of all wage and salary employment, and represented the seventh highest paying job in the county. In Jefferson County, 1,150 people were employed in the lumber and wood products industry. This accounts for 19 percent of all wage and salary employment, and represents the third highest paying job in the county. In Klamath County, 3,180 people were employed in the lumber and wood products industry. This accounts for 19 percent of all wage and salary employment, and represents the second highest paying job in the county. In Grant County, 370 people were employed in the lumber and wood products industry. This accounts for 14 percent of all wage and salary employment (because of the limited industry base in the manufacturing sector, the State does not separate out the lumber and wood products from the other manufacturing employment. This number represents all manufacturing employment), and represents the third highest paying job in the county. In Lake County, 290 people were employed in the lumber and wood products industry. This accounts for 13 percent of all wage and salary employment, and represents the third highest paying job in the county. Wheeler County has no manufacturing sector industries (U.S Department of Commerce, Bureau of Economic Analysis, 2001).

### **Job and Personal Income Effects**

Timber harvest (lumber and wood products) and road work (road construction, reconstruction, and decommissioning) would affect employment and income in three ways: (1) direct effects attributable to employment associated with the harvesting, transportation, and manufacturing, (2) indirect effects attributable to industries that supply materials, equipment, and services to these activities, and (3) induced effects attributable to personal spending by the owners, employees, families, and related industries. Employment and personal income impacts were made from estimates derived from Gebert et al. (2002) and Phillips (2004 pers. comm.). The jobs associated with prescribed fire and noncommercial thinning are based on local observations and do not include indirect and induced jobs.

Table 3-29 shows the annual estimated job and income impacts by alternative. These estimates are for commercial forest products, noncommercial thinning, piling of small woody debris (slash), road construction, road reconstruction, road decommissioning, and prescribed fire. No attempt has been made to value what has been termed ecosystem service values. This type of analysis, if done at all, is more appropriate at the Forest Plan level, not at the project level.

Timber harvest jobs and income shown in Table 3-29 are based on State-wide relationships and are not necessarily the expected impact in any one county. Because of this, the estimated jobs and income figures in Table 3-29 are likely to be higher than what one would expect in a less developed rural economy. For example, the indirect and induced jobs described above would be less in a rural economy such as Crook's as money "leaks" out of the local economy to Redmond, Bend, and the Willamette Valley. The jobs and income associated with the road work are

directly tied to Crook County’s economy (Phillips 2005). However, they are based on all road work within the County. Because the road work on the Forest is generally less intensive, the number of jobs portrayed in Table 3-29 is likely overstated.

Over half of the timber jobs displayed in Table 3-29 are associated with primary manufacturing (sawmills), and since there is no certainty on where this manufacturing would occur (may not be processed even within the zone); it is not possible to predict where many of these jobs would exist.

**Table 3-29. Annual Employments and Income Maintained or Created**

	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4</b>
Estimated Timber Volume to be Harvested (MMBF)	0	25.9	16.0	0
Jobs, timber harvest	0	411	254	0
Income, timber harvest (\$1000)	0	\$14,100	\$8,700	0
Jobs, road work	0	13.4	6.6	0
Income, road work (\$1000)	0	0.43	0.21	0
Jobs, noncommercial thinning /slash piling	0	18	14	17
Jobs, prescribed fire	0	10	9	10

### Direct and Indirect Effects of No Action

There would not be any activities implemented; therefore, no jobs would be created. As a result there would be no direct benefits to the local, regional, or State economies. In all actuality, the No Action Alternative would have negative impacts to local and regional economies because forest product jobs would not be maintained. The ability to substitute this material from another source is questionable given the current availability of timber, especially from Federal lands. As noted in the affected environment section, Crook County no longer has any primary manufacturing capacity and more than half of the direct jobs supported by the harvesting, transporting, and processing of timber are associated with primary manufacturing. However since the activities would take place in Crook County, it is likely that many of the logging jobs that would be supported under Alternatives 2 and 3 would in fact be associated with Crook County’s logging industry. It is also unlikely that many of these local logging jobs would be supported by another harvest activity on the Ochoco National Forest or within the Zone. This would result in some downward pressures on all facets of Crook County’s economy.

The economic activity associated with road work, and vegetation and fuel treatments would not occur under this alternative. Except for the prescribed fire treatments (these are usually accomplished with local Forest resources), many of the jobs associated with these activities, especially the noncommercial thinning and slash piling, are accomplished through the use of contracting and many of the resources needed, including workers, are from outside the Zone.

### Direct and Indirect Effects of Alternatives 2, 3, and 4

Alternative 4, similar to Alternative 1, proposes no commercial harvest activities. Since most of the economic activity associated with an alternative is tied directly to these activities, the economic effects would be similar to the No Action Alternative. Alternatives 2 and 3 propose commercial harvest activities and would contribute to the local, regional, and State economies. Table 3-29 displays the expected level of harvest in million board feet and the number of timber and related jobs that would be created or maintained by the alternative. The estimated jobs would occur over several (3 -7) years as timber is harvested and processed. Given the major restructuring of the wood product industries over the past 10 to 15 years, it is likely that these would not be new jobs but jobs needed to maintain current levels of employment in the forest products industry. As noted in the affected environment section, Crook County no longer has any primary manufacturing capacity. Over half of the direct jobs supported by the harvesting, transporting, and processing of timber are associated with the primary manufacturing. Assuming all the logging activities would be associated with Crook County (there is no certainty that this would be the case)

approximately 136 jobs not the 411 listed in the table and 1,218,000 dollars not the 14.1 million of income under Alternative 1; and 84 jobs vs. the 254 and 752,500,000 dollars of income vs. 8.7 million under Alternative 3.

In addition to the employment and income figures from harvesting and manufacturing of wood products, the vegetation, fuel treatments, and road work, would also generate jobs and income over the next 3 to 10 years.

It is reasonable to expect a good proportion of the noncommercial thinning work would go to minority-based small businesses, as they have in the past. The vast majority of these businesses and their employees are based along the I-5 corridor, so most of the disposable income from these activities would not flow into local communities. There would be some local economic activity generated from these activities but it may be outside the area. The primary services needed by the workers would be food and shelter. Local businesses that can supply food (grocery stores and restaurants) and other services would capture most of the money being spent by the workers in the area. Some businesses may need to increase their employment, either by temporarily adding employees, or giving present employees more hours. This would likely result in increased local household incomes during implementation of project activities. Since these businesses have supported similar workforces in the past, capital expansion would probably not be required.

Within the social context presented above, the action alternatives have the potential to bring in workers from the outside to perform logging and related activities. While the outside workforce is more likely to be racially diverse than the local resident population, the residents have worked effectively with and supported anticipated fluctuations in the workforce expected with the implementation of an action-based alternative.

## **Cumulative Effects of All Alternatives**

Overall, the economic influence from implementation of any of the alternatives is likely to be small within the economic context of the zone as a whole. Trends in employment indicate increased employment, primarily in construction, services, and trade. This would help ameliorate adverse economic impacts under Alternatives 1 and 4. However, with the strong likelihood that much of the logging and transportation activity would be directly tied to Crook County's logging industry; the County's economy is likely to suffer regardless of the overall economic trends. Alternatives 2 and 3 which provide commercial wood products in addition to economic activities associated with the other management activities, along with these same overall economic trends, will help strengthen local, particularly Crook's, and regional economies. In the context of larger economies, regional or State-wide scales, the amount lost under Alternatives 1 and 4, or the amount provided in Alternatives 2 and 3, would not generate much economic activity.

## **Other Environmental Resources**

### **Air Quality**

#### **Affected Environment**

Air quality can be affected by both wildfire and prescribed burning. National Ambient Air Quality Standards have been developed and include standards for total suspended particulates (solid material contained in smoke). The Oregon Department of Environmental Quality (DEQ) is responsible for assuring compliance with the Clean Air Act. In 1994, the Forest Service, in cooperation with the DEQ, the Oregon Department of Forestry and the Bureau of Land Management, signed a Memorandum of Understanding (MOU) to establish a framework for implementing an air quality program in Northeast Oregon. The MOU includes a prescribed fire emission limit of 15,000 tons of PM 10 per year for the national forests of the Blue Mountains (Malheur, Ochoco, Umatilla, and Wallowa-Whitman). (PM 10 are particulate matter that measure 10 microns in diameter or less, and are small enough to enter the human respiratory system.) All prescribed burning on these forests is coordinated with the DEQ and the Oregon Department of Forestry through the State of Oregon smoke management program.

There has been no prescribed burning in the Maury Mountains since November 1999, with the exception of the activities in Sherwood Prescribed Burn area in 2004. Winds in the project area are typically from the southwest to

northeast during the spring and fall prescribed burning periods. Inversions are common at night in the fall in the Paulina valley, but tend to dissipate by mid-morning as surface temperatures increase due to solar heating.

### Direct, Indirect, and Cumulative Effects of No Action

There would be no emissions produced from prescribed burning related to the West Maurys project. In the event of a high-intensity wildfire, smoke emissions would exceed desired levels.

There is a 1,300 acre wildlife enhancement underburn planned for 2004 and 2005 in the Sherwood Creek drainage. There would be no cumulative effects related to smoke, because this alternative would not add any emissions to the emissions from the Sherwood Prescribed Burn project.

There are no other past, present, or reasonably foreseeable future projects that would affect air quality.

### Direct and Indirect Effects of Alternatives 2, 3, and 4

Table 3-30 displays an estimate of annual PM10 emissions from prescribed fire over the 10-year implementation period.

**Table 3-30. Projected Annual PM10 Emissions from Prescribed Fire (tons)**

Project Year	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
% of Project	10	10	10	15	15	10	10	10	5	5
<b>Alternative 2</b>										
Natural Fuels	53.3	53.3	53.3	80.1	80.1	53.3	53.3	53.3	26.7	26.7
Activity Fuels	169.9	169.9	169.9	254.8	254.8	169.9	169.9	169.9	84.9	84.9
Pile Burning	73.8	73.8	73.8	110.7	110.7	73.8	73.8	73.8	36.9	36.9
<b>Total PM10</b>	<b>297.0</b>	<b>297.0</b>	<b>297.0</b>	<b>445.6</b>	<b>445.6</b>	<b>297.0</b>	<b>297.0</b>	<b>297.0</b>	<b>148.5</b>	<b>148.5</b>
<b>Alternative 3</b>										
Natural Fuels	41.0	41.0	41.0	61.5	61.5	41.0	41.0	41.0	20.5	20.5
Activity Fuels	134.6	134.6	134.6	201.9	201.9	134.6	134.6	134.6	67.3	67.3
Pile Burning	51.0	51.0	51.0	76.5	76.5	51.0	51.0	51.0	25.5	25.5
<b>Total PM10</b>	<b>226.6</b>	<b>226.6</b>	<b>226.6</b>	<b>339.9</b>	<b>339.9</b>	<b>226.6</b>	<b>226.6</b>	<b>226.6</b>	<b>113.3</b>	<b>113.3</b>
<b>Alternative 4</b>										
Natural Fuels	51.2	51.2	51.2	76.8	76.8	51.2	51.2	51.2	25.6	25.6
Activity Fuels	169.9	169.9	169.9	254.8	254.8	169.9	169.9	169.9	84.9	84.9
Pile Burning	51.3	51.3	51.3	110.7	110.7	51.3	51.3	51.3	25.6	25.6
<b>Total PM10</b>	<b>272.4</b>	<b>272.4</b>	<b>272.4</b>	<b>445.6</b>	<b>445.6</b>	<b>272.4</b>	<b>272.4</b>	<b>272.4</b>	<b>136.1</b>	<b>136.1</b>

The highest estimated annual PM10 emission rate is 445.6 tons (Alternatives 2 and 4, years 4 and 5), which is less than 3 percent of the annual emission limit for the Blue Mountains.

Due to the location of the project area and local weather patterns, smoke from prescribed fire would not affect Class I wilderness areas or urban Special Protection Zones. The nearest Class I wilderness is the Strawberry Mountain Wilderness, 75 miles to the east. The nearest Special Protection Zone is Bend, 40 miles to the west, into the prevailing winds. Prescribed fire operations would be suspended during persistent inversion conditions, which would increase the potential for smoke pooling in the Paulina valley. Impact from smoke could affect widely scattered individual dwellings in the Paulina valley, and would be short term.

### Cumulative Effects of Action Alternatives

There is a 1,300-acre wildlife enhancement underburn planned for 2004 and 2005 in the Sherwood Creek drainage. Prescribed burning on the West Maurys project is not expected to start until spring 2005 at the earliest. There is a

small chance that smoke from the Sherwood Prescribed Burn would overlap with emissions from burning included in the action alternatives. The cumulative effects of emissions have been included in Table 3-30 under natural fuels.

During the summer months, there are occasional smoke intrusions into the Prineville area from agricultural burning in Crook and Jefferson County, and from wildfires on lands to the west (prevalent wind direction is from the west during the summer months). Prescribed burning in the West Maurys project area would occur during the spring and fall, and would not coincide with those emissions.

There are no other past, present, or reasonably foreseeable future projects that would affect air quality.

## Threatened, Endangered, Proposed, and Sensitive Species

Biological Evaluations have been prepared for Wildlife, Fisheries and Botanical species. More detailed information on species' habitat and impacts from the alternatives can be found in these reports. A summary of the determinations for all species can be found in Appendix A of this document.

### Wildlife

Threatened, Endangered, and Sensitive wildlife species that are documented or suspected to occur on the Ochoco National Forest are listed below. There are no endangered species known or suspected to occur on the Ochoco National Forest. Highlighted species are those known to occur or with potential habitat within the project area.

Canada lynx (Threatened)  
**Northern Bald Eagle (Threatened)**  
**Wolverine (R-6 Sensitive)**  
Upland sandpiper (R-6 Sensitive)  
Western sage grouse (R-6 Sensitive)  
Peregrine Falcon (R-6 Sensitive)  
**Bufflehead (R-6 Sensitive)**  
Pygmy Rabbit (R-6 Sensitive)  
**Gray Flycatcher (R-6 Sensitive)**  
Tricolored Blackbird (R-6 Sensitive)

The Deschutes and Ochoco Forest-wide Programmatic Biological Assessment (BA) addresses program activities that may affect, but are not likely to adversely affect listed species. Canada lynx habitat was remapped in 2001. As a result, due to insufficient quantities of primary habitat, Key Linkage Areas (KLA) and Lynx Analysis Units (LAU) are not currently mapped on Ochoco National Forest. In addition, the Deschutes and Ochoco National Forests requested informal consultation (March 30, 2001) on continued implementation of their respective Land and Resource Management Plans with LAUs mapped in accordance with the 2000 Lynx Conservation Assessment and Strategy, August 2000 (LCAS).

The U. S. Fish and Wildlife Service (USFWS) concurred that the mapping was consistent with current direction, and that implementing forest plans using the current mapping would result in “may affect, but not likely to adversely affect” (NLAA) conflict determinations (May 24 and June 22, 2001). Project Design Criteria (PDC) only apply within LAUs and KLAs. Therefore, there is no need to address the Interagency Programmatic BA (2001-2003) Project Design Criteria for lynx on this project.

Five sensitive species were not addressed because there is no or only low probability habitat in the project area. These species are Peregrine falcon, upland sandpiper, western sage grouse, tricolored blackbird, and pygmy rabbit. For these reasons, there would be no impact from any of the alternatives to the species listed.



## **Northern Bald Eagle (Threatened)**

### **Affected Environment**

Bald eagles utilize large trees for nesting, and they forage in a variety of habitats, particularly water bodies, wetlands and riparian meadows. There are two known bald eagle nests (alternate nests for a single pair) within one Bald Eagle Management Area (BEMA), and two mapped winter roosts (Eagle Roosting Area) within the project area. Protective measures have been in place for bald eagles since they were listed in 1978. The Pacific Bald Eagle Recovery Plan was released in 1986. Since that time the population of bald eagles has been increasing in Oregon.

Bald Eagle Management Area (BEMA) – This is not an allocated management area in the Forest Plan. However, the “Joint Aquatic and Terrestrial Programmatic Biological Assessment for Federal Lands within Deschutes Basin administered by the Bureau of Land Management Prineville Office and the Deschutes and Ochoco National Forests, June 2003-June 2006” identifies the need to provide bald eagle management areas around known nest sites to streamline consultation.

Two Eagle Roosting Management Areas are located on Pine and Shotgun Creeks. Both areas contain a mosaic of Douglas-fir, dry pine, and western juniper plant associations. The sites are droughty with shallow, rocky soils. Current vegetation includes open stands of young juniper and ponderosa pine, grass and shrub areas, and stringers of denser conifers near streams and up side draws. Small groups of large ponderosa pine and Douglas-fir occur in the stringers. These have been identified as suitable roost sites for wintering bald eagles. Multiple canopies have developed beneath the large overstory trees located in the draws increasing stand density to levels that impair vigor and health of the large trees. These trees are at increasingly higher risk of mortality due to competition related stress, bark beetles, dwarf mistletoe, and crown fire.

The bald eagle is known to occur within the project area. Bald eagles have been nesting near Antelope Reservoir. The general vegetation patterns in the BEMA are a mosaic of open sagebrush covered hills and conifer stands on north slopes and swales. Two nests are located in large, old ponderosa pine trees in small draws. The nest sites are dense with in-growth of young understory trees and accumulated ground fuels. This has increased the risk to the nest trees from bark beetle-related mortality and high-intensity wildfire. Noncommercial thinning and hand piling was recently completed around one of the nest trees. Outside the project area but within the area of influence, there are two additional bald eagle nests. One of these is located approximately 2-1/2 miles east of the project area and the other one is located approximately 6 miles north of the project area.

### **Direct, Indirect and Cumulative Effects of Alternative 1**

No activities would occur in Alternative 1 (No Action). Stands would remain at high risk of mortality and increasing risk of high-intensity fire including crown fire because of dense pockets of coniferous vegetation around the nest trees. The southern most nest tree currently has an abundance of fuels throughout the nest stand. The northern most nest tree has had some previous juniper thinning and slash pull back and is in a smaller patch of timber surrounded by open habitat and is less at risk of loss to future wildfire.

Over time, live nest trees may be weakened by competition stress and succumb to insect infestation. Once the live overstory trees die, they become less attractive as nest sites for bald eagles. With a higher risk of insect infestation and high-intensity fire, there is also a risk of loss of mid-size ponderosa pine trees that could serve as replacement nest trees in the future. Long-term maintenance of roosting stands would be at risk in the long-term because of stand densities.

Past management activities occurring near the northern nest have included juniper thinning and slash pull back from medium and large pine trees in the nest stand. Ongoing and foreseeable activities in this area that may impact bald eagles include continued recreation use at Antelope Flat Reservoir and Campground, grazing, and activities on adjacent private land. Alternative 1 would have no effect because there are no management activities that would affect habitat or change potential disturbance levels. The cumulative effect of combining implementation of this alternative with past, present, and reasonably foreseeable actions, is retaining a higher risk of high-intensity wildfire

in proximity to a well used recreation area. In combination, this retains a fuel risk with a potential ignition source. Alternative 1 results in an increased risk of loss of eagle habitat to wildfires.

#### **Direct and Indirect Effects of Alternative 2**

Harvest and noncommercial thinning are proposed within 1/2-mile of nest trees. Prescribed burning is proposed around both nest trees. Treatments would reduce the risk of bark beetle mortality by reducing stand density and reducing the risk of high-intensity fire around the nest trees by removing ladder and surface fuels. These actions increase the potential longevity of these nest trees. Measures described in the Design Criteria and Resource Protection Measures Section would minimize the risk of impacts to known and potential future nest trees from project activities.

Harvest and associated treatments would occur on approximately 5 acres near the Pine Creek roosting area. Merchantable trees less than 21 inches dbh would be cut and removed. Noncommercial thinning with associated prescribed fire would occur on an additional 58 acres. Thinning treatments would reduce understory conifer stocking improving large tree vigor. Prescribed fire would reduce accumulated and harvest-related fuels. These activities reduce stand density and reduce the potential for high-intensity fire thus reducing long-term risk. Outside of the designated eagle roosting areas, similar treatments in other suitable and potential roosting areas will help maintain large tree roosting opportunities.

#### **Direct and Indirect Effects of Alternative 3**

Harvest and noncommercial thinning are proposed within 1/2-mile of the nest trees. Prescribed burning would occur around one nest tree reducing risk at this site. This would occur at the southern most nest, which currently has the highest level of risk due to high stocking levels. This alternative would increase the potential longevity of the southern nest tree and potential future nest trees in this stand. The other nest tree would remain at its current level of risk. Measures described in the Design Criteria and Resource Protection Measures Section of Chapter 2 would minimize the risk of impacts to known and potential future nest trees from project activities.

Harvest and associated treatments would occur on approximately 5 acres near the Pine Creek roosting area. Merchantable trees less than 21 inches dbh would be cut and removed. Noncommercial thinning with associated prescribed fire would occur on an additional 50 acres. Thinning treatments would reduce understory conifer stocking improving large tree vigor. Prescribed fire would reduce accumulated and harvest-related ground fuels. Reduced stand density and prescribed fire would reduce the potential for high intensity fire thus reducing long-term risk. Outside of the designated eagle roosting areas, similar treatments in other suitable and potential roosting areas will help maintain large tree roosting opportunities.

#### **Direct and Indirect Effects of Alternative 4**

Noncommercial treatments are proposed within 1/2-mile of nest trees. Prescribed burning is proposed around both nest trees. Treatments would reduce competition among trees in thinned stands, but only slightly. Nest trees would remain at a higher risk of loss to wildfire, but treatments within nest stands would be the same as under Alternative 2. Measures described in the Design Criteria and Resource Protection Measures Section would minimize the risk of impacts to known and potential future nest trees from project activities.

This alternative would treat 55 acres of noncommercial thinning and 8 acres of prescribed fire in eagle roosting areas. Treatments would be slightly less effective in reducing risk to overstory roost trees than in Alternative 2 or Alternative 3. Long-term maintenance of roosting stands would be at risk in the long-term because of stand densities.

#### **Cumulative Effects of Alternatives 2, 3 and 4**

Past management activities at the northern nest included juniper thinning and slash pull back from medium and large pine trees in the nest stand. The activities proposed by this project, with Design Criteria and Resource Protection Measures included, should complement previous activities to maintain the health of overstory trees and to reduce the risk of future high intensity fire. Ongoing and foreseeable activities in this area that may impact bald eagles include

continued recreation use at Antelope Flat Reservoir and Campground, grazing, and management of adjacent private land. Of these, recreation use on the reservoir is the most likely to impact bald eagles. This can be from competition for prey resources as well as by startling birds off perch trees while they are hunting or resting. Grazing has a negligible impact on eagles. The reservoir has a stocked fishery and this prey resource is not dependent on fish reproduction in streams entering the reservoir. Eagles also feed on waterfowl and carrion. Thus, they are not dependent on prey species that may compete with cattle for forage. To date there have been no conflicts between bald eagle nest protection and management of the adjacent private land. This project meets the Project Design Criteria in the Programmatic Biological Assessment for bald eagle nesting and roosting areas. For these reasons, the determination for this project is “may affect but not likely to adversely affect” for all action alternatives because there would be no adverse effect to habitat and potential disturbance would be mitigated.

## **California wolverine (R-6 Sensitive)**

### **Affected Environment**

California wolverine utilize rocks, talus, and large log habitat for denning, and they forage in a variety of habitats, usually in remote locations. Even though there is potential habitat in the project area, there are no known wolverine dens near the project area. However, there have been sightings of wolverine on the Lookout Mountain Ranger District between 1969 and 1994. The nearest recorded sighting was approximately 4 miles away from the project area.

### **Direct, Indirect and Cumulative Effects of Alternative 1**

The no action alternative does not directly alter cover or forage for species that would be likely food resources for wolverine. However, there may be a higher risk of future large-scale disturbance associated with this alternative. Under this alternative, forage for many herbivorous species would continue to decline, resulting in less available food resources for carnivores such as wolverine. At some point in the future forage areas would likely develop due to insect or disease outbreaks or high-intensity wildfire. Thus availability of prey would vary over time depending on extent and intensity of future disturbance events.

Ongoing uses in the project area would continue to occur. There are no cumulative effects to wolverine that result from combining ongoing activities with implementation of this alternative. The determination for the No Action Alternative is No impact because there would be no effect to habitat and no change in potential disturbance levels.

### **Direct and Indirect Effects of Alternatives 2, 3, and 4**

The project does not alter rock, talus habitat, but could alter large wood accumulations and vegetation, which could alter denning habitat. The project has a low probability of disturbing any wolverine due to the relatively low potential for occupancy of habitat. The alternatives that reduce open road density, could improve habitat conditions by reducing potential for human disturbance. However, none of the proposed alternatives reduce road density enough to result in a notable change in habitat suitability. The project would improve the forage base for potential prey species and source of carrion. Potential food resources for carnivores, such as wolverine, would be improved under the action alternatives.

### **Cumulative Effects of Alternatives 2, 3, and 4**

Ongoing uses in the project area, such as recreation and road maintenance, would continue to occur. There are no cumulative effects to wolverine that result from combining ongoing activities with implementation of the action alternatives. For these reasons, the determination for this project is “may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing” for all action alternatives.

## **Gray Flycatcher (R-6 Sensitive)**

### **Affected Environment**

Gray flycatchers utilize open stands in arid woodlands, or shrub communities, where there is tall shrub habitat such as big sagebrush, bitterbrush, or mountain mahogany. They may breed and forage in juniper, pine-juniper, aspen, tall sagebrush/bunchgrass, or mountain mahogany stands. They also forage in riparian woodlands and shrub/grassland communities. Such habitats are present in the vicinity of the project area. No sightings of this species have been recorded in the project area, but they are expected to occur there. Within the project area, they would be expected to occur in juniper and big sage brush habitats with a well developed shrub layer.

The Breeding Bird Atlas (Adamus et al. 2001) indicates that this species population is presently increasing and that this species is widely distributed across its range. Lower elevation areas, below the forest boundary are the core reproductive habitats for this species.

### **Direct, Indirect and Cumulative Effects of Alternative 1**

The no action alternative does not directly alter upland shrub habitat. However, there may be a higher risk of future large scale disturbance associated with this alternative. Under this alternative foraging and nesting habitat for gray flycatchers would continue to decline as juniper density increases in juniper steppe, juniper woodland and dry pine sites. At some point in the future succession would be set back to a grass forb stage due to high intensity wildfire. Upland shrub communities would redevelop on some of these burned over areas in the future. Thus availability of habitat would vary over time depending on extent and intensity of future disturbance events.

Ongoing uses in the project area would continue to occur. There are no cumulative effects to gray flycatcher that result from combining ongoing activities with implementation of this alternative. The determination for the No Action Alternative is No impact (NI).

### **Direct and Indirect Effects of Alternative 2, 3, and 4**

Disturbance from silvicultural treatments and prescribed burning could disrupt activities of individuals during implementation and there is some potential for direct mortality. When these activities occur in the spring and summer, reproduction may be disrupted. However, this species evolved in an environment in which fire was an integral part of the ecosystem, so birds capable of flight should be able to escape entrapment. Birds that are displaced early in the nesting season may re-nest, or become non-reproductive during that nesting season. When thinning or burning occurs in the fall, the activities would be outside of the nesting season, and potentially after these birds have left Oregon for the fall migration. Thinning and burning would reduce coniferous canopy closure and water uptake, allowing more light and moisture to be available to the understory vegetation. This could improve habitat overtime by allowing shrub understories to develop. Burning can also reduce nesting structure in the short term by removing tall shrubs.

### **Cumulative Effects of Alternatives 2, 3, and 4**

Ongoing uses in the project area would continue to occur. There are no cumulative effects to gray flycatcher that result from combining ongoing activities with implementation of this alternative. For these reasons the determination is “may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing” for all action alternatives.

## **Bufflehead (R-6 Sensitive)**

### **Affected Environment**

The bufflehead uses deep water lakes in mountainous forested areas, nesting in tree cavities close to water. They also use lowland lakes and estuaries in the winter. There is a moderately sized reservoir within the project area and two small reservoir ponds are present in the vicinity of the project area. The reservoir habitat may be used as stop-over sites during migration, or in the winter when they are free of ice. Though this species has been documented on the Ochoco National Forest, only one sighting of this species was recorded on Lookout Mountain Ranger District in 2003 during the fall migration.

Potential habitat for this species is present in or near the project area, but it has marginal suitability as a nesting area due to level of human activity and a shortage of potential nesting sites (snags).

### **Direct, Indirect, and Cumulative Effects of Alternative 1**

The no action alternative does not directly alter lake habitats or snag abundance near shorelines. Over time some trees in proximity to Antelope Reservoir may die due to competitive stress. The number of snags developing of sufficient size and proximity to open water is expected to be negligible due to the open habitat conditions around the majority of this water body.

Ongoing uses in the project area would continue to occur. There are no cumulative effects to bufflehead that result from combining ongoing activities with implementation of this alternative. The determination for the No Action Alternative is no impact because there would be no effect to habitat and no change in potential disturbance levels during the most likely time of occupancy.

### **Direct and Indirect Effects of Alternative 2, 3, and 4**

Project activities could result in changes in snag density in stands near the lakeshore. However, the number of snags affected of sufficient size and proximity to open water is expected to be negligible due to the open habitat conditions around the majority of this water body. Bufflehead may use the reservoir as a stop over site during migration or in the winter when it is free of ice. Project activities would not occur during this time, and the project should not alter lake or lakeshore habitat.

### **Cumulative Effects of Alternatives 2, 3, and 4**

Ongoing uses in the project area would continue to occur. There are no cumulative effects to bufflehead that result from combining ongoing activities with implementation of this alternative. For these reasons, the determination is “may impact individuals or habitat, but is not likely to contribute to a trend toward federal listing” for all action alternatives.

## **Fisheries and other Aquatic Species**

Two aquatic species are federally listed as threatened and are known to occur on the Ochoco National Forest and Crooked River National Grassland. These species are: bull trout (*Salvelinus confluentus*) and Mid-Columbia River steelhead trout (*Oncorhynchus mykiss* ssp.). There are no endangered aquatic species on the Ochoco National Forest and Crooked River National Grassland. Several species from the R-6 Regional Forester's sensitive species are known to occur on the Ochoco National Forest and include: redband trout (*Oncorhynchus mykiss* ssp.), Malheur mottled sculpin (*Cottus bairdi*), West Slope cutthroat trout (*Oncorhynchus clarki lewisi*), Columbia spotted frog (*Rana luteiventris*), and Mid-Columbia River spring chinook salmon (*Oncorhynchus tshawytscha*). Mid-Columbia River spring chinook salmon EFH (essential fish habitat) is also located on the Ochoco National Forest.

The following species were not considered further because there is no passage for the species to the project area, they are not known to exist in the project area, or there is no habitat for the species in the project area. These species are:

- Bull trout are known to occur in Squaw Creek in the Crooked River National Grassland but do not occur within the project area and have no passage to the project area.
- Mid-Columbia River steelhead trout are known to occur throughout the main stem lower Deschutes River below Regulator Dam and in most tributaries below the dam. On the Lookout Mountain Ranger District, steelhead are known to occur in Trout Creek in the Deschutes Basin and in Bridge and Badger Creeks in the John Day Basin. Steelhead trout may have been in the project area before downstream dams were built.
- Malheur mottled sculpin are presently only in some streams on the Emigrant Creek Ranger District in Harney Basin, Malheur National Forest.
- West Slope cutthroat trout have not been found in the project area and are not known to occur.
- Mid-Columbia River spring chinook salmon historically may have been in the project area before downstream dams were built.
- Mid-Columbia River spring chinook salmon and EFH (essential fish habitat) is not known to have been historically within the project area (USDA 2003).

The definition for adverse effects in INFISH (1995) was utilized in the fisheries analysis. This definition states “adverse effects include short- or long-term, direct or indirect management related impacts of an individual or cumulative nature, such as mortality, reduced growth, or other adverse physiological changes; harassment of fish; physical disturbance of redds; reduced reproductive success; delayed or premature migration; or other adverse behavioral changes. Adverse effects to designated critical habitat include effects to any of the essential features of critical habitat that would diminish the value of the habitat for the survival of native inland fish.” Webster’s (1998) dictionary defines harassment as “To annoy or torment repeatedly and persistently; to wear out: exhaust.”

The December 2004 Resource Report and Biological Evaluation for Aquatic Species is incorporated by reference and includes additional information related to fisheries and the Columbia spotted frog.

## **Redband Trout and Columbia spotted frog**

### **Affected Environment**

There is redband trout and Columbia spotted frog habitat within the West Maurys project area. (Note: MIS rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) are similar to redband trout in habitat needs and responses to management actions; therefore, redband trout will act as a surrogate for rainbow and brook trout. Effects to redband trout described in this section also apply to rainbow and brook trout as MIS).

Stuart et al. (1996) reviewed numerous characteristics of redband trout in the Crooked River Basin, including previous genetic analyses. The review shows clearly that redband trout in the Crooked River group into three distinct geographic clusters. One group of related population occurs in the lower Crooked River (below Bowman Dam) and includes populations from the lower main stem Crooked River, as well as McKay Creek, Mill Creek, Marks Creek, and Ochoco Creek. A second group of related populations occurs in the main stem Crooked River above Prineville Reservoir and Bowman Dam and the various small tributaries in this section including Bear Creek and Pine Creek. The third group of related populations occurs in the north and middle forks of the Crooked River and their various headwater tributaries.

Interior redband trout remain in the Crooked River and its tributaries today. Redband trout is the only salmonid species currently present within the project area. The population numbers have decreased over time and non-native species have been introduced. Lower numbers of redband have resulted from the loss of riparian vegetation, particularly hardwood trees, bank erosion, entrenched streams, loss of beaver and woody debris, modified stream channels from narrow and deep to steeper slopes. Straighter channels due to degradation are accompanied by increased bank erosion, increased sediment transport, increased sediment deposition in depositional areas, and loss of floodplains.

It is estimated that most of the sediment in the streams in the West Maurys project area results from in-channel erosion such as bank erosion, head cuts, and channel scour. Channel destabilization can result from changes in peak flows, sediment load, and livestock impacts, but down cutting in the Crooked River and Bear Creek appear to be a major cause of the instability. Potential increases from in-channel sources resulting from harvest and natural disturbance induced runoff have already been discussed under Issue 2.

Historically, Columbia spotted frogs were found at elevations ranging from near sea level to 7,370 feet. Their range extended from southeast Alaska through British Columbia, eastern Washington and Oregon to northeast California and eastward to western Montana and Wyoming, and northern Utah. Spotted frogs breed in very shallow water at the edge of ponds or streams, in flooded meadows, or in water pooled on top of flattened, dead vegetation at the edge of a pond, in early to mid-spring, generally from the end of March to the end of May depending on temperature. Informal surveys have revealed that there are populations in the West Maury project area. Spotted frog habitat would be protected in Alternatives 2, 3, and 4 through design criteria for treatments in RHCAs. These resource protection measures include no heavy equipment in RHCAs (unless on an existing road), and treatment prescriptions designed to promote shade, increase large wood recruitment in streams, increase the deciduous component of RHCAs, and reduce fuel loadings to approximate historical levels.

The Ochoco National Forest has completed Bottom Line Surveys, Level II Surveys, and temperature monitoring on the principal drainages on Forest Service administered lands. The Bottom Line Survey collects data on cut banks, woody debris, pools, shade and other variables in 100-foot sections along stream reaches. The Bureau of Land Management completed inventories for most streams on BLM land adjacent to the project area during the 1970's. Bottom Line Survey data for streams indicate that most mountain streams have low occurrence of pools, woody debris, shade, high width-to-depth ratio, and entrenchment ratios.

The streams in the West Maurys Project area lack stable stream components such as woody riparian vegetation, large wood, pools, entrenchment, and previous down cutting. For example, stream surveys completed in 1991 and in 1998 are showing a leveling trend but not increasing towards improvement to meet stable stream components. Hunting, camping, off-road vehicle use, and driving on roads would continue by forest visitors. These activities occur within RHCAs as many of the forest roads in the Maury Mountains are located within RHCAs.

There are generally few visible indications of improvement in floodplain functions, water storage, peak flows or base flows, although such improvements should accrue from the past restoration efforts. A notable exception is lower Klootchman Creek, which entrenched several decades ago and has developed a new, stable floodplain system. Recovery rates appear to be much slower on the steeper mountain streams than on lower-gradient streams of the project area.

The elimination of beaver dams has eliminated many pools that retained water during dry months. Summer water temperatures are higher, and fewer areas of refugia are available to support aquatic populations during severe conditions. Restoration of entrenched streams may improve natural irrigation and water storage in some valley reaches. Beaver dams would improve the quality of summer habitat for trout and other components of the aquatic ecosystem (December 2004 Resource Report and Biological Evaluation for Aquatic Species).

There are six RMOs that apply to the West Maury Project Area. These objectives relate to (1) pool frequency; (2) large woody debris in forested systems; (3) bank stability (non-forest systems); (4) lower bank angle (non-forested systems); (5) width/depth ratio (all systems); and (6) water temperature.

#### **Direct, Indirect, and Cumulative Effects of No Action**

There would be “No Impact” to redband trout and Columbia spotted frog species or habitat because there are no treatments proposed in this alternative. The existing condition of the streams would continue to inhibit the success of redband trout populations and fitness. Without effective habitat restoration and management, redband trout and Columbia spotted frog populations habitat and fitness would not increase.

On-going uses in the project area, such as road maintenance, noxious weed treatments, livestock grazing, and recreation use would continue. Restoration projects, such as riparian planting and headcut repair authorized in other documents, would be implemented. Fish population distribution throughout the project area would still be limited

by 1) stream flow, 2) both man-made and natural barriers, 3) stream gradient, and 4) rearing and spawning habitat quality and quantity. The primary reason for the decline in production of salmonids throughout the project area has been the loss of instream habitats and declining water quality. Populations of existing salmonids (redband trout) would not begin to increase until the channel structure improves and water temperatures decrease. It is estimated that most of the sediment in the streams in the West Maury project area is coming from in-channel erosion such as bank erosion, head cuts, and channel scour.

Although the alternative does not harvest timber, there is some risk that insect and disease mortality may reduce stream shading. If this mortality is light to moderate, it may be beneficial (i.e., natural thinning). Dead trees which fall into or adjacent to the channel, would add to the channel stability, catch sediment, and provide cover and structure to the channel. This would help to provide cool clean water, provide structure to develop pools, increase the amount of cover for fish, and help retain water for late season flows. However, large amounts of dead and dying trees from insect and disease in the riparian areas could also burn at high intensity and reduce stream shading, increase water temperature, and decrease potential for large wood recruitment.

Because of the existing impacts of sediment, the No Action Alternative would move towards attainment of Riparian Management Objectives at a slower rate than the action alternatives for aquatic species and their habitat because no vegetation management would be done to improve riparian habitat conditions. Attainment of improved aquatic and riparian habitat and fish populations where streams are degraded may not improve over time without treatment.

Watersheds with previous harvest would continue to recover. Due to past harvest practices such as skid trails through RHCAs, fire suppression, and current conifer stocking, many of these conifer stands would not improve without treatment. In RHCAs, individual tree growth would not increase to promote the development of large trees and large woody debris (LWD) recruitment to the stream channel within the timeframe as in Alternatives 2, 3, or 4. Large wood develops pools, traps sediment, decreases water temperatures, and provides cover for fish.

The effects of past management practices such as logging and skidding in riparian areas, effects of the land use generated sediment, channel widening and aggradation, and channel stability loss, could persist for at least several decades. From Hagans' (et al. 1986) prediction in another study area, it could be more than a century for recovery from past management practices, even if no further disturbance occurred in the area.

In the event of a wildfire, there would be varied intensities of fire depending on the varied amounts of fuel loading. In RHCAs, large wood is below INFISH standards. The upper steeper draws (Class IV) would likely have a high-intensity fire. There would be a loss of future LWD recruitment until new seedlings are established that could take decades. In the lower parts of the drainages, there would be immediate large wood recruitment as the dead and dying trees in the moderate and low intensity burn fall into the streams. There would be an increase of sediment as a result of losing vegetation along the RHCAs and uplands, likely in a mosaic pattern. Shade would be reduced and water temperatures increased. Pools would form from the sediment being trapped in the fallen wood. In the unstable stream reaches, down cutting would continue where large wood is deficient.

The resulting open canopy would increase growth of woody riparian vegetation. As the cover over streams increased, temperatures would decrease and seedlings would reestablish. In Alternative 1, post wildfire, large wood would be available in the RHCAs quicker than in Alternatives 2, 3, and 4 with vegetation and fuels treatments. It would take longer in Alternative 1 to recruit the next generation of large wood until seedlings reestablished and grew into large wood and fell into the streams.

Livestock grazing continues to impact streams by trampling and by consuming riparian (woody) streamside vegetation such as willows. Grazing woody vegetation along streams reduces shade, increases temperature, increases compaction due to trampling, reduces pools, and causes stream bank cutting.

Bank conditions where cattle have been concentrating are not stable. Without treatment to open the canopy in the uplands, sunlight would not reach the forest floor and would result in a subsequent decrease in forage in upland areas. Livestock would continue to concentrate in the RHCAs.

Degraded channel conditions in the headwaters of many streams and in spring areas in the project area have resulted from livestock concentration. Changing livestock management is outside the scope of this document; however, it is



reasonably foreseeable that there will be an improvement in riparian condition due to changes in the range utilization standards in the Grazing Implementation Monitoring Module (IIT 2000). Studies in the intermountain region (Clary 1999) indicate that the height of grasses and forbs that are to be left in key riparian areas indicate a level of grazing that allows a corresponding recovery of palatable woody vegetation. Bank stability and channel geometry interact with vegetation but may respond differently, depending on the extent of continued disturbance in the channel and the current channel condition.

Due to past harvest practices, fire suppression, and current conifer stocking, many of these conifer stands would benefit from thinning (commercial and noncommercial thinning) and activity fuels under burning. Without treatment, it could take more than a century to begin to move the vegetation towards historical conditions (Hagans et al. 1986).

There are approximately 320 acres of private land within and adjacent to the project area. These parcels have had previous selective harvest but are predominately scattered overstory ponderosa pine with medium to high densities of understory trees. Current uses appear to be for dispersed recreation and possibly cattle grazing. Activities for the future are likely to remain similar to those ongoing today.

#### **Direct and Indirect Effects of Alternatives 2, 3, and 4**

The key components of fish habitat include: pools, temperature, large woody debris, width/depth ratio, and sedimentation. The proposed treatments are designed to enhance recruitment of large woody debris. Streams would increase in numbers of pools formed by downed wood and improve the width/depth ratio by making the streams narrow and deeper. An indirect effect of the proposed treatments and recruitment of large wood for streams include development of deeper and narrower streams, reduced temperatures, and trapped sediment within the wood structure. There is no further discussion on the fish habitat key components by individual stream reaches as the treatments are similar and designed to improve recruitment of large wood in Alternatives 2, 3, and 4. Further information on individual stream reaches can be found in the Resource Report and Biological Evaluation for Aquatic Species and is incorporated by reference.

**Pools:** The proposed treatments are designed to enhance recruitment of large woody debris. Streams would increase in numbers of pools formed by downed wood. As the numbers of pools increase, the width/depth ratio would be improved as the streams become narrower and deeper. Pools increase the volume of water in the channel without markedly increasing the surface area; thus, providing a buffer against wide swings in water temperatures. None of the alternatives would adversely affect pools.

**Temperature:** The proposed treatments would reduce temperature over time by forming pools from large woody debris recruitment and the resultant deeper and narrower stream channels. Pools increase the volume of water in the channel without markedly increasing the surface area; thus, providing a buffer against wide swings in water temperatures. Riparian vegetation would also be improved over time. As riparian vegetation increases, the amount of stream shading would also increase and reduce water temperatures. None of the alternatives would increase stream temperatures.

**Large woody debris:** The proposed treatments are designed to enhance recruitment of large woody debris. Large woody material in streams and the adjacent floodplain provides stream bank stability, decreases flow velocities, increases storage time (decreases downstream flood risk), and stores sediment. Proposed underburning is designed to burn in a mosaic pattern and to preserve existing large woody material in riparian areas. The three action alternatives would not adversely affect large woody debris.

**Width-to-depth ratio:** Width-to-depth ratios would improve from the proposed treatments. Recruitment of large woody debris in streams would increase numbers and quality of pools by making the streams narrower and deeper. This would reduce width-to-depth ratios and increase the ability of a stream to reach the floodplain and reduce shear stress on stream banks (reducing cut banks). The appropriate width-to-depth ratios result in improved fish habitat and water quality. The three action alternatives would not adversely affect width-to-depth ratios.

**Sedimentation:** Both depth and width can respond rapidly to changes in sediment load and/or discharge. Whether a stream erodes downwards or outwards is influenced by both local shear stresses and whether the stream bed or

banks are the most easily eroded. Prescribed fire has been designed in each alternative to minimize the potential effects of fire in RHCAs. Treatments in RHCAs are designed to rejuvenate riparian plant species composition. This would accelerate the improvement of riparian plants more closely to the natural rate of recovery. These fuel projects would not have more of an effect on fish or fish habitat than a naturally-occurring, low-intensity fire. Water quality would not be adversely affected by sedimentation.

Alternatives 2, 3, and 4 do not differ substantially in effects to fisheries and aquatics except in the magnitude of treatments. Alternative 2 treats more acres with commercial treatments, noncommercial thinning, and prescribed fire than Alternatives 3 or 4. Alternative 4 treats the same acreage as Alternative 2 except there would be no commercial treatment and slightly less fuels treatments. All alternatives contain specifications for treatment to protect riparian dependent resources and the effects are similar between the alternatives relative to threatened and endangered, sensitive, and management indicator species. Specifics of treatment impacts by RHCA class, watersheds, and subwatersheds may be found in the December 2004 Resource Report and Biological Evaluation for Aquatic Species and is incorporated by reference. Table 3-31 displays the acreage of treatments within RHCAs by alternative.

**Table 3-31. Comparison of Acreage Treated by Alternative**

	<b>Commercial Harvest within RHCA</b>	<b>Noncommercial Treatments within RHCAs</b>	<b>Fuels Reduction within RHCAs</b>	<b>Totals*</b>
Alternative 1	0	0	0	0
Alternative 2	65	1,294	572	1,877
Alternative 3	59	933	432	1,376
Alternative 4	0	1,300	501	1,741

\*totals do not add because of overlap.

Noncommercial thinning and natural fuels burning would occur within RHCAs. These activities are designed to maintain or improve existing shade conditions, to promote development of large-size trees, and to enhance long-term recruitment of large woody debris within riparian areas. These activities would contribute to meeting Riparian Management Objectives (RMOs). See Appendix C for a listing of RMOs.

Several units (18, 19, 29, 148, 204, 393, 411, 416, 445, 448, 473, 476, 499, 504, 506, 533, and 594) in Alternatives 2 and 3 commercially treat vegetation within RHCAs for a total estimated treatment of 72 acres. Treatment is designed to maintain or improve existing shade conditions by thinning conifers to promote deciduous trees and shrubs, to promote development of large-size trees by reducing competition, and to enhance long-term recruitment of large wood within riparian areas. These activities would contribute to meeting RMOs in INFISH for large wood recruitment and shade. No ground-based heavy equipment would be utilized to remove commercial trees within the RHCA unless on existing roads; wood would be removed with the use of a mobile yarder or a tractor mounted winch from the existing roads. Noncommercial thinning in RHCAs varies with 1,294 acres occurring in Alternative 2, 933 acres occurring in Alternative 3, and 1,300 acres in Alternative 4.

In noncommercial thinning units, the trees are too small to be sold as conventional mill products; these trees would be left on site after cutting and would be available for firewood, posts and poles, or other uses. Noncommercial thinning projects including both cutting dense understory trees and cutting juniper to restore upland grass and shrub communities. Prescribed fire or grapple piling would be used to reduce fuels created by thinning. Treatment units contain riparian habitat that would be lightly thinned to develop and maintain a high forest canopy for shade or to promote development of broadleaf shrub and tree cover.

Thinning is expected to increase individual tree growth and promote the development of large trees and LWD recruitment to the stream channel. Fish habitat would improve due to increased cover and pool formation with LWD input (Bjorn and Reiser 1991). Increased LWD will also slow hydraulic gradients, reducing potential erosion during high flow events, help to develop narrower and deeper channels, catch and retain sediment and organic matter, and would allow fish colonization of previously unused habitat.

Natural fuels and activity fuels underburning would avoid burning large wood in RHCAs. There would be no hand fire lines within 20 feet of Class II and III RHCAs and within 10 feet of Class IV RHCAs. Fire may be purposely ignited within RHCAs to protect structures, create fuel breaks, and to thin seedlings with fire. Fire may also creep into RHCAs, but has been designed to retain large wood and riparian vegetation. Prescribed fire has been designed in each alternative to minimize the potential effects of fire in RHCAs. Treatment in RHCAs would rejuvenate riparian plant species composition. This would accelerate the improvement of riparian plant species more closely to the natural rate of recovery. These underburning activities would not have more of an effect on fish habitat or fish than a naturally-occurring, low-intensity fire. Naturally-occurring fire would move in and out of the riparian areas, removing vegetation in a mosaic pattern. Large down wood in RHCAs would be minimally impacted from the underburning activities. The proposed prescribed fire includes underburning some forest stands after thinning, and underburning some unthinned stands to maintain the existing low fuel levels. Prescribed fire reduces surface fuels, which reduces the potential intensity and resistance to control of future wildfires. Prescribed fire would also be used to reduce seedling and sapling density; regenerate grass, forbs, and shrubs; and reduce the encroachment of western juniper into pine stands.

Burning would be conducted for approximately a 10-year period and scattered throughout the West Maury Project area to meet the disturbance regime. There would be a slight increase in the potential for sedimentation 1 year after the burn should a rain event occur before vegetation reestablishes. Filtering vegetation would then become established to reduce sedimentation to streams. Acres of prescribed fire treatments would be similar in Alternative 2 (572 acres), Alternative 3 (432 acres), and Alternative 4 (501 acres).

Fire objectives in INFISH would be met in each alternative. Fire is designed to enhance RMOs (Appendix C) by treating fuels to reduce the risk of high-intensity wildfire and minimize disturbance of riparian ground cover and vegetation. Strategies recognize the role of fire in ecosystem function and identifies those instances where fire suppression or fuel management actions could perpetuate or be damaging to long-term ecosystem function or inland native fish. These actions such as fire retardant, incident bases, camps, helibases, staging areas, and helispots are not planned to be used to carry out prescribed fire objectives and operations.

With treatment by fuels and noncommercial thinning within RHCAs, there would be an increase in large wood recruitment for future decades as trees increased in size, died, and fell into the RHCA. Since shade would not be reduced riparian woody vegetation would not increase as quickly as in the case of a wildfire where the canopy in RHCAs becomes open with sunlight reaching the vegetation. This would be the case for Alternatives 2, 3, and 4.

Hand piling of fuels would occur without equipment or resource damage within RHCAs in Alternatives 2, 3 and 4. Grapple piling would not occur within RHCAs.

A roads analysis (West Maurys Roads Analysis) was completed prior to analysis of the proposed alternatives to determine the influence of each road on riparian areas and to identify roads no longer needed for access. Road construction and use may impact water quality and timing by increasing sediment delivery, reducing infiltration, and increasing the rate of water delivery to streams. Most sediment production outside stream channels in the project area results directly or indirectly from roads. Roads within RHCAs disturb overland and groundwater flow, can reduce shading, displace deciduous vegetation and reduce potential for large woody debris recruitment. Road crossing of streams can impede natural flow (USDA 2003). The existing open road density is 2.35 miles per square mile. The density is below the Forest Plan standard and guideline of 3.0 miles per square mile. For Alternative 2, 10.2 miles of roads would be decommissioned and 8.8 miles would be decommissioned in Alternative 3. Road decommissioning and inactivation within the RHCAs would likely reduce bank erosion at stream crossings and sediment from road surfaces and allow for stream channels to maintain function.

All newly constructed specified roads would be closed after use is completed. Alternative 2 would construct 14.9 miles of roads and Alternative 3 would construct 6.9 miles of new roads. All newly constructed temporary roads (6.1 miles in Alternative 2 and 3.8 miles in Alternative 3) would be decommissioned by the timber purchaser after use is completed. Alternative 2 would reconstruct 22.6 miles of road and Alternative 3 would reconstruct 16.7 miles. There would be no road construction or reconstruction associated with Alternative 4.

### **Cumulative Effects of Alternatives 2, 3, and 4**

Long-term riparian management objectives would be enhanced by performing vegetation management (both commercial harvest and noncommercial thinning) within RHCAs. Activities in RHCAs are designed to maintain or improve shade conditions, to promote development of large-size trees, and to enhance long-term recruitment of large wood within riparian areas. These activities would contribute to meeting RMOs in INFISH.

Livestock grazing would continue to impact streams by trampling and by consuming riparian (woody) streamside vegetation such as willows. Grazing woody vegetation along streams reduces shade, increases temperature, increases compaction due to trampling, reduces pools, and causes stream bank cutting.

After implementing burning, thinning and grapple and hand piling treatments, livestock would be attracted to the newly sprouting vegetation that would occur in the uplands and within RHCAs. Because the proposed treatments in the uplands reduce canopy closure in forested stands, there would be a subsequent increase in forage production and palatability in the short-term (2-3 years) in the upland areas.

Based on stream surveys, bank conditions where cattle have been concentrating are not stable. By treating uplands and reducing canopy closure in forested stands, sunlight reaching the forest floor would result in a subsequent increase in forage in upland areas. In the burned areas, the newly sprouted vegetation would increase in forage palatability and in nutrients for the first 3 years that would make it easier to attract cattle away from riparian areas to uplands. This would alleviate grazing pressure and trampling in RHCAs. The previously burned vegetation would then return to normal level of nutrients as it became part of the landscape and providing increased riparian plant growth and bank stability.

Degraded channel conditions in the headwaters of many streams and in spring areas in the project area have resulted from livestock concentration. Changing livestock management is outside the scope of this document; however, it is reasonably foreseeable that there will be an improvement in riparian condition due to changes in the range utilization standards in the Grazing Implementation Monitoring Module (IIT 2000). Studies in the intermountain region (Clary 1999) indicate that the height of grasses and forbs that are to be left in key riparian areas indicate a level of grazing that allows a corresponding recovery of palatable woody vegetation. Bank stability and channel geometry interact with vegetation but may respond differently, depending on the extent of continued disturbance in the channel and the current channel condition.

The vegetation and fuels treatments would increase recruitment of large wood as the large trees become old and die and woody riparian vegetation that would increase the potential for downed wood to create pools. These treatments would not have a direct effect on other stream components.

The proposed treatments in Alternatives 2, 3 and 4 are designed to not retard the attainment of the RMOs and would not slow the rate of recovery below the near natural rate of recovery.

In addition to decreases in stream temperature, increased vegetation would lead to changes in fish and amphibian cover and their prey base. Fish and amphibian cover within the lower portions of all the major drainages would change from one dominated by substrate to one dominated by LWD and vegetation. Trout production should increase as the quantity and quality of cover improves (Wesche 1974, Binns and Eisermann 1979). This would allow use of portions of the stream not used currently because of lack of cover. A healthy stand of deciduous vegetation would provide structure for increased diversity and populations of terrestrial and aquatic insects which are important food items for redband trout (Chapman and Demory 1963) and amphibians. In addition, the leaf drop of deciduous trees will provide increased quantities of organic material and nutrients which will be available for aquatic insects and invertebrates (Cummins 1974). The increase in riparian vegetation and large woody material is expected to help stabilize stream banks, reduce erosion and lead to the development of undercut banks. It will also trap sediment from upstream sources (Platts 1991).

Due to past harvest practices, fire suppression, and current conifer stocking, many of these conifer stands would benefit from thinning (commercial and noncommercial thinning) and activity fuels under burning. Without treatment, it could take more than a century to begin to move the vegetation towards historical (Hagans et al. 1986).

Conifer thinning is expected to increase individual tree growth and promote the development of large trees and LWD recruitment to the stream channel. Fish and amphibian habitat would improve slightly due to increased cover and pool formation with LWD input (summary by Bjorn and Reiser 1991). Increased LWD will also slow hydraulic gradients, reducing potential erosion during high flow events, help to develop narrower and deeper channels, catch and retain sediment and organic matter, and may allow fish colonization of previously unused habitat.

Determination for aquatic species: Alternatives 2, 3, and 4 may impact individuals or habitat, but would not likely contribute to a trend towards federal listing or loss of viability to the population or species for redband trout and Columbia spotted frog species or habitat. The action alternatives were designed to enhance or improve dimension, pattern, and profile to streams. There would be no adverse physiological changes or adverse biological changes as a result of any of the action alternatives as defined by INFISH. Chapter 2 includes Design Criteria and Resource Protection measures that were developed by the interdisciplinary team to comply with standards and guidelines in INFISH.

The proposed projects do not violate standards and guidelines (listed in the Fisheries Report, Appendix C) for timber (TM), Fire/Fuels Management (FM), and Roads Management (RF) from INFISH (1995). The proposed projects are designed to avoid adverse effects on inland native fish.

Short-term sedimentation from project implementation would not be measurable and would not harass fish or frogs. Fish may be displaced for a short period of time during the activity but would have refuge in other areas of the stream away from project activities. Fish and frogs would not be annoyed or tormented repeatedly and persistently by the proposed activities that would cause a decline or diminish the habitat for the survival of native inland fish or frogs.

Tables 3-38 and 3-39 identify open road densities within 400 feet of streams and potential stream crossings that would be used for haul that need culvert replacements. Fish do not occupy the streams in the areas where culverts would be replaced. Any culvert replacements would be designed to accommodate peak flows. Table 2-6 identifies road activities proposed under each alternative. Sedimentation to streams is discussed in the Hydrology/Watershed Conditions section.

## **Botany**

The West Maurys Botany Report including the Biological Evaluation for Sensitive Plants, Noxious Weed Management, and Plants of Cultural Value is incorporated by reference. The following is a summary of the pertinent information documented in this report including current conditions, survey information results and effects analyses. Further detail on the summary information can be found in the report. Scientific names of all species mentioned can be found in the report.

There are no known proposed, endangered, or threatened plant species known or expected to occur on the Ochoco National Forest. Habitat is not present. Therefore, no effect to threatened or endangered species is expected to occur with any of the alternatives.

## **Affected Environment**

Of the 26 sensitive plant species documented or suspected to occur on the Ochoco National Forest and the Crooked River National Grassland, 14 do not have potential habitat within the West Maurys project area. These species are: Estes wormwood, South Fork John Day milkvetch, Peck's milkvetch, Deschutes milkvetch, long-bearded mariposa lily, dwarf suncup, narrow-leaved sedge, yellow lady's slipper orchid, Ochoco lomatium, disappearing monkeyflower, Peck's penstemon, Columbia cress, arrow-leaf thelypody and Howell's thelypody. There would be no impact to any of these species from any of the alternatives.

The 12 sensitive species that have potential habitat, or are known to occur in the analysis area, have been grouped where they occupy similar habitats, and anticipated effects of the alternatives are similar. The habitat groups are riparian, moist forest, and non-forest scabland. The following species are those that have either been documented in

or near the West Maury analysis area, or have a higher potential for occurrence in the area. The groupings are as follows:

1. species associated with riparian habitats (including wet meadows, seeps and springs): Peck's lily; six *Botrychium* species including ascending moonwort, Crenulate moonwort, Mingan's moonwort, mountain moonwort, twin-spike moonwort, Pinnate moonwort and two sedges; porcupine sedge and interior sedge.
2. species associated with moist forests: Back's sedge.
3. species associated with non-forest scabland habitats: Henderson's needlegrass, Wallowa needlegrass.

Surveys were conducted for sensitive plants in the West Maury area in 1990-1991. Most of these surveys were completed as intuitive control and in areas with the highest potential for Peck's lily and needlegrass species. In 2003, additional intuitive control surveys were completed on a variety of habitats, with emphasis on sites with the potential for Back's sedge and interior sedge. Survey records are available at the Lookout Mountain Ranger District. Only Peck's lily populations were found.

### **Species associated with riparian habitats**

Peck's lily - Populations are primarily along meadows and low-gradient drainages in the lower elevations. Compared with other portions of the Ochoco NF, the West Maurys project area contains relatively few areas of potential habitat. Peck's lily is on the Oregon Natural Heritage Program (ONHP) List 1, meaning the species is threatened with extinction throughout its range (ONHP 2001). The Draft Species Management Guide (Kagan 1996) regards all three Maury Mountains populations as "select" populations, with two of these populations occurring within the West Maury analysis area (Shotgun and upper Bear Creek drainages). The goal is to manage selected populations in order to maintain or increase the overall population. Previously unrecorded sites were discovered in 2003, primarily in areas acquired during a land exchange. They added to the size of one population.

*Botrychium* spp. - Habitat for the six *Botrychium* spp. is primarily sedge/forb communities associated with seeps, drainages, and the edges of wet meadows. Ascending, crenulate, and twin-spike moonwort are on ONHP List 1. Mingan's, mountain, and pinnate moonwort are on ONHP List 2, meaning these species are threatened with extirpation from the State of Oregon. Though several surveys have been completed, none of these species have been documented in the Maury Mountains. Known sites containing populations of *Botrychium* spp. in other portions of the Ochoco National Forest are somewhat shaded to fully open at the edges of clearcuts. More individuals have been found at intact sites versus altered sites. At least one population is in a natural wet meadow. Habitat and populations appear to be stable (Ianni et al. 1996).

Porcupine and Interior sedge - These species are associated with very wet riparian habitats, usually in association with perennial water. Porcupine sedge is on the Oregon Natural Heritage Program (ONHP) List 2. Interior sedge is on ONHP List 3, meaning that more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout its range. On the Ochoco National Forest, porcupine sedge has been found only along Black Canyon Creek and other creeks on the Paulina Ranger District. It also occurs in the Bridge Creek watershed on public lands administered by the Bureau of Land Management. It appears to be a species that is more often associated with non-forested lower elevations. Interior sedge has been documented at higher elevations on the Ochoco NF. Neither species has been documented in the analysis area. Habitat for these species appears stable (Helliwell 2001, Yates 2001, and Halvorson 2003).

### Direct and Indirect Effects of No Action

This alternative includes no disturbance, such as road construction, timber harvest, burning or other activities that could affect viability of these species. Habitat would be maintained. Therefore, no impact to Peck's lily, the six *Botrychium* spp., and the sedges is expected. Monitoring indicates populations of these species are currently stable; therefore short-term effects (<10 years) are unlikely. Because Peck's lily can decline if competition is not set back due to fire or other disturbance, the continued policy of wildfire suppression and lack of management practices, such as tree thinning and prescribed burning, may lead to a long-term decline (Halvorson 2003 and Kagan 1996). Discussion of wildfire risk and potential for population expansion of noxious weeds is included in the cumulative effects section.

#### Direct and Indirect Effects of Alternatives 2, 3, and 4

All of the action alternatives avoid disturbance of known populations and high probability habitat for Peck's lily, the six *Botrychium* spp., and the sedges. Except for existing roads and selected crossings, no ground-based equipment would be used in any RHCA or other areas identified as habitat for these species.

Seeding of native or native cultivar grasses and forbs would take place during rehabilitation of log landings and portions of inactivated or decommissioned roads, including those in riparian areas, to reduce potential for erosion and introduction and spread of noxious weeds. Additional seeded grasses and forbs could move into Peck's lily habitat. Observations indicate Peck's lily populations are stable. Populations of native and non-native grasses and non-noxious forbs appear to have shared this habitat with Peck's lily for decades. Therefore, seeding is not expected to affect existing populations. On highly disturbed sites such as roads, seeded grasses and forbs can colonize these sites and reduce risk of some noxious weeds, such as teasel (*Dipsacus sylvestris*), which appears to be a greater threat to Peck's lily. Habitat for the *Botrychium* spp. and the sedges is very moist. Seeding upland grasses and forbs of the species proposed is not likely to expand into this habitat and affect these species. Though some localized impacts due to non-native invasive plants, such as teasel, are apparent in Peck's lily habitat, they presently do not appear to threaten the viability of this or other sensitive species on the Ochoco NF.

The habitat for these species is typically excluded from commercial timber harvest, except for an estimated 67 acres in Alternatives 2 and 3. Moist habitat would be unlikely to burn during prescribed burning. However, connected actions including road maintenance, reconstruction and obliteration, noncommercial thinning, and fuels treatments that would occur within the RHCAs, may damage some individual Peck's lily populations or habitat for the *Botrychium* spp. or the sedges. However, these activities are expected to only affect the periphery of such habitat (e.g. thinning along a meadow edge), are not expected to burn with high intensity, or would affect areas already heavily disturbed (e.g. road obliteration), or otherwise primarily in marginal habitat or other areas unlikely to affect viability of populations. Therefore, the immediate, anticipated effects would be that some individuals or habitat may be impacted, but would not be likely to contribute to a trend towards federal listing or a loss of viability to sensitive plant species associated with riparian areas, wet meadows, or seeps and springs.

Where noncommercial conifer thinning and prescribed burning would occur along forest/meadow interface that contains habitat for Peck's lily, the expected long-term effects (>10 years) would be enhanced habitat resulting from the reduction of shade and the expansion of meadow habitat (Kagan 1996). This could result in expansion of populations. Road obliteration may result in less vehicle use in riparian areas, which could also further protect, and may enhance habitat.

#### **Species associated with moist forest**

Back's sedge occupies riparian areas and moist meadows, but also has been documented in moist woods and thickets in Eastern Oregon (Wood 2003). Recent information suggests occurrences of this species in Oregon have been misidentified, and are actually *Carex cordillerana*, a "new" species yet to be described. Until such change is adopted by the Oregon Natural Heritage Program (ONHP), Back's sedge will be used. Though this species has been found on a variety of moist sites, several populations occur in rocky areas, which are less susceptible to livestock grazing, indicating this species may be more likely to occur in areas with little or no grazing (Lytjen 2003). Back's sedge is on the ONHP List 2. In Central Oregon, this species was last documented in 1916 on private land at "Cabin Station Pasture," adjacent to the Ochoco National Forest along Ochoco Creek (Halvorson 2002).

Though surveys have been completed on a variety of sites throughout the Ochoco NF, including the Maury Mountains in 2003, this species has not been recently documented on the Forest or in Central Oregon. These and earlier surveys indicate this species is likely not present in the Maury Mountains. Back's sedge may have been extirpated from Central Oregon. Closest known populations presently known are approximately 100 miles east of the West Maurys project area. The Umatilla, Malheur, and Wallowa-Whitman National Forests maintain populations of this species and populations are apparently stable (Yates 2001 and Wood 2003). It is also known to occur on lands managed by the Burns District of the Bureau of Land Management (Lytjen 2003).

#### Direct and Indirect Effects of No Action

This alternative includes no road construction, road decommissioning, timber harvest, seeding, burning or other activities that could affect viability of this species. Habitat would be maintained. Therefore, no impact is expected that would likely contribute to a trend towards federal listing or a loss of viability for Back's sedge.

#### Direct and Indirect Effects of Alternatives 2, 3, and 4

Most of the suitable habitat for this species is associated with upland portions within Riparian Habitat Conservation Areas (RHCAs). Except for existing roads or crossings, no ground based equipment would be used in RHCAs. Therefore, this activity is not expected to affect viability of this species.

As described earlier, seeding of upland grasses and forbs would occur on portions of decommissioned or closed roads, including those in this habitat, to stabilize soils and reduce potential for noxious weed introduction or spread. If available, native seed produced from local collections would be used. Otherwise, native cultivars would be used. A variety of native cultivars are present in many areas of the Ochoco National Forest, and do not appear to be aggressive in displacing existing native vegetation. Seeding these native cultivars is therefore not expected to affect Back's sedge. Even less risk would be expected with the seeding of locally collected native grasses and forbs.

Though surveys indicate this species is not likely to occur in the Maury Mountains, and may no longer occur in Central Oregon, potential habitat does exist. The moist sites associated with this species are primarily in RHCAs. Vegetation and fuels management treatments in RHCAs would be completed without the use of ground disturbing equipment. The activities would occur in drier, upland plant communities, which would not be primary habitat for Back's sedge. Activities such as road maintenance and road decommissioning may impact some habitat, but are expected to result in long-term enhancement of riparian habitat by reducing impacts from vehicles and sedimentation. Therefore, some habitat may be impacted by implementation of these alternatives, but is not expected to lead to a trend towards federal listing or affect viability of Back's sedge.

#### **Species associated with non-forest scabland habitat**

Henderson's and Wallowa needlegrass - These perennial grasses are regional endemic species. They are associated with residual, clay soils known as lithosols. This habitat is commonly referred to as non-forest balds, or "scablands." Both species are on the ONHP List 1. These species are uncommon but widely scattered on the Ochoco National Forest (Maze and Robson 1996). These species occur sporadically in central and northeastern Oregon on rocky, scabland ridges, often in association with rigid sagebrush (*Artemisia rigida*), Sandberg bluegrass (*Poa secunda*), onespoke oatgrass (*Danthonia unispicata*), and buckwheat (*Eriogonum*) species. Dry, heavy clay to gravelly, droughty, shallow soil is common, with aspect mostly south to southwest, with gentle to moderate slopes. Known sites are at elevations of 3,400 to 5,400 feet. Closest documented populations are on land managed by the BLM within the North Fork Crooked River watershed. None have been documented within the project area, though few areas of suitable habitat have been surveyed.

Studies indicate that where scabland soils occur on slopes exceeding 15 percent, measurable erosion has occurred over the last 100 years. As a result of these changes, productivity and plant community composition has also likely changed due to the loss of surface soil, grazing, and invasion by exotic species. Monitoring indicates the majority of this change occurred several decades ago. Though this species occurs on these altered sites, it is difficult to estimate effects of these changes on sensitive *Achnatherum* populations.

Where scablands occur on flatter slopes, less erosion has occurred, indicating little change in productivity and plant communities.

Monitoring of this species has not been extensive. However, scabland habitat associated with this species presently appears to be stable, and, except for road construction and some damage by OHV traffic, has changed little over the last few decades. Because scabland habitat does not recover from disturbance, protection is emphasized under direction of the Forest Plan (1989). Long-term effects of exotic grasses on this species are unknown, but if



associated soils remain undisturbed, effects of exotics are less apparent. On the Ochoco National Forest, the majority of this habitat appears to be stable, and is expected to remain suitable for these species.

#### Direct and Indirect Effects of No Action

This alternative includes no road construction, road de-commissioning, timber harvest, seeding, burning or other activities that could affect viability of this species. Habitat would be maintained. Therefore, no impact is expected that would likely contribute to a trend towards federal listing or a loss of viability for the needlegrasses. Discussion of wildfire risk and potential for population expansion of noxious weeds is included in the cumulative effects section.

#### Direct and Indirect Effects of Alternatives 2, 3, and 4

All action alternatives avoid ground-disturbing activities on scablands that provide the primary habitat for Henderson's and Wallowa needlegrass. Observations indicate that scabland habitats are affected little, if at all, by prescribed burning activities. This is due to low fuel levels inherent to this habitat. Therefore, all alternatives are expected to result in no impact to these species.

#### **Cumulative Effects of All Alternatives (including No Action)**

Though habitat quality has declined since pre-settlement on the Ochoco National Forest, observations and monitoring over the last decade indicate habitats for sensitive species are generally stable, despite continuing influences from livestock grazing, noxious weeds, recreation use, stream channel stabilization, road construction and other continuing activities in the project area (Ianni et al. 1996 and Halvorson 2003). Sensitive species associated with scablands, or non-forest balds, have changed little in the last few decades, and are expected to remain in their current condition. In some areas, riparian improvement projects, such as planting, headcut (stream channel) repair, and development of riparian pastures, appear to have enhanced or expanded habitat for sensitive species associated with riparian areas. Where conifer thinning (and follow-up burning) has occurred, forest stands have moved towards conditions more closely approximating pre-settlement. This is expected to benefit sensitive plant species that favor open conditions. An example is thinning and prescribed burning along a forest/meadow interface, where fire suppression has resulted in conifer expansion into meadow habitat. Meadow habitat associated with Peck's lily would increase, reversing the trend of "shrinking meadows" (Arno 2000).

The Sherwood Prescribed burn would not affect sensitive plant habitat because it would be conducted under moist conditions and would result in a low-intensity burn.

Prescribed burning would occur with the West Maury project, and is probable but not currently planned to occur in or adjacent to the project area beyond implementation of the West Maurys Fuels and Vegetation project (except for that already discussed with the Sherwood prescribed burn). Because of low fuel levels on scablands, these sites can only burn during extreme conditions, such as during high winds on hot summer days. Observations indicate these sites are also generally less susceptible to noxious weeds. Therefore, sensitive species associated with scablands are expected to be unaffected by other prescribed burning projects or noxious weeds.

On upland forest sites, prescribed burning can result in increased exposed soils, which can increase susceptibility to noxious weed introduction and spread (Arno 2000 and Asher et al. 2001). This risk increases when prescribed fire exceeds normal intensities, such as occurs during unanticipated weather changes during burning activity. Burning is also likely to improve forage production and palatability, and can also result in increased livestock use on burned areas. If these areas burn too hot, or if livestock grazing occurs before sufficient recovery of vegetation and the soil organic layer, grazing can impact these areas by compacting and displacing soil, and increase risk of erosion, riparian degradation and serve as vectors for introduction and spread of noxious weeds (DeClerk 1997, DiTomaso 1997, Miller et al. 1999, Asher et al. 2001, and Zimmerman et al. 2002). This could affect sensitive plants and habitat. However, large-scale burning can also help distribute livestock, and its impacts, over a wider area. Grazing has occurred on what is now the Ochoco National Forest for a century, and prescribed fire with subsequent grazing has occurred for the last 20 years. Sensitive plant populations presently appear stable following these activities (Ianni et al. 1996).

Prescribed burning within riparian habitat conservation areas (RHCA) would occur where specific areas are expected to benefit from burning. While some areas likely to burn are within the RHCA boundary, they are generally outside the actual riparian zone that is influenced by higher moisture levels. Relatively little moist site riparian vegetation, and associated riparian-associated sensitive plant habitat, is expected to burn. Therefore, as discussed above, burning and successive grazing would not be expected to affect sensitive plants or habitat associated with riparian zones. If implemented within normal burning prescriptions, cumulative effects of burning is not expected to affect long-term viability of sensitive plant species, and for some species, such as Peck's lily, continuation of the prescribed burning program may enhance long-term habitat (Halvorson 2003).

Non-native invasive plant species currently do not appear to have a measurable effect on the viability of sensitive plant populations. Noxious weeds are expected to continue to be introduced by vehicles and livestock, but control measures are also occurring under the 1998 Integrated Weed Management Plan, and are expected to continue. Though Canada thistle is expected to expand, its impacts to sensitive plants are presently not foreseen. Continued introduction of biological control agents may ultimately result in a decline of this noxious weed.

Assuming noxious weed control continues, weeds are less likely to affect sensitive plant habitats. Therefore, no cumulative effects are expected on sensitive plant species. The Forest Service Pacific Northwest Regional Office is currently completing an environmental analysis to update Forest Plan direction that will better assure prevention or reduction of the spread of invasive plants. The Deschutes and Ochoco National Forests are preparing an environmental impact statement analyzing the treatment of noxious weeds. This is expected to result in additional treatment areas on the Ochoco National Forest for integrated noxious weed management. Implementation of additional weed management is expected to have little short-term effect on sensitive plant species, and may have long-term beneficial effects.

With the current vegetation and fuels conditions in the West Maury analysis area, wildfire is foreseeable. Wildfire could affect native plant communities and associated sensitive plants directly (Owen 2003), or indirectly by increasing susceptibility to noxious weeds (Asher et al. 2001).

Sensitive plant species associated with riparian areas, Peck's lily, the six *Botrychium spp.*, and porcupine and interior sedge, are not expected to be affected. These species occur in areas that are generally moist year-round, or in the case of *Calochortus longebarbatus* var. *peckii*, are dormant during wildfire season and also in areas with generally light fuel loads, and therefore are not expected to burn with high intensity. *Calochortus spp.* are generally recognized as dependent on disturbances such as wildfire (Kagan 1996, and Kaye et al. 1990 and 1994).

Species associated with scabland, Henderson's and Wallowa needlegrass occur on areas with relatively low fuel density. However, these habitats are known to burn during wildfire events (Johnson 1998). Therefore, these species are likely to be adapted to, and remain viable with periodic wildfire.

Back's sedge has been documented in association with upland conifers, indicating it is adapted to periodic fire. Therefore, wildfire is not expected to affect viability of this species.

In general, thinning and fuels reduction treatments that move conditions towards the historical range would reduce potential adverse effects due to wildfire. Potential effects due to wildfire would vary with alternatives, with anticipated degree of wildfire effects inversely related to acres treated.

Determining more specific potential effects of wildfire for alternatives is not possible, due to so many unknown variables, such as fuels conditions during a wildfire event, weather, suppression forces available, and other factors. However, risk of future wildfire, and its potential effects to sensitive plants, would vary by alternative, corresponding to the degree of thinning and fuels management activities. Alternative 1 maintains the highest risk, and could decrease with thinning and burning that would occur outside the West Maury projects. Other alternatives would result in a more substantial reduction in wildfire risk, with Alternative 2 resulting in the lowest risk of future wildfire. Alternative 3 would be more aggressive in vegetation management, and would have a lower risk of wildfire than Alternative 4.

In view of the past and continuing activities, assessment of future activities, expansion of noxious weeds, and assessment of general wildfire effects on sensitive plant species, cumulative effects are expected to not change the findings determined in the direct and indirect effects.

Determination For Botanical Species: In summation, for all alternatives, there would be no impact to the viability of any sensitive plant species and implementation of any action alternative would not result in a species trending towards the need for federal listing. Some individuals or their habitat might be impacted. See Appendix A and the February 2005 Botany Report for individual species effects determinations.

## **Management Indicator Species (MIS)**

The Forest Plan identified MIS to help determine the effects of management activities on fish and wildlife habitat. Brook and rainbow trout were identified as an indicator of riparian and aquatic habitat. Pileated woodpecker was identified as an indicator for species that require mature forest and old-growth habitat and impacts to habitat from proposed activities have already been described under Issue 1E and will not be repeated. Primary cavity excavators and the common flicker were identified to represent species that utilize snags and old-growth juniper habitat, respectively.

### **Primary Cavity Excavators**

The northern flicker is listed as an MIS in the FEIS for the Forest Plan. This species was identified as an indicator for old-growth juniper. However, the flicker is a habitat generalist and can be found nesting in a wide variety of habitat types so long as snags or hollow trees of the appropriate dimensions are present. Habitat generalists among the primary cavity excavators are assured habitat by providing suitable habitat for the range of species that select for specific habitat types or more limiting habitat conditions. The existing condition for primary excavators is addressed by focusing on two species of habitat specialists, the white-headed and pileated woodpeckers. The pileated woodpecker prefers closed canopy, late to old-growth fir-dominated habitat. The best pileated feeding habitat is within stands dominated by large (>20"dbh) true fir (refer to Issue 1E, Old Growth Management Area). The white-headed woodpecker prefers ponderosa pine habitat that has a more open overstory with large pine for foraging and snags for nesting habitat. Its habitat associates are generally called the pine birds, including the pygmy and white-breasted nuthatches and the flammulated owl. This habitat is used by all of the local primary excavators with the exception of the pileated woodpecker, which prefers a fir component for foraging substrate and roost structure. Open forest conditions are preferred by Lewis' woodpecker, Williamson's sapsucker, and pygmy and white-breasted nuthatches.

### **Affected Environment**

Current conditions in the Maury Mountains are limited by site potential on south and west facing slopes (juniper and pine sites). On grand fir and Douglas-fir sites (which have better potential to provide pileated woodpecker habitat than pine sites) current conditions are also limited for pileated wood peckers, as closed-canopy stands with large tree size (E5a, M5a, L5a) are below the historical range of variability in dry grand-fir and Douglas-fir PAGs, as shown in Tables 17 through 20 of the Maury Mountains Watershed Analysis. The existing condition is currently deficient in pileated woodpecker habitat as already described in Issue 1E.

Current conditions in the Maury Mountains are limiting for white-headed woodpecker, and associated species, since open-canopy stands with large tree size (E5b, M5b, L5b) are below the historical range of variability in dry grand fir, Douglas-fir and (L5b) ponderosa pine PAGs, as shown in Tables 17 through 20 of the Maury Mountains Watershed Analysis. The existing condition is currently deficient in white-headed woodpecker habitat within the project area, as compared to the historic range of variability. No snags would be cut or removed in any alternative except those identified as safety risks. Effects of the alternatives on white-headed woodpeckers is described in detail below.

Snag and down wood levels as described in the Viable Ecosystems Management Guide would be applied to proposed harvest activities. Snag levels have been developed for each seral structural stage. A summary of snag and down wood levels based on plant association groups and the historic range of variability for seral/structural

stages provides an approximation of the numbers of snags to be maintained within each PAG. Viable Ecosystems guidelines are applied on a landscape basis. Table 3-32 displays snag levels averaged by PAG and Table 3-33 displays down wood levels by plant association.

**Table 3-32. Viable Ecosystems Guidelines for Snags (average number of snags per acre)**

Plant Association Group	Snags<20 inches DBH		Snags>20 inches DBH	
	HRV-low	HRV-high	HRV-low	HRV-high
Dry grand fir	3.3	7.3	1.0	3.4
Douglas-fir	1.5	3.4	.3	1.9
Moist ponderosa pine	1.1	2.4	.2	1.5
Dry ponderosa pine	0	.2	0	.6

**Table 3-33. Viable Ecosystems Guidelines for Down Wood Levels (average lineal feet per acre)**

Plant Association Group	HRV Low	HRV High
Dry grand fir	81	257
Douglas-fir	71	233
Moist ponderosa pine	55	167
Dry ponderosa pine	6	55

**Direct and Indirect Effects of No Action**

This alternative would not treat forest stands and the current trends in snag and large wood abundance would continue to occur. Mortality due to stand densities being above sustainable levels would result in recruitment of snag and down log habitat. Concurrently, the build-up of fuels and canopy conditions that favor crown fires and high-intensity fire may ultimately facilitate a stand replacing disturbance event. Such events yield an abundance of snags in the short term, but may result in large areas devoid of snags 50 to 100 years afterwards. Large snag recruitment would begin again after the new stand matures enough to provide such structure. This may take 150 years or more.

This alternative would maintain the existing acres of fir-dominated understories and the trend toward fir dominated habitats. The No Action Alternative would favor the species that utilize dense, fir-dominated habitats, in the short term. There would be a continued decline in suitability of existing white-headed woodpecker habitat since the species prefers open, pine dominated stands. However, because large size class trees are the limiting factor on this landscape, white-headed woodpecker habitat would increase over time as mid-size trees become larger. This alternative would not move towards the historical range of variability for the white-headed woodpecker and its associates, as rapidly as the action alternatives which promote the development of large size ponderosa pine. White-headed woodpecker habitat is below HRV. Projections indicate that HRV for white-headed woodpecker would be attained in about 25 years if stands continue to develop without large-scale stand replacing disturbance. The risk of such events would be higher under this alternative. This alternative would not accelerate development of habitat for white-headed woodpeckers.

**Direct and Indirect Effects of Alternative 2**

This alternative would help restore white-headed woodpecker habitat on most of the commercial harvest area. Where noncommercial thinning occurs in two-storied stands with a component of large live ponderosa pine and suitable snags for nesting, this treatment would also serve to help restore white-headed woodpecker habitat. This alternative is expected to restore white-headed woodpecker habitat on 339 acres post harvest. This alternative would have the greatest potential for creating habitat for the white-headed woodpecker and its habitat associates. However, white-headed woodpecker habitat would remain below HRV post treatment. Projections indicate that HRV for white-headed woodpecker would be attained in about 25 years if stands continue to develop without large-scale stand replacing disturbance. Snags and down wood may be consumed by prescribed fire. This should be partially offset by the creation of down wood due to fire-killed trees. The effect of fire on snag retention would likely result in a higher number of hard snags, with a concurrent reduction in soft and hollow snag habitat. Because of anticipated low fire intensity, it is also likely that while large existing snags may be consumed by fire, the snags

created by fire would tend to be in smaller size classes due to the vulnerability to fire mortality of smaller, thin barked trees. This alternative would accelerate development of habitat for white-headed woodpeckers.

**Direct and Indirect Effects of Alternative 3**

This alternative would help restore white-headed woodpecker habitat on most of the commercial harvest area. Where noncommercial thinning occurs in two-storied stands with a component of large live ponderosa pine and suitable snags for nesting, this treatment would also serve to help restore white-headed woodpecker habitat. This alternative is expected to restore white-headed woodpecker habitat on 249 acres. This alternative would have the moderate potential for creating habitat for the white-headed woodpecker and its habitat associates compared to Alternatives 1 and 2. However, white-headed woodpecker habitat would remain below HRV post-treatment. Projections indicate that HRV for white-headed woodpecker would be attained in about 25 years if stands continue to develop without large-scale stand replacing disturbance. Snags and down wood may be consumed by prescribed fire. This should be partially offset by the creation of down wood due to fire-killed trees. The effect of fire on snag retention would likely result in a higher number of hard snags, with a concurrent reduction in soft and hollow snag habitat. Because of anticipated low fire intensity, it is also likely that while large existing snags may be consumed by fire, the snags created by fire would tend to be in smaller size classes due to the vulnerability to fire mortality of smaller, thin barked trees.

**Direct and Indirect Effects of Alternative 4**

This alternative would help promote development of white-headed woodpecker habitat on most of the thinning area. Where noncommercial thinning occurs in two-storied stands with a component of large live ponderosa pine and suitable snags for nesting, this treatment would also serve to help restore white-headed woodpecker habitat. This alternative is expected to move stands toward restoration of white-headed woodpecker habitat on 339 acres, but would not be as effective in creating open forest conditions as the commercial treatments prescribed in Alternatives 2 and 3. However, this alternative retains a larger number of co-dominant fir trees that also contribute to size class. The acreages displayed in Table 3-34 are slightly higher for this alternative based on quantity of stands meeting nesting habitat criteria for this species. They do not necessarily reflect the quality of habitat for this species which is dependent on open stands of ponderosa pine. This alternative would have moderate potential for creating habitat for the white-headed woodpecker and its habitat associates. White-headed woodpecker habitat would remain below HRV post treatment. Projections indicate that HRV for white-headed woodpecker would be attained in about 25 years if stands continue to develop without large scale stand replacing disturbance. Snags and down wood may be consumed by prescribed fire. This should be partially offset by the creation of down wood due to fire-killed trees. The effect of fire on snag retention would likely result in a higher number of hard snags, with a concurrent reduction in soft and hollow snag habitat. Because of anticipated low fire intensity, it is also likely that while large existing snags may be consumed by fire, the snags created by fire would tend to be in smaller size classes due to the vulnerability to fire mortality of smaller, thin barked trees. This alternative would accelerate development of habitat for white-headed woodpeckers.

**Table 3-34. White-headed Woodpecker Nesting Habitat (acres)**

	<b>HRV low</b>	<b>HRV high</b>	<b>Acres Post Treatment</b>	<b>Acres in 10 yrs</b>	<b>Acres in 30 yrs</b>
<b>Alternative 1</b>	19,367	28,780	14,114	16,945	20,535
<b>Alternative 2</b>	19,367	28,780	14,453	17,205	20,663
<b>Alternative 3</b>	19,367	28,780	14,363	17,107	20,568
<b>Alternative 4</b>	19,367	28,780	14,984	18,555	23,212

**Cumulative Effects of Alternatives 1, 2, 3, and 4**

Since none of the action alternatives remove snags, existing levels would be retained with exceptions for safety hazards, road construction, and loss from prescribed burning. As a result of past harvest activities and stands adjacent to roads (subject to firewood gathering), stands previously managed have reduced snag densities. Regeneration harvests normally result in little snag retention. Selective harvest prescriptions focused on removing less thrifty trees and probably resulted in reduced natural rates of mortality in stands. There are no reasonably

foreseeable future activities, such as livestock grazing, which would have any effect on snag levels. Based on harvest history in the project area, the existing road network and assumptions further detailed in the Wildlife Report, the level of snag retention within the project areas is estimated to be at 77 percent of the potential population capability for primary cavity excavators, compared to data tables in Thomas 1979.

### **Decayed Wood Advisor (DecAID)**

DecAID (PSW-GTR-181) is an advisory tool to help land managers evaluate effects of forest conditions and existing or proposed management activities on organisms that use snags, down wood, and other wood decay elements. DecAID is not a model, it is a synthesis of wildlife research and forest inventory data, and provides information regarding abundance of snags and down wood on forested landscapes and their use by wildlife. DecAID can provide a basis for determining the number and distribution of snags and logs. It is possible to estimate the abundance and size distribution of woody material based on habitat types and structural conditions. Then the abundance of dead wood habitat can be related to the occurrence of various wildlife species that require dead wood habitat for some part of their life cycle. A more detailed description of how DecAID was utilized is found in the Wildlife Report and is incorporated by reference, including tolerance levels for individual species by plant association group and size / structure conditions.

Cumulative species curves provide data on how wildlife species use snags greater than 10 inches for nesting, roosting, resting, and/or foraging. Wildlife use of snag sizes and densities are based on various studies conducted within the relevant habitat types, but not necessarily in the project area or on Ochoco National Forest. DecAID shows levels based upon “percentage of tolerance”. This tolerance can be viewed as representing levels of assurance or confidence of providing for a particular species. Information is given at the 30, 50, and 80 percent tolerance levels. Some sites are inherently limited in their ability to provide high tolerance levels. For example southwest aspects in dry ponderosa pine/Douglas-fir forests may not be capable of growing the number of trees needed to reach the 80 percent tolerance levels for some species, whereas sites on north or northeast facing slopes could.

The comparison of estimated historic to current snag density and size class distributions reveal that in most cases the amount of area with no snags (in both size classes, 10+ inch and 20+ inch dbh) is less than might be expected under natural conditions. This is likely the result of aggressive fire suppression limiting the extent of high-intensity fires and reburns, which tend to result in areas devoid of snags at some point in time (after the fire, snags fall down or are consumed in a reburn). The amount of area with low density of snags (in both size classes) tends to run higher than might be expected under natural conditions in ponderosa pine and Douglas-fir habitat types. This likely results from a combination of factors including past vegetation management, firewood cutting, and fire suppression. The amount of area with low density of snags (in both size classes) is also higher in eastside mixed conifer stands dominated by small/medium sized trees. This represents the current trend of mortality to trees in overstocked stands that have resulted from fire suppression and species conversion associated with historic timber management practices (more area dominated by small size class trees). Eastside mixed conifer dominated by large structure trees are lacking on the current landscape, so all categories of snag size and density are below what would be expected under historic conditions for this habitat type. This is largely the result of past timber management. High density categories of snags (in both size classes) run lower in the current environment than would be expected under natural conditions in eastside mixed conifer stands. This likely results from a combination of factors including past vegetation management and firewood cutting. High density snag patches would occur under natural conditions, often as a result of small high-intensity fires, insects, or disease disturbances. The relative shortage of high-density snags in the eastside mixed conifer habitat type results from a combination of factors including past vegetation management, salvage, firewood cutting, and fire suppression. High density categories of snags (in both size classes) are comparable to what might be expected under natural conditions in ponderosa pine and Douglas fir stands. These habitat types had limited distribution of areas with very high snag density under natural conditions due to site capability and fire frequency.

Detailed information from cumulative species curves and predicted tolerance levels are contained in the Wildlife Report. This project does not propose to harvest existing snags in any action alternative, so the amount of snags present within the project area should not be substantially altered by implementation of this project. The project would remove trees up to 20.9 inches dbh, so there could be an effect on the abundance of trees available for recruitment of future snags. However, the action alternatives do not propose harvest of existing snags, so the

amount of snags present within the project area should not be substantially altered by implementation of silvicultural treatments under any alternative in the short term. The abundance, size and condition class distribution of snags may be affected by prescribed burning as described above under alternative effects. However, it is not anticipated that existing snag abundance would be substantially altered by implementation of any action alternative. Thus, the percent of population potential and percent tolerance for species evaluated under DecAID should not be further affected by the alternatives in the short term. There could be some affect on the likelihood of developing areas with high snag density in treated stands as a result of reducing competitive stress and improving tree health and resiliency. This could affect movement toward high tolerance levels for species that select for high snag density, such as black-backed woodpeckers, within treated stands. Though there may be less of a tendency for high density snag patches to develop in treated stands, there will be sufficient tree stocking levels retained to allow for recruitment of snag patches under future disturbance events. In addition, even under alternative that proposes the most treatment, approximately 50 percent of the project area will remain untreated under this project, maintaining opportunities for snag recruitment across the landscape.

Requirements for abundance and distribution of habitat for cavity nesting species is described in the Wildlife and Fish Forest-wide Standards and Guidelines section of the Forest Plan. The Forest Plan (p. 4-243) specifies a forest-wide objective of 47 percent of maximum potential. The Forest Plan (p. 4-262) provides standards by management area as well. Objectives for management areas within the project area range from 0 to 100 percent. Using a weighted average of the acres within each management area in the West Maury Project Area and the snag habitat levels specified in the Forest Plan, a project-level objective of approximately 49 percent can be obtained. The current snag level within the project area is at 77 percent. This meets the objective for the forest-wide scale, as well as the minimum level that would be projected based on objectives for management areas within the project area.

The Eastside Screens revised the Forest Plan and requires snags to be retained at the 100 percent population level (at least 2.25 snags per acre in ponderosa pine and mixed conifer PAGs) within harvest units. This project does not propose to salvage dead trees and would not affect ability of forested stands in the project area to meet the requirement of 100 percent of maximum potential population in the future.

The Viable Ecosystem Management Guide provides information on snag retention by PAG and seral/structural stage. No harvest unit would have snags marked for removal. This project would not alter the current snag levels at a landscape scale and would not affect the ability of forested stands within the project area to meet the standards in the future.

Snag distribution requirements would be met to the extent that snags are present in the existing condition or are present after fuels treatment. Harvest treatments should not alter the available snag habitat level, as snags are not to be removed other than as required for safety. Fuels treatments may alter snag availability as described above. Post treatment monitoring would be conducted to verify that snag requirements are met, or to identify areas with deficiencies in which to plan for snag creation and recruitment (Chapter 2). This monitoring should be done on at least 10% of the treatment units. Since all trees greater than or equal to 21 inches would be left, and trees less than 21 inches would be thinned, opportunities to provide snags in deficient areas, and sources for recruitment of future snags would be retained.

Past timber management has reduced the abundance of overstory trees, snags, and large down logs on private timberlands in the project area. These actions have limited the suitability of these private timberlands for occupancy by woodpeckers and other primary cavity excavators.

## **Western Flicker**

The northern flicker is a management indicator for old-growth juniper habitat. The HRV for old-growth juniper habitat in the project area ranges from 30-72 acres. Currently, there is 1-acre of old-growth juniper habitat. None of the alternatives would modify the existing amount of old-growth juniper habitat. All juniper trees greater than 21 inches dbh would be retained. Effects to this species have not been discussed because none of the alternatives propose to substantially alter habitat, only beneficial impacts would be realized by juniper thinning. None of the alternatives would have an affect on large juniper tree habitat that is suitable for nest excavation.

## **Fisheries**

Fish species identified as management indicator species are listed in the FEIS for the Forest Plan. These species are rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*). In the past, these fish have been stocked by the Oregon Department of Fish and Wildlife. They are no longer stocked in the streams in the West Maury project area but naturally reproduce in many streams (Class II). For purposes of this analysis, effects to redband trout have already been described in the Threatened, Endangered, Sensitive Species section of this Chapter and will act as a surrogate for MIS fish species effects analysis. No further evaluation will be discussed in this section.

## **Other Wildlife Species**

### **Raptors**

#### **Affected Environment**

There are 16 raptor nests (other than goshawks) which have been identified in the project area. They include nine red-tailed hawk, two Cooper's hawk, one great horned owl, one osprey, one golden eagle, and two bald eagle nests. Refer to the Threatened, Endangered, Proposed or Sensitive Species section for a discussion on northern bald eagles. No prairie falcon nests are known to occur within this project area. There would be no impacts to prairie falcons. Seasonal restrictions have been identified for treatment units near raptor nests.

#### **Direct and Indirect Effects of No Action**

Alternative 1 would not treat forest stands and thus the current trends in forest development would continue to occur. This alternative would maintain the existing acres of fir-dominated understories and the trend toward fir dominated habitats. This would tend to favor the forest dwelling accipiters (Cooper's hawk) and the small forest dwelling owls (pygmy owls, saw whet owls). These dense, fir-dominated understory conditions would result in a continued loss of herbaceous and shrubby vegetation in the understory. As a result, shrub and ground nesting bird populations (prey) would remain depressed, and the ability of open forest avian predators to effectively hunt ground dwelling small mammals would continue to be limited. There would be a continued decline in habitat for species which prefer grassland/shrub steppe, open forest and edge habitats (ferruginous hawks, harriers, red-tailed hawks, kestrels, flammulated owls, barn owls and great horned owls). Tree mortality due to stand densities being above sustainable levels would result in recruitment of snag and down log habitat over time. This would likely trigger an increase in the woodpecker population in the short term, which are also prey for avian species. Concurrently, the build up of fuels and canopy conditions that favor crown fires and high fire intensity may ultimately facilitate a stand replacing disturbance event. Such events would provide foraging opportunities for species that prefer to hunt open country, but would result in limited nesting habitat for species that nest in green forests or live trees. This alternative would maintain the suitability of all existing habitat for raptors in the short-term and would not result in disturbance or displacement of raptors from existing occupied territories.

#### **Direct and Indirect Effects of Alternative 2**

Canopy closure would be reduced to less than 60 percent in treated stands. Retained trees would expand their crowns in diameter and depth in response to the release from competition that results from the thinning. Thinning of mid-story trees would promote the development of large structure trees, large snags and down logs. Reducing competition from below is also likely to improve the longevity of existing large trees in the overstory. Thus, treatments may reduce suitability, in the short term, for the forest dwelling accipiters and the small, forest-dwelling owls. However, over time, the treatments may maintain overstory canopy by improving health and vigor of retained trees in the stands. The development of herbaceous and shrubby vegetation in the understory that results from reducing conifer density, should also improve habitat for many species of shrub and ground nesting birds, and the ability of open forest avian predators to effectively hunt ground dwelling small mammals would also be improved. Large raptors that nest on large trees or snags in relatively open forests, such as osprey, red-tailed hawks and golden eagles would benefit in the long-term from treatments that promote the development of large trees and snags. This type of treatment would occur on the most acres under this alternative. This alternative would maintain the



suitability of habitat for raptors that select for open forest environments within treated stands and for other species in untreated stands. This alternative has the potential to disturb nesting raptors in occupied territories.

### **Direct and Indirect Effects of Alternative 3**

Impacts and improvements described under alternative 2 would also occur under alternative 3 in treated stands. However, less area would be treated. Within goshawk post-fledging areas (PFA) and pileated woodpecker feeding habitat the intensity of treatment would be reduced as described in Issue 1C (goshawk) and 1E (pileated habitat). Thus, the reduction in habitat suitability for dense forest dwelling species and improvement in habitat conditions for open forest dwelling species under this Alternative would be between that in Alternatives 1 and 2. This alternative would maintain the suitability of habitat for raptors that select for open forest environments within treated stands (but on fewer acres than in Alternative 2) and for other species in untreated stands. This alternative has potential to disturb nesting raptors in occupied territories.

### **Direct and Indirect Effects of Alternative 4**

Impacts and improvements described under alternative 2 would also occur under alternative 4 without commercial harvest. However, the intensity of treatment would be substantially less than either Alternative 2 or 3 because of the lack of commercial harvest in this alternative. Thus, the reduction in suitability for dense forest dwelling species, and improvement in habitat conditions for open forest dwelling species under this alternative would be between that in Alternatives 1 and 2. This alternative would improve the suitability of habitat for raptors that select for open forest environments within treated stands (but not as well as the other action alternatives) and for other species in untreated stands. This alternative has potential to disturb nesting raptors in occupied territories.

### **Cumulative Effects of all Alternatives**

In the future, it's likely, but not currently planned, that management would continue to move forested stands toward historic conditions. This would increase the abundance of open, park-like ponderosa pine stands on dry sites. There would likely be a continuation to manage forests to increase the abundance of large tree structure in single story structural classes on more mesic sites. This management trend is likely to continue until the multi-strata LOS and single-strata LOS is within the HRV. This process would reduce the amount of habitat available for species that prefer dense forest canopy, while increasing the amount of habitat available for species that select more open stands. Thinning of stands with relatively small trees should promote the development of large tree habitat in the future. The recruitment of large trees and large snags would contribute potential habitat for species that nest high in tall trees, such as red-tailed hawks, or that require large snags to accommodate appropriately sized cavity nests, such as kestrels and many owls.

There are 6,009 acres of privately owned timberland adjacent to the project area (within subwatersheds that overlap the project area boundary). On these lands, past timber management has reduced the abundance of overstory trees and snags. These actions may have limited the suitability of these timberlands for occupancy by some species of raptors. Some species are likely to nest in timbered areas on NFS lands and forage over privately owned habitat (e.g., red-tailed hawks). However, some species prefer to nest in open habitats and may nest and forage within the privately owned habitat in the analysis area (e.g., ferruginous hawks).

There are no other reasonably foreseeable future activities, including livestock grazing, which would affect raptor habitat.

## **Neotropical Birds**

### **Affected Environment**

Executive Order 13186 titled "Responsibilities of Federal Agencies to Protect Migratory Birds" directs the environmental analysis of Federal actions to evaluate the effects of actions on migratory birds with an emphasis on species of concern. The neotropical migratory birds are described in the Partners In Flight - Northern Rocky Mountains Bird Conservation Plan. This conservation plan identifies priority habitats and focal species by

subprovince. The Ochoco National Forest is within the Blue Mountains subprovince. Table 3-35 lists the habitats and species listed for the Blue Mountains subprovince.

**Table 3-35. Migratory Bird Species of Concern**

Priority Habitats	Focal Species for the Blue Mountains Subprovince
Dry Forest	White-headed woodpecker, flammulated owl, chipping sparrow, Lewis' woodpecker
Mesic Mixed Conifer	Townsend's warbler, Vaux's swift, varied thrush, MacGillivray's warbler, olive-sided flycatcher
Riparian Woodland	Lewis' woodpecker, red-eyed vireo, veery
Riparian Shrub	Willow flycatcher
Subalpine Forest	Hermit thrush
Montane Meadows	Upland sandpiper
Steppe Shrublands	Vesper sparrow
Aspen	Red-naped sapsucker
Alpine	Gray-crowned rosy finch

Of the 18 species identified, 9 species were modeled using the data derived from the Viable Ecosystem Model. White-headed woodpecker was analyzed and is described in the Primary Cavity Excavators section previously in this Chapter. Of the remaining eight species analyzed, four are currently above the minimum amount of habitat abundance and four are below. Hermit thrush was not analyzed because the project area does not contain any subalpine forest. The existing amount of priority habitat has been compared to the desired range of habitat identified as the Historic Range of Variability (HRV). This allows a comparison between what exists today as opposed to the balance of conditions that may have existed historically. Generally, there is a relative shortage of habitat for those species associated with large tree structure and open forest conditions. These trends are primarily the result of past management practices and fire suppression activities.

Species whose habitat is currently below historic abundance are: chipping sparrow, Lewis' woodpecker, olive-sided flycatcher and Townsend's warbler. Species whose habitat is currently within historic abundance are: flammulated owl, varied thrush, and MacGillivray's warbler. Species that require specialized habitats such as riparian vegetation, meadows, shrublands, aspen or alpine cannot be modeled this way. None of the alternatives include reducing shrub or meadow habitat. The action alternatives do include restoration activities in stands where aspen occurs and prescribed burning would result in restoration of upland shrub and grassland habitats. The upland sandpiper is discussed in the threatened, endangered and sensitive species section of this EIS. This species is a Region 6 Regional Forester's Sensitive Species and its habitat is not affected by the project proposals.

The Vesper sparrow inhabits steppe shrublands found at lower elevations and are not present within forested habitats or in the project area. The Gray-crowned rosy finch inhabits alpine habitats that do not occur within this project area. Therefore, the proposed activities would have no effect to these species or their habitats.

Additional specific information on species habitat projections can be found in the February 2005 Wildlife Report. Table 3-36 displays the existing acres of species' habitat to the historic range of variation of species' habitat within the project area.

**Table 3-36. Comparison of Existing Habitat to HRV (acres)**

Species	HRV minimum (acres)	HRV maximum (acres)	Existing Acres	Status
Flammulated Owl	23,520	28,780	27,170	Within Range
Chipping sparrow	16,970	28,780	12,446	Below minimum
Lewis' woodpecker	12,840	22,786	6,010	Below minimum
Varied Thrush	1,518	4,532	2,364	Within range
MacGillivray's warbler	0	0	0	Within range
Olive-sided flycatcher	14,246	27,179	6,983	Below minimum
Townsend's warbler	578	1154	438	Below minimum



### **Direct, Indirect, and Cumulative Effects of No Action**

No activities outside of the on-going operation and maintenance that occur on the forest would occur. By delaying density management in forested stands, this alternative would continue to perpetuate the abundance of wildlife species associated with dense forests having true-fir and Douglas-fir understories. Under this alternative, there would be a continued decline in habitat abundance for all species that select open forest and early seral conditions as denser, mid to late seral conditions continue to develop. In the long-term, Alternative 1 would result in the least amount of habitat for species that select for open forest or early seral conditions. In the long-term, this alternative would result in the most habitat for species associated with denser, mid to late seral conditions. Habitat projections for the individual species are identified in the Wildlife Report and have not been repeated here, but are incorporated by reference. In the long term, approximately 30 years, habitat for all species remains similar to current conditions, except for habitat for Townsend's warbler which moves to within historic conditions. Therefore those species' habitat that was within HRV remains so and those species' habitat that was below, remains below.

The red-eyed vireo, veery, and willow flycatcher are associated with riparian woodland and shrub plant communities. These habitats exist within the project area, but are small in size and fragmented. These species may be present and utilizing the habitats as available. The No Action Alternative would retain the current trends in displacement of riparian vegetation due to encroachment by young conifers in portions of this habitat type. The red-napped sapsucker is a bird that uses aspen dominated vegetation and riparian woodlands almost similar to the vireo, veery and willow flycatcher. The No Action Alternative does not propose aspen restoration activities involving thinning of conifers which are competing with aspen. This alternative maintains habitat for species that select for dense forest conditions and continues the decline in habitat conditions for species that use open forest conditions until one or more disturbance events (insects or fire) create open conditions in the future. Past management actions have been incorporated in the discussion of existing conditions. There are no current or reasonably foreseeable future activities that would affect habitat for neotropical bird species within the project area. Livestock grazing would continue and current impacts to riparian woodland and shrub plant communities would continue and these impacts are incorporated into the existing condition discussions for these plant communities, including the acreage estimates of habitat and the projections.

### **Direct and Indirect Effects of Alternative 2**

This alternative results in increases in habitat for species that select for open forest and early seral conditions due to stand density reduction and the favoring of early seral species. The habitat relative to HRV (within or below) remains as described above (Table 3-36). In the long-term, Alternative 2 results in the greatest amount of habitat for all open forest species as well as those that select for large tree size. Proposed treatments would cause a short-term reduction in the amount of habitat for species that select for denser forests or later seral conditions. In the long-term (measured at 30 years post-treatment), habitat for all species compares to HRV as described above (if within stays within, if below stays below), except that habitat for Townsend's warbler becomes within historic abundance levels.

This alternative would alter the current trend in displacement of riparian vegetation due to encroachment by young conifers in the portions of this habitat type where prescribed fire or silvicultural treatments are employed. This would result in a beneficial effect to species associated with riparian woodland and shrub plant communities (red-eyed vireo, veery and willow flycatcher). This alternative also proposes aspen restoration activities in stands where aspen occurs involving thinning of conifers which are competing with aspen clones. This would occur in clones within 37 harvest units. This would result in a beneficial effect to species associated with aspen dominated vegetation. These treatments are consistent with the goals and objectives for these habitats as listed in the Partners In Flight, Landbird Conservation Strategy for the Northern Rocky Mountains. Specific design criteria for maintenance of riparian shrub habitat are included Chapter 2. This alternative reduces habitat for species that select for dense forest conditions and reverses the decline in habitat conditions for species that utilize open forest conditions.

### **Direct and Indirect Effects of Alternative 3**

This alternative results in increases in habitat for species that select for open forest and early seral conditions due to stand density reduction and the favoring of early seral species. The habitat relative to HRV (within or below)

remains as described above (Table 3-36) post treatment. In the long-term, this alternative results in more of habitat for all open forest species as well as those that select for large tree size, but not as much as in Alternative 2. Proposed treatments would cause a short-term reduction in the amount of habitat for species that select for denser forests or later seral conditions. In the long-term (measured at 30 years post-treatment), habitat for all species compares to HRV as described above (if within stays within, if below stays below), except that habitat for Townsend's warbler becomes within historic abundance levels.

This alternative would alter the current trend in displacement of riparian vegetation due to encroachment by young conifers in the portions of this habitat type where prescribed fire or silvicultural treatments are employed. This would result in a beneficial effect to species associated with riparian woodland and shrub plant communities (red-eyed vireo, veery and willow flycatcher). This alternative also proposes aspen restoration activities involving thinning of conifers which are competing with aspen clones. This would occur in 29 harvest units. This would result in a beneficial effect to species associated with aspen dominated vegetation. These treatments are consistent with the goals and objectives for these habitats as listed in the Partners In Flight, Landbird Conservation Strategy for the Northern Rocky Mountains. Specific design criteria for maintenance of riparian shrub habitat are included Chapter 2. This alternative reduces habitat for species that select for dense forest conditions and reverses the decline in habitat conditions for species that use open forest conditions, but not to the extent of Alternative 2 but more than Alternative 4.

#### **Direct and Indirect Effects of Alternative 4**

This alternative results in slight increases in habitat for species that select for open forest and early seral conditions due to stand density reduction and the favoring of early seral species. The habitat relative to HRV (within or below) remains as described above (Table 3-36). In the long term, Alternative 4 results in the least amount of habitat for all open forest species of the action alternatives. Proposed treatments would cause a short-term reduction in the amount of habitat for species that select for denser forests or later seral conditions compared to no action, but retains more closed forest habitat than the other action alternatives. In the long-term (measured at 30 years post-treatment), habitat for all species compares to HRV as described above (if within stays within, if below stays below), except that habitat for Townsend's warbler becomes within historic abundance levels.

This alternative would alter the current trend in displacement of riparian vegetation due to encroachment by young conifers in the portions of this habitat type where prescribed fire or silvicultural treatments are employed. This would result in a beneficial effect to species associated with riparian woodland and shrub plant communities (red-eyed vireo, veery and willow flycatcher). This alternative also proposes aspen restoration activities involving thinning of conifers which are competing with aspen clones. This would occur in clones within 37 harvest units. This would result in a beneficial effect to species associated with aspen dominated vegetation. These treatments are consistent with the goals and objectives for these habitats as listed in the Partners In Flight, Landbird Conservation Strategy for the Northern Rocky Mountains. Specific design criteria for maintenance of riparian shrub habitat are included Chapter 2. This alternative reduces habitat for species that select for dense forest conditions and reverses the decline in habitat conditions for species that use open forest conditions compared to no action, but to a much lesser extent than Alternatives 2 or 3.

#### **Effects Common to Alternatives 2, 3, and 4**

Resource protection measures that restrict activities within nesting seasons for goshawk and other raptors and during elk calving season would also reduce disturbance to nesting birds where their home ranges overlap with restricted areas. In addition, due to logistical limitations on harvest, thinning, and burning activities, some of the work would be scheduled outside of the nesting season. However, a portion of the project work would occur during the nesting season and some individuals would likely be impacted by management activities. Since most migratory birds occupy relatively small nesting season home ranges and are present in relatively large numbers, it is expected that suitable habitat outside of treatment units would provide alternate cover for birds that are displaced during activities. The area outside of treatment units would also provide source populations for re-colonization of areas in which individuals have been lost. Birds that are disturbed early in the nesting season may move out of the treatment area during operations and may re-nest later, or outside of the area of activity. In some cases, habitat outside of the unit may be limiting or fully occupied, in which case the displaced birds may become non-reproductive during the year of operation. These would be short-term impacts to individual birds or pairs of birds. This is a trade-off under the

action alternatives for the long-term benefits of providing increased amounts of habitat for the focal species (and the communities they represent) that are currently below the minimum historic levels within this project area, and for the restoration of habitat for species that utilize herbaceous and shrubby vegetation.

#### **Cumulative Effects of Alternatives 2, 3, and 4**

Since the early 1990's the Ochoco National Forest's emphasis has shifted from removal of large pine to re-establishment of large pine and larch, and other single-strata LOS stands. Through the foreseeable future, the Ochoco National Forest will continue to manage forested stands to increase the abundance of open, single-storied ponderosa pine stands on dry sites. This is the type of forest structure thought to be the historic condition on the majority of ponderosa pine sites. There would also be a continuation to manage forests to increase the abundance of large tree structure in both multi- and single-strata structural classes on more mesic sites. This management trend would likely continue until multi-strata LOS and single-strata LOS is within the HRV. This process would reduce the amount of habitat available for species that prefer dense forest canopy such as pileated woodpecker, while increasing the amount of habitat available for species that select more open stands and larger trees such as white-headed woodpecker. Thinning of stands with relatively small trees should promote the development of large tree habitat in the future. The recruitment of large trees and large snags would contribute potential habitat for species that nest high in tall trees, that require large branches, or large snags to accommodate nests. Ultimately, all species habitat would move toward an abundance and distribution that is thought to be within the HRV based on site conditions within the project area.

Continued livestock grazing would affect riparian woodland and shrub communities, but the proposed treatments in these areas would promote these species by reducing competition from conifer species. This would result in more riparian woodland and shrub community development and result in more habitat in the future.

Other forest management activities, such as grazing, mining, and recreational use can influence the quality of habitat and use of areas by migratory birds. For example, herbivory can alter the structure and composition of herbaceous and shrubby vegetation, which can influence changes in forage base and nesting cover for some species of birds. For species that forage in open grassy areas, such as blue birds, the effect can be positive. For species that nest in willow thickets, such as willow flycatchers, the effects can be negative. For other species that nest and forage in the overstory, such as white-headed woodpeckers there is no effect from herbivory on the forest floor.

## **Hydrology / Watershed Conditions**

Conditions relative to percent EHA and water yield have already been discussed under Key Issue 2 earlier in this chapter. The following sections describes effects to sedimentation/turbidity, chemical effects, temperature, and riparian/wetlands. The following information is summarized from the February 2, 2005, West Maury Water Quality Report.

### **Sediment**

#### **Affected Environment**

It is estimated that most of the sediment in the streams in the West Maury project area is coming from in-channel erosion such as bank erosion, head cuts, and channel scour. Channel destabilization can result from changes in peak flows, sediment load, and livestock impacts, but down cutting in the Crooked River and Bear Creek appear to be a major cause for the instability in the West Maury project area. Potential increases from in-channel sources resulting from harvest and natural disturbance induced increases in runoff are addressed by the EHA model.

The Forest Plan indicates that State water quality standards would be accomplished by maintaining stream bank stability and implementing Best Management Practices (BMPs). BMPs are the primary mechanism to enable achievement of water quality standards. BMPs would be monitored to verify that management objectives are accomplished. Treatments within Riparian Habitat Conservation Areas were designed to meet Riparian Management Objectives (RMOs). See Appendix C for a listing of RMOs and Appendix D for a listing of BMPs.

The Relative Erosion Rate (RER) procedure evaluates sediment delivery. The procedure does not calculate the actual sediment load but calculates a relative erosion rate that is used to compare alternatives. It evaluates direct changes to sediment load resulting from current management practices and average rates that reflect previous practices and recovery rates. Only management activities within 600 feet of mapped streams are evaluated because activities more than 600 feet from stream channels deliver only negligible amounts of sediment. Soil erosivity is based on the Forest Soil Resource Inventory (SRI); slopes are derived from the GIS Digital Elevation Model (DEM); delivery potential is calculated from a technique derived from PSWHA I (Leven 1978); and potential sediment yield and recovery are calculated using the “Guide for Producing Sediment Yield from Forested Watersheds” (Forest Service, R1/R4, 1981), and WATSED (Forest Service, R1, 1992). Based on the low average annual precipitation in the project area, low volume per acre, and not operating in the rainy season, haul delivered sediment should be low (less than 10 percent of the road delivered sediment). Because of the uncertainty of the destination mill, the accuracy of the model, and the low sediment delivery, haul delivered sediment was not calculated. No machine fire line is proposed with any action alternative, and the amount of delivered sediment from hand fire line would be very small. Therefore, sediment delivery from hand fire line construction was not calculated with this RER analysis.

The RER depicts potential sediment delivery based on the amount and type of ground disturbance, slope/erosion class (based on soil erosivity and slope), and distance to stream channels. The RER model is an effective tool for comparing alternatives. The actual sediment delivery may be higher or lower than predicted depending on the amount of vegetative recovery before storm events and storm intensity. Elevated sediment delivery may occur even if no additional activities are accomplished if a large runoff event occurs such as the high-intensity rainstorm that caused the Newsome Creek flood in the late spring of 1991.

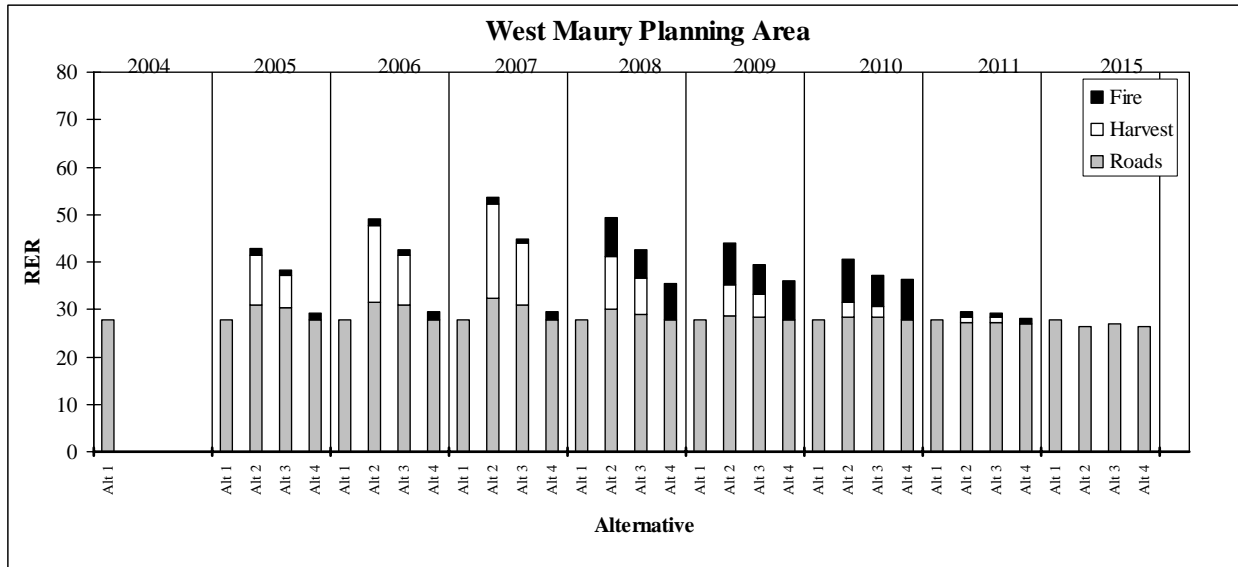
The amount of sediment transported by streams is derived from surface erosion delivered to the channel, scour of the streambed, scour of the channel banks, and mass soil movement. The amount of sediment delivered from surface erosion and mass soil movement outside the stream channel is dependent on soil erosivity, the amount and type of ground disturbance, slope, and distance to the stream. A map showing the slope erosion hazard for the project area is on file at the Lookout Mountain Ranger District (Prineville Ranger Station). About two-thirds of the sediment delivered to the stream from surface erosion comes from within 200 feet of the channel and more than 90 percent comes from within 400 feet. Within the first 200 feet, draw bottom roads and stream crossings are two of the primary contributors of sedimentation. In addition draw bottom roads prevent stream shading vegetative cover, contribute to losses of in-channel and future Large Woody Material (LWM) recruitment, and disrupt streamside water tables.

High sediment levels adversely affect the habitats of fish, insects, and other aquatic animals, reduces the esthetic quality for recreation users, and may lead to channel type changes.

The increase in RER calculated for the action alternatives would be roughly proportional to the area treated and the miles of road and temporary road constructed or reconstructed. Noncommercial thinning was not included in the tables because it would not produce measurable increases in sediment. Haul delivered sediment, which is not included in the RER, would be proportional to the number of trips taken and number of miles traveled in the project area, which should be roughly proportional to the volume harvested.

The RER portrays average sediment load changes attributable to forest management practices and natural disturbance factors. Sediment delivered on any given year will vary depending on weather patterns, storm tracks, and snowmelt. Figure 3.7 compares the potential sediment delivery between the alternatives derived from the RER model.

**Figure 3.7 West Maury Project Area Relative Erosion Rate**



Further information on assumptions and calculations for sediment can be found in the February 2, 2005, West Maury Water Quality Report.

**Direct and Indirect Effects of No Action**

Sediment levels would not change. Natural fuels levels would continue to increase and fire intensities would be higher than under historic conditions should a wildfire get started. Roads in the stream influence zone would not be closed or decommissioned.

No increase in the cumulative sediment yield in the project area would occur as a result of this alternative. The primary source of sediment above background results from the road system. Road densities within 400 feet of streams would remain the same. Fuel loadings in the majority of the project area are currently in mixed and high-intensity fire regimes. Over time, without disturbance, fuel loading in stands would continue to progress toward high intensity, which has a higher risk of stand replacement fire. In the long term, there is a potential for effects associated with fuel loading that would carry high-intensity wildfire. If a large-scale, high-intensity fire were to occur, there would be a high probability of increased sediment delivery resulting in adverse effects to aquatic habitats. It is difficult to predict the time, the scale, or the intensity at which such an event might occur.

In-Channel - It is estimated that most of the sediment in the streams in the project area is coming from in channel erosion such as bank erosion, head cuts, and channel scour. The Bottom Line Survey identified headcuts on the following streams: Gibson Creek (14), Newsome Creek (18), Florida Creek (5), Sherwood Creek (6), Shotgun Creek (6), Little Ferguson Creek (2), Klootchman Creek (3), Deer Creek (1), Friday Creek (3), and Faught Creek (1). The effects of in-channel erosion has been considered in the EHA model under Key Issue 2.

Uplands - Sediment from ground disturbance associated with trails, Off Road Vehicle (ORV) use, dispersed recreation, and recreational firewood gathering may cause localized problems but is small on a watershed scale and was not included in the analysis. Sediment from routine road maintenance was included in the model. Over time, most of the upland management generated sediment delivered to streams by surface erosion on Forest Service administered lands in the project area would be coming from roads. Open road densities within 400 feet of stream channels, the source area of an estimated 90 percent of surface sediment delivered sediment, are shown in Table 3-37. There would be no road closures with this alternative.



**Table 3-37. Open Road Densities within 400 Feet of Streams**

Subwatershed (in project area)	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3	Alternative 4
Upper Prineville Reservoir (Sanford Creek)	5.5 mi/mi <sup>2</sup>	4.0 mi/mi <sup>2</sup>	4.0 mi/mi <sup>2</sup>	5.5 mi/mi <sup>2</sup>
	0.6 miles	0.5 miles	0.5 miles	0.6 miles
Newsome Creek	3.2 mi/mi <sup>2</sup>	3.1 mi/mi <sup>2</sup>	3.1 mi/mi <sup>2</sup>	3.2 mi/mi <sup>2</sup>
	18.2 miles	17.7 miles	17.7 miles	18.2 miles
Conant Creek	7.1 mi/mi <sup>2</sup>	7.1 mi/mi <sup>2</sup>	7.1 mi/mi <sup>2</sup>	7.1 mi/mi <sup>2</sup>
	0.4 miles	0.4 miles	0.4 miles	0.4 miles
Pine Creek	3.3 mi/mi <sup>2</sup>	3.2 mi/mi <sup>2</sup>	3.2 mi/mi <sup>2</sup>	3.3 mi/mi <sup>2</sup>
	7.6 miles	7.1 miles	7.1 miles	7.6 miles
Drake Creek	2.7 mi/mi <sup>2</sup>	2.7 mi/mi <sup>2</sup>	2.7 mi/mi <sup>2</sup>	2.7 mi/mi <sup>2</sup>
	1.7 miles	1.7 miles	1.7 miles	1.7 miles
Little Bear Creek	2.7 mi/mi <sup>2</sup>	1.1 mi/mi <sup>2</sup>	1.1 mi/mi <sup>2</sup>	2.7 mi/mi <sup>2</sup>
	1.7 miles	0.7 miles	0.7 miles	1.7 miles
Upper Bear Creek	3.5 mi/mi <sup>2</sup>	3.5 mi/mi <sup>2</sup>	3.5 mi/mi <sup>2</sup>	3.5 mi/mi <sup>2</sup>
	3.1 miles	3.1 miles	3.1 miles	3.1 miles
Headwaters Bear	5.3 mi/mi <sup>2</sup>	4.8 mi/mi <sup>2</sup>	4.9 mi/mi <sup>2</sup>	5.3 mi/mi <sup>2</sup>
	23.7 miles	21.4 miles	22.0 miles	23.7 miles
Indian Creek	2.6 mi/mi <sup>2</sup>	2.6 mi/mi <sup>2</sup>	2.6 mi/mi <sup>2</sup>	2.6 mi/mi <sup>2</sup>
	0.2 miles	0.2 miles	0.2 miles	0.2 miles

### Cumulative Effects of No Action

While livestock can affect upland sediment delivery, in the West Maury Project Area, their primary impact appears to be on riparian vegetation and channel condition. Degraded channel conditions in the headwaters of many streams and in spring areas in the project area have resulted from livestock concentration. Changing livestock management is outside the scope of this document; however, it is reasonably foreseeable that there would be an improvement in riparian condition due to changes in the range utilization standards in the Grazing Implementation Monitoring Module (IIT 2000). Studies in the intermountain region indicate that the height of grasses and forbs that are to be left in key riparian areas indicate a level of grazing that allows a corresponding recovery of palatable woody vegetation (Clary 1999). Bank stability and channel geometry interact with vegetation but may respond differently, depending on the extent of continued disturbance in the channel and the current channel condition. The Forest Service is currently developing a proposal to update the five Allotment Management Plans (AMPs) in the Maurys. The AMP updates will be analyzed over the next 1-2 years; any changes to livestock grazing as a result of that analysis will not be made until after a decision is made on the West Maury Fuels and Vegetation Management project. It is reasonably foreseeable that forthcoming changes that will result in improved channel condition will include activities such as moving water troughs out of riparian areas, fencing or enlarging exclosures at springs, and developing more water sources in the uplands.

Headcut repair and riparian planting is expected in Gibson, Klootchman, and West Fork Shotgun Creeks. These activities would result in reduced sediment delivery in the long-term as stream functioning would be improved. Individual headcuts contribute small to moderate amounts of sediment into streams in the project area. The proposed headcut repair activities have a high potential for short-term, localized sediment delivery. Site-specific measures will be implemented to minimize sediment production. These measures include the timing of activities (during low flow periods so water flow will not move soil) and diverting water around the in-stream activity. Headcut repair activities should result in a decrease in sediment production within 1 year of completion. Riparian planting activities would help to stabilize stream banks and reduce in-channel erosion as vegetation becomes established. Riparian planting would take at least 4-5 years to begin stabilizing stream channels.

## Direct and Indirect Effects of Alternative 2

The RER analysis indicates that about 55 percent of the potential new sediment originates from timber harvest. Approximately 825 acres of tractor harvest and 569 acres of skyline harvest are proposed within 400 feet of streams. In addition 72 acres of RHCA would be thinned in conjunction with aspen treatments by horse logging or pulling cable from existing roads or from outside the RHCA. Megahan (1980) found that partial cut, tractor harvest produced about 30 percent less sediment than clearcutting and skyline harvest should produce about half of that caused by tractor harvest. About 26 percent of the new potential sediment would originate from fuels treatments. About 4,426 acres of fuels treatment would be proposed within 400 feet of streams. Only about 19 percent of new potential sediment is projected to come from roads. This alternative constructs approximately 1.0 mile of system road and 1.5 miles of temporary road within 400 feet of a stream. The new system road 1680-152 would require installation of a stream crossing on the west fork of Shotgun Creek, a Class III stream. Reopening with limited reconstruction would be required within 400 feet on 2.2 miles of system road and 1.0 mile of temporary road. Stream crossings on the following reopened roads may need to be replaced depending on the condition of existing culvert size and current acceptable functioning. If the size of the culvert is too small and the culvert is not functioning, then the culvert would be replaced.

**Table 3-38. Alternative 2 Reopened Roads with Potential Stream Crossings**

Road Number	Stream Class III	Stream Class IV
1600024	-	5
1620101	-	1
1640170	-	1
1700150	-	1
1700200	1	1
1700305	1	-
1750	-	2
1600100S1	-	2
1600208	-	1
1680152S4	1	-
1700000S1	-	2
1700100S2	-	1
1700300S1	-	1
1750380S1	-	2
1600202T1	-	1
1610050T1	-	4
1750050T1	-	1

There are 4.4 miles of existing open roads and 3.1 miles of existing closed roads within 400 feet of streams that would be decommissioned.

Harvest, road construction, reconstruction, and fuels treatment in this alternative would increase sediment. Most of the sediment in the streams would come from in-channel erosion such as bank erosion, head cuts, and channel scour. In addition to upland sediment delivery from the existing road system, sediment delivered from the harvest of 15 percent of the area, fuels treatments on 47 percent of the area, and construction and reconstruction of roads within 400 feet of streams would increase the cumulative sediment yield in the project area. Decommissioning of 2.0 miles of closed road and 3.1 miles of open road would reduce road densities within 400 feet of streams and would reduce long-term sediment delivery.

Because of unstable channels in many of the drainages, background sediment is high in the project area. Based on the background sediment levels and the estimated levels resulting from proposed activities, this alternative would meet state turbidity standards. Activity fuels in the harvest units with noncommercial thinning and the adjacent

RHCAs with noncommercial thinning would not be burned until several years after the noncommercial thinning would be accomplished. This would result in additional fuels breakdown and a lower intensity burn.

Alternative 2 has the highest Relative Erosion Rate due the highest levels of commercial harvest and other vegetative treatments and the highest mileage of road management.

**Direct and Indirect Effects of Alternative 3**

The RER analysis indicates that about 58 percent of the potential new sediment originates from timber harvest. Approximately 687 acres of ground based selective harvest and 233 acres of skyline cable selective harvest are proposed within 400 feet of streams under this alternative. In addition 61 acres of RHCAs will be thinned in conjunction with aspen treatments by horse logging or pulling cable from existing roads or from outside the RHCA. Megahan (1980) found that ground based selective harvest produced about 30 percent less sediment than clearcutting and the proposed cable systems should produce about half of that caused by tractor logging. About 30 percent of the new potential sediment originates from fuels treatments. Approximately 3,048 acres of fuels treatment would be proposed within 400 feet of streams. Only about 12 percent of new potential sediment is projected to come from roads. This alternative would construct 0.4 miles of new system road and 0.5 miles of new temporary road within 400 feet of streams. The new system road 1680-152 would require installation of a stream crossing on the west fork of Shotgun Creek, a Class III stream. Reopening with limited reconstruction would be required within 400 feet on 1.3 miles of system road and 1.0 miles of temporary road. Stream crossings on the following reopened roads may need to be replaced depending on the condition of existing culvert size and current acceptable functioning. If the size of the culvert is too small and the culvert is not functioning, then the culvert would be replaced.

**Table 3-39. Alternative 3 Reopened Roads with Potential Stream Crossings**

Road Number	Stream Class III	Stream Class IV
1600024	-	5
1620101	-	1
1640170	-	1
1700150	-	1
1700200	1	1
1700305	1	-
1750	-	2
1600100S1	-	2
1680152S4	1	-
1700100S2	-	1
1700300S2	-	1
1750380S1	-	2
1600202T1	-	1
1750050T1	-	1

There are 3.7 miles of existing open roads and 2.7 miles of existing closed roads within 400 feet of streams would be decommissioned.

Harvest, road construction, reconstruction, and fuels treatment in this alternative would increase sediment. Most of the sediment in the streams would come from in-channel erosion such as bank erosion, head cuts, and channel scour. In addition to upland sediment delivery from the existing road system, sediment delivered from the harvest of 10 percent of the area, fuels treatments on 31 percent of the area, and construction and reconstruction of roads within 400 feet of streams would increase the cumulative sediment yield in the project area. Decommissioning of 1.8 miles of closed road and 2.4 miles of open road would reduce road densities within 400 feet of streams and should reduce long- term sediment delivery.

Because of unstable channels in many of the drainages, background sediment is high in the project area. Based on the background sediment levels, this alternative should meet state turbidity standards. Activity fuels in the harvest

units with noncommercial thinning and the adjacent RHCA with noncommercial thinning would not be burned until several years after the noncommercial thinning was accomplished. This would result in additional fuels breakdown and a lower intensity burn.

The RER would be approximately 70 percent of that from Alternative 2 with approximately 10 percent of the potential decrease attributable to roading, 68 percent to harvest, and 22 percent to fuels treatments.

### **Direct and Indirect Effects of Alternative 4**

No timber harvest is proposed under this alternative. In Alternative 4, all of the new potential sediment originates from fuels treatments. About 4,287 acres of fuels treatment is proposed within 400 feet of streams. There would be no road construction or reconstruction. A few closed roads may be opened for access to grapple pile units but they would not be reconstructed. Drainage structures would be refreshed and the affected roads would be re-closed when the fuels treatment is completed. Road delivered sediment resulting from this alternative should be very small and was not evaluated in this alternative. There is only one Class IV stream crossing, on Road 1600024 (a closed road). Road 1600024 would be reopened to access Unit 327 and would be re-closed after treatment.

Fuels treatment in this alternative would increase sediment. Most of the sediment in the streams would come from in-channel erosion such as bank erosion, head cuts, and channel scour. In addition to upland sediment delivery from the existing road system, sediment delivered from fuels treatments on 45 percent of the area within 400 feet of streams would increase the cumulative sediment yield in the project area.

Because of unstable channels in many of the drainages, background sediment is high in the project area. Based on the background sediment levels, this alternative should meet state turbidity standards.

### **Cumulative Effects of Alternatives 2, 3, and 4**

Alternatives 2, 3, and 4 have a potential cumulative effect from increased livestock use in treated riparian areas and in prescribed fire areas due to removal of brush and down wood, increased grass and forb production, increased palatability of forage resulting from higher nutrient content and new growth, and forage remaining succulent later into the season in riparian areas. Increased trampling of banks could increase sediment delivery and grazing on streamside vegetation could reduce shade. Grazing the same season as the prescribed fire treatment has the highest risk of increasing sediment delivery to treated streams.

In-Channel - It is estimated that most of the sediment in the streams in the West Maury Project area is coming from in channel erosion such as bank erosion, head cuts, and channel scour. In channel effects have been considered in the EHA model under Key Issue 2.

Uplands - Sediment from ground disturbance associated with trails, Off Road Vehicle (ORV) use, dispersed recreation, and firewood gathering may cause localized problems but is small on a watershed scale and was not included in the analysis. Sediment from routine road maintenance was included in the model. Over time, most of the upland management generated sediment delivered to streams by surface erosion on Forest Service administered lands in the project area would be coming from roads. Open road densities within 400 feet of stream channels, the source area of an estimated 90 percent of surface sediment delivered sediment, are shown in Table 3-37. Proposed road closure would reduce the cumulative sediment delivery in the long run but ground disturbance resulting from ripping and installing drainage structures would probably increase sediment the first year or two.

Grazing – Alternatives 2, 3, and 4 have a potential effect from increased livestock use in treated riparian areas and in the prescribed fire areas due to removal of brush and down wood, increased grasses and forbs, increased palatability of forage resulting from higher nutrient content and new growth, and forage remaining succulent later into the season in riparian areas. Increased trampling of banks could increase sediment delivery and grazing on streamside vegetation could reduce shade. Grazing the same season as the prescribed fire treatment has the highest risk of increased sediment delivery to treated streams.

While livestock can affect upland sediment delivery, in the West Maury project area, their primary impact appears to be on riparian vegetation and channel condition. Degraded channel conditions in the headwaters of many streams and in spring areas in the project area have resulted from livestock concentration. Changing livestock management is outside the scope of this document; however, it is reasonably foreseeable that there will be an improvement in riparian condition due to changes in the range utilization standards in the Grazing Implementation Monitoring Module (IIT 2000). Studies in the intermountain region (Clary 1999) indicate that the height of grasses and forbs that are to be left in key riparian areas indicate a level of grazing that allows a corresponding recovery of palatable woody vegetation. Bank stability and channel geometry interact with vegetation but may respond differently, depending on the extent of continued disturbance in the channel and the current channel condition. The Forest Service is currently developing a proposal to update the five Allotment Management Plans (AMPs) in the Maurys. The AMP updates will be analyzed over the next 1-2 years; any changes to livestock grazing as a result of that analysis will not be made until after a decision is made on the West Maury Fuels and Vegetation Management project. It is reasonably foreseeable that forthcoming changes that will result in improved channel condition will include activities such as moving water troughs out of riparian areas, fencing or enlarging exclosures at springs, and developing more water sources in the uplands.

As indicated earlier, the actual sediment delivered may be higher or lower than predicted depending on whether drainage structures have been installed and the amount of vegetative recovery before a storm event and the intensity of the storm. Design Criteria and Resource Protection measures are designed to reduce the amount of sediment delivered. Even if no additional ground-disturbing activities took place in the project area, elevated sediment delivery could happen if a large runoff event occurred.

Stream Restoration - Individual headcuts contribute small to moderate amounts of sediment into streams in the project area. Headcuts on Gibson, Klootchman, and Shotgun Creek would occur in the near future. Remaining headcuts have been prioritized and will be treated as funds become available. Headcut repair activities have a high potential for short-term, localized sediment delivery. Site-specific mitigation measures will be implemented to minimize sediment production. These mitigation measures include the timing of the activities (during low flow periods so water flow will not move soil) and diverting water around the in-stream activity. Headcut repair activities should result in a decrease in sediment production within one year after completion. The Ochoco National Forest has also applied for funding to replace the undersized culverts on Klootchman Creek from the Forest boundary to the 16 road. At this time, replacing undersize culverts on Klootchman Creek has not been funded and no specific proposal has been developed. If the project is funded, an analysis under NEPA will be completed.

## **Chemical Effects**

### **Affected Environment**

Water chemistry samples were collected in the summers of 1997 and 1998 for the DEQ Regional Environmental Monitoring and Assessment Program (REMAP). Streams sampled in or close to the National Forest boundary ranged from fair to good on the water quality index with all meeting the state dissolved oxygen and pH standards. A summary and interpretation of the results plus tables of individual results may be found in the "Upper Deschutes River Basin R-Map: 1997-1998 Water Chemistry Summary" Technical Report BIO99-04.

### **Direct and Indirect Effects of No Action**

No increase in nutrient delivery to streams would occur as result of this alternative. Over time, without disturbance, fuel loading will continue the progression toward Condition Class 3, which has a higher risk of high-intensity fire. In the long term, there is potential for indirect effects associated with fuel loading that would carry a high-intensity wildfire. If a large-scale, high-intensity fire was to occur, increased nutrient delivery to streams would be expected proportional to the percentage of effective ground cover lost and the distance to streams. The flush would be most pronounced the first couple of heavy rains after the fire but might persist for several years-. It is difficult to predict the time, or the scale and intensity at which such an event might occur, but it is highly probable that it would be larger and more intense than what happened historically due to increased ladder fuels and higher fuel loadings.

## **Direct and Indirect Effects of Alternatives 2, 3, and 4**

Nutrient flushes resulting from rapid mineralization and mobilization of nutrients as a result of fire may affect water quality (Baker 1988 and Tiedeman et al. 1978). Calcium, magnesium, and potassium when converted to bicarbonate salts and nitrogen in several forms are susceptible to movement into streams by either leaching into the ground water or overland flow. However, most of the increased available nutrients are taken up by plants or bound to the soil, roots, or debris. The loss of plant cover increases the potential for erosion of these elements. Increased nutrients that reach the streams tend to get bound up in primary production and associated aquatic communities. DeByle and Packer (1972) found that sediment was the primary source for loss of phosphorous, calcium, magnesium, and potassium, whereas sodium losses were mostly in solution. The flush is most pronounced in the first couple of heavy rains after the fire but may persist for several years depending on fire intensity.

Prescribed burning to treat fuels accumulation in the project area will result in the mineralization and mobilization of nutrients. Prescribed fire would only have a minimal impact on the watershed because the surface vegetation, litter, and forest floor would only partially burn. Most of the increased available nutrients will be taken up by plants or bound to the soil, roots, or debris. Van Wyk (1982) found that nutrient release as a result of prescribed burning did not persist beyond the first winter after burning with the nutrient output returning to pre-burn levels within 3 to 10 months. Most of the increase occurred in the first 2 storms after the burn.

In Alternative 2, approximately 17,889 acres of prescribed fuels treatments would increase nutrients in streams within burned drainages. The area actually burned would range from less than 10 percent in hand piled units to between 40 and 70 percent in prescribed burning units. Nutrient levels would return to pre-burn levels within 1 year of treatment.

In Alternative 3, approximately 13,370 acres of prescribed fuels treatments would increase nutrients in streams within burned drainages. The area actually burned would range from less than 10 percent in hand piled units to between 40 and 70 percent in prescribed burning units. Nutrient levels would return to pre-burn levels within 1 year of treatment.

In Alternative 4, approximately 16,407 acres of prescribed fuels treatments would increase nutrients in streams within burned drainages. The area actually burned would range from less than 10 percent in hand piled units to between 40 and 70 percent in prescribed burning units. Nutrient levels would return to pre-burn levels within 1 year of treatment.

## **Cumulative Effects for Alternatives 2, 3, and 4**

Forests in the inland west are dependent on a combination of biological and fire decomposition processes to regulate nutrient availability and cycling (Harvey et al. 1994). Increased nutrients from fire that reach streams would tend to get bound up in primary production and associated aquatic communities. Because of fire suppression and the loss of aspen, alder, and other deciduous trees and shrubs in riparian zones, nutrient levels are probably lower than they were historically in streams in the project area. Britton (1991) found that a late summer prescribed burn appeared to have little effect on the invertebrate fauna and that maintaining shade was the major concern.

Nutrient levels in streams in the project area would not change with Alternative 1 (No Action). Over time, fuel loadings within the project area would tend to increase towards conditions conducive to high-intensity fire conditions. If a large-scale, high-intensity fire were to occur, increased nutrient delivery to streams would be expected proportional to the percentage of effective ground cover lost and the distance to streams. The flush would be most pronounced the first couple of heavy rains after the fire but might persist for several years after the fire. It is difficult to predict the time, or the scale and intensity at which such an event might occur.

The Sherwood prescribed burn (1,300 acres) to be done in 2004 would alter the nutrients in streams and would take place prior to implementing actions in the West Maurys project area, chemical levels would return to pretreatment levels within 1 year and would not have any cumulative effects with actions proposed with the action alternatives.

## Temperature and State Listed Water Quality Limited Streams (303(d))

### Affected Environment

There are no bull trout in the project area or in the Maury Mountains. The Maury Mountains Watershed Analysis disclosed that redband trout are the only salmonid species currently present in the Maury Mountains planning area. The Oregon Department of Environmental Quality did not identify any bull trout habitat in the Maury Mountains (Oregon Water Quality Standards, Fish Use Maps, Figure 130A). The temperatures in the INFISH Interim RMOs (Table 1A) are based on bull trout presence or potential. Based on the Interim RMOs, project design criteria includes measures so that the 7-day moving average daily maximum water temperature is not increased in any adult holding habitat or spawning or rearing habitats in the project area. The state water quality standards more accurately reflect attainable conditions and the target species (redband trout) found in the project area. The new State standards (340-041-0028, approved by EPA March 2004) identify that the 7-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use may not exceed 18.0°C (64.4°F). The state of Oregon assumes that waters meeting this standard will provide water temperatures suitable for redband trout spawning. Even though streams in the project area are not required to meet the state steelhead spawning standards, it appears streams that are meeting the 18°C threshold should be meeting the spawning threshold (13°C (55.4°F) between January 1 and May 15). Water temperatures over the 18.0°C threshold are not to be increased further except in accordance with Water Quality Standards direction.

Five streams in the project area are on the 2002 State 303(d) list of Water Quality Limited Water Bodies for summer water temperature: Bear, Cow, Deer, Klootchman, and Shotgun Creeks. While Bear Creek is also listed for water temperatures between October 1 and June 30, it no longer applies under the new state standards. Shotgun Creek had a daily 7-day average temperature below state thresholds and is expected to be removed from the 303(d) list when it is updated. Stream temperature data gathered from 1994 through 2003 in the project area can be found in Table 3-40. Additionally, Figure JS21 and JS22 in the February 2005 Water Quality Report depict the daily 7-day average maximum water temperature for Newsome Creek and Klootchman Creek, representative north and south slope project area drainages, for 1994 through 2003 and are incorporated by reference. Large fluctuations on Klootchman Creek from year to year appear to be attributable to fluctuations in flow, lack of shade in a meadow system, and solar input to a south aspect stream.

Monitoring indicates that the floating 7-day maximum average water temperatures in most Bear Creek tributaries range from the low to mid 70's. Water temperatures in these ranges are higher than the preferred range for salmonids and retard growth. Bear Creek at the National Forest boundary is recording maximum summer water temperatures in the mid to upper 70's. This is probably due to Antelope Reservoir storage and releases. Maximum 7-day floating average water temperatures in Bear Creek tributaries range from the high 60's to mid 70's in Klootchman and Deer Creek. The 1994 7-day maximum average water temperature for Klootchman Creek at the National Forest boundary (Klootch #1) appears to have resulted from the water level falling below the data recorder level. The streams in the Upper Crooked River Watershed on the north slope of the Maurys are below the state water temperature threshold.

No measurable increase in water temperature on listed streams, except in accordance with Water Quality Standards direction, may result from management practices in the Bear Creek Watershed because Bear Creek, Cow Creek, and Klootchman Creek are on the State 303(d) list of Water Quality Limited Water Bodies for summer water temperature. Streams on the north slope of the project area, which are under the state standard threshold (a floating 7-day maximum average of 18°C (64.4°F)), may not be warmed by more than 0.3°C (0.5°F) above the ambient condition unless greater increases would not reasonably be expected to adversely affect fish or other aquatic life.

**Table 3-40. West Maury Area 7-Day Average Max Water Temperatures 1994-2004**

Station		1994	1995	1996	1997	1998	1999	2000	2001	2003	2004
<b>Bear Creek Watershed</b>											
Bear #1	7 Day	-	<b>71.6</b>	<b>78.3</b>	<b>76.1</b>	<b>79.4</b>	-	-	-	-	-
	Days>64.4	-	80	70	92	66	-	-	-	-	-
Bear #2	7 Day	-	-	-	-	<b>79.1</b>	<b>77.0</b>	-	-	-	-
	Days>64.4	-	-	-	-	83	93	-	-	-	-
Deer	7 Day	-	<b>70.4</b>	<b>78.6</b>	<b>73.8</b>	<b>75.2</b>	<b>68.6</b>	<b>71.9</b>	<b>76.8</b>	<b>78.2</b>	-
	Days>64.4	-	40	80	88	78	37	39	66	90	-
Kloutch #1	7 Day	<b>83.4</b>	<b>70.8</b>	<b>72.3</b>	<b>71.6</b>	<b>72.9</b>	<b>67.8</b>	63.2	<b>75.3</b>	<b>78.1</b>	<b>72.0</b>
	Days>64.4	46	50	63	53	61	33	0	80	93	51
Kloutch #2	7 Day	62.6	-	-	-	<b>70.1</b>	<b>67.2</b>	-	-	-	-
	Days>64.4	0	-	-	-	45	21	-	-	-	-
<b>Upper Crooked Watershed</b>											
Florida	7 Day	61.9	-	-	-	61.0	<b>66.9</b>	-	-	-	-
	Days>64.4	0	-	-	-	0	7	-	-	-	-
Gibson	7 Day	-	-	-	-	-	-	-	-	52.0	-
	Days>64.4	-	-	-	-	-	-	-	-	0	-
Newsome	7 Day	62.3	58.8	-	59.4	58.6	57.6	60.7	57.1	55.8	58.7
	Days>64.4	0	0	-	0	0	0	0	0	0	0
Sherwood	7 Day	58.9	55.4	58.1	-	54.9	55.9	55.7	57.1	55.8	53.1
	Days>64.4	0	0	0	-	0	0	0	0	0	0
Pine #1	7 Day	<b>73.8</b>	-	64.0	-	64.1	61.6	63.0	<b>64.8*</b>	-	-
	Days>64.4	46	-	0	-	0	0	0	3	-	-
Pine #2	7 Day	-	-	-	-	-	-	-	-	61.5	60.7
	Days>64.4	-	-	-	-	-	-	-	-	0	0

Bold temperatures indicate the temperature was over the threshold.

### Direct and Indirect Effects of No Action

No reduction in shading would result from this alternative. There would be no increase in water temperatures.

### Cumulative Effects of No Action

There would be no change in water temperatures in the project area in the event of no disturbances. Because stand densities and fuel loadings would not be reduced, in the event of a wildfire, should riparian habitat conservation areas be burned severely, it is likely that canopy cover would decrease with a commensurate increase in stream temperatures.

### Direct and Indirect Effects of Alternatives 2, 3, and 4

Reductions in solar input resulting from shading are a primary factor effecting stream temperature. Shade functions (Beschta et al. 1987) generally occur within 100-200 feet of the channel. Noncommercial thinning and associated aspen enhancement are proposed in RHCAs under Alternatives 2, 3, and 4. The only commercial harvest proposed in RHCAs would be in Alternatives 2 and 3 in unit 8 on lower Pine Creek and merchantable logs still available after Large Woody Debris (LWD) requirements are met in aspen stand enhancement conifer thinning sites. There are no



commercial treatments in Alternative 4. The height of trees, at various slopes and distances that provide shade during the period when peak temperatures occur, were calculated. Only trees less than the height indicated by the calculations would be thinned from units along perennial streams unless the removal would be needed to enhance conditions for hardwoods within RHCAs. Shade is not a consideration along intermittent streams because intermittent streams are dry during the summer months when peak water temperatures occur. However, shade would be maintained along intermittent streams because none of the action alternatives include commercial harvests in Class IV RHCAs and they include implementation of other RMOs.

Commercial harvest in Unit 8 in Alternatives 2 and 3 and noncommercial thinning in RHCAs would not result in temperature increases on perennial streams. Removing conifers from aspen stands or to improve alder or willow production in commercial and non-commercial units may reduce shade but should not result in a measurable increase in water temperatures. Removing conifers from aspen stands may reduce some shade but would not result in a measurable increase in water temperatures as deciduous vegetation would be expected to increase with reduced competition. Possible short-term reductions in shade resulting from conifer thinning in aspen stands or to improve alder or willow production and prescribed fire would occur but would not produce any measurable increases in temperature.

Prescribed burning would be accomplished when moisture conditions favor a low-intensity burn. There is a risk of prescribed fire reducing shade; however, short-term increases in temperature (up to 6 months) are allowed even on streams over threshold during activities that restore riparian vegetation (Oregon Water Quality Standards 340-041-0004(5)(a)). To reduce this risk, fire ignition would generally occur outside RHCAs and the fire would be allowed to back into the RHCAs. However, due to variations in the landscape and to meet mosaic and fire intensity objectives, fire may be ignited within RHCAs under heavy fuels conditions, to protect old growth trees, to protect threatened, endangered, and sensitive plants and meet other botany concerns, to break up fuel continuity, move fire across a road running parallel to a stream, or meet other RMOs. It is the intent that fire be reintroduced into RHCAs but less extensively than in the uplands. Burning within meadow systems adjacent to creeks within treatment units, to retard conifer encroachment, would be coordinated with the District Botanist, Fisheries Biologist, and/or Hydrologist.

Alternative 2: There will be 952 acres of noncommercial thinning and about 4 acres of harvest in Class I, II, and III RHCAs. This should not reduce shade on fish-bearing streams or non-fish bearing perennial streams. Thinning of conifers from within 50 feet of aspen stands (including sprouts) in commercial and noncommercial units in RHCAs is proposed. Approximately 67 acres of commercial thinning in conjunction with aspen treatments will be accomplished in Class I, II, and III RHCAs. Commercial logs thinned from aspen stands may be removed in designated units under Alternative 2, after LWD requirements are met, by horse logging or pulling cable from existing roads or from outside the RHCA. There is a risk of conifer thinning in aspen stands and prescribed fire reducing shade for a short term; however, water temperatures should still meet state standards. Approximately 39 percent of the RHCAs on fish-bearing streams and 29 percent on perennial non-fish bearing streams are in units with prescribed fire. This alternative estimated that between 20 and 50 percent of the area in the RHCA will actually have fire in it. Post-treatment prescribed fire monitoring in 2004 found the actual area burned in Class I, II, and III RHCAs in the Lower North Fork Crooked River Fuels Reduction Project was lower than 20 percent. This low of a percentage of area burned may not meet Riparian Management Objectives (RMOs) for the West Maury Planning Area and may require modification of BMPs. There should not be any measurable increase in water temperatures on perennial streams. There is a potential to increase water temperature in intermittent non-fish bearing streams (Class IV) when they are flowing, but this should not result in a violation of state water quality standards because these streams go dry before peak water temperatures occur in the watershed.

Alternative 3: There would be 702 acres of noncommercial thinning and 54 acres of harvest in Class I, II, and III RHCAs. This would not reduce shade on fish-bearing streams or non-fish bearing perennial streams. Thinning of conifers from aspen stands would occur. Commercial logs thinned from these stands would be removed if they can be winched to a road. There is a risk of conifer thinning in aspen stands and prescribed fire reducing shade for a short term; however, this should meet state standards because deciduous plants would increase with reduced competition and increased shade would result. Approximately 30 percent of the RHCAs on fish-bearing streams and 25 percent on perennial non-fish bearing streams would be in prescribed fire units. It is estimated that between 20 and 50 percent of the area in the RHCA would actually have fire in it. There would not be any measurable increase in water temperatures on perennial streams. There is a potential to increase water temperature in intermittent non-

fish bearing streams (Class IV) when they are flowing, but this would not result in a violation of state water quality standards because these streams go dry before peak water temperatures occur in the watershed.

Alternative 4: There would be 1,023 acres of noncommercial thinning in Class I, II, and III RHCAs. This should not reduce shade on fish-bearing or non-fish bearing perennial streams. Thinning of conifers from aspen stands would occur. There is a risk of conifer thinning in aspen stands and prescribed fire reducing shade for a short term; however, water temperatures would still meet state standards. Approximately 34 percent of the RHCAs on fish-bearing streams and 27 percent on perennial non-fish bearing streams would be in prescribed fire units. It is estimated that between 20 and 50 percent of the area in the RHCA would actually have fire in it. There would not be any measurable increase in water temperatures on perennial streams. There is a potential to increase water temperature in intermittent non-fish bearing streams (Class IV) when they are flowing, but this should not result in a violation of state water quality standards because these streams go dry before peak water temperatures occur in the watershed.

No measurable direct temperature change would occur in any of the Class II-III streams in the project area under any of the alternatives.

### **Cumulative Effects of Alternatives 2, 3, and 4**

Past logging, roading, and grazing have reduced shading in the project area. No reduction of shading would result from timber harvest and most noncommercial thinning based on the design criteria identified in Chapter 2.

Reasonably foreseeable riparian planting and headcut repair would occur on the Gibson, Klootchman, and West Fork Shotgun Creeks in the project area. The riparian planting will help stabilize stream banks but is not expected to provide much shading for at least 10 years. Past deciduous riparian plantings outside of exclosures on the south slope of the project area are being heavily browsed by livestock and wildlife.

There are no other future vegetation management activities planned in the project area that would affect stream temperature. Cattle grazing would continue at current levels and would not cumulatively add to the reduction in shading since no additional increase in temperature would be expected from the proposed activities.

Alternative 1: There will be no change in water temperatures in the project area. In the event of a large-scale, high-intensity wildfire, increased solar input to streams would result from reduced shade but would be offset somewhat by increased flows. Increases in temperature would be proportional to the amount of canopy lost, the distance to the stream and the aspect. The effect would be most pronounced in confined valleys with dense understory. While producing other adverse affects, losing shade on other than perennial streams would not have much effect on summer maximum stream temperatures. It is difficult to predict the time, or the scale and intensity at which such an event might occur.

Alternatives 2, 3, and 4: There would not be any measurable increase in water temperatures in any fish-bearing or non-fish-bearing perennial streams in the project area. There is a potential to increase water temperature in intermittent non-fish bearing streams (Class IV) when they are flowing, but this should not result in a violation of state water quality standards because these streams go dry before peak water temperatures occur in the project area. Other ongoing and reasonably foreseeable activities would have no cumulative effects on water temperature, because they would not result in any measurable decrease in shade.

All alternatives, even considering cumulative effects, would not produce measurable increases in the maximum water temperature and would meet state and INFISH water quality temperature standards. State Water Quality Rules indicated that recurring activities, including rotating grazing pastures, are not to be considered new or increased discharges which would trigger an anti degradation review as long as they do not increase in frequency, intensity, duration, or geographic extent (OAR 340-041-0004(4)(a)).

## **Riparian / Wetlands**

### **Affected Environment**

A riparian area is an area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland. It includes wetlands and those portions of the floodplain and valley bottom that support riparian vegetation. Wetlands are areas that are saturated frequently enough to support vegetation that requires saturated soil conditions for growth or reproduction. Wetlands generally include swamps, marshes, springs, seeps, bogs, wet meadows, mudflats, ponds, and other similar areas. Legally, federal agencies define wetlands as possessing hydrophytic vegetation, hydric soils, and wetland hydrology. All three characteristics must be met for an area to be identified as a wetland. Generally, to be considered hydric soil, there must be saturation at temperatures above freezing for at least 7 days. Lowering water tables resulting from channel down cutting have reduced the area capable of supporting riparian vegetation in the project area.

Aspen and cottonwood stands are being crowded out by conifer encroachment and regeneration suppressed by cattle and wildlife. Alder, willow, and other deciduous riparian vegetation have decreased in the project area due to conifer encroachment, shading by upland vegetation, and grazing by cattle and wildlife.

The primary impact from livestock in the West Maurys project area appears to be on riparian vegetation and channel condition. Degraded channel conditions in the headwaters of many streams and in spring areas have resulted from livestock concentration. Changing livestock management is outside the scope of this document; however, it is reasonably foreseeable that there will be an improvement in riparian condition due to changes in the range utilization standards in the Grazing Implementation Monitoring Module (IIT 2000). Bank stability and channel geometry interact with vegetation but may respond differently, depending on the extent of continued disturbance in the channel and the current channel condition.

A review of the Ochoco National Forest GIS layer for RHCAs and springs, Forest water rights, and field review of streams and springs within proposed harvest units was accomplished. In the West Maurys project area, RHCAs on fish-bearing streams extend 300 feet from the edge of the stream's active channel. RHCAs on perennial streams extend 150 feet from the edge of the stream's active channel. On ponds, reservoirs, and wetlands greater than 1 acre, the RHCAs extend 150 feet from the edge of the wetland or max pool elevation. RHCAs extend 50 feet from the edge of intermittent streams, wetlands less than 1 acre, and landslides. Stream bank stability associated with root strength, vegetation, and floodplain condition, is achieved within a distance of 0.5 to 1 site-potential tree height. Litter fall, large woody debris (LWD) recruitment, nutrient retention, and nutrient input functions (Gregory et al. 1987) generally occur within 100-200 feet of the channel.

### **Direct, Indirect, and Cumulative Effects of No Action**

There would be no change in riparian condition in the short term but with a continued upward trend with existing activities such as stream headcut repair and improvements in grazing management. Road densities within RHCAs would not change.

Over time, without disturbance, fuel loading would continue to move towards a high risk of high-intensity fire. Fuel loadings would continue increasing and vegetation conditions would continue moving away from historic composition and distribution. In the long term, there could be a potential for indirect effects associated with increased fuel loading that would carry a high-intensity fire. If a large-scale, high-intensity fire were to occur, there would be a high risk of increased sediment production and delivery, loss of shade and increased water temperatures, increased and flashier flows, loss of large woody debris, and channel degradation.

Livestock grazing would continue as described in the Affected Environment.

## Direct and Indirect Effects of Alternatives 2, 3, and 4

Thinning and fuels treatments would only be accomplished in RHCAs to enhance RMOs (see Appendix C). There would be negligible direct effects to stream bank stability, LWD recruitment, nutrient input, or nutrient retention in Class I-III streams resulting from commercial harvest in Alternatives 2 or 3 or noncommercial thinning in all action alternatives. No commercial harvest is proposed in Class IV RHCAs under any alternative. The only commercial harvest in Alternatives 2 and 3 proposed in Class I, II, and III RHCAs is what can be reached with a mobile yarder from the road or winched to road, or would be horse logged. Accelerated growth of trees in the RHCAs resulting from thinning under all action alternatives would provide larger trees sooner for LWD recruitment. Growth rates in Alternative 4 would be reduced compared to Alternatives 2 and 3 because trees greater than 9 inches dbh would not be thinned. These trees would still be suppressed under competitive conditions for resources for growth. Ground-based logging equipment in Alternatives 2 and 3 would not operate off roads within RHCAs, except horse logging; this would be done to meet RMOs. All alternatives meet BMPs and Forest Plan standards and guidelines.

In Alternative 2 treatments would be accomplished to improve cottonwood and aspen conditions. Approximately 76 acres would have commercial harvest, 1,089 acres of RHCA would have noncommercial thinning (includes 140 acres of juniper thinning), to move the RHCAs toward the historic range of variability, to maintain existing large diameter trees or aspen stands, to accelerate the growth of smaller trees for future riparian needs, reduce the risk of stand replacement fire, and allow future reintroduction of fire. In Alternative 3, there would be 61 acres of commercial harvest, 933 acres of noncommercial thinning (includes 119 acres of juniper thinning). Alternative 4, would have 1,300 acres of noncommercial thinning (includes 140 acres of juniper thinning). Alternative 2 would decommission 3.0 miles of open road and 2.8 miles of closed road within RHCAs. Alternative 3 would decommission 2.3 miles of open road and 2.3 miles of closed road within RHCAs.

Burning would be accomplished when moisture conditions favor a low intensity burn. Prescribed burning ignition would generally occur outside RHCAs and the fire would be allowed to back into the RHCA. However, due to variations in the landscape and to meet mosaic and intensity objectives, fire may be ignited within RHCAs under heavy fuels conditions, to protect LOS stands, to protect sensitive plants and meet other botany concerns, to break up fuel continuity, move fire across a road running parallel to a stream, or meet other RMOs. It is the intent that fire be reintroduced into RHCAs, but less extensively than in the uplands. Burning within meadow systems adjacent to creeks, to retard conifer encroachment, would be coordinated with the District Botanist, Fisheries Biologist, and/or Hydrologist.

Alternative 2 moves 34 percent of RHCAs toward desired condition using timber harvest, noncommercial thinning, and juniper thinning. Approximately 39 percent of the RHCAs in the project area are in fuels treatment units. Prescribed fire would primarily be allowed to back into these units and the percent of the area burned would be less than in the uplands. The number of miles of open road in RHCAs would be reduced by 7 percent. Proposed treatments, other than road closures, are primarily aimed at improving vegetation within RHCAs.

Alternative 3 moves 25 percent of RHCAs toward desired condition using timber harvest, noncommercial thinning and juniper thinning. Approximately 29 percent of the RHCAs in the project area are in fuels treatment units. Prescribed fire would primarily be allowed to back into the RHCAs and the percent of the area burned would be less than in the uplands. The number of miles of open road in RHCAs would be reduced by 5 percent. Proposed treatments, other than road closures, are primarily aimed at improving vegetation within RHCAs.

Alternative 4 moves 34 percent of RHCAs toward desired condition using noncommercial thinning and juniper thinning. Approximately 34 percent of the RHCAs in the project area are in fuels treatment units. Prescribed fire would primarily be allowed to back into these units and the percent of the area burned would be less than in the uplands. The number of miles of open road in RHCAs would be reduced by 7 percent. Proposed treatments, other than road closures, are primarily aimed at improving vegetation within RHCAs.

## **Cumulative Effects of Alternatives 2, 3, and 4**

Alternatives 2, 3, and 4 have a potential cumulative effect from increased livestock use in treated riparian areas and in the prescribed burn area due to removal of brush and down wood, increased grasses and forbs, increased palatability of forage resulting from higher nutrient content and new growth, and forage remaining succulent later into the season in riparian areas. Increased trampling of banks could increase sediment delivery and grazing on streamside vegetation could reduce shade. However, prescribed burning in the uplands could provide more palatable sources of forage in upland areas.

Fire has been excluded from many riparian areas due to past grazing practices and fire suppression. This has resulted in fuel loadings above natural conditions; increased LWD densities; later successional plant communities; increased densities of seedlings, saplings, and small trees; and decreases in aspen, cottonwood, willow, alder, and other deciduous riparian vegetation. Silvicultural and fuels treatments in the uplands under Alternatives 2, 3, and 4 would reduce the risk of a large fire in the project area with treatments in the RHCAs reducing impact intensities within stream-side zones and wetlands, should a fire occur.

Connected and reasonably foreseeable riparian planting and headcut repair will occur on the Gibson, Klootchman, and West Fork Shotgun Creeks. The riparian planting will help stabilize stream banks but will not be effective for at least 4 to 5 years and measurable increases in shade are not expected for at least 10 years in areas currently devoid of vegetation. Past deciduous riparian plantings outside of enclosures on the south slope of the project area are being heavily browsed by livestock and wildlife. Remaining headcuts have been prioritized and riparian planting opportunities have been identified. Additional headcut treatments and riparian planting will be accomplished as funds become available.

Other ongoing and reasonably foreseeable activities would have no measurable effect on riparian condition.

## **Geology**

The project area is located on the western corner of the Blue Mountains physiographic province, which also includes the Wallowa, Elkhorn, and Strawberry mountains. The shaping of the landforms in the watershed is a reflection of the past geologic history of the area. The tectonic movement, uplift of the Blue Mountain anticline, and mass wasting processes have combined to create the broad ridges and steep draws. Mass wasting, sheet and rill are some of the physical processes currently in action. Further details of the geologic description of the area can be found in the Geology and Minerals Report and is incorporated by reference.

## **Landslide Prone Areas**

### **Affected Environment**

Addressing the potential for initiating slope movement through management activities, beyond the natural process and proposing mitigations through design elements and minimizing landslide terrain within the units is in compliance with the soil mass wasting standards and guidelines in the Forest Plan. The design criteria and resource protection measures (Chapter 2) protect seeps, springs, and riparian areas are in compliance with the Forest Plan.

Landslide debris (QIs) covers approximately 3 percent (1,293 acres) of the analysis area (Swanson 1969). The landslide and debris flow deposits are composed of chaotic masses of angular blocks, chiefly mixtures of basalt and tuffaceous sedimentary rocks (Swanson 1969). The unit includes debris flows and large talus piles. The landslide debris is mapped around the crest of the Maurys, on the eastside of the project area. The unconsolidated material is highly susceptible to weathering. The landslide scarps associated with the debris are located on the crest of the ridges.

Based on an air photo interpretation, the West Maurys project area has a series of dormant landslide scarps and debris lobes around the western end of the crest of the Maury Mountains (see the Geology report for specifics). The

dormant landslides tend to occur on slopes greater than 40 percent and are generally associated with ridge tops. The dormant landslide forms originate on Picture Gorge Basalts or are midslope in the Clarno and John Day Formations. When the dormant landslides were more active, they contributed a portion of the existing sediment currently occupying the flood plains of the stream courses. The dormant landslide terrain is primarily located in Mid Crooked River, Bear Creek, and Camp Creek watersheds.

The visible landslides and related debris cover a total estimated 1,894 acres, 5 percent of the project area. These areas, depending on slope and aspect, are in a moderate to high risk for reactivation by management activities such as road construction or harvest, or by the continued weather pattern of higher precipitation. The remaining analysis area is at low risk for mass wasting instability by management activities or by the continued weather pattern of higher precipitation.

**Direct, Indirect, and Cumulative Effects of Alternative 1**

The No Action Alternative would allow the dormant landslide terrain to continue the natural process of erosion under the current precipitation pattern. There would be no direct, indirect, or cumulative effect.

**Direct and Indirect Effects of Alternatives 2 and 3**

For all the units in the action alternatives, the primary concern from a mass wasting standpoint is for those units on dormant landslide terrain and underlain by mapped landslide debris. The Clarno Formation and a minor amount of mapped landslide debris underlie the West Maury commercial units. Landslide terrain tends to develop unusual subsurface drainage patterns. The intensity and style of management activity on landslide terrain, in the vicinity of seeps and springs, could potentially change the drainage pattern, possibly increasing the risk for instability.

The proposed harvest thinning (HTH) prescription does not generally alter groundwater movement measurably, except in the vicinity of seeps and springs. Harvest Select (HSL) removes a larger volume of timber as the treatment thins from below. The final density is similar to the harvest thinning treatment. Neither treatment would reduce the amount of water taken up by the trees through evapotranspiration substantially. Reducing the amount of evapotranspiration would leave more groundwater in the slope, which has the potential to decrease slope stability.

The acres of dormant landslide terrain are fairly equally spread across the watershed. The affected area varies slightly based on the proposed managed acres for each alternative (see Table 3-41). Alternative 2 proposes management of slightly more acres located in dormant landslide terrain than Alternative 3.

The skyline logging system tends to be less likely to increase instability than a tractor logging system which tends to compact the soil, changing groundwater flow patterns, potentially altering slope stability (see Table 3-41). Alternative 3 proposes management of roughly the same acres with the tractor method as Alternative 2.

**Table 3-41. Dormant Landslide Terrain by Alternative with Commercial Harvest**

<b>Logging System</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4</b>
Skyline (acres)	104	44	0
Tractor (acres)	610	602	0
Total Treated Acres within Dormant Landslide Terrain	<b>714</b>	<b>646</b>	<b>0</b>
<b>Total Treated Acres</b>	18,508	14,404	0
Percent of Treated Acres within Dormant Landslide Terrain	<b>4</b>	<b>4</b>	<b>0</b>

There are 1,895 acres of dormant landslide terrain within the planning unit boundary, of which Alternative 2 proposes to treat 38 percent (714 acres) and Alternative 3 proposes treatment of 34 percent (646 acres).

The dormant landslide terrain acres by unit are listed for each alternative in Table 3-42. The units identified would have seeps and springs buffered and any evidence of recent motion evaluated by the geologist. Although the Harvest Select prescription removes a larger volume of timber, the skyline or mobile yarder method used to harvest

those units is less likely to compact the landslide debris. The units, generally located on the upper slopes, may have a slightly increased risk for indirectly destabilizing the lower slopes if there should be a sustained weather pattern of higher precipitation.

**Table 3-42. Units by Alternative with Commercial Harvest in Dormant Landslide Terrain**

Unit/Harvest Mthd	Total Acres	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 4 (acres)
<b>Skyline and Tractor</b>				
133/S -- HSL	39	32	0	0
139.1/S -- HSL	38	14	14	0
139.2/S -- HSL	31	28	0	0
157/S -- HSL	41	31	31	0
<b>Subtotal Skyline</b>	<b>149</b>	<b>104</b>	<b>44</b>	<b>0</b>
53/T --HSL	63	1	1	0
148/T -- HSL	38	10	10	0
204/T -- HSL	59	59	59	0
299/T -- HSL	22	8		0
376/T -- HSL	196	20	20	0
445/T -- HSL	82	51	51	0
<b>Sub-total Tractor</b>	<b>460</b>	<b>149</b>	<b>141</b>	<b>0</b>
<b>Sub total - HSL</b>	<b>609</b>	<b>253</b>	<b>185</b>	
<b>Tractor</b>				
78/T -- HTH	13	3	3	0
87/T -- HTH	44	15	15	0
401/T -- HTH	148	148	148	0
429/T -- HTH	115	33	33	0
448/T -- HTH	181	180	180	0
476/T -- HTH	89	11	11	0
504/T -- HTH	71	71	71	0
<b>Subtotal Tractor/HTH</b>	<b>661</b>	<b>461</b>	<b>461</b>	<b>0</b>
<b>Grand Total Acres</b>	<b>1,270</b>	<b>714</b>	<b>646</b>	<b>0</b>

Several units, based on slope and presence of landslide indicators, are more sensitive than others. Units are common to both alternatives unless identified as not occurring in Alternative 3. The units on steeper slopes are Units 133, 139.1, 139.2 and 157. Alternative 3 does not harvest Units 133 or 139.2. Units 204, 445, 504, 448 and 401 are tractor harvest. During a field visit, red clays, generally associated with slip planes in the Clarno Formation, along with seeps and springs were observed in the units. These units are prescribed for commercial thinning and harvest select prescription.

With the implementation of design criteria identified in Chapter 2, such as if seeps or springs are found, a no heavy equipment buffer around the wet area to protect from additional compaction would be designated. Protection of springs and seeps by providing a buffer is important. The additional compaction of ground surrounding wet areas could alter the subsurface water flow, increasing the risk for reactivation of landslide debris, depending on the steepness of the slope.

Riparian corridors are protected because vegetation is left on the stream banks in RHCAs. The landslide debris should remain stable, reducing the risk for increasing sediment production. The riparian vegetation will maintain the stability of the landslide debris toeslopes. Protection of springs and seeps by providing a buffer is important. The additional compaction of ground surrounding wet areas could alter the subsurface water flow, increasing the risk for reactivation of landslide debris, depending on the steepness of the slope.

The percentage of proposed reconstruction of system and temporary roads on dormant landslide terrain for Alternatives 2 and 3 is equal. The relative risk for reactivation of landslide terrain is equal for Alternative 2 and 3, given the same number of miles crossing unstable terrain. There are 10.2 miles of road proposed for decommissioning under Alternative 2. Three miles (9%) are within dormant landslide terrain. Under Alternative 3, there are 8.8 miles of road proposed for decommissioning, with 3 miles within dormant landslide terrain. After

addressing hydrologic concerns such as drainage by providing for adequate hydrologic flows, these roads would be decommissioned.

Those units located on the upper slopes of dormant landslide scarps have a slightly increased potential for reactivating the landslide debris on the lower slopes when combined with a higher precipitation or a rain on snow event like the forest experienced in 1997, due to the potential increase flow of groundwater to the lower slopes. Alternatives 2 and 3 propose roughly the same amount of tractor harvest method acres (see Table 3-41). Alternative 2 includes an additional 100 acres of the skyline harvest. Although the percent of treated acres within dormant landslide terrain is equal, Alternative 3 treats fewer acres. Alternative 3 would have slightly less of an effect than Alternative 2.

Potential risk for an increase in sediment transport due to mass wasting is low to moderate for all the action alternatives. The alternatives are roughly equal in the percentage of acreage proposed for management within dormant landslide terrain, as shown in Table 3-42. The slight difference lies in the prescription, method of harvest and total acres to be harvested. Although Alternatives 2 and 3 treat roughly the same percentage of dormant landslide terrain, the actual acres at risk is less in Alternative 3. The acres reduced would be harvested by skyline under the prescription in Alternative 2, which would not compact the ground and is unlikely to alter the subsurface flow.

The proposed treatments of noncommercial thinning and prescribed natural fire would have no direct effects on increasing slope instability. Indirectly, the treatments would encourage increased growth of the vegetation, which would increase the evapotranspiration and improve slope stability.

#### **Direct and Indirect Effects of Alternative 4**

The proposed treatments of noncommercial thinning and prescribed natural fire would have no direct effects on increasing slope instability. The juniper thinning treatment has 8 acres underlain by dormant landslide terrain, of the 2,688 acres. Of the proposed 16,407 acres of prescribed fire, 693 acres are underlain by dormant landslide terrain. Of the 9,039 noncommercial thinning acres, 833 acres are underlain by dormant landslide terrain. Indirectly, the treatments would encourage increased growth of the vegetation, which would increase the evapotranspiration and improve slope stability. There would be no change in sediment transport from roads.

#### **Cumulative Effects of All Alternatives**

There are no past, present or reasonably foreseeable future activities or projects that would increase the potential for activating landslide prone areas within the project area. One activity that is widespread in the project area is livestock grazing. Cattle grazing would not increase the surface compaction or reduce vegetation enough to increase the flow of groundwater to the lower slopes. Headcut repair would have a beneficial impact by decreasing the amount and rate of peak flows and reducing sedimentation. Therefore there would be no additional impacts from other activities besides the action alternatives on landslide prone areas. With the implementation of the following precautions, potential direct, indirect or cumulative effects would be minimized. This is in compliance with INFISH for the interim riparian standard. Springs and landslide prone areas less than 1 acre would be protected by a slope distance of 50 feet. Unstable terrain and spring areas greater than 1 acre would be protected by a buffer of 150 feet. If there is any indication of recent landslide activity, the area would be evaluated by the geologist and the buffer may be increased. See Design Criteria and Resource Protection Measures for Watershed Resources in Chapter 2.

### **Mineral Materials (gravel and rock pits)**

#### **Affected Environment**

Through development of the road system for timber and recreation access within the Maury watershed, 31 mineral material sources have been opened over the past three decades and are the likely sources to be used for reconstruction/stream restoration activities. The material sources vary in size from 0.5 acre to 14 acres. The average size is 0.5 acre. They cover 39.5 acres (0.1 percent) of the National Forest System land. These sources vary in chemical composition from rhyolite to basalt. The rock quality varies from marginal pit run to crushing quality.



The status of the sources range from active to partially rehabilitated. The Geology Report contains a comprehensive listing of the material sources.

**Direct and Indirect Effects of No Action**

Under the No Action Alternative, extraction of rock would continue for use in road maintenance and restoration activities but would be minimal in amounts.

**Direct and Indirect Effects of Alternatives 2, 3, and 4**

No new material sources would be developed, only existing sources would be utilized for road maintenance, construction and reconstruction. No sources would be depleted because the amount of rock needed would be minimal. No road construction or reconstruction would occur with Alternative 4.

**Cumulative Effects of all Alternatives**

Minor amounts of rock may be needed for routine maintenance and spot rocking on roads in the project area. Additional small amounts of rock would be needed for stream restoration activities. No other reasonably foreseeable future actions would utilize the quantities of rock needed for implementation of the action alternatives.

**Soils**

**Affected Environment**

The project area contains a wide variety of soils and landtypes. Volcanic ash from Mt. Mazama blanketed the area about 6,600 years ago and has been subsequently reworked by water and air. Newberry Crater ash has also been deposited over much of the area. Ash soils (greater than 7 inches of ash) occur on about 32 percent of the area or about 12,000 acres. The balance of the project area is largely residual soil which is clay-loam or clay texture.

Most of the project area consists of slopes that are 35 percent or less; 36 percent of the total area is in the 0-15 percent slope class and 54 percent is in the 16-35 percent class. Nine percent of the project area is in the 35-50 percent class and 1 percent is in the 51-70 percent class. Approximately 90 percent of the project is considered tractor ground and 10 percent is considered cable or helicopter ground based on slope class.

The major landtypes are the B landtypes (55 percent), T landtypes (35 percent), and L landtypes (7.5 percent). Additional minor landtypes are the A (1.6 percent), C (less than 1 percent) and M (less than 1 percent) landtypes. An acreage summary by major landtype is provided in Table 3-43.

**Table 3-43. West Maurys Project Area Major Landtypes**

Landtype	Approximate NFS Acres	Percent of NFS Lands	Parent Material
B	20,710	55.0	Basalt
T	13,257	35.0	Tuffs and basalt
L	2809	7.5	Landslide Deposits
A	608	1.6	Mixed Alluvium
C	67	>1	Colluvial Escarpments
M	62	>1	Mixed Alluvium

Information regarding the descriptions of existing landtypes can be found in the January 6, 2005, Soils Report and is incorporated by reference. Landtypes are utilized to identify soils with high tillage potential, vegetation types, and soils that are susceptible to displacement or detrimental compaction from activities.

Site productivity is maintained through protection of the soil from detrimental disturbance. The Forest Plan requires “in order to maintain site productivity, all project activities will be planned to reduce soil compaction and displacement to the lowest reasonable level. Strive to reduce compaction and displacement to get as close to 90 percent of the total activity area (including permanent, rocked, and non-surface roads) remaining in a non-compacted/non-displaced condition, as realistically possible, one year after any land management activity. The minimum will be 80 percent of the total activity area. Existing areas exceeding these standards will be scheduled for rehabilitation as soon as possible. An activity area is the total area for which a ground disturbing activity is planned, for example, a unit for a timber sale, slash disposal project, or grazing allotment. The area would also include transportation systems within and directly adjacent to the project.”

Soil compaction is defined as the increase in bulk density of 15 percent for residual soils and 20 percent for ash soils. Bulk density is measured by the weight of soil in a set volume. Compaction arises from a reduction in pore space between soil particles resulting from heavy equipment passing over the surface during periods when the soils are susceptible to compaction. Frozen soils during winter can provide enough strength to protect soils from compaction. Soil displacement is the movement or rearrangement of soil so that normal processes are affected and also is the stirring of soil horizon layers. Displaced soils are often not vegetated as a result of disturbance and are susceptible to raveling and erosion. Damage to soils from burning usually occurs when fuels that are burned are in direct contact with the soil and the duration and intensity of burning is high. This normally occurs with high concentrations of fuels found at landings. As a result, soils become hydrophobic, meaning surface water does not infiltrate the soil and instead flows over the surface until an area is intersected where infiltration can occur. Burning of hand or grapple piles does not normally result in hydrophobic soils because of the smaller pile size and reduced temperatures and duration of the burning.

The susceptibility of a particular soil to detrimental compaction and displacement varies considerably depending on soil texture and rock content. Soils in the West Maury project area have varying depths of volcanic ash capping. The volcanic ash surface soils are more susceptible to compaction and displacement than the clayey subsoils. The clay in this area is high shrink and swell clay which reestablishes cracks with each dry season and swells up with each wet season. These soils are not susceptible to detrimental compaction because any increase in density is ameliorated by the yearly shrinking and swelling actions.

In 1998, the Regional Forester clarified the direction for planning and implementing activities in areas where soil standards have been exceeded from prior activities. In areas where less than 20 percent detrimental compaction exists prior to activities, the cumulative detrimental effect of the current activity following project implementation and restoration must not exceed 20 percent. In areas where more than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration must at a minimum, not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality.

The following is a description of activities associated with the action alternatives. Effects vary with the magnitude of commercial harvest and type of logging system and grapple piling.

## Direct and Indirect Effects of Commercial Harvest Systems

**Table 3-44. Acres of Harvest by Logging System**

Logging System	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Ground based - Tractor	0	5,499	4,319	0
Skyline	0	2,111	931	0
Light (Horse, Mobile yarder)	0	203	238	0
Total Harvest	0	7,763	5,488	0

### Ground-based Tractor System

This harvest system has the highest amount of soil impacts associated with it and can result in exceeding the soil standards if not carefully designed and actively monitored. Classic, rubber-tired skidders and skidding crawler-type tractors are used on an average 100-foot skid trail spacing to skid logs to the landings, which are accessed by roads.

The main skid trails comprise the majority of the detrimental disturbance, which is largely compaction and displacement. The same applies to landings with the addition of more soil puddling and charring from landing piles. Skid trails on an average of 100-foot spacing contribute roughly 10-15 percent disturbance in an average unit with landings and roads making up an additional 5 and 2 percent, respectively. Overall, potential for detrimental soil conditions is 17-22 percent for a designated ground-based harvest system which includes landings, skid trails, and roads. This does not include any mitigation or other measures to reduce potential impacts, nor does it include existing levels of detrimental disturbance. Design criteria such as utilizing existing skid trails, landings and roads, the use of tillage to reduce compaction will reduce percent detrimental soil impacts.

Past harvest practices have often led to unacceptable amounts of soil damage. Evaluation of existing conditions on the proposed harvest units reveals that many acres currently exceed the standard for unacceptable condition. Current individual unit design criteria keep the overall percentage of net detrimental impacts to a minimum. If passes are kept to no more than two on previously disturbed areas, then detrimental conditions will be less likely to result from this entry.

**Table 3-45. Summary of Existing Detrimental Soil Disturbance in Proposed Harvest Units**

Alternative	% Harvest Acres with 20% or Less Existing Soil Damage	% Harvest Acres with More Than 20% Existing Soil Damage
2	77	23
3	68	32
4	0	0

Estimates of existing detrimental soil conditions related to past harvest activities were derived from examining past management actions, conducting soil monitoring and extrapolating results to similar areas not monitored using aerial photo interpretation and local knowledge. Historical harvest records were also researched to determine the extent of harvest, yarding system, time since harvest and harvest prescriptions.

Recent monitoring results show that detrimental soil conditions can be kept within acceptable levels using ground-based harvest equipment (see Soils Report, Appendix B: Soil Monitoring Reports, Blackbear Timber Sale, Paulina Ranger District). This requires that design criteria be carefully followed and that tillage opportunities are carefully evaluated.

### Grapple Piling

Grapple piling of residual slash resulting from harvest and noncommercial thinning activities is done to lessen the fuel loadings and break up fuel continuity. Grapple piling is accomplished with a machine with an articulating arm able to reach 25-30 feet from the machine. Grapple pile machines operate on existing skid trails and do not result in additional compaction to harvest units. Usually a 50 percent reduction in horizontal fuel continuity is adequate. With 100-foot skid trail spacing and a 25-30 foot boom length on the arm, this objective can be accomplished without additional disturbance.

### Tillage Treatments to alleviate compaction

The main purpose of tillage is to decompact the soil and improve soil moisture and aeration. Tillage is recommended in previously harvested areas to reduce existing compaction and anticipated compaction resulting from proposed activities, especially on skid trails, landings, and temporary roads. An assessment of tillage potential is based on the land type, steepness of slopes, soil depth, and types of soils. Further information on assessing the potential for tillage can be found in the January 6, 2005, Soils Report. Short-term effects include increases in localized erosion potential until effective vegetative cover is established. The short term negative effects would be lessened with the use of water bars and strategic slash treatment. Resistance to root growth is lessened also. Long term effects are largely beneficial due to improved infiltration, percolation, aeration and lessened bulk density. Table 3-48 displays a unit-by-unit description of the alternatives relative to proposed treatments, system of harvest, fuels treatments, existing soil compaction levels, and post soil compaction levels with and without tillage.

## **Skyline systems**

Skyline systems would result in little to no increase in current compaction levels in harvest units. This is because no heavy machinery would be allowed on the steeper slopes and during yarding operations, logs would either be fully suspended or have one end suspended which results in little compaction. Soil impacts would be limited to displacement of surface organic material in individual yarding corridors. This harvest system is used largely on steeper slopes where there is sufficient deflection for the use of cable operations. They are usually set up with an uphill access road at the top of the unit or drainage with landings along the road. The potential for detrimental disturbance is much lower than ground-based harvest. Overall potential for detrimental disturbance is 6-12 percent for a designated harvest system including landings, cable corridors, and roads. Detrimental disturbance occurs primarily on landings, roads, and cable corridors.

## **Mobile Yarder Systems**

Mobile yarders would be utilized to yard trees from existing roads without the need to enter the RHCAs. This would occur in units 8 and 21 within RHCAs. No detrimental soil effects would be expected from these activities under either Alternative 2 or 3. Mobile yarders don't have the reach that larger skyline machines have but are useful on shorter steep pitches often too steep for tractor operations. With the mobile yarders, complete suspension is often not attained but these yarders produce less ground disturbance than skidders.

## **Horse and / or Mule Systems**

Horse logging would be utilized in Unit 594 and near selected aspen stands. Using this method, yarding can occur within higher density stands and less ground disturbance and compaction would occur. On locally monitored horse logging units (Mule Timber Sale), detrimental soil disturbance was minimal. A small drag trough was created during skidding activities, but was minimal compared to the impacts of the original tractor trail. Off trail disturbance was slight with an estimated 5 to 7 percent of the ground in an observable disturbed state. Detrimental displacement and compaction were low. (David, 2002; Mule/Horse Logging Impacts on Mule TS #3)

## **Soil Compaction and Displacement**

### **Direct and Indirect Effects of No Action**

This alternative proposes no management actions which would affect the soil resource in the short-term. Existing natural processes would continue. No soil restoration tillage would be performed. Recovery of existing soil (compaction) would occur through natural processes. These processes include frost heaving in the top 4 to 6 inches of soil. These natural processes can take 10 to 50 years or more to fully restore damaged ash soils, while clayey residual soils may recover in 1-2 years due to shrinking and swelling actions of the smectitic clay. The clay in this area of Oregon cracks when dry in the summer and swells in the winter wet season. It is not susceptible to detrimental compaction due to this characteristic.

Fuels reductions would not occur, which increases the risk of high-intensity wildfire with increased oxidation and mineralization of nutrients such as nitrogen and potassium. This increased fire intensity and severity can reduce site productivity. (Harvey et al. 1991) This alternative would comply with the regional soil standards in the short-term but may exceed regional standards and guidelines in the long term if stands are not thinned and large tonnage is produced, burned by wildfire, and then returned (Shank 2004).

### **Direct and Indirect Effects of Alternative 2**

This alternative proposes the most harvest overall, as well as the most ground-based harvest. This alternative has the greatest potential to increase the amount of detrimental soil compaction, displacement, and charring. Approximately 23 percent of the acres proposed for harvest currently exceed the 20 percent detrimental soil conditions standard. The remaining 77 percent of acres proposed for harvest currently have less than 20 percent of the area in a detrimental condition. This alternative has unit-specific design criteria which will ensure that all

activity units meet the soil standards (see Table 3-48 and Chapter 2, Design Criteria and Resource Protection Measures). This alternative also creates approximately 38.2 additional acres of detrimental soil conditions due to construction of new and temporary roads. Implementation of this alternative would result in an estimated 47 acres of tillage to alleviate detrimental soil compaction. Some detrimental soil charring would occur under the grapple piles but will be of a low percentage (estimated to be 5 to 6 piles per acre at 100 square feet/pile which yield 1.1 to 1.3 percent impacts which are mostly on existing trails and landings). Broadcast burning of natural fuels would produce some detrimental charring but is estimated to only be a fraction of a percent. There would be no net increase of detrimental soil conditions. Implementation of this alternative would comply with the regional soil standards.

**Table 3-46. Proposed New and Temporary Road Construction (miles)**

	Alternative 2	Alternative 3	Alternative 4
New Specified Road (miles)	14.9	6.9	0
Temporary Road (miles)	6.1	3.8	0
TOTAL new road (miles)	21.0	10.7	0
acres of “new” detrimental soil disturbance (approximately 1.82 acres per mile of road)	38.2	19.5	0

**Direct and Indirect Effects of Alternative 3**

This alternative proposes the second most harvest overall, as well as the second most ground-based harvest. This alternative has the lesser potential (of the two action alternatives) to increase the amount of detrimental soil compaction, displacement, and charring. Approximately 32 percent of the acres proposed for harvest currently exceed the 20 percent detrimental soil conditions standard. The remaining 68 percent of acres proposed for harvest currently have less than 20 percent of the area in a detrimental condition. This alternative has unit specific practices identified which will ensure that all activity units meet the soil standards (see Table 3-47 and Chapter 2, Design Criteria and Resource Protection Measures). This alternative also creates approximately 19.5 additional acres of detrimental soil conditions due to construction of new and temporary roads. Implementation of this alternative would result in approximately 47 acres of tillage to alleviate detrimental soil compaction. Some detrimental soil charring would occur under the grapple piles but will be of a low percentage (estimated to be 5 to 6 piles per acre at 100 square feet/pile which yield 1.1 to 1.3 percent impacts which are mostly on existing trails and landings). Broadcast burning of natural fuels would produce some detrimental charring but is estimated to only be a fraction of a percent. There would be no net increase of detrimental soil conditions. Implementation of this alternative would comply with the regional soil standards.

**Direct and Indirect Effects of Alternative 4**

This alternative is the third most potentially ground disturbing alternative but only includes grapple piling of noncommercial thinning slash and no commercial harvest. This activity would be largely constrained to existing skid trails, roads and landings. No new detrimental compaction is anticipated with this alternative because grapple pilers would be limited to existing skid trails, roads and landings and to one to two passes over ground previously undisturbed. The proposed grapple piling acreage is 2,638 acres for this alternative which is similar to Alternatives 2 and 3. Some detrimental soil charring would occur under the grapple piles but will be of a low percentage (estimated to be 5 to 6 piles per acre at 100 square feet/pile which yield 1.1 to 1.3 percent impacts which are mostly on existing trails and landings). Broadcast burning of natural fuels would produce some detrimental charring but is estimated to only be a fraction of a percent. There would be no net increase of detrimental soil conditions. The failure to thin the young pole and sawtimber component (from 9 to 21 inches dbh) would increase per acre standing fuel loadings which would increase fire intensity and severity in the future especially in reburn conditions (see Shank et al. 2004). Implementation of this alternative would comply with the regional soil standards.

**Direct and Indirect Effects of Other Treatments for Alternatives 2, 3, and 4**

Other treatments proposed such as noncommercial thinning, hand piling and prescribed burning do not result in detrimental soil impacts. No heavy equipment would be utilized to accomplish these activities. Prescribed burning would result in some removal of surface fuels, herbaceous vegetation, and duff layers but there would not be 100

percent coverage in any burned unit. Prescribed burning is designed and done under spring-like conditions where moisture levels prevent total consumption of organic material. No detrimental soil effects would be expected from these activities under any alternative.

The action alternatives would maintain long-term site productivity. The primary impacts to soils would occur where soil is compacted, anticipated to occur only on designated skid trails, temporary roads, and landings. Maintenance of the soil organic layer would be achieved in all of the action alternatives with commercial harvest (Alternatives 2 and 3) through the use of skyline logging systems and, for tractor harvest designating skid trails for machine use, or by tractor logging under winter conditions. Soil organics, including coarse woody material, would be at levels which maintain site productivity through all activities including, harvest, noncommercial thinning and prescribed fire. Levels of coarse woody material resulting from the proposed activities are displayed in Table 3-47. Coarse woody material is defined as woody residue larger than 3 inches dbh. Down log levels are intended to be representative of historic conditions, including disturbance regimes. Use of these levels is best applied at the landscape (watershed) scale; however application can be made at any scale where the plant association group and seral/structural stage composition is known. Utilizing prescribed fire, and the resultant charring of coarse woody debris, does not interfere substantially with the decomposition or function for the soil resource (Graham et al. 2004). Further description and analysis of coarse woody debris can be found in the Soils Report.

**Table 3-47. Proposed Down Wood Historic Range of Variability by Plant Association Group**

<b>Plant Association Group</b>	<b>Down Log &gt; 12” in diameter HRV – total lineal feet per acre</b>
Moist Grand Fir	188-410
Dry Grand Fir	81-257
Douglas-fir	71-233
Moist Ponderosa Pine	55-167
Dry Ponderosa Pine	6-55

Forest Mycorrhizal associations: Ectomycorrhizae are an important fungal component of temperate forests. These mostly symbiotic fungi species infect host species of pines and firs. The trees provide nutrients to the fungus and the fungus provides nutrients and minerals to the tree. The fine mycelial strands increase the surface area of nutrient collection and provide an important soil link for forest trees. Harvest treatments such as commercial thinning (the majority of the treatment proposed) have little effect on these fungal associations as long as there are live host tree species throughout the stand. No detrimental effects would be expected from these activities under any alternative.

The Forest Plan (p. 4-196) states, “In order to maintain site productivity, all project activities will be planned to reduce soil compaction and displacement to the lowest reasonable level.” R-6 Supplement No. 2500-98-1 (to the Forest Service Manual) clarifies direction for planning and implementing activities in areas where soil standards are exceeded from prior activities. The West Maury Project meets the standards in the Forest Plan and in R-6 Supplement No. 2500-98-1 through individual unit assessments and mitigations such as tillage, winter logging, or the requirement to stay on existing disturbance only. In addition to Table 3-48, Appendix A of the January 6, 2005, Soils Report contains unit-specific soils analysis and mitigations.

**Table 3-48. Soil Disturbance by Unit for Alternatives 2 and 3**

Unit	Acres	Proposed Action			Alternative 3			Existing Soil Disturbance%	Post Treatment estimate	Tillage Potential	Tillage Acres	Post Tillage Estimate	Mitigations
		Harvest	Grapple Pile	Logging System	Harvest	Grapple Pile	Logging System						
8	23	HSL		M	HSL		M	5	15	L		15	
10	65	HSL	GP	T	HSL	GP	T	5	15	L		15	
11	3	HSL	GP	T	HSL	GP	T	20	20	M		20	Stay on existing trails, no net increase over 20%.
12	41	HSL	GP	T	HSL	GP	T	9	19	L		19	
18	7	HSL	GP	T	HSL	GP	T	8	18	M		18	
19	43	HSL		S				3	8	L		8	
20	138	HSL	GP	T	HSL	GP	T	25	25	L		25	Stay on existing trails. No net increase.
21	64	HSL		M	HSL		M	10	20	L		20	
29	76	HSL		S				1	7	L		7	
33	44	HSL		S				2	8	L		8	
44	32	HSL		T				2	12	M		12	
50	55	HSL	GP	T				2	12	M		12	
53	63	HSL		T	HSL		T	12	20	L		20	
62	27	HTH		S	HTH		S	5	10	L		10	
63.1	69	HTH		T	HTH		T	15	20	L		20	Stay on existing trails, no net increase over 20%.
72.1	28	HSL		S	HSL		S	10	15	L		15	
75	30	HSL	GP	T				8	18	M		18	
78	13	HTH		T	HTH			18	20	L		20	Stay on existing trails, no net increase over 20%.
79	42	HSL		S	HSL		S	11	15	L		15	
80	106	HSL	GP	T			T	6	16	H		16	
81	57	HSL		T	HSL		T	18	25	M	3	20	Stay on existing trails. Designate new skid trails. Till.
82	30	HSL		S	HSL		S	2	12	M		12	
87	44	HTH		T				8	18	L-M		18	
103	149	HSL		S				0	5	L		5	
112	94	HSL		T	HSL		T	15	20	M		20	Stay on existing trails, no increase over 20%.
115	85	HSL		T	HSL		T	2	12	L-M		12	
118	93		GP	T		GP	T	15	20	L-M		20	Stay on existing trails, no increase over 20%.
125	92	HTH	GP	T	HTH	GP	T	18	20	L		20	Stay on existing trails, no increase over 20%.
126	70	HSL		S			S	6	16	L		16	
133	39	HSL	GP	T			S	2	12	L-M		12	
134	39	HSL	GP	T			S	8	13	L		13	
136	103	HTH		T	HSL	GP	S	18	25	L-M	5	20	Stay on existing trails. Designate

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Unit	Acres	Proposed Action			Alternative 3			Existing Soil Disturbance%	Post Treatment estimate	Tillage Potential	Tillage Acres	Post Tillage Estimate	Mitigations
		Harvest	Grapple Pile	Logging System	Harvest	Grapple Pile	Logging System						
													new skid trails and landings. Till.
139	70	HSL		S	HSL		S	2	7	L		7	
148	39	HSL		T	HSL		T	6	16	H		16	
149	27	HSL		T				12	18	L-M		18	
157	41	HSL		S	HSL		S	3	6	L		6	
162	39	HTH		S	HTH		S	3	6	L		6	
166	188	HTH	GP	T	HTH	GP	T	25	25	L-M	9	20	Stay on existing trails. No net increase. Till
173	29	HTH	GP	T	HTH	GP	T	15	20	L		20	Stay on existing trails, no increase over 20%.
195	119	HSL		S	HSL		S	0	6	L		6	
198	175	HSL	GP	T	HSL	GP	T	25	25	L		25	Stay on existing trails. No net increase.
203	129	HSL	GP	T	HSL	GP	T	12	18	L		18	
204	59	HSL		T				25	25	H	3	20	Stay on existing trails. No net increase.
205	26	HSL		S				6	9	L		9	
226	51	HSL		S	HSL		S	16	23	H	2	20	Stay on existing trails. Designate new skid trails. Till...
228	70	HSL		T	HSL		T	18	20	L		20	Stay on existing trails, no net increase over 20%.
240	58	HSL		T	HSL		T	18	25	M	3	20	Stay on existing trails. Designate new skid trails. Till.
241	15	HSL		S	HSL		S	0	5	L		5	
242	70	HSL	GP	T	HSL	GP	T	16	23	M	2	20	Stay on existing trails. Designate new skid trails. Till.
253	80	HSL	GP	T				15	20	L		20	Stay on existing trails, no increase over 20%.
254	54	HSL		T	HSL		T	24	24	L		24	Stay on existing trails. No net increase.
258	11	HSL		S	HSL		S	0	6	L		6	
261	39	HSL		T	HSL		T	13	20	L		20	
282	31	HSL		S	HSL		S	2	8	L		8	
285	44	HSL		S				4	8	L		8	
287	9	HSL	GP	T	HSL	GP	T	5	15	M		15	
292	33	HSL		S	HSL		S	0	5	L		5	
294	14	HSL		S	HSL		S	3	6	L		6	
296	46	HSL	GP	T				6	16	M		16	
299	22	HSL	GP	T			T	7	17	H		17	
300	55	HSL	GP	T	HSL	GP	T	14	20	L		20	
303	34	HSL	GP	T				8	18	H		18	
309	79	HSL	HP		HSL	HP	T	10	19	H		19	



Chapter 3 – Affected Environment and Environmental Consequences

Unit	Acres	Proposed Action			Alternative 3			Existing Soil Disturbance%	Post Treatment estimate	Tillage Potential	Tillage Acres	Post Tillage Estimate	Mitigations
		Harvest	Grapple Pile	Logging System	Harvest	Grapple Pile	Logging System						
316	48	HSL	GP	T	HSL	GP	T	25	25	H	2	20	Stay on existing trails. No net increase.
317	77	HSL	GP	T			T	4	14	M		14	
318	55	HSL		S				2	6	L		6	
324	27	HSL		S	HSL		S	0	5	L		5	
327	5	HSL	GP	T				0	10	L		10	
334	29	HIM		S	HIM		S	3	6	L		6	
347	33	HSL		S	HSL		S	0	5	L		5	
350	22	HSL		S			S	2	8	L		8	
351	86	HTH	GP	T	HTH	GP	T	25	28	M	4	20	Stay on existing trails. Designate new skid trails. Till.
364	28	HSL		S	HSL		S	2	6	L		6	
365	41	HSL	GP	T			T	6	16	L		16	
375	48	HSL		T	HSL		T	25	25	L		25	Stay on existing trails. No net increase.
376	196	HSL	GP	T	HSL	GP	T	20	25	L-M	10	20	Stay on existing trails. Designate new skid trails. Till.
382	13	HSL		T			T	8	18	L-M		18	
384	79	HSL		T				9	19	L		19	Stay on existing trails. Keep total disturbance below 20%.
385	41	HSL		S	HSL		S	2	6	L		6	
386	31	HSL		T			T	6	16	L-M		16	
390	44	HSL	GP	T	HSL	GP	T	25	25	L		25	Stay on existing trails. No net increase.
393	187	HSL		S				0	6	L		6	
401	148	HTH		T	HTH		T	22	22	L		22	Stay on existing trails, no net increase.
405	48	HSL	GP	T			T	8	18	M		18	
410	83	HSL	GP	T	HSL	GP	T	9	19	H		19	
411	33	HSL		T				10	19	L		19	
416	66	HSL		T	HSL		S	12	20	L		20	
417	33	HSL		T	HSL		T	7	17	L		17	
426	28	HSL		T			S	0	10	L		10	
429	115	HTH	GP	T	HTH	GP	T	25	25	L		25	Stay on existing trails. No net increase.
439	54	HTH	GP	T	HTH	GP	T	10	20	L		20	
441	45	HTH	GP	T	HTH	GP	T	12	20	L		20	
445	71	HSL		T	HSL			15	20	L		20	Stay on existing trails, no net increase over 20%.
447	42	HSL		T	HSL		T	25	25	L		25	Stay on existing trails. No net increase.
448	181	HTH	GP	T	HTH	GP	T	15	20	L		20	Stay on existing trails, no net

Chapter 3 – Affected Environment and Environmental Consequences

Unit	Acres	Proposed Action			Alternative 3			Existing Soil Disturbance%	Post Treatment estimate	Tillage Potential	Tillage Acres	Post Tillage Estimate	Mitigations
		Harvest	Grapple Pile	Logging System	Harvest	Grapple Pile	Logging System						
													increase over 20%.
452	81	HSL	GP	T	HSL	GP	T	6	16	L		16	
459	11	HSL		T			T	18	20	L		20	Stay on existing trails, no net increase over 20%.
473	85	HSL		T				4	14	L		14	
476	89	HTH		T	HTH		T	16	20	L		20	Stay on existing trails, no net increase over 20%.
478	167	HSL		T	HSL		T	9	19	L		19	
483	19	HTH	GP	T				25	25	L		25	Stay on existing trails. No net increase.
484	56	HSL		S	HSL		S	2	4	L		4	
485	35	HTH		T	HTH		T	25	25	L		25	Stay on existing trails. No net increase.
495	74	HSL	GP	T	HSL	GP	T	25	25	L		25	Stay on existing trails, no net increase.
499	69	HSL		T	HSL		T	25	25	L		25	Stay on existing trails. No net increase.
501	141	HTH		T	HTH		T	25	25	L		25	Stay on existing trails. No net increase.
504	71	HTH	GP	T	HTH	GP	T	18	20	L		20	Stay on existing trails, no net increase over 20%.
506	90	HSL	GP	T	HSL	GP	T	20	25	M	4	20	Stay on existing trails. Designate new skid trails. Till.
507	65		GP	T		GP	T	12	19	L		19	
524.1	23	HSL		T	HSL		T	2	15	L		15	
524.2	79	HSL		S	HSL		S	3	5	L		5	
529	185		GP	T				10	15	L		15	
532	54	HSL		S	HSL		S	4	7	L		7	
533	140	HSL	GP	T				15	20	L		20	Stay on existing trails, no net increase over 20%.
538	61	HSL	GP	T	HSL	GP	T	12	20	L		20	
559	30	HSL		T	HSL		T	8	18	L		18	
563	115	HSL	GP	T				12	20	L		20	
569	72	HSL		T			T	14	20	L		20	
570	81	HSL		T	HSL		T	8	18	L		18	
576	73	HTH		T	HTH		T	16	20	L		20	Stay on existing trails. Allow no more than 4% increase.
578	14	HSL		T				8	18	L		18	
580	80	HSL		T	HSL		T	10	19	L		19	
591	45	HSL		T				3	13	L		13	
594	150	HSL		L-H	HSL		L	6	16	L		16	
595	47	HSL		S				4	7	L		7	

Unit	Acres	Proposed Action			Alternative 3			Existing Soil Disturbance%	Post Treatment estimate	Tillage Potential	Tillage Acres	Post Tillage Estimate	Mitigations
		Harvest	Grapple Pile	Logging System	Harvest	Grapple Pile	Logging System						
598	118	HSL		T			T	4	14	L		14	
601	35	HSL		T			T	2	12	L		12	

HSL – Unevenaged Management  
 HTH – Commercial Thinning  
 HIM – Improvement Cut  
 GP – Grapple Pile  
 M – Mobile Yarder  
 S – Skyline system  
 T – Tractor yarding  
 L-H – Horse logging

Tillage Potential  
 L – Low (not good candidate for tillage because soil and physical features)  
 M – Moderate  
 H – High

Alternative 4 is not included in this table because detrimental compaction is not expected to increase because grapple pilers would be limited to existing skid trails, roads, and landings and one to two passes on previously undisturbed areas. These conditions would not increase the amount of detrimental soil conditions from the existing condition.

### **Cumulative Effects of Alternatives 2, 3, and 4**

Analysis of the entire project area indicates that approximately 7 percent (2,750 acres of existing detrimental disturbance divided by entire project area acreage (37,974)) of the project area currently has detrimental soil damage resulting from past harvest activities. The project area also has 220 miles of roads which equates to approximately 400 acres of detrimental compaction. Currently, detrimental soil conditions occur on approximately 8 percent of the project area (from roads and past harvest activities). Other activities that can cause compaction are fence construction and maintenance for cattle allotment management and water developments. There are approximately 89 miles of fence in the project area and motorized access is permitted to allow access for maintenance and construction of fences. Assuming that fence corridors average 10 feet in width, this would add an additional 208 acres of compaction. There are approximately 146 water developments in the project area and it is assumed that livestock use results in 1 acre of compacted ground at each water development. Compacted ground associated with fence lines and water developments only increase the overall compaction in the project area by 0.7 percent. No measurable increase is expected with any of the action alternatives at the project area scale with the implementation of the design criteria such as reusing existing skid trails for harvesting and fuels treatments. Individual unit compaction levels are expected to increase slightly (see Table 3-48) but an estimated 47 acres of tillage is expected to reduce compaction resulting from ground-based harvest and grapple piling activities. Both Alternatives 2 and 3 would increase detrimental soil conditions by less than one-tenth of a percent. In reviewing past, present, and reasonably foreseeable future actions, no overall measurable increase in the amount of detrimental soil conditions is expected across the project area for any action alternative.

The Sherwood prescribed burn would result in little to no measurable effect on the soil resource because the burn would be conducted under moist conditions resulting in low-intensity fires. The ground cover vegetation would be expected to recover quickly after burning because of the low-intensity fire, leading to little or no sediment production.

## **Heritage Resource Sites and Plants of Cultural Value**

### **Affected Environment**

Columbia Plateau and Great Basin cultural areas overlap in the high desert country of Central Oregon. The aboriginal inhabitants were well adapted to the unique desert, mountain, and plateau ecosystems. The Plateau Culture area includes the interior drainages of the Frasier and Columbian River, excluding the upper reaches of the Snake, John Day, and Deschutes Rivers (Lebow et al. 1990). The Great Basin Culture Area encompasses all the Great Basin plus peripheral parts of the southern tributaries of the Columbia River and much of the upper Colorado River. Distinctions between these groups are recognized by their language families, “Sahaptin” and “Shoshonean” and specific cultural traditions. Small family and extended family groups moved throughout their territories in relationship to the environment, seasonal changes, and availability of foods. Although the availability of resources fluctuated over the millennia, the archaeological records suggest the native inhabitants followed life ways similar to those recorded ethnographically for the area. Archaeological sites are primarily recognized by stone tools and flakes resulting from making stone tools. The upland settings, like the Maury Mountains are believed to have been occupied in the spring, summer, and fall during seasonal rounds. Winter villages were commonly located in the lower elevation country with less snowfall.

Subsistence rounds, settlement patterns, and social ties were similar yet unique to the Northern Paiute and Columbia River groups. The Columbia River people place great importance on salmon, taken with weirs, dip nets, and spear. The Great Basin groups, specifically the Northern Paiute, relied more on a broader spectrum of resources for hunting, gathering, and collecting activities. In general, the Plateau groups developed more sedentary settlement patterns with winter villages common along the Columbia River. Great Basin groups traveled in smaller family groups during the warmer seasons and congregated into larger groups for semi-permanent winter camps. Ethnographic studies refer to winter villages along the main stem of the Deschutes River and its major tributaries including the Crooked River. By 9,000 years ago, Plateau people harvested fish, gathered plant foods, hunted large and small animals, and traded as they did more recently with Lewis and Clark’s arrival (Hunn 1990).

Central Oregon and the Ochoco Mountains are within the historic ancestral domain of several tribes including The Burns Paiute, The Confederated Tribes of the Warm Springs Reservation, The Klamath Tribe, and the Confederated Tribes of the Umatilla Reservation. The Ochoco National Forest is within the ceded lands of The Confederated Tribes of the Warm Springs Reservation. The earliest inhabitants of Central Oregon are known through the stories of origin and cultural tradition and the archaeological record over 12,000 years old. An intensification of hunting and gathering life ways developed during the warmer and drier intervals that followed. Archaeological evidence during the Archaic Period is characterized by an increased range of specialized tools and utensils, especially milling stones, geared to subsistence resources of each region. Site patterns in the Maury Mountains show a preference for south facing slopes along drainages and high elevation spring sites along the summit.

Heritage resource sites include prehistoric, historic, and traditional cultural sites that may be affected, both negatively and positively, by the proposed activities. A complete description of the existing and known heritage resource sites can be found in the Heritage Report (Holtzapple, Heritage Existing Conditions, Effects Report, and West Maury Planning Area SHPO Report). The most common type of site in the Maury Mountains is lithic scatters. Lithic scatters would include flake debitage, flaked stone tools, and groundstone tools. The artifacts and cultural stratigraphy may be negatively affected by ground-disturbing activities from ground-based logging equipment, road construction, fuels treatments, or unplanned wild land fires. Machinery crushes artifacts and disturbs the spatial arrangement. Wildfire and prescribed fire, specifically the degree and temperature, can melt or disfigure artifacts and alter the hydration bands on obsidian. The fire intensity and duration of burning are highly variable and dependent on the nature of available fuels and weather conditions. Methods used for dating archaeological materials and environmental conditions rely on relatively stable environmental conditions and high temperatures can “reset” the chronological indicators. Research has shown obsidian is altered with temperatures ranging from 200–300 degrees Celsius and greater (Loyd 2002). Historic sites often involve wooden structures like cabin remains, fences, and log troughs and would be adversely affected by fire, heavy equipment, and tree falling. Traditional cultural sites are areas used in the past or present for gathering plants for food, medicine, or other purposes. Ground disturbance from machinery and fire occurrence before plants are dormant could adversely affect these areas and plant populations. Prescribed fire may benefit plant populations when applied during the appropriate plant cycle. Access to these areas is a concern for neighboring Tribes and activities like closing roads could restrict access. Limiting or controlling access from vehicles and all terrain vehicles (ATVs) would reduce surface disturbance and potentially reduce vandalism to heritage sites resulting in a positive effect.

Reducing ladder fuels and/or changing the arrangement of existing fuels would lower the potential for unplanned fires and better provide for the protection of artifacts, features, and traditional cultural plant communities. Unplanned fires or wildland fires typically occur in the summer when fuels are drier and temperatures are hotter. Resource protection is responsive to wildfire conditions and often results in a loss of the resource.

The effects analysis is based on the potential for damage to artifacts, features, environmental settings and ground disturbance by machinery, fuel loadings and potential temperature and duration of fire treatment, and degree of risk for successfully implementing design criteria for the proposed alternatives.

Many plant species of cultural value occur within the forested lands. The plants discussed here focus on only a few of the culturally significant plants gathered by local tribes. Bitterroot (*Lewisia rediviva*) and several *Lomatium* species occupy non-forested habitats often called “scabland.” Soils associated with scabland or lithosols are shallow with a high clay content. These habitats are sensitive to disturbance and native vegetation does not completely recover from disturbance activities like log landings, roads, and off road vehicle use. The Forest Plan identifies these fragile areas for protection except where disturbance is unavoidable. Less than 1 percent of scabland habitat would be disturbed by proposed activities in the action alternatives. Populations and the abundance of culturally significant root crops would be expected to remain the same although individual plants may be affected by proposed actions. These root crops are present in open rocky areas with shallow soils. Such areas were included in the Sherwood Burn Project.

Camas (*Camassia quamash*) is generally found in moist areas and wet meadows. Yampa (*Perideridia gairdneri*) has a broader distribution and can be found in the understory vegetation in forested areas. Several of the *Lomatium* species also occupy a broader range of habitat including forested areas. Hanging black moss (*Bryoria fremontii*) primarily grows on the lower branches of conifers and decades of fire suppression has likely resulted in an increase of this species. Proposed activities would reduce the density of trees that provide habitat for the lichen but current

levels would be maintained on untreated acres. Under all alternatives, the viability and availability of these culturally significant species would continue. Creeks and riparian vegetation are important to area Tribes for the combined values of water quality, fish habitat, and vegetation such as aspen, cottonwoods, willows, and currants.

### **Direct, Indirect, and Cumulative Effects of No Action**

Existing management practices would continue under the No Action alternative but no new vegetative treatments would occur. Levels of natural fuels would continue to accumulate, dense understory trees would not be treated, and thinning of larger trees would not be scheduled. Untreated fuels under this alternative would increase the potential for unplanned, high-intensity wildfires and would have a negative affect on the physical materials and features of cultural resource sites. The risk of hotter and uncontrolled wildland fires would continue to increase and in turn lead to the loss of wooden features, soil scorching, damage to stone artifacts, and loss of site setting and the ability to collect further chronological data. There would be a direct negative effect to artifacts, features, and site settings from catastrophic fire and related fire suppression activities. Cultural plants and their abundance would be at risk of loss from unplanned fires, hotter burning temperatures, soil scorching, and associated fire suppression activities.

The Sherwood prescribed burn project focused on areas with timber or juniper within the project area. The root crops were not affected by the prescribed burning operations largely because patches of bare soil were common on these sites and fuel loadings were too low to carry fire. When fire did creep into these more open areas, burning temperatures were low, often carried by cheat grass and winds. Such short duration fire with low burning temperatures did not reduce the population of root crops. The timing of the Sherwood Burn occurred when the bitterroot was in bloom or post bloom stages. This type of short duration fire with low burning temperatures would not affect the stone tools or other qualities of the site. Fire was not allowed on sites with heavy fuel loadings where higher burning temperatures and longer duration fire would be expected.

Planned riparian restoration projects and wildlife habitat improvement projects would continue. These types of projects have addressed the protection and management of heritage values under separate project analysis and compliance. The Confederated Tribes of the Warm Springs Reservation and The Burns Paiute Tribes are supportive of riparian restoration projects particularly those that incorporate planting native species like willow, aspen, cottonwood, and chokecherry. Potential wildfire effects on plants of cultural value are varied, depending on the species and habitat. Willow (*Salix spp.*) could initially be reduced following fire, but in the long term may be enhanced by fire. Young straight stems are more desirable for basketry materials than older multi-branched stems.

Recreational activities including dispersed camping, off road vehicle use, and artifact collecting are most damaging to heritage sites. Dispersed camping areas commonly overlap with heritage site locations along creeks, meadows, and springs. Disturbance to sites results from human use, vehicle use, fire rings temporary outhouses, and vandalism. In general, increased recreational use correlates to increased vandalism and damage to heritage sites through removal of artifacts or disturbance to features. Site damage from off road use and all terrain vehicles has increased in the past 5 years. Recreation use would continue at the current rate under the no action alternative and disturbance to heritage sites would continue.

The headcut stabilization projects and treatment of noxious weed projects have addressed the protection and management of heritage values under separate project analysis and compliance. Resource protection was accomplished on a case specific basis.

Cattle tend to graze and damage surface artifacts near water sources, spring developments, salt grounds, and along fence lines. Artifacts may be broken where cattle trail and graze. Surface and subsurface disturbance occurs most where cattle trails are developed or near water developments or salting areas where cattle are concentrated. New construction associated with allotment management activities would address heritage concerns on a case-by-case basis.

### **Direct and Indirect Effects of Alternative 2**

The treatment recommendations and criteria were developed to protect heritage values and avoid ground-disturbing actions on sites and reach a finding a No Effect with the SHPO. See Design Criteria and Resource Protection

Measures, Heritage Resources, Chapter 2. The viability of plants of cultural interest and their habitat (lithosols, riparian corridors, forested stands) would be maintained. Riparian habitat, meadows, and non-forested openings would be protected by a variety of design criteria.

Commercial harvest activities are proposed on an estimated 7,700 acres. A sequence of treatments would occur on most of these proposed commercial harvest acres to move the seral and structural conditions of forest stands towards their historic ranges of variability. Implementation would likely occur through timber sale or stewardship contracts over a 5 to 10-year period. Treatments would begin with commercial harvest, then noncommercial thinning and grapple piling where specified, and finally slash treatment or underburning. There would be a greater risk for damage to heritage sites in areas where multiple treatments of commercial harvest, noncommercial thinning, grapple piling, and activities fuels treatments are scheduled over time. Design criteria related to heritage resources have been applied to 25 commercial harvest units involving an estimated 1,850 acres. Alternative 2 treats the most acres using commercial harvest, noncommercial thinning, and burning.

Noncommercial thinning would be scheduled on an estimated 5,700 acres. This includes 2,700 acres of small conifer removal and an estimated 3,000 acres of juniper removal, typically non-forested areas. An estimated 5,300 acres of the noncommercial thinning acres would be treated with fire within 2-3 years to remove activities generated slash. Design criteria would be applied to avoid or reduce adding thinning slash to sensitive heritage areas, and to prevent hot surface temperatures during burning to protect artifacts, features, and environmental settings. Grapple piling of fuels would not be allowed on designated sites to avoid disturbance by ground-based equipment and hotter surface temperatures from pile burning. Management of heritage sites would involve 20 units and approximately 1,250 acres under Alternative 2.

Natural fuels burning would be prescribed on approximately 6,300 acres to reduce fuel loadings, thin younger trees, and mimic historic fire cycles and intensity. Burning prescriptions vary but are designed to mimic more frequent fire cycles with lower burning temperatures. Natural fuels burning generally would not compromise the integrity of lithic scatter sites due to low burning temperatures and short duration fire. Design criteria would be applied to 19 units involving 1,570 acres to ensure sensitive sites and features would be protected. Historic wooden features at risk have been identified and would be protected through avoidance and/or site-specific design criteria.

Juniper treatments, generally located in non-forested settings, have the greatest potential to overlap with populations of culturally significant root crops and archaeological sites. Design criteria would be applied to juniper removal to girdle the tree or fall fewer junipers and prevent hot surface temperatures and additional fuel accumulation where necessary.

Use of prescribed fire helps prevent unplanned wildland fire which typically burns hotter and faster than prescribed fire. Underburning activities with low burning temperatures (200–300 degrees Celsius) and short duration fire, or conditions common to spring burning conditions would not be expected to adversely affect stone artifacts or their spatial arrangement. Advanced planning and coordination with resource specialists during prescribed fire situations can avoid and reduce effects to sensitive resources compared to crisis management during hotter, unplanned wildfires and associated suppression activities.

Thinning and burning treatments on approximately 18,000 acres within the 38,000-acre project area in Alternative 2 would reduce the potential risk for future unplanned wildland fire and the resulting adverse effects to heritage resources from hotter burning temperatures, larger burned areas, and associated fire suppression activities.

No heritage sites would be affected by the proposed road changes. Less than 1 percent non-forested openings where culturally significant root crops may occur would be affected by temporary roads or log landings. In these areas the plant community and habitat would be retained. Neighboring Tribes have a concern for access to areas when roads are closed. The roads to be closed to vehicle traffic and decommissioned are generally less than 0.5 to 1 mile segments and are not the only access to an area.

## Direct and Indirect Effects of Alternative 3

Design criteria included in the West Maury EIS planning process would be applied during implementation. These management guidelines have been written for the Maurys EIS treatments to avoid ground-disturbing actions on sites and reach a finding a No Effect with the Oregon State Historic Preservation Office.

Alternative 3 proposes commercial harvest treatment which generally includes non-commercial thinning and activity fuels treatments on approximately 5,400 acres with known heritage concerns. Design criteria would be applied on 20 units involving 1,650 treatment acres. These treatments would be spread over several years. Commercial harvest treatments involve ground based-equipment and repeated entries over time. These types of conditions increase the potential risk of damage to sites. When completed, stand treatments would reduce the risk of catastrophic fires and potential damage to sites.

Noncommercial thinning of conifers and junipers involves 14 units with heritage concerns and 1,040 of 5,100 acres in Alternative 3. Grapple piling would not be allowed on designated sites to avoid ground disturbance and piling of fuels and hot temperatures. In general thinning young trees, scattering slash, and burning would not affect stone artifacts. Avoidance of wooden features and structures is handled through planning efforts, identification, and field preparation efforts. Following thinning and harvest, the risk of futures fires would be reduced.

Alternative 3 proposes natural fire treatments on 4,850 acres with 17 units and 1,230 acres with heritage concerns. In general, low burning temperatures and short duration of natural fire treatments would not adversely affect stone artifacts or the environmental conditions. Wooden features or structures would be identified and avoided through planning and preparation efforts. Design criteria were developed to avoid sensitive areas for use of ATVs, fire line construction, and staging areas. Burning opportunities would likely be in the spring or fall when temperatures are cooler and moisture is higher.

No heritage sites would be affected by the proposed road changes. Less than 1 percent non-forested openings where culturally significant root crops may occur would be affected by temporary roads or log landings. In these areas the plant community and habitat would be retained. Neighboring Tribes have a concern for access to areas when roads are closed. The roads to be closed to vehicle traffic and decommissioned are generally less than 0.5 to 1 mile segments and are not the only access to an area.

## Direct and Indirect Effects of Alternative 4

Alternative 4 proposes vegetative treatments using noncommercial harvest and natural fuels treatments. There would be no commercial harvest and no ground-based logging equipment. A greater number of acres would be treated with noncommercial thinning (11,700 acres) and natural fire (5,300 acres). Ground-based equipment would be used for grapple piling of thinning slash and would occur where existing fuels and thinning slash are dense, similar to the units identified in Alternatives 2 and 3. Less ground-disturbing equipment would decrease the potential risk for damage to heritage sites. Approximately 11,700 acres would be proposed for noncommercial treatment and would include 35 units and 2,750 acres with heritage concerns. Some 5,320 acres are proposed for natural fuels treatments and would include 21 units and 1,980 acres with heritage concerns.

The proposed treatment units in Alternative 4 would involve more heritage resource management than Alternative 2 or 3; however, the noncommercial thinning and natural fuels treatments in general would have less potential to damage heritage resources. The noncommercial grapple pile units would require the most intensive management to protect and avoid heritage sites and artifacts. Alternative 4 has approximately 2,640 acres identified to grapple pile. There would be no new road construction or road closure activities in Alternative 4.

Alternative 4 would reduce the risk of fire by removing young trees and burning activities generated slash on some 17,000 acres. In general, all the action alternatives would reduce fuels on a similar number of acres but the size and spatial arrangement would vary. Refer to the discussion in fuels effects for the comparison of risk from unplanned wildland fires between the action alternatives.



## **Cumulative Effects of Alternatives 2, 3, and 4**

The effects from grazing, road maintenance, and recreation uses would be the similar to the No Action Alternative. Areas where cattle concentrate would have the greatest potential to affect the soil surface and damage surface artifacts. Alternative 2 would open forested stands on the most acres and increase the potential for grazing and surface disturbance. Opening stands through harvest, noncommercial thinning, or fuels treatments would increase the opportunity for livestock to graze and potentially meander through sensitive heritage sites. Slash from noncommercial treatments would offer some protection to sensitive areas in the short term by creating barriers for cattle grazing. Livestock tend to graze and damage surface artifacts near water sources, spring developments, salt grounds, and along fence lines. Artifacts may be broken where cattle trail and graze. Surface and subsurface disturbance occurs more where cattle trails are developed or where cattle are concentrated. In general, spring and stock watering improvements would include deteriorating log troughs within new spring enclosure fences. This would retain the log trough feature and protect it from cattle.

The Sherwood Burn project was designed to avoid sensitive sites for prescribed burning activities. These included log watering troughs and lithic scatters where fuel conditions would potentially create high burning temperatures and potentially affect the lithic tools and flakes. Culturally significant root crops were observed on some of the non-forested high benches and ridges. These open areas had light fuel conditions and prescribed fire was not expected to carry; however, if fire did spread, the short duration fire with low burning temperatures would not reduce individual plants or the plant communities. Several headcut repair projects scheduled in the Maurys, like Pre-Emption and Rickman, were designed to avoid heritage sites. Truck traffic and dumping large rock for the project would also avoid all known sites.

The headcut stabilization projects in Bear Creek and treatment of noxious weed projects have addressed the protection and management of heritage values under separate project analysis and compliance. Resource protection was accomplished on a case specific basis.

Recreational activities including dispersed camping, off road vehicle use, and artifact collecting are most damaging to heritage sites. Dispersed camping areas commonly overlap with heritage site locations along creeks, meadows, and springs. Disturbance to sites results from human use, vehicle use, fire rings temporary outhouses, and vandalism. In general increasing recreational use correlates to increasing vandalism and damage to heritage sites through removal of artifacts and disturbance to features. Site damage from off road use and all terrain vehicles has increased in the past 5 years and would be expected to continue.

## **Ceded Lands, Tribal Trust Resources, and Tribal Interests**

### **Affected Environment**

The introduction of Euro-American culture brought abrupt changes to the hunting and gathering life ways for the Plateau and Great Basin groups. Congress affirmed Indian land title in Oregon in 1848 and between 1850 and 1877 implemented treaty policies. By 1850, traditional life ways were significantly interrupted. The 1855 Treaty with the Tribes of Middle Oregon established the Warm Springs Reservation. The treaty also reserved usual and accustomed rights and interests on lands ceded to the government. These reserved rights protect and retain tribal rights and privileges for hunting, fishing, gathering roots and berries, and pasturing stock as described in the Treaty. The boundary of lands ceded to the government in the 1855 Treaty extends from the Cascade Mountains through Central Oregon and up to the Columbia River inclusive of all lands within the Ochoco National Forest and Crooked River National Grassland. The Confederated Tribes of the Warm Springs Reservation have a Memorandum of Understanding with the neighboring forests to work in cooperation towards the development and implementation of policy, program recommendations, and actions affecting lands and natural resources. The agreement recognizes the need to be consistent with the Warm Springs Tribal Code Chapter 490, Ordinance 68 that sets forth the protection, preservation, and encouragement of tribal and Indian history, culture, tradition, and heritage. The Confederated Tribes of Warm Springs Reservation and our neighboring tribes have a strong and valued connection with the land and continue their cultural traditions and practices to preserve, protect, and promote tribal culture and heritage today.

Additionally, the Maury Mountains are within ancestral and aboriginal lands of interest to The Burns Paiute, The Confederated Tribes of the Umatilla Indian Reservation, and The Klamath Tribes.

Contemporary Indian People continue their cultural traditions and practices today and the Ochoco National Forest and Maury Mountains are visited for hunting, gathering, and collecting traditional foods and resources.

The Forest Plan standards and guidelines provide direction for management activities and specifically address the following:

1. **Religious Freedom:** Meet all requirements of the American Indian Religious Freedom Act. This law makes it policy of the federal government to “protect and preserve for American Indians their inherent right to freedom to believe, express, and exercise [their] traditional rights.” This protection includes but is not limited to access to sites, use and possession of sacred objects, and the enhancement of ceremonies and traditional rites. Related activities include the gathering and processing of plants for food, medicinal, or craft use, the construction of sweat lodges, or vision quest structures, and the like.
2. **Treaty Rights:** Honor the rights reserved by the Confederated Tribes of the Warm Springs Indians for lands ceded to the federal government through the Treaty of 1855. On ceded lands, the Tribes have the right to take fish in streams running through and bordering the Reservation and at all other usual and accustomed stations in common with citizens of the United States. The right of hunting, gathering roots, and berries, and pasturing stock on unclaimed lands in common with citizens was also secured within ceded lands.

## **Direct, Indirect and Cumulative Effects of No Action**

There would be no change over the existing condition and tribal treaty rights would be preserved. Vehicular access would remain the same because no roads would be closed or decommissioned. There are no past, present, or reasonably foreseeable future actions that would affect tribal treaty rights. Cattle grazing would continue under current management until a new decision was prepared that could adjust grazing levels and practices but would not alter treaty rights. Fuel loadings would continue to increase and if a wildfire occurred, with the current continuity of fuel loadings, the probability is high that high-intensity fire would result. Changes in the availability of plants of cultural values would probably be reduced until the area of high-intensity fire recovered.

## **Direct, Indirect, and Cumulative Effects of Alternatives 2, 3, and 4**

All alternatives preserve tribal treaty rights. No restriction of treaty rights would occur with any of the alternatives. Decommissioning of 10.2 miles of road in Alternative 2 and 8.8 miles in Alternative 3 would reduce the opportunities for vehicle access but would not restrict other forms of access such as foot or all terrain vehicles. Vegetative conditions would be approximating historic conditions (to a greater extent in Alternative 2, then Alternative 3 and to the least extent in Alternative 4), plants of cultural value that occur in more open forested conditions would be expected to increase. There are no past, present, or reasonably foreseeable future actions that would alter tribal treaty rights over the existing condition. Future actions include stream restoration projects like Pre-Emption, Sherwood prescribed burn, and noxious weed management. These projects have been designed to protect heritage sites and cultural plants of value. None of these actions would result in changes in access or restrictions of tribal treaty rights or resources. Tribes would be consulted on revisions to allotment management plans on a case-specific basis.

## **Recreation**

### **Affected Environment**

Recreation use in the project area includes wildlife viewing, driving for pleasure, camping, hiking, and horseback riding. Current direction emphasizes dispersed rather than developed recreation. Because much of the Ochoco National Forest is currently roaded, the dispersed roaded recreation opportunities exceed the demand. There are

diverse recreational opportunities within the project area: Antelope Campground, Pine Creek Camp, and Hammer Creek Wildlife/Recreation Area. The project area also encompasses approximately 54 unnamed dispersed sites.

### **Hammer Creek Wildlife/Recreation Area**

The main access to the area is provided by Forest Road 16, which follows the area's west boundary. Forest Road 1750 and the Hammer Creek Trail from the south can also reach the area. The Hammer Creek trail (which lies entirely within the management area) is a 6-mile loop route. The Forest Plan emphasis for the area is to provide and maintain habitat diversity for a variety of wildlife species where open road density is minimal; and provide a scenic, semi natural or natural-appearing setting for non-motorized recreational opportunities. Management activities are to remain visually subordinate to the characteristic landscape.

#### **Direct, Indirect, and Cumulative Effects of No Action**

Under the No Action Alternative, there would be a continuation of mortality of the large pine component due to high stocking density and active bark beetles. Fuel loadings, including small understory trees, would continue to increase. The amount of open, park-like stands would continue to decrease. In the long term, scenic quality would be degraded as open stands of large diameter trees become less abundant.

Sherwood prescribed burn, authorized under a separate decision in 2004 in the western half of this area, would impact users in 2004 and 2005 with potential smoke for a few days while burning was occurring. Stream restoration activities would be evident in the short term because the initial activities would result in small areas of soil disturbance from log and boulder placement and riparian plantings. After a short period of time, approximately 1 month, the vegetation resulting from the plantings and nature regeneration would regrow in the newly disturbed areas. The disturbed soils would no longer be evident. Noxious weed control is limited to roadside treatments and one population within (but adjacent to Forest Road 16) the Hammer Creek Wildlife and Recreation Area. The impacts of these treatments would be limited because of the limited amount of acreage treated and the short duration of treatment (less than 1 week). Livestock grazing would be evident in areas of concentration near water developments and flat areas because of trampling of vegetation.

#### **Direct and Indirect Effects of Alternative 2**

Recreation users would be affected as activities occurred. Under this alternative, there would be 6,095 feet of trail impacted by proposed treatments. There would be 448 feet of trail impacted in Unit 253 (commercial harvest). There would be 1,559 feet of trail in Unit 193 (noncommercial thinning) and 4,088 feet of trail in Unit 101.1 plus 101.2 (noncommercial thinning and prescribed fire). Users could be temporarily displaced and would see more evidence of vegetation treatments. In the short term, the scenic quality of the area would be affected, as visual evidence (stumps, slash, etc.) of the activities would be apparent. Users could also encounter dust, noise, logging traffic and smoke, if they are present when these activities occur. In the long term, scenic quality would be enhanced as more large pine develop and views of open, park-like stands become more frequent.

#### **Direct and Indirect Effects of Alternative 3**

This alternative has the least impact to users. There would be 1,559 feet of proposed noncommercial thinning along Hammer Creek Trail in Unit 193. Users would be temporarily displaced by thinning slash and smoke from prescribed fire activities. There would be no commercial harvest with this alternative, therefore noise and soil disturbance from heavy equipment would not occur. Stands would not benefit from reduced stand densities and mortality in the large diameter ponderosa pine would continue but at slightly reduced levels compared to Alternative 1.

#### **Direct and Indirect Effects of Alternative 4**

Recreation users would be affected as activities occurred. Under this alternative, there would be a total of 6,095 feet of trail impacted by proposed treatments. There would be 448 feet of trail impacted in Unit 253 (noncommercial thinning). There would be 1,559 feet of trail in Unit 193 (noncommercial thinning) and 4,088 feet of trail in Unit 101.1 plus 101.2 (noncommercial thinning and prescribed fire). Users would be temporarily displaced and would

see evidence of vegetation treatments. In the short term, the scenic quality of the area would be affected, as visual evidence (stumps, slash, etc.) of the noncommercial activities would be apparent. Visual evidence of prescribed burning, such as needle scorching, blackened boles of trees and mortality in small diameter trees, would be apparent for approximately 1 season. Ground vegetation, such as grasses and forbs would be stimulated by burning and would regrow and cover the burned ground. There would be no commercial harvest with this alternative, therefore noise and soil disturbance from heavy equipment would not occur. With only noncommercial activities and prescribed fire occurring, stand densities would not be reduced and mortality in the large diameter ponderosa pine would continue but at slightly reduced levels compared to Alternative 1.

#### **Cumulative Effects of Alternatives 2, 3, and 4**

Sherwood prescribed burn, authorized under a separate decision in 2004 in the western half of this area, would impact users in 2004 with potential smoke for a few days while burning was occurring. Stream restoration activities would be evident in the short term because the initial activities would result in small areas of soil disturbance from log and boulder placement and riparian plantings. After a short period of time, approximately a month, the vegetation resulting from the plantings and nature regeneration would regrow in the newly disturbed areas. The disturbed soils would no longer be evident. Noxious weed control is limited to roadside treatments and one population within (but adjacent to Forest Road 16) the Hammer Creek Wildlife and Recreation Area. The impacts of these treatments would be limited because of the limited amount of acreage treated and the short duration of treatment (less than a week). Livestock grazing would be evident in areas of concentration near water developments and flat areas because of trampling of vegetation.

#### **Camping Areas**

Antelope Reservoir Campground is a popular heavily used site within a mature stand of predominantly ponderosa pine with areas of western juniper and scattered Douglas-fir. The campground lies within three management areas: Developed Recreation, General Forest Winter Range, and Visual Management Corridor. The campground is located approximately 43 miles southeast of Prineville at the end of Forest Road 17. There are 25 campsites with a picnic area and boat launch. The reservoir is open year round for fishing.

The current stand is uneven-aged with scattered old overstory ponderosa pine over a mixture of ponderosa pine and western juniper of varying size and age. Stocking density of both pine and juniper is high considering the low site quality associated with these plant communities. Competition related stress is evident in shortened needles, lower crown ratios, and low growth rates. Bark beetles, including western pine beetle, mountain pine beetle and red turpentine beetle are active in the area with recent mortality of the large pine component.

Pine Creek dispersed camp is primarily used during hunting seasons. This site is located approximately 37 miles from Prineville off Forest Road 1750-450. The meadow and large pine draw users to this camp.

In addition to Pine Creek Camp, there are approximately 54 other recognized dispersed camping sites within the project area with use ranging from high to low. It is likely that other dispersed camping sites exist because users are continually creating new sites. Management allocated dispersed sites receive management emphasis such as protecting the naturalness of the immediate area adjacent to the site, reducing hazards such as danger trees and fuel loadings, and avoid using them as industrial camps, slash piling, or rock material storage areas.

#### **Direct, Indirect, and Cumulative Effects of No Action**

With this alternative, no treatment would occur and there would be the continuation of mortality of the large pine component. In the long term, recreation experience and scenic quality would be degraded due to the loss of the larger trees becoming less abundant and overstocking and down material becoming more prevalent. In the event of a high intensity wildfire, those stands with high canopy closures and high stand densities would probably result in high mortality. The recreation experience would be degraded because of the lack of residual trees and areas could be closed due to the danger of falling hazard trees.

### **Direct and Indirect Effects of Alternatives 2, 3, and 4**

Treatments would improve the long-term health of timber stands adjacent to and within camping areas; however, short-term impacts (3-5 years) to the affected camping areas (whether developed and/or dispersed) from commercial harvest and noncommercial thinning would include increased noise from chainsaws and grapple piling. Burning activities would result in smoke, blackened ground, and scorched vegetation. Some screening that was provided by juniper trees would be removed in Antelope campground; however, the over all recreational experience would not be changed. Loss of screening in some dispersed sites may cause some users to choose other sites or select new sites with more privacy. The overall Roaded Natural Recreation Opportunity Spectrum would not be changed in any alternative.

### **Cumulative Effects of Alternatives 2, 3, and 4**

There are no other current or planned activities that would affect camping areas within the project area. Recreational trends in the project area would continue to increase as populations in the Prineville area increase. Increased pressures on facilities such as developed campgrounds and dispersed sites would result in more emphasis on maintaining these facilities in a safe and enjoyable manner.

## **Non-native Invasive Plants (Noxious Weeds)**

### **Affected Environment**

Non-native invasive plants are aggressive plants capable of degrading environmental quality. Noxious weeds are a subset of these plants, and are designated “noxious” by the Secretary of Agriculture or state agencies. Because some non-native species known to be aggressive have not been officially designated as “noxious,” the term, “non-native invasive plants” is becoming more common. Many use the term, “noxious weeds” for all non-native invasive plants. In this EIS, both terms are used to describe plants considered “non-native invasive” on the Ochoco National Forest.

The introduction and spread of noxious weeds can reduce the diversity and abundance of native vegetation, forage, diversity and quality of wildlife habitat, increase erosion, and decrease water quality. They have developed many characteristics, such as rapid growth rates, high seed production, and extended growing periods that give them advantages over native plants (Sheley and Larson 1994, Shelly et al 1999, Scott and Pratini 1995, Roche and Roche 1988, and USDA/USDI 2000).

Most noxious plants are shade intolerant, and therefore have greater potential for invasion on non-forest sites or forest sites that have been disturbed. Proposed activities would remove vegetation and expose soils, creating conditions conducive to the establishment and increase of competing and unwanted vegetation, specifically noxious weeds.

Livestock grazing can increase the potential for introduction and spread by selective grazing of more palatable native species (Olson 1999 and Belsky 2000). Other factors that may increase risk include recreational vehicles (especially off-road vehicles), burning, and other activities that expose soils, creating an ideal seedbed for noxious weeds. Seed can be introduced from weed-infested areas through soils attached to vehicles and road maintenance or other equipment. No artificial regeneration or site preparation activities are proposed. Therefore, analysis of competing and unwanted vegetation is limited to noxious weeds.

Efforts to control competing and unwanted vegetation may affect the natural and human environment. The Ochoco NF is currently managing noxious weeds under the 1998 Integrated Weed Management Plan and Environmental Assessment/Decision Notice (USDA 1998), and the Forest Plan as amended in July 1995 to implement noxious weed management. Weed management includes a variety of strategies, depending on the species, size of infestation, and location. Included are chemical, cultural, mechanical, and biological controls.

On August 22, 2004, the Forest Service Pacific Northwest Regional Office issued a Draft Environmental Impact Statement for The Pacific Northwest Invasive Plant Program, Preventing and Managing Noxious Weeds (USDA

2004a). The proposal is to provide management direction related to noxious weeds for all National Forests in the Pacific Northwest Region. The proposal includes measures to increase prevention and make available a set of treatment tools, including herbicides, for managing noxious weeds.

In addition, the Deschutes and Ochoco National Forests are currently analyzing noxious weed infestations under a joint EIS process that proposes treatment of specific noxious weed infestations. This has been prompted by the need to update existing environmental analysis and include weed infestations that were unknown during the most recent analysis in 1998. Noxious weed management on the Ochoco National Forest may be modified based on decisions resulting from the Regional and Deschutes/Ochoco EIS processes.

The National Strategy for Invasive Species Management Weed states that weed management is most effectively accomplished by prevention, early detection, rapid response, control and management, rehabilitation and restoration (USDA 2004b), and early treatment. Prevention measures, such as requiring weed-free equipment for National Forest projects, detection (inventory) to identify new infestations, and early treatment are standard procedure for the integrated weed management program. Monitoring of treated infestations has shown that weed control has been effective, and herbicide use has declined where treatment has occurred. However, new infestations of all invasive plants are occurring and are likely to continue.

Noxious weed surveys are ongoing. As of 2003, several noxious weed species have been documented within the project area. Some widespread weed species, such as Canada thistle (*Cirsium arvense*), have not been fully documented or are not controlled as aggressively.

Biological controls (insects) have been introduced for Canada thistle within and outside the National Forest. Ongoing research and monitoring has shown some success in reducing weed densities in the Central Oregon region, but trends for biological controls have not been established. An overall assessment of long-term effectiveness of biological controls within the analysis area cannot be described at this time.

The road system serves a variety of human uses. While some areas offer rehabilitation opportunities, continued road effects are likely for some portion of the road system. Roads will continue to provide dispersal and susceptible sites for noxious weeds. Expanding non-native noxious weed infestations outside the National Forest will likely increase potential for new noxious plant infestations. Combined with increasing recreational use, the potential for new infestations and spread appears likely to increase.

### Site Analysis

Most weeds have been present in the area for at least a decade. Weed inventories indicate most infestations begin on disturbed areas, such as road shoulders, old log landings, and recreation sites. With most infestations along roads, primary introduction of noxious weeds appears to be through vehicles. Other vectors include water (streams and canals), wind, livestock, wildlife, and mineral material and heavy equipment used for road maintenance and construction projects. In the FEIS, Map 15 – Noxious Weeds, displays the known infestations.

Table 3-49 identifies noxious weed infestations that are currently being treated under existing environmental analyses. Map 15 in the Draft EIS displayed the locations of noxious weed treatment areas.

**Table 3-49. Existing Noxious Weed Treatment Sites**

Site #	Location	Acres	Weed Species	Weed Densities	Treatment History
3-4	FS 16 Rd System	5	spotted knapweed	scattered plants along road system	chemical, limited hand pulling, biocontrol (1998 EA)
		5	diffuse knapweed		
		10	Russian knapweed		
		20	Canada thistle		
3-5	FS 17 Rd System	20	Canada thistle	scattered plants along road system	chemical, limited hand pulling, biocontrol (1998 EA)
		11	Russian knapweed		
		3	diffuse knapweed		

Other weed infestations are scattered throughout the analysis area. The February 2, 2005, Botany Report Notes Table (Appendix A) lists proposed treatment units in proximity to weed infestations and is incorporated by reference in this EIS. Other than Canada thistle, bull thistle, and teasel, most infestations not included in the current weed management plan are hand pulled and removed when encountered.

The aggressiveness of the prevention and treatment strategy is based on the type of weed to be controlled. For species such as spotted knapweed and yellow star thistle, the threshold for control is one plant. Some species, such as bull thistle, are not receiving active treatments. Though this species quickly establishes the first few years following burning or timber harvest, its density decreases over time as other vegetation becomes re-established. Aside from bull thistle, Canada thistle is particularly common in the analysis area and may be the most common noxious weed on the Ochoco National Forest. It can be found on a variety of sites, including rock pits, roadsides, dispersed camping areas, meadows, old harvest units, and others. It is well distributed among proposed treatment areas. This perennial plant has an especially deep root system, making hand pulling infeasible. Consequently, this species is a low priority for treatment. In susceptible areas, numerous, small infestations are often followed by rapid expansion (Sheley 2004). This species may be the greatest threat for expansion, especially following proposed treatment activities or wildfire.

Biological controls have been released, and have established in some areas. Within the West Maury project area, their effectiveness has not yet been determined. Because these species are so widespread, and treatment options so limited, not all infestations of Canada thistle, teasel, and bull thistle have been identified.

Weed densities have generally decreased where controls have been implemented, though on the majority of sites, some seed production still occurs from plants that germinate after treatment, re-sprout after incomplete pulling, or otherwise escape the control. As long as seed production continues, eradication is difficult. This situation is complicated by the persistence of viable seed in the soil for many years (Eddleman 1996). Some infestations, such as Canada thistle, are not being effectively contained by biological controls, and continue to expand.

Additional road construction, logging, burning and other activities that remove vegetation and expose soil may further increase potential for introduction and spread of noxious weeds. New infestations can also result from seed or plant parts carried in on soils attached to logging equipment.

Pre-project noxious weed surveys were completed in 2003 and most infestations occur along roads. Chapter 2 (pp. 37-38) includes design criteria and resource protection measures to reduce the potential introduction and spread of noxious weeds. Common weed species, such as teasel (not a state listed noxious weed, but considered an invasive non-native on the Ochoco National Forest due to its potential for displacement of native vegetation) and Canada thistle, have not been completely documented.

## **Risk Assessment**

Forest Service Manual (FSM) direction requires that Noxious Weed Risk Assessments be prepared for all projects involving ground-disturbing activities. For projects that have a moderate to high risk of introducing or spreading noxious weeds, Forest Service policy requires that decision documents must identify noxious weed control measures to be used during project implementation (FSM 2081.03). Noxious weed control measures, including prevention measures, have been included in Design Criteria and Resource Protection Measures in Chapter 2.

Two types of analyses are included in the risk assessment. The first compares the amount of exposed soils for alternatives, and the other uses a checklist of risk factors, such as burning adjacent to infestations, etc. The risk assessment comparison of disturbed acres only includes direct and indirect effects of the alternatives. The risk factors assessment includes these effects, as well as the cumulative effects of recreation use, grazing and other maintenance activities expected to occur in the project area.

## **Soil Disturbance**

Table 3-50 displays the amount of exposed soil disturbance anticipated for each alternative.

**Table 3-50. Soil Disturbance by Alternative**

Activity	Exposed Soil (Acres) Alternative 1	Exposed Soil (Acres) Alternative 2	Exposed Soil (Acres) Alternative 3	Exposed Soil (Acres) Alternative 4
Road Decommission / Inactivate (0.7 acres/mile)	0	7	6	0
Road Construction/ Reconstruction (1.7 acres/mile)	0	74	47	0
Timber Harvest (estimate 20% for tractor, 6% for skyline, 3% for light)	0	1,224	927	0
Additional Prescribed fire (estimate 20% exposure)	0	2,132	1,715	3,445
Total Area	0	3,437	2,695	3,445

### Direct and Indirect Effects of No Action

Alternative 1 would have no potential for increasing the risk for introduction and spread of noxious weeds. However, new weed infestations would still be likely to establish within the project area as a result of present and reasonably foreseeable future activities such as vehicle use by the public and continued cattle grazing. Discussion of the risk of wildfire risk and potential for expansion of noxious weeds is included in the cumulative effects section.

### Direct and Indirect Effects of Alternatives 2, 3, and 4

Alternatives 2, 3, and 4 would create additional ground disturbance as identified in Table 3-50. Alternative 2 has the most additional ground disturbance and Alternative 4 has the least amount of additional ground disturbance. Since noxious weeds would be more likely to spread to newly disturbed areas, Alternative 2 would have the highest risk for additional spread of noxious weeds with Alternative 4 having the least risk and Alternative 3 less than but closer in risk to Alternative 2.

Following project activities, road closures and competitive seeding would reduce the potential for weeds. Increased risk from ground disturbance would be partially offset by reduced vehicle use.

### Risk Factor Assessment

A checklist was developed, with various activities rated for risk of introducing or spreading weeds (Mafera 2003). Any high-risk activity results in a high risk ranking for that alternative. The complete risk factor assessment is in the Botany report and is incorporated by reference.

This checklist includes direct, indirect, and cumulative effects. An example of an activity with direct effects would be heavy equipment use, such as road grading, within infested areas. This activity would likely directly spread weeds. An activity with indirect effects would be burning slash piles adjacent to infestations. Burned sites would be highly susceptible to weed spread.

The checklist also includes the cumulative effects of reasonably foreseeable activities, such as off-road vehicle use within weed infestations. Vehicles are expected to continue to introduce and spread noxious weeds. Table 3-51 compares expected soil disturbance, and therefore, weed risk, by alternative.

**Table 3-51. Summary of Noxious Weed Risk Factor Assessment by Alternative**

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Risk of Noxious Weed Introduction / Spread	high	high	high	high
Number of Risk Factors Rated High	2	10	10	6



The risk factor assessment indicates high risk for all alternatives, including no action. Vehicle use within infestations is high risk. Livestock movement within or from areas with known infestations is also high risk. These risk factors are present in all alternatives.

## **Direct and Indirect Effects of No Action**

Alternative 1 is the baseline for comparison and no actions would be undertaken. Therefore, this alternative would have no potential for increasing the risk for introduction and spread of noxious weeds. However, new weed infestations are still likely to establish within the analysis area as a result of present and reasonably foreseeable activities, such as vehicle use by the public and grazing.

## **Direct and Indirect Effects of Alternatives 2, 3, and 4**

These alternatives include ground disturbance, burning, and other activities that increase risk of noxious weed introduction and spread. In general, actions involving large equipment and heavy localized ground disturbance such as mechanical thinning or removal of trees with log skidders are likely to create more opportunities for infestation compared with activities using smaller equipment that travels on a bed of slash. Hand thinning is generally low risk, but vehicles and people can introduce weeds. Prescribed burning of natural and activity fuels are generally lower risk also, but can create bare soil areas that are also more vulnerable to infestation.

Risk assessment for introduction/spread of noxious weeds by project activities is a complex process because of many variables, such as type and season of logging, intensity of prescribed burning, proximity to noxious weed infestations, etc. However, the following have been considered in the assessment:

- Most weed populations are located along road corridors, indicating introduction and spread is primarily due to vehicles. Therefore, log-hauling activity may be no more responsible for introduction and spread of noxious weeds than other traffic. However, log haul can substantially increase overall traffic levels on National Forest roads, increasing weed risk.
- The potential for introduction of noxious weeds due to logging activity is much greater than other activities because of soil disturbance and removal of vegetation by log skidding and road and landing construction activity. Logging equipment (skidders, cats, feller-bunchers, etc.) is much more likely to bring in noxious weed seed or plant material because equipment may be transported from site to site with soil and weed seed or plant parts attached.
- Compared with log skidding and burning, soils heavily disturbed by road construction or use as log landings will be more susceptible to noxious weed infestation for many years, perhaps several decades.
- Burning of natural and activity fuels (logging and thinning slash) would increase susceptibility to some degree. However, compared with wildfire, this burning is generally low intensity. Vegetation recovers much more quickly (often with greater vigor than before burning), and the majority of the soil organic layer is retained. Maintaining vegetation and the soil organic layer results in less susceptibility to noxious weed introduction and spread.
- Risk assessment may also consider the costs associated with controlling noxious weeds as a result of project activities. For example, the Ochoco NF is currently spending approximately \$200 per year to control the spread of each knapweed infestation. With knapweed seed bank viability of up to 10 years, overall costs of eradication would be \$2,000 per site, assuming no inflation and complete elimination of seed production. Costs of prevention associated with cleaning equipment and other measures are estimated at \$3,000-\$5,000 for implementation of all project activities.
- Present and reasonably foreseeable effects were considered, including livestock grazing, recreation use, road maintenance and road de-commissioning, thinning, burning of natural and activity fuels, riparian work

such as planting and stream headcut repair, hardwood enhancements (e.g. aspen fencing) and other activities (e.g. firewood cutting).

- Road inactivation (closed but available for future use) and de-commissioning (closed with no anticipated future use) activities would be beneficial in reducing noxious weed risk because introduction vectors (vehicles) would be reduced.
- Not all noxious weeds can be effectively controlled by herbicides or other measures. The 1998 Noxious Weed Environmental Assessment and Decision Notice limits herbicide use to knapweed and a few other species. Limited controls are available for some species in certain locations, such as teasel in riparian zones. Limiting the potential for introduction and spread of these species is important in maintaining existing desirable vegetation.
- Fire lines would be constructed by hand to facilitate natural fuels underburning. These lines are expected to re-vegetate quickly, and have minimal effect on weed risk.

### **Cumulative Effects of all Alternatives**

The exact source of present infestations is unknown, but they are expected to have originated over several areas. The location pattern shows concentrated sites along primary travel corridors. The primary vector for noxious weeds appears to be vehicles. Other infestations are associated with recreation sites and mineral material sites, indicating introduction by vehicles and equipment. Weeds can be introduced through contaminated hay brought in for horses by the recreating public. Weeds also spread by wind, canals and streams. Livestock and wildlife can carry seed in their digestive tract, as well as in their coat (Sheley et al 1999).

The West Maury road system serves a variety of human uses. Roads would continue to provide dispersal and susceptible sites for noxious weeds. Expanding non-native noxious weed infestations outside the West Maury area would likely increase potential for new noxious plant infestations. Combined with increasing recreational use, the potential for new infestations and spread appears likely to increase.

The cumulative effects of present and reasonably foreseeable activities indicate a high risk for introduction and spread of noxious weeds for all alternatives. Weeds would continue to be introduced and spread by vehicles, equipment such as used for road maintenance and construction activities, livestock fence maintenance, the recreating public (mountain bikers, horseback riders, hikers, and campers), dog and horse trial events, off-road vehicles, water, windborne seed, livestock, wildlife and other sources.

Prevention techniques for weed risk associated with reasonably foreseeable activities would be employed. Examples include clean equipment requirements for road maintenance activities. The majority of other activities, including recreational driving and illegal off-road vehicle use, would be more difficult to control.

Fire suppression can result in introduction or spread of weeds by equipment brought in from different areas that may contain weed seed or plant parts. Due to the emergency nature of wildfire, prevention measures including equipment cleaning are not always implemented or feasible. Dozer lines, hand lines, drop points, safety zones, staging areas, etc., all create bare ground with heavy travel and disturbance. Vehicle traffic during and after suppression activity can introduce weeds to highly susceptible soils. Fire rehabilitation efforts mitigate many of the negative effects through seeding, weed control, erosion control, and area closures.

Wildfire and suppression effects associated with No Action could exceed action alternatives in degree of exposed soils and reductions of shade, creating conditions highly susceptible to weeds. Completing a more specific analysis of potential wildfire effects, and weed risk, is not possible due to so many unknown variables, such as fuels conditions during a wildfire event, weather, suppression forces available, and other factors that determine the size and intensity of wildfire, as well as the unknown suppression effects such as the extent of construction of dozer line and safety zones.

However, in general, No Action Alternative 1 maintains the highest risk of adverse wildfire effects. Because fuels would be largely untreated, risk of future wildfire, and its potential effects to noxious weed risk, would be the highest of all alternatives. Wildfire risk would decrease somewhat with thinning and burning that would occur outside the West Maury projects.

Alternatives 2, 3, and 4 would decrease potential adverse effects somewhat due to thinning and prescribed fire. These alternatives would result in a more substantial reduction in wildfire risk than Alternative 1, with Alternative 2 resulting in the lowest risk of future wildfire. Alternative 3 would have a slightly lower risk of wildfire than Alternative 4.

Cumulative impacts of travel on West Maury roads by visitors would be detrimental to native vegetation through the spread of noxious weeds in the long term. Human use of the National Forest is increasing and is expected to increase in the future as populations in nearby towns continue to grow. Wet season off road use and legal road use can be conducive to weed spread due to mud clinging to tires.

Prevention techniques through design elements incorporated into the alternatives and the current weed treatment program would help reduce cumulative effects.

Areas where prescribed burning would take place are expected to re-vegetate quickly and become less susceptible to non-native noxious weeds, especially with low intensity winter/spring burns that are planned with this project. Project design criteria to evaluate pastures following burning would occur, and may necessitate adjustments to grazing plans.

Prescribed burning generally avoids construction of fire lines, using instead natural fuel breaks such as ridge tops, or human-created breaks, such as roads. This practice reduces the amount of soil disturbance associated with wildfire suppression and prescribed burning projects; therefore reducing opportunities for weed establishment and spread.

In addition, new weed infestations have been documented in the analysis area on sites that have had relatively little disturbance. There is an inherent risk of new infestations (such as from windblown seed) in all alternatives, regardless of other activities.

Weed infestations included in the 1998 Integrated Weed Management Plan are expected to be treated each year, and would continue to decrease in size. Treatment areas are described in Table 3-49 and in the Draft EIS on map 15. The remaining untreated infestations would continue to spread, displacing native and desirable non-native vegetation, reducing biodiversity, and increasing potential for other impacts as described previously. Projecting the potential effects related to the decline, rate, or extent of spread is difficult due to many unknown variables, including weather patterns, funding, and the completion date and decisions related to the current Deschutes/Ochoco NF and Regional EIS processes for managing non-native invasive plants.

## **Roads / Transportation System**

### **Affected Environment**

Roads provide access to National Forest lands and are classified as arterial, collector, and local roads. Arterial roads serve large land areas, and usually connect to other arterial roads and public highways. They provide the main access into the Ochoco National Forest. Collector roads provide service to smaller land areas usually connecting arterial roads with forest local roads. Local roads connect terminal facilities with forest collector, arterial, or public highways, or provide minor linkage with other roads.

Forest roads are managed by a system of maintenance levels 1 through 5. Those in maintenance level 1 (inactivated) are closed to highway vehicles and managed in a storage category, primarily for resource protection and safety reasons. Maintenance level 2 roads are open for high clearance vehicles (pickups, all purpose vehicles). Levels 3, 4, and 5 are maintained as suitable for use by low clearance vehicles (passenger cars). Those in levels 4 and 5 are usually asphalt paved and provide a more comfortable ride at higher travel speeds. There are no level 4 or 5 roads in the project area... There are 177 miles of existing roads of which 37 miles are closed and managed under

maintenance level 1. There are 140 miles of existing open roads. Decommissioned roads are no longer needed in the transportation system. There are 40 miles of decommissioned roads within the project area.

## **Direct and Indirect Effects of No Action**

Continued use would occur on all existing open roads. Unneeded roads would not be decommissioned and would require maintenance to ensure resource damage did not occur. No roads would be constructed or reconstructed.

## **Direct and Indirect Effects of Alternatives 2, 3, and 4**

### **Road Activities**

New system roads constructed would be closed and temporary roads constructed would be decommissioned following timber sale and associated activities in Alternatives 2 and 3. Alternative 2 would construct 14.9 miles of system road and Alternative 3 would construct 6.9 miles of road. There would be 6.1 miles of temporary road construction in Alternative 2 and 3.8 miles in Alternative 3. There would be 22.6 miles of reconstruction in Alternative 2 and 16.7 miles in Alternative 3. There would be no reconstruction or construction of roads in Alternative 4. Roads no longer needed to maintain access would be decommissioned with 10.2 miles in Alternative 2 and 8.8 miles in Alternative 3.

### **Access**

The current uses of the transportation system would change. Administrative use traffic would continue. Logging-related traffic would occur within the watershed. Temporary road closures for public safety would occur in the vicinity of active logging operations. Newly constructed roads and temporary roads would be used for logging activities and then closed. Personal use would not be allowed on these roads. Other commercial uses such as rock haul and cattle haul would continue and would be coordinated with logging traffic to reduce potential conflicts.

Personal uses, such as access for recreation or tribal access for gathering, would continue; however, some areas would be temporarily closed during logging activities. When logging activities are completed, some areas would be closed to vehicular access.

Overall, vehicular access in the West Maurys project area would be reduced because roads would be decommissioned. When all road management actions are complete, the open road density in the project area would be 2.3 miles per square mile for Alternatives 2 and 3. Road density including closed roads (but not decommissioned roads) would be 3.2 miles per square mile for Alternative 2, for Alternative 3 it would be 3.1 miles per square mile, and under Alternative 4 it would be 2.4 miles per square mile.

The use on roads is limited to vehicles with legal size loads unless restricted. The forest Commercial Road Rules document lists road use restrictions and others may be added to the contract. It is standard to restrict log haul to dry or frozen ground conditions.

Road 1680152 accessing Units 18, 29, and 81 passes through private property in T. 17 S., R. 20 E., Section 30. The Forest Service does not have right-of-way or an easement through this section. Because of the poor location (streamside) and condition of this road, a new system road was proposed on NFS lands to access those units.

## **Cumulative Effects of all Alternatives**

Currently, access to the project area is restricted because of structural deterioration on bridges accessing the project area. The bridge at the west termini of Road 16 was closed and has now been removed due to structural deterioration. Crook County has a new bridge under contract with completion anticipated by the end of the construction season in 2005. The bridge on road 17 (Pine Creek) is weight restricted, however properly loaded log trucks would be able to use the bridge. Heavy equipment will need to be evaluated for the weight restriction and may need to use only the Newsom Bridge.

Public and administrative road users would experience encounters with log trucks on all the arterial and collector roads in the project area. Most spur roads accessing commercial harvest units would be signed "For Logging Use Only."

The demand for vehicular access to National Forest System lands is expected to increase as the demand for recreation increases. The amount of open roads available for vehicular access is expected to decrease. More users on fewer roads are expected to increase the need for road maintenance. The Roads Analysis for the West Maurys Project Area identified that there are several opportunities to reduce the resource risks associated with the existing road system. This includes recommendations for decommissioning, closing, or reconstructing roads. There are no proposals at this time to analyze or implement any recommendations included in the Roads Analysis other than those road-related activities included as part of the action alternatives. If the Forest Service chooses to implement any of the recommendations in the future, those activities would undergo environmental analysis at the time the road activities would be proposed for implementation. Because none of the recommendations in the Roads Analysis (other than those already analyzed as part of the action alternatives) are proposed at this time, there are no cumulative effects.

## Visual Quality Objectives

### Affected Environment

The Forest Plan assigned visual quality objectives by management areas. They are:

- Developed Recreation – Retention
- Eagle Roosting – Modification
- General Forest – Maximum Modification
- General Forest Winter Range – Maximum Modification
- Hammer Creek Wildlife and Recreation – Partial Retention in area, Retention on Trails
- Old Growth – Retention
- Visual Management Corridors – Partial Retention
- Riparian Habitat Conservation Areas – Modification

#### Definitions of Visual Quality Objectives

- Retention – Human activities are not evident to the casual forest visitor.
- Partial Retention – Human activities may be evident, but must remain subordinate to the characteristic landscape.
- Modification – Human activity may dominate the characteristic landscape, but must, at the same time, follow naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in the foreground or middleground.
- Maximum Modification – Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

### Direct and Indirect of No Action

There would be no treatments associated with this alternative. There would be no changes to the vegetation and no additional activities that would affect the visual quality. Mortality would continue to increase and more dead trees would occur across the landscape. Increasing levels of fuel loadings could result in high-intensity wildfire, potentially creating large expanses of dead trees and open areas in the long term.

### Direct and Indirect Effects of Alternatives 2, 3, and 4

All treatments under meet the visual quality objectives for the management areas. Commercial treatments proposed in Alternatives 2 and 3 are not regeneration harvests and would only result in reduced tree densities at the highest

intensities of treatments in Alternative 2. The current condition of forested landscape pattern, line, and texture would remain after treatments, and may even be improved with the reduction of smaller diameter tree densities which would result in more open stands and greater viewing distances within stands. The density treatments would also result in increased growth rates of residual trees which would in the future result in more numbers of large diameter trees across the landscape. Noncommercial treatments would reduce the densities of smaller diameter trees, enhance growth of residual trees, and create more open viewing distances. Slash resulting from noncommercial thinning would be evident until the piles were burned and re-vegetated. Prescribed fire would result in scorched trees and red needles. These effects would become less evident in 2-3 years after the burn. Herbaceous vegetation would be stimulated for a few years after the burn.

For Developed Recreation and the treatments proposed within this management area, the Ochoco Forest Plan provides a clarification for the retention VQO. It states “Timber harvest activities will normally not be visually evident, but may for safety and visual enhancement. Scenic views may be enhanced through harvest or thinning, but will appear natural.” (Forest Plan, p. 4-71) The treatments proposed include commercial harvest and prescribed fire in and around Antelope Campground. Thinning would occur around large trees and in dense clumps to reduce overall stocking to about 40 square feet basal area per acre. Created slash would be treated by hand-piling concentrations and underburning. The fire prescription would seek to reduce scorching of residual trees and shrubs. Residual canopy closure would be about 40 percent. Human activities would be evident during treatments but a few years after treatments, the visual quality of the area would be improved. Fewer large trees would die as a result of competition stress reducing potential hazard trees in a developed recreation site and reducing potential for high intensity fire.

## **Cumulative Effects of all Alternatives**

Past timber management has resulted in differences in line, form, color and texture due to the amount of regeneration harvests where the majority of trees were removed juxtaposed against forested stands and provides a sharp contrast across the landscape. Many of these treatments occurred prior to adoption of the Forest Plan in 1989.

The Sherwood burn project (1,300 acres) would occur within the Hammer Creek Wildlife and Recreation Area under partial retention. The burn would result in scorched trees and red needles that would persist for several years following the burn but would meet the criteria of being evident while remaining subordinate to the characteristic landscape as no trees would be harvested in this project. Livestock grazing would not affect the forested character of the landscape in the project area. There would be no other additional past, present or reasonably foreseeable future actions that would affect the visual quality objectives.

## **Unroaded Character**

Unroaded areas are defined in the FEIS for the Roadless Area Conservation Final Rule as “any area, without the presence of a classified road, of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition. Unroaded areas do not overlap with the inventoried roadless areas.” (USDA Forest Service 2000, p. G-12). Unroaded areas have typically not been inventoried and are, therefore, separate from Inventoried Roadless Areas (IRAs). The term “unroaded area” is used to differentiate these areas from IRAs. There are no IRAs within the West Maury's Fuels and Vegetation Management Project. There are no IRAs within the Maury Mountains section of the Ochoco National Forest. The nearest IRA is the Lookout Mountain IRA approximately 20 miles to the north-northeast of the West Maury's project area.

The Oregon Natural Resources Council (ONRC) suggested that the West Maury project area includes an “unroaded” area which closely, but not exactly, coincides with the Hammer Creek Wildlife and Recreation Management Area. Road 1750-363 along Hammer Creek that bisects the area has been decommissioned. All other existing roads are on the periphery of the ONRC identified unroaded area. ONRC requested that the Forest Service consider the impacts to the values that unroaded areas may have prior to logging. ONRC also stated that the Forest Service should avoid logging and road building in these areas. The ONRC identified unroaded area is 3,039 acres in size.

## Direct and Indirect Effects of No Action

No road construction would occur. No vegetation management or fuel reduction activities would take place. Vegetation conditions would continue to increase in density with site conditions exceeding carrying capacity with mortality continually increasing. The likelihood of high intensity unplanned fire in the event of an ignition from lightning increases with the continual increases in fuel loadings. Suppression of unplanned fire would be difficult because of the lack of access roads and dense forest conditions in portions of the unroaded area. Approximately 1,300 acres of a mosaic prescribed fire authorized under a separate decision signed in February 2004 would be done in the 2004 and 2005 in the western half of the area reducing fuel loadings in the short term in this portion. This prescribed fire project is west of the Old Growth Management Area within the unroaded area / Hammer Creek Wildlife and Recreation Management area. Mechanized equipment would not be used to construct fire lines in this prescribed fire project. The objective of the prescribed fire project is to improve forage quality for big game and to reduce the risk of future high intensity wildfires.

## Direct and Indirect Effects of Alternatives 2, 3, and 4

No road construction is proposed within the ONRC identified unroaded area. Table 3-52 displays the treatments proposed in each alternative within the ONRC identified unroaded area.

**Table 3-52. Acres of Treatment within ONRC Identified Unroaded Area**

	Alternative 2	Alternative 3	Alternative 4
Commercial harvest with noncommercial thinning and grapple piling (acres)	43	43	0
Noncommercial thinning with fuels treatment (acres)	138	95	184
Prescribed fire (acres)	54	54	54
Total area treated	235	192	238
% of area treated	7.7	6.3	7.8

All treatments proposed within the ONRC unroaded area are adjacent to existing roads. All proposed activities are within previously managed areas and unroaded characteristics associated with the human activities would remain similar to pre-treatment conditions.

In the 43 acres of individual tree selection (commercial harvest) and associated treatments for Alternatives 2 and 3, there would be a short term increase in disturbed soils from skidding and more stumps would be visible. Fresh cut stumps would eventually fade and blend with the scenery over time. No trees over 21 inches dbh, live or dead, would be harvested except for hazard trees. Reducing densities of the smaller diameter trees would approximate stand structures present historically. Reducing stand densities also reduces competition among residual trees which increases the resiliency of the stand to insect and disease attacks. Noncommercial thinning would increase sight distances within the treated stands and increase the number of small diameter stumps. These stumps would deteriorate and would not be evident within 20 years of treatment. Grapple piles of slash after noncommercial thinning would be evident for approximately 1-2 years until they were burned. These 43 acres of commercial treatments proposed in Alternatives 2 and 3, are not within the Hammer Creek Wildlife and Recreation Management Area but are within the General Forest Management Area.

Noncommercial thinning effects have been discussed in the previous treatment description section. During and after prescribed burning for approximately 5 years, blackened boles of residual trees and scorched foliage would be evident but would also approximate characteristics found normally in this fire regime. Smaller diameter trees killed during the prescribed burning would have red needles for approximately 1-2 years and then only the black bole of the tree would remain for approximately 3-8 years until decay resulted in the bole no longer remaining upright. Fire lines would utilize natural features and existing barriers such as roads and streams as much as possible to reduce the amount of hand fire line construction. Constructed hand fire line would become less evident as needles, branches and other material fell and covered the fire line.

Overstory removal harvest occurred in the 1970's in the stand proposed for harvest treatment in this project. The current stand is composed of a mixture of young ponderosa pine, Douglas-fir and western juniper with scattered

overstory pine. Although the site is droughty, forest cover has expanded from the pre-1900 extent. In Alternative 2 and 3 treatments would include commercial thinning, noncommercial thinning and grapple piling of slash. Treatments would reduce stocking to recommended levels, retain all trees larger than 21 inches dbh, reduce canopy closure and create small stumps. No additional road construction is necessary. Logging equipment would utilize existing skid trails when practicable. Because the treatments proposed with all action alternatives are within previously harvested and treated units where evidence of past management practices are already present, are adjacent to existing roads, are not utilizing regeneration harvest methods, do not need road construction to implement, and have the objective of promoting late and old structure conditions, the majority of the area would still retain the characteristics of naturalness needed for consideration for potential wilderness or inventoried roadless designation.

## **Cumulative Effects**

The Sherwood prescribed burn of 1,300 acres authorized in 2004 would occur in the western portion of the Hammer Creek Wildlife and Recreation Management Area. The Sherwood prescribed burn would not alter the naturalness needed for consideration for potential wilderness or inventoried roadless designation. There are no other reasonable foreseeable future actions that would affect the characteristics of the unroaded area.

## **Environmental Justice and Civil Rights**

### **Affected Environment**

Civil Rights legislations, especially the Civil Rights Act (CR) of 1964, Title VI, prohibit discrimination in Forest Service program delivery. The underlying principal behind the Civil Rights Act is that no activity shall negatively affect minorities, woman, or persons with disabilities by virtue of their race, color, sex, national origin, religion, age, disability, or material or familial status. Environmental Justice (EJ), Executive Order 12898, demands the fair treatment and meaningful involvement of all people. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from the execution of our actions. EJ focuses on minority, low income groups, and subsistence lifestyles (including Indian Tribes). The purpose of involving these groups (EJ) and analyzing the effects upon them is to determine whether adverse civil rights impacts (CR) are anticipated, or whether disparate or disproportionate impacts associated with the alternatives is anticipated on any of these groups (CR/EJ).

### **Direct, Indirect, and Cumulative Effects of No Action**

Alternative 1 would result in increased wildfire risk and the associated risks to public health and safety. If larger and more intense wildfires would occur, it would support short term increases in opportunities in jobs related to fire suppression activities and subsequent restoration activities. In the long term, fewer opportunities for jobs would result. Alternative 1 would not provide any of the opportunities (jobs, access to firewood, etc.) that Alternatives 2, 3, and 4 would provide because of timber harvest, road work, noncommercial thinning, and prescribed fire.

Other present and reasonably foreseeable future projects, such as Sherwood prescribed burn, riparian plantings, and headcut repairs provide opportunities for short-term seasonal employment.

### **Direct, Indirect, and Cumulative Effects of Alternatives 2, 3, and 4**

With this project, there is no known potential for disparate or disproportionately effects, or to discriminate or negatively impact any individual or subset of the population described above. The action alternatives were designed to provide for human health and safety of all members of the public by reducing the risk of wildfire. In addition, the commercial harvest treatments in Alternatives 2 or 3, would provide easier access to firewood (landing/harvest units) which should positively effect low-income, older, or those with disabilities, who are not able to afford the type of vehicle needed to access, or physically manage gathering firewood from anything but accessible sites. Also, the types of employment opportunities provided by the alternatives, timber harvest activities (logging, hauling, etc.), prescribed burning, noncommercial thinning, millwork, etc., would have positive effects on the categories of



individuals and population groups these laws and regulations are intended to protect. Other present and reasonably foreseeable future projects, such as Sherwood prescribed burn, riparian plantings, and headcut repairs provide opportunities for short-term seasonal employment.

With the 10.2 miles of road closure and decommissioning in Alternative 2, and 8.8 miles in Alternative 3, there would still be ample access throughout the project area. Tribal rights (ceded lands) and Tribal traditional uses were covered earlier under Heritage, Ceded Lands, Tribal Trust Resources, and Tribal Interests and the actions in Alternatives 2, 3, or 4 would not have any measurable impacts on Tribal interests. The project is not located in a minority community nor would it affect residents of low or moderate income. Any impacts would not affect any specific subset of the American population at a disproportionately higher rate than others.

In addition, the effects of this project on the social and economic context of these groups are within those described in the Ochoco Forest Plan. The benefits and risks associated with implementation of the proposed action are provided to all members of the public. Therefore, the project would not pose disproportionately high or adverse effects to minority communities or to low income groups. As a result, no formal Civil Rights Impact or Environmental Justice Analysis was undertaken.

## **Prime Farmland, Rangeland, and Forestland**

There are no prime farmlands, rangelands, or forestlands within the project area.

## **Floodplains and Wetlands**

Effects to floodplains or wetlands are already discussed under Fisheries, Water Yield (Issue 2) and Riparian Habitat Conservation Areas sections of this document.

Treatments within RHCAs have already been identified in Chapter 2 and the effects of those treatments have been described in Water Quality, Fisheries and Riparian Habitat Conservation Areas sections of this chapter.

## **Irreversible and Irretrievable Commitment of Resources**

Irreversible commitments are decisions affecting nonrenewable resources such as soils, wetlands, roadless areas, and cultural resources. Such commitments are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at great expense or because the resource has been destroyed or removed.

The construction of roads, to provide access to timber, is an irreversible action because of the time it takes for a constructed road to revert to natural conditions. Alternatives 2 and 3 propose some level of road construction.

Removing aggregate (gravel) from mineral material sources would result in an irreversible commitment of resources. Once aggregate is removed from material source sites and placed on roads, it cannot be renewed except over long periods of time.

Irretrievable commitments of natural resources involve the loss of production or use of resources. This represents opportunities foregone for the period of time that the resource cannot be used.

Timber stands that are not managed at this time present an irretrievable loss of growth potential. Although the lost growth is irretrievable, it is not irreversible because the stands could be managed at a later date.

## Unavoidable Adverse Effects

All of the alternatives considered result in some adverse effects. Many of these adverse effects can be minimized through implementation of the design criteria and resource protection measures identified in Chapter 2. Even after minimizing adverse effects, there are still adverse effects that cannot be avoided.

Soils - Additional detrimental soil conditions are expected as a result of implementing Alternatives 2 and 3. The use of ground-based tractor logging equipment would result in additional compaction and displacement. The design criteria identified in Chapter 2 and on Table 3-48 describe resource protection measures to minimize these unavoidable adverse effects. The alternatives were designed to limit the amount of detrimental soil conditions, consistent with Regional guidelines for soils. Activities in areas that currently exceed 20 percent detrimental soil conditions would not result in a net increase of compaction and displacement.

Road construction also results in adverse effects on soils. Both permanent (system) and temporary road construction results in soil compaction and displacement. On temporary and decommissioned roads, the road surface can be revegetated but soil productivity is reduced because of compaction. These adverse effects to soils cannot be avoided.

Air Quality - All three action alternatives include prescribed fire activities that would produce smoke, including particulate matter such as PM-10. Chapter 2 includes design criteria and resource protection measures, including measures for air quality, to reduce adverse effects from burning. Changes in weather during burning operations could result in smoke and particulate matter drifting into inhabited areas. The effects of smoke and particulate matter are an adverse that can be completely avoided. Prescribed fire operations would be suspended during persistent inversion conditions, which would decrease the potential for smoke pooling in the Paulina valley.

Noxious Weeds - The potential for introduction and spread of noxious weeds exists under every alternative considered, including no action. A noxious weed risk assessment was completed and the potential for introducing and spreading noxious weeds is an adverse effect that cannot be completely avoided. The three action alternatives create conditions that are conducive to the introduction and spread of noxious weeds. Design criteria and resource protection measures have been identified and would be implemented to minimize these adverse effects. However, proposed activities such as road construction, commercial timber harvest, grapple piling, and prescribed fire activities still result in conditions conducive to the introduction and spread of noxious weeds.

## Short-term Uses versus Maintenance and Enhancement of Long-term Productivity

The action alternatives propose short-term harvest of timber, while enhancing the long-term health of forested stands. Existing conditions are outside the historic range of variability and may not be sustainable over the long term. Proposed treatments including prescribed fire, in part, mimic natural disturbance processes and move conditions toward a balance of sustainable vegetative conditions. Soil and Water are two key factors in ecosystem productivity and protection of these resources is provided by the design criteria discussed in Chapter 2. Sustainable levels of timber, wildlife habitat, water quality and other resources depend on maintaining the long-term soil productivity upon which vegetation relies. Quality and quantity of water from the project area would fluctuate as described previously, but no long-term effects to water resources are anticipated as a result of commercial harvest, noncommercial thinning, and fuels reduction treatments. All alternatives provide fish and wildlife habitat at levels necessary to maintain viable populations of the species within the project area. The amounts of suitable habitat vary with the level of density management in each alternative.

## Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with ...other environmental review laws and executive orders.”

## **National Historic Preservation Act**

A cultural resource inventory has been completed for the project area. On January 7, 2005, the Ochoco National Forest completed the “Project Review for Heritage Resources under the Terms of the 2004 Programmatic Agreement” with the Oregon State Historic Preservation Officer (SHPO). The activities in the selected alternative have been designed to have No Effect or No Adverse Effect to cultural resource sites through both protection and avoidance.

## **U.S. Fish and Wildlife Service and the National Marine Fisheries Service**

Biological Evaluations (BEs) have been prepared to document possible effects of proposed activities on threatened and endangered species in the project area. There are no endangered species known or suspected to occur on the Ochoco National Forest. Threatened species that are known or suspected to occur on the Ochoco National Forest include bull trout, mid-Columbia River steelhead, northern bald eagle, and Canada lynx. Potential effects to these species were analyzed and the analysis is summarized in the BEs (February 1, 2005 Wildlife BE and December 2004 BE for Aquatic Species) and in the Final EIS (pp. 117-135). The analysis documents that there would be no effect to bull trout or mid-Columbia River steelhead. The project may affect, but is not likely to adversely affect northern bald eagle and Canada lynx. Consultation with the U.S. Fish and Wildlife Service has been completed. Consultation with the National Marine Fisheries Service is not needed.

## **Clean Air Act**

The selected alternative is designed to be consistent with the Clean Air Act. The Oregon Department of Environmental Quality (DEQ) is responsible for assuring compliance with the Clean Air Act. In 1994, the Forest Service, in cooperation with the DEQ, the Oregon Department of Forestry and the Bureau of Land Management, signed a Memorandum of Understanding (MOU) to establish a framework for implementing an air quality program in Northeast Oregon. The MOU includes a prescribed fire emission limit of 15,000 tons of PM 10 per year for the national forests of the Blue Mountains (Malheur, Ochoco, Umatilla, and Wallowa-Whitman). (PM 10 are particulate matter that measure 10 microns in diameter or less, and are small enough to enter the human respiratory system.) All prescribed burning on these forests is coordinated with the DEQ through the State of Oregon smoke management program. All prescribed fire treatments authorized by this Record of Decision would be conducted in compliance with the State of Oregon Smoke Management System and would meet smoke management objectives for total emissions.

## **Clean Water Act**

The selected alternative will comply with the Clean Water Act. This Act establishes a non-degradation policy for all federally proposed projects. The selected alternative meets anti-degradation standards through planning, application, and monitoring of Best Management Practices (BMPs). The Environmental Protection Agency has certified the Oregon Forest Practices Act and regulations as BMPs. The State of Oregon has compared Forest Service practices with the State practices and concluded that Forest Service practices meet or exceed State requirements. Site-specific BMPs have been designed to protect beneficial uses. Chapter 2 of the Final EIS lists the design criteria and resource protection measures that are common to all action alternatives. A number of these measures are BMPs. Appendix D of the Final EIS describes the application of water quality BMPs and lists the BMPs that will be utilized to implement the activities in Alternative 2 modified.

The Final EIS documents the analysis of effects to streams listed on the 2002 state 303(d) list of Water Quality Limited Water Bodies for summer water temperature. These streams are: Bear, Cow, Klootchman, Deer, and Shotgun Creeks. Implementation of the selected activities should not result in any measurable increase in water temperatures in any fish-bearing or non-fish bearing perennial stream in the project area. Commercial timber harvest and noncommercial thinning activities were designed so that they do not reduce shade. There is a possibility that conifer thinning in aspen stands will cause short-term reductions in shade. However, these slight reductions in shade should not result in any measurable increase in water temperature because the area affected is small. There is

a potential to increase water temperature in intermittent non-fish bearing streams (Class IV) when they are flowing, but this should not result in a violation of state water quality standards because these streams go dry before peak water temperatures occur in the project area.

# Chapter 4

## Consultation and Coordination

## **Changes between Draft and Final**

This listing of agencies, organizations, and people consulted was updated.

# CHAPTER 4 – CONSULTATION AND COORDINATION

## Introduction

This chapter identifies the list of preparers that contributed to the analysis and were consulted during the preparation and development of this environmental impact statement. A listing of agencies, organizations, and people that received the scoping letter and the draft environmental impact statement is also included.

## List of Preparers

### Interdisciplinary Team (IDT) members

Bryan Scholz – IDT Leader, Fuels Planner  
Barbara J. Fontaine – Silviculturist  
Dede Steele – District Wildlife Biologist  
Jim Seymour – District Hydrologist  
Rodd Kubitzka – Transportation Planner  
Gayle Hammond – District Transportation Planner  
Barb Franano – District Fisheries Biologist  
Barb Smith – District Recreation Specialist  
Janet Schlosser – Writer/Editor  
Gery Ferguson – Writer/Editor

### Additional Contributors

Mark Lesko – District Botanist  
Terry Holtzapple – District Archaeologist  
Jim David – Forest Soils Specialist  
Bruce Wright – Geographic Information System Specialist / Analyst  
Caroline Gordon – Forest Geologist  
Paul Cuddy – Forest Environmental Coordinator  
Katherine Farrell – District Environmental Coordinator

**BRYAN SCHOLZ** has an A.S. degree in Forestry, an A.S. degree in Wildfire Science, and is a graduate of Technical Fire Management through Colorado State University. He is an Assistant Fire Management Officer in the fuels management program on the Crooked River National Grassland and the Lookout Mountain Ranger District of the Ochoco National Forest. He has 20 years of government employment with fire and fuels management with the Forest Service.

**BARBARA J. FONTAINE** has a B.S. degree in Forest Management from Oregon State University. She became a certified silviculturist after completing studies in the Silviculture Institute (Oregon State University and University of Washington). Her experience includes project planning, timber sale planning, preparation and appraisal, timber stand improvement and reforestation program management, and silvicultural prescriptions preparation. She has been observing growth and development of local forest stands for 28 years, and has been a Silviculturist on the Lookout Mountain Ranger District, Ochoco National Forest, for 13 years.

**DEDE STEELE** has a B.S. degree in Wildlife Science and a B.S. degree in Rangeland Resources from Oregon State University. Her experience includes 21 years of government service working for the Willamette, Ochoco and Deschutes National Forests and for the U.S. Fish and Wildlife Service. She has worked as a District and Forest

level Biologist, as an interdisciplinary resource planner, and as a Service Biologist. She is currently a District Wildlife Biologist on the Lookout Mountain Ranger District, Ochoco National Forest.

**JIM SEYMOUR** has a B.S from Colorado State University in Watershed Science with a concentration in Hydrology. His experience includes 24 years of government service as a hydrologist working on the Deerlodge National Forest in Montana, the Olympic National Forest in Washington and is currently on the Lookout Mountain Ranger District, Ochoco National Forest.

**GAYLE HAMMOND** has an A.S. degree in Engineering Technology from Linn-Benton Community College. She has been with the Forest Service 23 years working for the Malheur, Siskiyou, and Wallowa-Whitman National Forests as an engineering technician. Her experience includes planning, location, survey and design, contract preparation and administration of roads and recreation sites. She is currently the road manager and transportation planner for the Lookout Mountain Ranger District, Ochoco National Forest.

**BARBARA FRANANO** has B.S. and M.S. degrees in Biology (fish and wildlife emphasis) from West Texas State University in Canyon, Texas. Her experience includes 23 years of government service working for the Wasatch-Cache, Uinta, and Ochoco National Forests, U.S. Bureau of Reclamation, and the Division of Wildlife Resources in Utah. She has worked as a fisheries and wildlife biologist and as a program manager for special uses. For the last 5-1/2 years, she has been the Fisheries Biologist for the Lookout Mountain Ranger District and Crooked River National Grassland, Ochoco National Forest.

**GERY FERGUSON** has a B.S degree in Wildlife Management from Michigan State University, with a secondary emphasis in Forestry. Her experience includes 23 years of government service working for the Deschutes, Umpqua, and Colville National Forests. She has worked as a reforestation and timber stand improvement technician, presale forester, wildlife biologist, planner, assistant forest planner, litigation and appeals specialist, and environmental coordinator. She is currently on temporary detail to the Lookout Mountain Ranger District, Ochoco National Forest as their District Environmental Coordinator.



## List of Organizations and Persons Consulted

Asante Riverwind, League of Wilderness Defenders  
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Marc Albert, Natural Resources Defense Council  
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Scott Cooper, Crook County Judge  
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## List of Agencies Consulted

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Jeff Dillon, U.S. Fish and Wildlife Service  
Scott Hoefer, National Oceanic and Atmospheric Administration, Fisheries  
USDA, National Agricultural Library  
Environmental Protection Agency, Region 10  
USDI Office of Environmental Policy and Compliance  
Environmental Protection Agency, Office of Federal Activities

## List of Tribes Consulted

Confederated Tribes of the Warm Springs Reservation  
The Burns Paiute  
The Confederated Tribes of the Umatilla Indian Reservation  
The Klamath Tribes





























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# Appendix A

## **Changes Between Draft and Final EIS**

The appropriate resource specialists have signed the summary of effects.

# Appendix A

## West Maury Final EIS

### Biological Evaluation for Sensitive Species and Biological Assessment for Listed Species

### Summary of Effects

Species:	Listing	Alt. 1	Alt. 2	Alt. 3	Alt. 4
<b>Aquatic Species</b>					
Redband trout	Sensitive	NI	MIIH	MIIH	MIIH
Bull trout	Threatened	NE	NE	NE	NE
Mid-Columbia River steelhead	Threatened	NE	NE	NE	NE
Malheur mottled sculpin	Sensitive	NI	NI	NI	NI
Mid-Columbia River spring chinook salmon Essential Fish Habitat	Sensitive	NI	NI	NI	NI
Mid-Columbia River spring chinook salmon	Sensitive	NI	NI	NI	NI
Westslope cutthroat trout	Sensitive	NI	NI	NI	NI
Columbia spotted frog	Sensitive	NI	MIIH	MIIH	MIIH
<b>Wildlife Species</b>					
Northern bald eagle	Threatened	NE	NLAA	NLAA	NLAA
Canada lynx	Threatened	NLAA	NLAA	NLAA	NLAA
Peregrine falcon	Sensitive	NI	NI	NI	NI
Tri-colored blackbird	Sensitive	NI	NI	NI	NI
Bufflehead	Sensitive	NI	MIIH	MIIH	MIIH
Upland sandpiper	Sensitive	NI	NI	NI	NI
Pygmy rabbit	Sensitive	NI	NI	NI	NI
Gray Flycatcher	Sensitive	NI	MIIH	MIIH	MIIH
California wolverine	Sensitive	NI	MIIH	MIIH	MIIH
Western sage grouse	Sensitive	NI	NI	NI	NI
<b>Botanical Species</b>					
<i>Achnatherum hendersonii</i>	Sensitive	NI	MIIH	MIIH	MIIH
<i>Achnatherum wallowaensis</i>	Sensitive	NI	MIIH	MIIH	MIIH
<i>Artemisia ludoviciana</i> ssp. <i>estesii</i>	Sensitive	NI	NI	NI	NI
<i>Astragalus diaphanus</i> var. <i>diurnus</i>	Sensitive	NI	NI	NI	NI
<i>Astragalus peckii</i>	Sensitive	NI	NI	NI	NI
<i>Astragalus tegetarioides</i>	Sensitive	NI	NI	NI	NI
<i>Botrychium ascendens</i>	Sensitive	NI	MIIH	MIIH	MIIH
<i>Botrychium crenulatum</i>	Sensitive	NI	MIIH	MIIH	MIIH
<i>Botrychium minganense</i>	Sensitive	NI	MIIH	MIIH	MIIH
<i>Botrychium montanum</i>	Sensitive	NI	MIIH	MIIH	MIIH
<i>Botrychium paradoxum</i>	Sensitive	NI	MIIH	MIIH	MIIH
<i>Botrychium pinnatum</i>	Sensitive	NI	MIIH	MIIH	MIIH
<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i>	Sensitive	NI	NI	NI	NI
<i>Calochortus longebarbatus</i> var. <i>peckii</i>	Sensitive	NI	MIIH	MIIH	MIIH
<i>Camissonia pygmaea</i>	Sensitive	NI	NI	NI	NI
<i>Carex backii</i>	Sensitive	NI	MIIH	MIIH	MIIH

Species:	Listing	Alt. 1	Alt. 2	Alt. 3	Alt. 4
<i>Carex hystericina</i>	Sensitive	NI	MIH	MIH	MIH
<i>Carex interior</i>	Sensitive	NI	MIH	MIH	MIH
<i>Carex stenophylla (C. eleocharis)</i>	Sensitive	NI	NI	NI	NI
<i>Cypripedium parviflorum</i>	Sensitive	NI	NI	NI	NI
<i>Lomatium ochocense</i>	Sensitive	NI	NI	NI	NI
<i>Mimulus evanescens</i>	Sensitive	NI	NI	NI	NI
<i>Penstemon peckii</i>	Sensitive	NI	NI	NI	NI
<i>Rorippa columbiae</i>	Sensitive	NI	NI	NI	NI
<i>Thelypodium eucosmum</i>	Sensitive	NI	NI	NI	NI
<i>Thelypodium howellii</i>	Sensitive	NI	NI	NI	NI

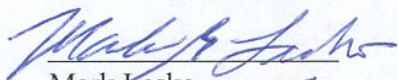
**Determination for Federally Listed Species:**

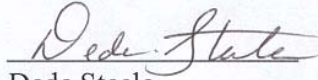
NE no effect  
 LAA may effect - likely to adversely affect  
 NLAA may effect - not likely to adversely affect

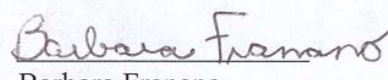
**Determination for Sensitive Species:**

NI no impact  
 MIH may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species  
 BI beneficial impact

Prepared by:

  
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# Appendix B

## Description of Activities

## **Changes Between Draft and Final EIS**

This is a new appendix.

This appendix contains information that was included in Chapters 1 and 2 of the Draft EIS. It has been moved here for clarity.

## APPENDIX B

### Description of Activities

#### Commercial Thinning

All commercial thinning activities are a form of density management.

**Commercial Thinning:** This treatment would remove trees that are large enough to have commercial value and would be sold to a timber purchaser. Commercial-size trees are generally 9 inches dbh and larger. Trees larger than 21 inches dbh would not be cut, either live or dead unless the tree is a safety hazard to operations or needs to be removed for road construction activities. There are three types of commercial thinning proposed with this project: individual tree selection, commercial thinning and improvement cutting.

**HIM – Improvement Cut:** This prescription may be prescribed for stands where severe insect and/or disease problems have reduced stocking levels of acceptable trees below recommended guidelines for the particular site. Due to damage or the presence of disease, the remaining trees are not capable of vigorous growth or the development of large structure is impaired. These conditions most often occur in stands that had become dominated by late-seral species with multiple canopies and dense stocking. These stands contain few trees larger than 21 inches dbh. Damaged or diseased trees less than 21 inches dbh would be cut as well as general thinning. Merchantable trees would be sold and removed from the stand. The prescription also includes precommercial thinning where stand conditions include overstocking of non-merchantable trees. The residual stocking following treatment will be between the minimum and recommended stocking levels. Healthy seedlings and saplings may contribute significantly to the residual stocking. Healthy early-seral species would be favored although a mixture of species would remain. Residual basal area is between 25 and 40 square feet.

**HSL – Uneven-aged Management, individual tree selection:** This prescription would be used in overstocked stands with an existing component of large trees (greater than 21 inches in diameter). Current stand conditions also include multiple canopies and dense stocking and may include all seral stages. The stand would be thinned from below to recommended stocking levels. Merchantable trees would be sold and removed from the stand. Precommercial thinning would be included when stands contain large amounts of non-merchantable trees. Treatment would create immediate structure and species composition changes to larger structures and generally earlier seral conditions. Species diversity would remain but the proportion of early seral species increases. The stand would remain uneven-aged (contains two or more age classes) and would exhibit multiple canopies. Existing large trees would benefit from reduced competition and the increased growth rate in younger, smaller trees would eventually augment the number of large trees to help increase the amount of late and old structure. Residual basal area is usually greater than 60 square feet and would exceed 100 square feet if numerous trees larger than 21 inches dbh are present.

**HTH – Commercial thinning:** Although commercial thinning is often specified as an intermediate treatment in even-aged silvicultural systems, in this analysis commercial thinning has been identified for stands lacking a significant component of large trees (more than 3 trees per acre more than 21 inches dbh). These stands appear even-aged with a single dominant canopy although the diameter range often includes a large number of sapling and pole-size trees. Thinning would be usually from below unless a change in species composition is desired due to dwarf mistletoe problems. Merchantable trees would be sold and removed from the stand. The prescription also includes precommercial thinning where stand conditions include overstocking of non-merchantable trees. The resulting stand would be at the recommended stocking. A small structural change may be immediately apparent and often results in earlier seral species compositions. Residual basal area is between 40 and 70 square feet.

## Logging Systems

**Skyline** – Skyline systems are usually proposed in units which have greater than 35 percent slopes. One-end suspension of logs is required. Skyline systems may be indicated for some areas with slopes less than 35 percent in order to reduce road use next to streams. Full suspension would be used over riparian areas. Cable corridors, approximately 15 feet wide, may need to be cut through an occasional stream crossing. When full suspension cannot be gained over riparian areas, logs would be pulled away from the stream to the landing. Trees felled for corridors would generally be included in the harvest (except for trees within RHCAs). Stumps, standing trees, or tractors may be used for anchors (and may be located within the RHCA but no tractors would be allowed within RHCAs unless on existing roads or closed roads). Maximum distance between skyline corridors is 150 feet. Skyline corridor placement depends on topography and may be parallel or fan out from one landing. Parallel corridors generally produce less damage to the residual trees. Landings average 1/4-acre.

**Tractor** – Tractor yarding refers to ground-based equipment and includes tractors, rubber tired skidders, and feller/bunching systems. Maximum slope is less than 35 percent and average slope is less than 20 percent. In small portions of tractor units with slopes greater than 35 percent, winch-lining of logs would be required in the timber sale contract. Winch-lining is limited to distances of less than 100 feet. Directional felling places logs closer to the skidder for yarding. Optimum skidding distances are 300 to 600 feet. Longer skidding distances up to 1,500 feet are feasible if using a feller/buncher. When skidding distances exceed 600 feet, temporary road location may reduce site disturbance. Uphill tractor skidding is limited, usually to slopes less than 15 percent. Skid trails are laid out in parallel or branching patterns. Tractor skid trails are planned at 150 feet apart to keep area of disturbance at less than 10 percent. Existing skid trails are reused where practicable. Feller/buncher skid trails average 50 to 75 feet apart, since the booms can usually only reach 30 to 35 feet. Landing size is usually less than 1/4-acre.

### **Light (horse and mobile yarder)**

**Horse Logging** - Horse logging may be selected in some units to meet specific needs. Needs may include less disturbance and tracking to protect certain resources. Skidding distances are usually shorter than in tractor systems. Maximum slope is less than 25 percent.

**Mobile yarder** - Units adjacent to streams along main roads have mobile yarding specified. Landings are small because material is loaded immediately to keep road closure reduced.

## Commercial and Noncommercial additional treatments

**Aspen Treatments:** Where aspen occurs within or adjacent to proposed treatment units, treatment prescriptions would be adjusted to provide additional benefits to aspen within riparian habitat conservation areas and upland areas. This would meet the need to promote deciduous vegetative conditions in RHCAs. The project area contains numerous small aspen stands usually associated with riparian areas but sometimes are located in upland areas. Aspen develop as clones where individual trees are short-lived and replaced by sprouts from the root system. Aspen is sensitive to conifer encroachment and high stand density, over-browsing by livestock, deer and elk, and lowered water tables. Thinning of conifers would occur in aspen stands that are located within treatment units. In general, conifers younger than the mature aspen (100 years) would be cut within 100 feet of any aspen including sprouts. The conifers thinned which are merchantable would be harvested. Upland thinning treatments would benefit aspen by increasing moisture and light availability. The clones would respond by producing more sprouts and expanding in area which would strengthen overall clone health.

## Noncommercial Vegetative Treatments

**PCT – precommercial (noncommercial) thinning:** Precommercial thinning or noncommercial thinning reduces stocking in the non-merchantable stand component (generally up to 9 inches dbh). This is often prescribed in addition to commercial harvest to reduce overall stocking to recommended levels. Generally, structure or seral stages does not change from the existing situation but growth and development are promoted. Normally, the desired condition after treatment would be to have trees below 9 inches in diameter spaced approximately 18 feet apart but could range to 30 depending on the density of overstory residual trees to maximize growth. Spacing would also



vary depending on the area and resource objectives such as in riparian habitat conservation areas where more trees would be left because of the desire to maintain shading on streams or less trees would be left to promote the development of broadleaf shrub and tree cover such as aspen.

**TWF – Thin with Fire:** This is identified for stands with a large component of seedlings and saplings under a canopy of much larger trees. The purpose is to reduce stocking of seedlings and saplings to maintain earlier seral stages and reduce future density problems. This prescription works best when mid-story canopies are open with few ladder fuels present in the stand.

**JUT – Juniper thinning:** Juniper thinning or noncommercial thinning reduces the amounts of younger junipers that have increased in number due to fire suppression. This prescription has been prescribed for dry ponderosa pine, western juniper woodland and steppe sites to reduce the amount of post-1900 juniper stocking. All younger trees would be cut and all old-growth junipers would be retained. This usually results in a return to the grass and shrub stage or maintains the large structural component but in more open stages. Juniper cutting increases the growth and development of grass and shrub cover.

## Fuels Reduction Treatments

**Prescribed Fire** – Prescribed fire would be used to reduce surface fuels and reduce the potential intensity, suppression cost, and resistance to control of future wildfires. Prescribed fire reduces seedling and sapling densities, ladder fuels, regenerates grasses, forbs, and shrubs and reduces the encroachment of western juniper into ponderosa pine stands. Prescribed burning in RHCAs would be done to encourage deciduous hardwoods such as aspen, decrease conifer competition, and to reduce fuel loadings. Burning would take place in both the spring and fall as long as burning prescription parameters could be met. Generally, south and west slopes would be burned in the spring. North and east slopes normally do not dry out enough to conduct burning in the spring so generally burning would occur in the fall. Hand line, existing roads, major streams or other natural features will be used to keep prescribed fire within treatment units. No heavy equipment will be used to construct firelines. On slopes where erosion in the fireline could occur, water bars (a small trench to direct the flow of water off the line) would be dug into the fireline. Hand fireline would be avoided through seeps, bogs, springs, meadows, and any other wet area. Hand fireline in RHCAs would not occur within 10 feet of intermittent (Class IV) streams, and within 20 feet of perennial (Class I, II, and III) streams. Where it is necessary to limit fire spread near streams or cultural resource sites, surface fuels would be cleared without disturbing the soil. Fireline construction would be minimized by using roads, major streams, rocky areas, or other existing fuel breaks. Where fuel breaks are not available, a fireline would be built. Hand fireline is constructed using hand tools, and consists of clearing a 5-10 foot wide path of seedlings, saplings, brush, and downed woody debris, and removing ground fuels (litter and duff layer) down to mineral soil for a width of 1-3 feet. The width of the line depends on the fuel type the line is constructed through, with narrower line in light fuels such as grass or duff, and wider line in heavier fuels such as high loadings of downed woody material and brush. Position on the slope and topography are other factors dictating the size of the hand fireline. There are two types of commercial thinning proposed with this project: underburning natural fuels and underburning activity fuels.

**Underburning natural fuels** – The application of fire in order to produce a desired average flame length and rate of spread for the objective of fuels consumption. Natural fuels are those fuels resulting from the natural mortality and decay of vegetation in forested and grass, forb, and shrub dominated plant associations. Hand fireline or natural features will be used to keep prescribed fire within treatment units. No heavy equipment will be used to construct firelines.

**Underburning activity fuels** - The application of fire in order to produce a desired average flame length and rate of spread for the objective of fuels consumption. Activity fuels are those fuels resulting from a management activity such as commercial timber harvest or precommercial thinning. Hand line or natural features will be used to keep prescribed fire within treatment units. No heavy equipment will be used to construct firelines.

**Piling** - Piling slash and burning the piles is proposed where fuel loadings are expected to be too high to underburn without causing undesired effects, or to facilitate fuels reduction adjacent to the National Forest boundary. Piling increases the amount of fuels that can be treated within the project area within the lifetime (time span) of the project.

Piling can occur immediately after thinning, before the fuels dry out, reducing the duration of the short-term hazard that exists after thinning. Piles would be centered in the spaces between trees in order to prevent damage to the trees when the piles are burned. Material which is rotten would not be piled. Piling usually removes 60-70 percent of the fuel in any given area, leaving the rest to maintain effective ground cover and to provide nutrients for cycling. Piles would be burned in the late fall or early winter of the second or third season after they are piled. Fire from burning piles could spread in a low-intensity underburn and creep around the forest floor between the piles. Piles would burn for varying amounts of time, depending on the size of the piles and how dry the piles are. Hand piles and grapple piles would finish burning within a few hours; landing piles would finish burning within a few days.

**Grapple piling** – Piling slash would normally occur where fuel loadings are expected to be too high to underburn without causing undesired effects, or to facilitate fuels reduction adjacent to the National Forest boundary. Grapple piling is using a machine such as an excavator, with a grapple on an articulating arm, to pile forest fuels. Grapple pilers would operate on existing skid trails. Grapple piling allows fuels to be treated immediately after thinning, would reduce the impact of smoke from future underburns, and would reduce the duration of the short-term hazard that exists after thinning. Piling can occur immediately after thinning, before the fuels dry, reducing the duration of the short-term hazard that exists after thinning. Piles are normally 5-10 feet high and 10-15 feet in diameter. Piles would normally be burned in the fall. Machinery would operate on existing skid trails and not create new soil disturbance.

**Hand piling** – The use of manual labor to pile slash resulting from management actions. Piles are normally 4-6 feet high and 5-10 feet in diameter. Piles would normally be burned in the fall.

## Road Actions

**System Road Development, New Construction** – System roads would be constructed to access multiple harvest treatment units. All newly constructed system roads would be closed after timber sale and associated treatments have concluded. New construction would be for this treatment entry and managed for long-term intermittent use under maintenance level 1 (closed but not decommissioned). It may be necessary to cut trees over 21 inches in diameter to construct a road in a particular location to access a proposed unit or avoid damaging resources, though this would be the exception.

**Reopening of Existing Closed Roads** – These are maintenance level 1 roads which are currently inactivated and closed to motorized traffic. They are needed to access harvest units and will be opened for short-term use and closed at the conclusion of timber sale and associated treatments.

**Reconstruction of Existing Roads** – Reconstruction of existing roads would be needed to ensure that unacceptable resource damage would not occur and that the road can be safely used for log hauling. This includes but is not limited to spot rocking, brush clearing within the road prism, restoring and adding drainage structures, relocating segments of road out of RHCA's or other sensitive areas and decommissioning the old segment, and erosion control work.

**Temporary Road Development** - Timber harvest operations require the use of temporary roads in some cases. Temporary roads would be constructed to provide access to the interior of harvest units to facilitate the harvest systems. These roads would normally be built on relatively flat ground slopes (less than 25%) and would be constructed to the lowest possible standard capable of supporting log haul in order to minimize ground disturbance. In many instances, as is typical in the case of ground-based systems, individual temporary roads would be constructed along the route of previously established skid trails to minimize construction costs associated with clearing the road template. This would result in little extra disturbance within the unit beyond what would already be experienced as a result of the employment of ground-based yarding systems. In most cases, temporary roads would not cross stream channels or other unique features on the landscape. All temporary roads would be decommissioned by the timber sale purchaser after operations have concluded.

**Road Decommissioning** – Decommissioning is defined as hydrologically stabilizing, blocking from motorized traffic, and removing from the road system. These roads are not needed for future use and are no longer managed or maintained for motorized use. Removing these roads from the system is meant to reduce potential sedimentation

from roads. In addition, decommissioning reduces road densities and can move towards meeting Forest Plan standards and guidelines. In this project, all roads identified for decommissioning access units proposed for treatment. Activities included in decommissioning a road are remove culverts and associated fill from stream channels; remove fill from the floodplain of stream channels; scarify, subsoil, or deep rip roadbeds as appropriate; remove side ditches; shape the roadbed to drain; construct water bars; remove unstable fill slopes; and/or apply seed and mulch. Decommissioning activities for individual roads are based on the site-specific existing condition of the road with the objective of eliminating use from motorized vehicles and hydrologically stabilizing the road prism.



# Appendix C

## Riparian Management Objectives

## **Changes Between Draft and Final EIS**

The contents of this appendix have not changed between Draft and Final EIS.

## APPENDIX C

### Riparian Management Objectives

The Inland Native Fish Strategy (INFISH) states, “Apply silvicultural practices for Riparian Conservation Areas (RHCAs) to acquire desired vegetation characteristics where needed to attain Riparian Management Objectives (RMOs)...” It also states burn projects are to be designed to, “contribute to the attainment of the Riparian Management Objectives” and to “minimize disturbance of riparian ground cover.” All harvest, silvicultural, and fuels practices are to enhance the riparian condition.

The following RMOs were derived from the INFISH standards and have been refined to add specificity related to existing conditions in the West Maury project area. RHCAs are measured from the edge of the channel on streams and the edge of riparian vegetation on wetlands.

The following general RMOs were derived from INFISH Table A-1:

1. All treatments in RHCAs will meet of State Water Quality Standards.
2. There will be no measurable increase in water temperature due to management activities in streams in the West Maury Project Area.
3. Pool frequency varies with width but will be consistent with Rosgen channel type.
4. Large Woody Debris (LWD) densities in streams, wetlands, and upper riparian zones will be consistent with the Desired Future Condition plant communities and channel type. No timber will be removed from the RHCA until these densities are met.
5. Greater than 80 percent of stream banks in stream reaches will be stable. Greater than 90 percent should be stable.
6. Lower bank angle on greater than 75 percent of stream banks on non-forested reaches will be less than 90 percent (i.e. overhanging banks).
7. Width to depth ratio will be consistent with the potential Rosgen channel type.

The following RMOs were developed for the West Maury project area:

1. There will be adequate LWD recruitment potential to maintain LWD levels within one (1) site potential tree height of the stream or wetland.
2. Moderate growth rates should be maintained in RHCAs within one (1) site potential tree height to provide future LWD recruitment, but stand densities will normally be higher than in the uplands.
3. Where prescribed, burning, thinning and/or harvest will be accomplished to maintain the larger trees in the RHCAs or to accelerate the recruitment of large trees, existing large old trees in the RHCAs will be maintained (i.e. trees greater than 21 inches dbh). If they pose an unacceptable risk due to disease or safety, they may be killed or felled but will not be removed from the RHCA.
4. Representative plant communities consistent with channel type, morphology, moisture, flood regime, and substrate, will be maintained in the RHCAs across the area.

5. Hardwoods (aspen, cottonwood, willow, alder, dogwood, etc.) consistent with site potential will become an integral part of riparian community and where excluded by past management actions, will be reintroduced. A variety of age classes will be present.

6. Within RHCAs, habitats will be maintained or enhanced to maintain viable populations of dependent plant and animal species.

7. RHCAs will be kept free of noxious weeds. Infestations will be controlled where they occur.

8. Meadow systems will be maintained across the landscape and the encroachment of conifers should be contained or reduced to maintain diversity of plant communities and wildlife habitats.

9. Based on the plant association group, fuels loading will be maintained within RHCAs at a level and distribution to allow fire to function as a natural disturbance factor at intensities within the Historic Range of Variability (HRV) while still maintaining vegetation, shade, and large wood to support other RMOs.

10. Infiltration, surface drainage, and interflow (shallow subsurface flow), will be maintained. If they have deteriorated due to past management activities, they will be reestablished where practical.

Considerations within RHCAs:

Wetlands – Primary considerations: surface flows, sediment delivery, historic range of variability (HRV)

Class IV Streams – Primary considerations: large woody debris (LWD), LWD recruitment, bank stability, and sediment delivery

Class III Streams – Primary considerations: Shade, bank stability, sediment delivery; 0-100 feet – LWD and LWD recruitment; 100-150 feet- stand health and HRV

Class I and II Streams – Primary considerations: Bank stability and sediment delivery; 0-100 feet – LWD and LWD recruitment; 0-200 feet – Shade; 100-300 feet – stand health and HRV; 200-300 feet – protecting the inner RHCA from high intensity fire and wind.



# Appendix D

## Best Management Practices

## **Changes Between Draft and Final EIS**

The contents of this appendix have not changed between Draft and Final EIS.

# APPENDIX D

## Best Management Practices

### Water Quality BMPs, INFISH, and LRMP Standards and Guidelines

A number of the mitigation measures described in Chapter 2 of the Final EIS, and procedural steps done in development of these projects, are identified as Best Management Practices (BMPs). BMPs also include requirements such as Forest Service manual direction, timber sale contract provisions, environmental documents, and Forest Plan standards and guidelines. The Forest Plan was amended by the Inland Native Fish (INFISH) Strategy in July 1995. Applicable INFISH standards are also identified.

The Forest Plan, as amended, guides natural resource management activities and establishes management standards and guidelines for the Ochoco National Forest. The Forest Plan requires compliance with State requirements in accordance with the Clean Water Act through the application of BMPs. The Environmental Protection Agency has certified the Oregon Forest Practices Act and regulations as BMPs. The State of Oregon has compared Forest Service practices with the State practices and concluded that Forest Service practices meet or exceed State requirements.

The following table describes design elements and other aspects of the project development process and identifies those design elements which are applied as site-specific BMPs and INFISH standards.

Mitigation Measure, Design Element, or Procedural Requirement	BMP/INFISH Reference
<p>Analysis and scheduling timber sale activities to avoid potential effects on water quality.</p> <p>Though not a priority watershed, the Maury Mountains Watershed Analysis was completed in 2001. Water quality and stream channel condition was identified as a key issue in the watershed analysis and water yield was identified as an issue in the West Maurys Project EIS.</p>	<p><b>T-1:</b> Timber Sale Planning Process</p> <p>Objective: Introduce water quality and hydrologic considerations into the timber sale planning process.</p> <p><b>INFISH RF-2a:</b> Roads Management</p> <p>Completing watershed analysis prior to construction of new roads or landings in RHCAs within priority watersheds.</p>
<p>Timber harvest units and other activities were evaluated to estimate the response of the watershed. The IDT reviewed each treatment unit including factors influencing potential for impacts to water quality such as EHA, soil erosion hazard, slope, landslide prone area, distance to stream, logging method, and effects to forest vegetation. Adjustments were made to silvicultural prescriptions and fuel treatments.</p>	<p><b>T-2:</b> Timber Harvest Unit Design</p> <p>Objective: Ensure that timber harvest unit design will secure favorable conditions of water flow, water quality, and fish habitat.</p>

Mitigation Measure, Design Element, or Procedural Requirement	BMP/INFISH Reference
<p>The potential for erosion and mass wasting for the area was evaluated by examining the soil, topography, rock type, drainage patterns, water conditions, and plant community. Water Quality Report, Geology Report, Soils Report.</p> <p>Areas with high erosion potential were identified and used to design treatments which reduced erosion potential.</p>	<p><b>T-3:</b> Use of Erosion Potential Assessment for Timber Harvest Design.</p> <p>Objective: Prevent downstream water quality degradation by the timely identification of areas with high erosion potential and adjustment of harvest unit design.</p>
<p>Based on the Forest GIS layer and data collected during the planning process and sale layout, the location of stream courses, springs, wet meadows, and RHCAs are delineated. In addition, sites identified during implementation will be reviewed by applicable resource specialists for protection needs.</p> <p>EIS Map 13 of 18</p>	<p><b>T-4:</b> Use of the Sale Area Map for designating Water Quality Protection Needs</p> <p>Objective: Delineate the location of protection areas and available water sources as a guide for both the purchaser and the sale administrator, and to ensure their recognition and proper consideration and protection on the ground.</p>
<p>The IDT addressed normal operating season for timber harvest operations, during which, operations may generally proceed without resource damage. Design elements also describe road conditions which would restrict timber hauling. Reference EIS Chapter 2, Mitigations, Design Criteria, and Resource Protection Measures.</p>	<p><b>T-5:</b> Limiting the Operating Period of Timber Sale Activities</p> <p>Objective: Ensure that purchasers conduct operations in a timely manner and conduct operations within the time period specified in the timber sale contract.</p> <p><b>INFISH RM-2 c5:</b> Regulate traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives.</p>
<p>Unstable lands that are unsuitable for timber management were identified through satellite imagery, aerial photos, and field reconnaissance. Reference EIS Chapter 3, Geology Report.</p>	<p><b>T-6:</b> Protection of Unstable Lands</p> <p>Objective: Provide for identification and appropriate management prescriptions for unstable lands.</p>
<p>Roads, skid trails, landings, and other timber harvesting facilities would be kept at a prescribed distance from designated stream courses.</p> <p>INFISH RHCAs have been identified for all streams within the West Maury Planning Area. Proposed treatments within RHCAs are intended to meet INFISH RMOs. Reference EIS Chapter 2, Water Quality Report, and Fisheries Report.</p>	<p><b>T-7:</b> Streamside Management Unit (SMU) Designation</p> <p>Objective: Designate a riparian area or zone along streams and wetlands where prescriptions are made that will minimize potential adverse effects of nearby logging and related land disturbance activities on water quality and beneficial uses.</p> <p><b>INFISH TM-1b:</b> Apply silvicultural practices for RHCAs to acquire desired vegetation characteristics where needed to attain RMOs. Apply silvicultural practices in a manner that does not retard attainment of RMOs and that avoids adverse effects on inland native fish.</p>

Mitigation Measure, Design Element, or Procedural Requirement	BMP/INFISH Reference
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>The road system to access sale units was designed so to minimize stream crossings. There is one new system road stream crossing in Alternatives 2 and 3. There is one stream crossing on a previous temporary road location in Alternative 2.</p> <p>EIS Design Elements - Soils</p> <p>Skid trails would be designated and approved prior to logging and would be located on already disturbed areas where possible. There will be no heavy equipment or skid trails in RHCAs.</p>	<p><b>T-8:</b> Streamcourse Protection</p> <p>a. Location, method, and timing of streamcourse crossings must be agreed to prior to construction</p> <p>Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow, and (3) to prevent sediment and other pollutants from entering streams.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Skid trails and the use of ground-based machinery for logging operations would not be allowed within RHCAs.</p> <p>No new temporary roads would be located within RHCAs.</p>	<p><b>T-8:</b> Streamcourse Protection</p> <p>d. Equipment shall not operate within SMUs (RHCAs) or protected streamcourses, as identified on the sale area map.</p> <p>Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow, and (3) to prevent sediment and other pollutants from entering streams.</p> <p>LRMP S&amp;G: No more than 10% of an activity area (Riparian MA-F15) can be compacted or displaced to a degree which degrades vegetative productivity.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Adequate drainage would be established on roads. Filter strips below drainage structures would be of sufficient size to catch sediment before runoff enters streams.</p> <p>New native surface and temporary roads would be designed with relief drainage (drivable dips, outslope, no berms). Drainage will be maintained during operations and be fully functional going into the winter and when roads are decommissioned or inactivated.</p>	<p><b>T-8:</b> Streamcourse Protection</p> <p>Water bars and other erosion control structures will be located so as to prevent water and sediment from being channeled into streamcourses, and to dissipate concentrated flows.</p> <p>Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow, and (3) to prevent sediment and other pollutants from entering streams.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Full suspension will be used over riparian areas.</p> <p>Cable corridors, approximately 15 feet wide, may need to be cut through an occasional stream crossing.</p> <p>When full suspension cannot be gained over riparian areas, logs will be pulled away from the stream to the landing.</p>	<p><b>T-8:</b> Streamcourse Protection</p> <p>g. Logs will normally be fully or partially suspended in cable log harvesting operations within the Streamside Management Unit (SMU) of protected streamcourses.</p> <p>Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow, and (3) to prevent sediment and other pollutants from entering streams.</p>

Mitigation Measure, Design Element, or Procedural Requirement	BMP/INFISH Reference
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Proposed units were evaluated by the IDT for suitability for tractor logging based on slope, soil erosivity, geologic stability, and distance from streams</p> <p>Slopes over 35% in Tractor units have been identified.</p>	<p><b>T-9:</b> Delineating Tractor Loggable Ground</p> <p>Objective: Protect water quality from degradation caused by tractor logging ground disturbance</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>There would be no new construction of landings within RHCAs. To reduce effects, existing landings may be reused if not contributing to water quality degradation.</p>	<p><b>T10:</b> Log Landing Location</p> <p>Objective: Locate landings in such a way as to minimize creation of hazardous watershed condition.</p>
<p>EIS Design Elements - Soils</p> <p>Skid trails would be designated and approved prior to logging and would be located on already disturbed areas where possible. Skid trails, landings, and roads would be designed to minimize the aerial extent of the activity. Objective is 20% or less of activity area in a detrimental soil condition.</p>	<p><b>T-11:</b> Tractor Skid Trail Location and Design</p> <p>Objective: Minimize the area compacted, erosion, and runoff water.</p>
<p>EIS Design Elements - Soils</p> <p>For tractor yarding units, the leading end of logs would be suspended above the ground during skidding operations to limit soil displacement. If slopes should exceed 35%, end lining would be required to minimize detrimental soil impacts.</p> <p>Slopes over 35% in tractor units were identified.</p>	<p><b>T-12:</b> Suspended Log Yarding in Timber Harvesting</p> <p>Objective: 1. Protect soils from excessive disturbance, and 2. Maintain the integrity of SMU (RHCA) and other sensitive watershed areas.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Effective ground cover would be established on deactivated and decommissioned roads within RHCAs to minimize sedimentation. An erosion control plan would be developed that incorporates applicable erosion control actions for all Action Alternatives and made part of the timber sale contract.</p>	<p><b>T-13:</b> Erosion Prevention and Control Measures During Timber Sale Operations</p> <p>Objective: Ensure that the purchaser's operations shall be conducted to minimize soil erosion.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>When consistent with other management actions, slash may be placed on skid trails, temporary roads, roads proposed to be decommissioned, and roads proposed to be inactivated when yarding is completed.</p> <p>EIS Design Elements - Noxious Weeds</p> <p>Revegetate temporary roads, landings, and other disturbed areas as soon as possible to reduce the potential for weed establishment and soil erosion.</p>	<p><b>T-14:</b> Revegetation of Areas Disturbed by Harvest Activities</p> <p>Objective: Establish a vegetative cover on disturbed sites to prevent erosion and sedimentation.</p>

Mitigation Measure, Design Element, or Procedural Requirement	BMP/INFISH Reference
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Landings and temporary roads will be ripped, water barred, and seeded as needed to prevent and control erosion.</p>	<p><b>T-15:</b> Log Landing Erosion Prevention and Control</p> <p>Objective: Reduce the impacts of erosion and subsequent sedimentation, on log landings, by use of mitigation measures.</p> <p><b>T-16:</b> Erosion Control on Skid Trails</p> <p>Objective: Protect water quality by minimizing erosion and sedimentation derived from skid trails.</p>
<p>Meadows, seeps, and springs have been identified through satellite imagery, aerial photos, and field verification. Wet meadows are afforded protection by the application of INFISH RHCAs. Dry meadows are protected from impacts from harvest and road activities. Aspen and cottonwood management is proposed to improve stand vigor.</p>	<p><b>T-17:</b> Meadow Protection During Timber Harvesting</p> <p>Objective: Avoid locating roads, landings, and skid trails in meadows.</p>
<p>EIS Monitoring Common to All Action Alternatives</p> <p>Timber sale administration will include monitoring for implementation of activities as planned including: harvest operations, road work, erosion control, and fuels treatment.</p> <p>Inspections of road drainage conditions following storm/runoff events would be done under the action alternatives. Maintenance would be scheduled as needed.</p>	<p><b>T-18:</b> Erosion Control Structure Maintenance</p> <p>Objective: Ensure that constructed erosion control structures are stabilized and working.</p> <p><b>INFISH RF-2 c4:</b> Requirements for pre-, during, and post-storm inspections and maintenance.</p>
<p>These BMPs are included in Alternatives 2 and 3 for Timber Sale activity. T-19 and T-21 are considered normal operating procedures and are included in timber sale contract language. T-20 is required per Forest Service Manual requirements. T-22 is provided for through monitoring and evaluation of conditions throughout the life of the timber sale contract.</p>	<p><b>T-19:</b> Acceptance of TS Erosion Control Measures Before Sale Closure</p> <p><b>T-20:</b> Reforestation</p> <p><b>T-21:</b> Servicing and Refueling of Equipment</p> <p><b>T-22:</b> Modification of TSC</p> <p><b>INFISH RA-4:</b> General Riparian Area Management Prohibit storage of fuels and other toxicants within RHCAs.</p>

Mitigation Measure, Design Element, or Procedural Requirement	BMP/INFISH Reference
<p>EIS, Chapter 2, Alternatives</p> <p>There are key differences among the alternatives for transportation system development and road management. Alternative 2 proposes building 5.8 miles of new system road and 5.3 miles new temporary road, reopening 16.9 miles, and reusing 5.5 miles of old temporary road. Alternatives 3 proposes building 3.0 miles of new system road and 5.0 miles new temporary road, reopening 14.5 miles, and reusing 4.3 miles of old temporary road. There is no road construction or reconstruction in Alternative 4. Alternatives 2, 3 and 4 propose decommissioning 3.44, 2.54 and 3.44 miles of existing road in RHCAs respectively. The road management proposed under Alternatives 2 and 3 would reduce the potential for sediment delivery in streams in the long-term.</p>	<p><b>R-1:</b> General Guidelines for the Location and Design of Roads</p> <p>a. Basic requirement for transportation facility development which best meets management objectives with least effect on environmental values.</p>
<p>Road management activities including: construction, reconstruction, inactivation, decommission, temporary roads, and use are identified as key factors affecting water quality and fish (reference EIS Chapter 1, Key Issue – Water Quality). During development of the EIS, the design and location of existing and proposed roads was evaluated by the IDT.</p>	<p><b>R-1:</b> General Guidelines for the Location and Design of Roads</p> <p>b. Interdisciplinary team evaluates effects of transportation system design and road location.</p> <p><b>INFISH RF-2 c1:</b> Road design criteria, elements, and standards that govern construction and reconstruction are identified.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>An erosion control plan is required by contract provisions common to road construction.</p>	<p><b>R-2:</b> Erosion Control Plan</p> <p>Objective: To limit and mitigate erosion and sedimentation through effective planning to initiation of road construction activities and through effective contract administration during construction.</p>
<p>Scheduling operations during periods when the probability of rain and runoff are low.</p> <p>Contractors are to schedule and conduct operations to minimize erosion.</p>	<p><b>R-3:</b> Timing of construction Activities</p> <p>Objective: Minimize erosion by conducting road construction operations during minimal runoff periods.</p>
<p>EIS Design Elements -Water Quality/Fisheries</p> <p>Cut and fill slope design, surface and subsurface drainage, and surfacing needs were considered in the development of the road designs.</p>	<p><b>R-4:</b> Road Slope Stabilization</p> <p>Objective: Reduce sedimentation by minimizing erosion from road slopes and minimizing the chances for slope failures along roads.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Road associated sediment is identified as a key factor affecting stream sedimentation. The alternatives include several design elements aimed at reducing the potential for sediment delivery from roads. Alternatives 2 and 3 require installation of straw bale sediment traps during operations in the wet season.</p>	<p><b>R-7:</b> Control of Surface Road Drainage Associated with Roads</p> <p>Objective: 1. Minimize the erosive effects of water concentrated by road drainage features, 2. Disperse runoff from or through the road, and 3. Minimize the sediment generated from the road.</p> <p><b>INFISH RF-2d:</b> avoiding sediment delivery to streams from the road surface.</p>



Mitigation Measure, Design Element, or Procedural Requirement	BMP/INFISH Reference
<p>EIS Alternative Development, Chapter 2</p> <p>Alternatives 2, 3, and 4 reduce the amount of open road miles within 400 feet of streamcourses. Hydrologic function would be restored on these roads. Stream crossing culverts and cross drain culverts will be removed on roads being decommissioned.</p> <p>Stabilize fill slopes and control water runoff to minimize the movement of sediment into streamside management units.</p>	<p><b>R-12:</b> Control of Construction in Streamside Management Units (RHCA's)</p> <p>Objective: Reduce the adverse effects of sediment from nearby roads on slope stability, vegetation, and aquatic resources along a designated stream zone.</p> <p><b>INFISH RF-3c:</b> Closing and stabilizing or obliterating, and stabilizing roads not needed for future management activities.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>A water conservation plan was developed for the forest to maintain base flows. This plan would be followed under the action alternatives.</p>	<p><b>R-17:</b> Water Source Development Consistent with Water Quality Protection</p> <p>Objective: Supply water for roads and fire protection while maintaining existing water quality.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Scarification of temporary roads, primary skid trails and landings is included in Alternatives 2 and 3.</p>	<p><b>R-23:</b> Obliteration of Temporary Roads and Landings</p> <p>Objective: Reduce sediment and restore productivity of the land at the completion of intended use.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Proposed road reconstruction was evaluated for designs that would reduce the potential for sediment delivery.</p>	<p><b>INFISH RF-3a:</b> reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or do not protect the watershed from increased sedimentation.</p>
<p>Fire severity regimes are described for the area in the Maurys Watershed Analysis and in the Fire/Fuels Resource Report. The effects of the alternatives are described for Fuels in the EIS, Chapter 3.</p>	<p><b>F-1:</b> Fire and Fuels Management</p> <p>Objective: Reduce the potential public and private losses which could result from wildfire and/or subsequent flooding and erosion, by reducing the intensity and destructiveness of wildfire.</p>
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Alternatives 2, 3, and 4 include design elements which reduce the effects of prescribed fire on water quality.</p>	<p><b>F-2:</b> Consideration of Water Quality in Formulating Prescribed Fire Prescriptions</p> <p>Objective: Provide water quality protection while achieving the management objectives through the use of prescribed fire.</p>
<p>Cumulative effects of proposed actions, past actions, and reasonably foreseeable future actions are included in the analysis. EIS Chapter 3.</p>	<p><b>W-5:</b> Cumulative Watershed Effects</p> <p>Objective: Protect the beneficial uses of water and streams from the cumulative effects of multiple management activities which may result in adverse (degraded) water quality or stream habitat conditions.</p>
<p>EIS Design Elements - Soils</p> <p>If slopes should exceed 35 percent on portions of tractor units, end lining would be required to minimize detrimental soil impacts. Slopes over 35% in tractor units have been identified.</p>	<p><b>VM-1:</b> Slope Limitations for Tractor Operations</p> <p>Objective: Reduce gully and sheet erosion and associated sediment production by limiting tractor use.</p>

Mitigation Measure, Design Element, or Procedural Requirement	BMP/INFISH Reference
<p>EIS Design Elements - Water Quality/Fisheries</p> <p>Wetlands and meadows are delineated within the project area. Springs, seeps, streams, and wet meadows have associated RHCAs applied. No off road ground-based harvest operations are proposed within RHCAs.</p>	<p><b>VM-2:</b> Tractor Operation Excluded from Wetlands and Meadows</p> <p>Objective: Limit turbidity and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion.</p>
<p>EIS Design Elements - Noxious Weeds</p> <p>Revegetate roads, landings, and other disturbed areas as soon as possible to reduce the potential for weed establishment and soil erosion.</p>	<p><b>VM-3:</b> Revegetation of Surface Disturbed Areas</p> <p>Objective: To protect water quality by minimizing soil erosion through the stabilizing influence of vegetation.</p>
<p>EIS Monitoring Common to All Action Alternatives</p> <p>Implementation monitoring and Water Quality monitoring to evaluate the effectiveness of BMPs and INFISH standards and guidelines is included for all the action alternatives.</p>	<p><b>W-7:</b> Water Quality Monitoring</p> <p>Objective: Determine effects of land management activities on the beneficial uses of water; monitor baseline watershed conditions for comparison with State Water Quality standards, Forest Plan standards, and estimation of long-term trends; ensure the health and safety of water users; evaluate BMP effectiveness; and determine the adequacy of data, assumptions, and coefficients in the Forest Plan.</p> <p><b>INFISH Monitoring:</b> Monitoring is an important component of the proposed interim direction. The primary focus is to verify that the standards and guidelines were applied during project implementation.</p>
<p>Maurys Watershed Analysis</p> <p>A watershed analysis was completed for the Maurys in 2001. Hydrologic character, stream channel condition, and water quality are key issues and receive emphasis in the report. The watershed analysis was used as a base for describing the purpose and need for action in the West Maurys Project.</p>	<p><b>INFISH Watershed Analysis</b></p> <p>Watershed analysis is a systematic procedure for determining how a watershed functions in relation to its physical and biological components. This is accomplished through consideration of history, processes, landform, and condition.</p>
<p>EIS, Alternative Description, Chapter 2</p> <p>Alternatives 2, 3, and 4 propose riparian restoration treatment prescriptions in areas where aspen occurs within treatment units.</p> <p>Long-term improvement in water quality is also expected under Alternatives 2 and 3, because of road decommissioning.</p> <p>Alternative 2, 3, and 4 treat fuel loadings at different levels to reduce the risk of high- intensity fire in RHCAs.</p>	<p><b>INFISH Watershed Restoration</b></p> <p>Watershed restoration comprises actions taken to improve the current conditions of watersheds to restore degraded habitat, and to provide long-term protection to natural resources, including riparian and aquatic resources.</p> <p><b>INFISH WR-1:</b> Watershed and Habitat Restoration Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserves genetic integrity of native species, and contributes to attainment of RMOs.</p>

# Appendix E

## Response to Comments

## **Changes Between Draft and Final EIS**

This is a new appendix.

This appendix contains responses to public comments, including all substantive comments.

# APPENDIX E

## Introduction

The Notice of Availability for the Draft EIS for the West Maurys Fuels and Vegetation Management Project was published in the Federal Register on September 3, 2004 (Vol. 69, No. 171). A legal notice inviting comments on Draft EIS was published in *The Bulletin* newspaper, Bend, Oregon, on September 11, 2004. The 45-day comment period closed on October 19, 2004. Nine comment letters were received during the comment period. Three letters from governmental agencies were received after the close of the comment period. Letters from governmental agencies are included in Appendix F.

This appendix restates a variety of the comments and provides a response. Every comment was read and considered, even though not every comment is restated here. All substantive comments have been restated.

The interdisciplinary team identified both substantive and non-substantive comments during the content analysis process. The appeal regulations (36 CFR 215.2) define substantive comments as “Comments that are within the scope of the proposed action, are specific to the proposed action, have a direct relationship to the proposed action, and include supporting reasons for the Responsible official to consider.”

## Cumulative Impacts

**Comment:** The Draft EIS (p. 211) states the primary impact from cattle grazing in the project area appears to be on riparian vegetation and channel condition. Because cattle grazing affects hydrology, riparian vegetation, stream morphology, sedimentation, and stream temperature, as well as the spread of noxious weeds, the effects and management of cattle grazing need to be more fully integrated into the analysis and disclosure of cumulative impacts. (EPA p 2)

**Response:** The effects of cattle grazing are adequately discussed throughout both the Draft and Final EIS, not just in the Hydrology/Watershed section. The cumulative effects section for non-native invasive species in the Draft EIS (pp. 241-242) describes how livestock affect the introduction and spread of noxious weeds. The Draft EIS describes the effects of livestock grazing on various wildlife habitats (see pp. 100, 101, 103, 107-109, 111, 116, 118-119, 124, 177, 181, 191, 195, 196, and 199). The Draft EIS (pp. 177 and 181) also describes the cumulative effects on fisheries and riparian areas.

**Comment:** Revised grazing management should be integrated with this project in order to better predict and manage the overall impacts. Predictions, such as on page 209 that noncommercial thinning in Riparian Habitat Conservation Areas (RHCAs) would not result in temperature increases on perennial streams, may not be accurate where cattle grazing removes the deciduous vegetation. (EPA p. 2)

**Response:** Integrating revised grazing management with the West Maury Project is not necessary to predict or manage the overall impacts. The Council on Environmental Quality (CEQ) regulations require the consideration of cumulative effects which leads to predicting the expected overall impact and allows decision-makers to make informed decisions. The cumulative effects discussions throughout the Draft and Final EISs describe the expected effects from continued livestock grazing at the current levels. As acknowledged in both the Draft and Final EISs, the Ochoco National Forest is analyzing a proposal to revise livestock grazing in the Maury Mountains area separate from the West Maury Project.

Noncommercial thinning specifications for diameter limits and spacing are designed to meet the Riparian Management Objectives for shade (Draft EIS, p. 73). These specifications were developed with the knowledge that livestock grazing would continue.

**Comment:** The NEPA document fails to fully disclose the cumulative effects of livestock grazing, timber harvest, prescribed fire, and road developments on water quality, forest health, wildlife habitat, noxious weeds, cultural resources, and other resources. NEPA requirements are not met with a mere listing of other projects; NEPA requires careful disclosure of impacts of other projects and adding up of impacts so they can be compared to management thresholds. The agency should disclose, analyze, and consider:

1. a “detailed catalog of past present and future projects”
2. “the time, type, place, and scale of past timber harvests”
3. “how these projects, and differences between the projects, are thought to have impacted the environment” and “explain in sufficient detail how different project plans and harvest methods affected the environment”
4. “analyze the impact of a proposed project in light of that project’s interaction with the effects of past, current, and reasonably foreseeable future projects”

(ONRC pp. 68-69.)

**Response:** The Draft and Final EISs include discussions of cumulative effects in Chapter 3. Cumulative effects discussions are provided for each environmental resource. The Draft and Final EISs include a list of the past, present, and reasonably foreseeable future actions; however, this list is simply the starting point for the cumulative effects discussions in Chapter 3.

The environmental consequences of past harvest activities on forest structure, species composition, and canopy closure that occurred prior to 1989 are captured in the 1989 satellite imagery. NEPA does not require amassing minute details; it does require the consideration of cumulative effects which are captured in the satellite imagery data. The 1989 satellite imagery was used in the Viable Ecosystem analysis to display the current distribution of seral structural stages and canopy cover. The satellite imagery was updated to include harvest projects after 1989 and ground verified (December 2004 Forest Vegetation Analysis Report, p. 3). The cumulative effects of these activities have been incorporated into the description of the affected environment for vegetation (Draft EIS, pp. 132-133). The Draft EIS (pp. 94-95) and the Final EIS (p. 58) disclose that from 1960 to about 1995, management direction of major timber sales concentrated on harvest of large trees resulting in the current deficiency of stands dominated by large trees.

For the analysis of detrimental soils condition, GIS data related to past harvest activities was utilized. Past harvest activity covers contain spatial and tabular data by decade including date, acres, prescription, and logging system used. These covers were used in the cumulative effects analysis by combining them with coverages of proposed activities to find areas of overlap and cumulative acres of treatment. The analysis files contain the resulting spreadsheets of these data unions and show amount of previous harvest by unit (see soil\_dis.xls spreadsheet in the project file).

Additional detail on cumulative effects analysis, including timing, type, and scale of past timber harvest can be found in the wildlife report, as noted in the Draft EIS (p. 191).

## Socio-Economics

**Comment:** The economic analysis is weak in portraying the costs and benefits of the proposed projects. Economics is important information for the reviewing public and the decision-maker. What are the economics of changing stand conditions and other management activities on project areas in relation to such important values as recreation and wildlife? The Forest Service at the national level has given great emphasis to the value of outdoor recreation in the economy. How is it affected by management? The costs to implement forest health projects, versus the costs incurred under major wildfire incidents are an important factor. The public needs to have information that shows that achieving the Purpose and Need for the activities is being done in a cost-effective manner. (CCNRPC p. 5)

**Response:** An economic analysis of the nature suggested by the comment is impractical at the project scale. The determination of net benefits includes assessment of market and nonmarket resource uses and values both quantitatively and qualitatively. This type of analysis is done at the forest planning scale, where the mix of activities across a large landscape can be assessed and measured.

**Comment:** While exact costs for implementing activities will not be known until the projects are put out for bid, average costs for all of the activities (thinning, prescribed fire, planning, road construction/reconstruction, timber harvest, etc.) are readily available and could be easily added to the Final EIS. (CCNRPC p. 6)

**Response:** Estimated costs of noncommercial thinning, prescribed fire, etc. are located in the analysis file (eis\_west\_maury/reports/silv/costcomp.xls). Although the cost of these activities are important for budgeting, scheduling, etc., they do not shed any meaningful light on the alternatives or the environmental consequences of implementing them. Therefore, estimated costs of implementing activities contained in the alternatives were not carried into the environmental document.

**Comment:** Derived income from harvesting activities could be shown in the Final EIS. (CCNRPC p. 6)

**Response:** Table 3-29 in the Final EIS depicts the direct, indirect, and induced income derived from the timber harvest activities.

**Comment:** Timber harvest may not be a primary purpose of this proposal, but the Forest Service has repeatedly stated that some of the Federal costs of treating stands for fuels reduction and forest health could be offset through commercial sale of forest products resulting from their treatments. This should be shown in the Final EIS. (CCNRPC p. 6)

**Response:** Both the Draft and Final EISs describe that there would be commercial timber harvest.

**Comment:** There is no justification for ignoring the job production related to road construction, road reconstruction, road decommissioning, or prescribed fire treatment. These are important family wage job activities, clearly add to the potential for local employment and income, and are a result of implementing an action alternative. (CCNRPC p. 6)

**Response:** Additional information regarding the jobs related to those activities has been included in the Final EIS in the Forest Wood Products and Seasonal Jobs section of Chapter 3.

**Comment:** Many of the jobs associated with road work, vegetation, and fuel treatments including noncommercial thinning and slash piling are accomplished through contracting and may be done by resources outside the County. A more aggressive and dependable program such as intended by the Healthy Forests Restoration Act could go a long way towards making it feasible for the development of local contractor resources. There is a tremendous amount of work to be done locally on the Ochoco National Forest and on the neighboring the Malheur and Deschutes National Forests. Without reasonable assurances of a continuing program, local contractors including minority and women-owned businesses will remain unable to invest in development of effective tools and staffing to be competitive. There is a major initiative underway to increase juniper thinning in central Oregon, and at least one co-generation plant operating in Madras. The Ochoco has the opportunity to help develop local contracting workforces and is urged to do so. (CCNRPC p. 6)

**Response:** Developing local contracting forces is beyond the scope of this vegetation management project. However, the West Maury Project includes many acres of juniper thinning, noncommercial thinning, and fuels treatments that are likely to be accomplished through contracting. These types of contracting opportunities can increase the feasibility of developing local contracting sources. Separate from this project, the Ochoco National Forest is considering options for reducing hazardous fuels in accordance with the Healthy Forest Restoration Act. Other projects than hazardous fuels can also encourage the development of local contracting sources.

**Comment:** A well-rounded program of contract opportunities in prescribed fire and thinning could help offset the detrimental effects to current local contractors who are largely tied to wildfire activities. This previous season caused major financial losses to local contractors who had little opportunity for fire assignments in the slow fire season. Over time, this could seriously degrade readiness for suppression in serious wildfire seasons. (CCNRPC p. 6)

**Response:** Development of a well-rounded program around these types of opportunities is outside the scope of this project. However, harvest activities are currently awarded through timber sale contracts to local and regional

purchasers who often subcontract portions of the work to local contractors. More than 95 percent of current annual noncommercial thinning is contracted with private concerns. Prescribed fire services have been contracted but unit costs were higher than in-house work and quality did not meet standards. The project is designed to accommodate diverse types of contracts including stewardship to increase efficiency.

**Comment:** The economic analysis takes no account of the economic costs of habitat loss, nor the economic benefits of high quality of life associated with healthy forests maintained with non-commercial restoration. The economic analysis should account for the economic costs associated with inappropriate thinning that opens the canopy too far and increases fire hazard. (ONRC, p. 4)

**Response:** The Forest is aware of the report "*The Economic Case Against National Forest Logging*" jointly authored by John Talberth and Karyn Moskowitz, as well as the November 6, 2000 response to their report prepared by the USDA Forest Service Washington Office. Economic analysis of the nature suggested is impractical at the project scale. Forest plans establish goals and objectives identifying the mix of activities and uses that maximize net public benefits. The determination of net benefits includes assessment of market and nonmarket resource uses and values both quantitatively and qualitatively. This analysis is done at the forest planning scale, where the mix of activities across a large landscape can be assessed and measured. Forest plans include standards and guidelines intended to prevent or mitigate adverse effects to both the socioeconomic and physical environments.

Project-level environmental analysis is used to assure that projects are consistent with Forest Plan goals, objectives, standards and guidelines, as well as to disclose environmental effects and assure informed decision-making. Economic analysis is used in project planning when needed to assess the costs and benefits of different alternatives. However, decisions made at the forest plan level, including the mix of activities found to maximize net public benefits, need not be reconsidered unless there is significant new information. Considering the purpose and need for action, and the scope of the project, the description of socioeconomic effects included in the Draft EIS (pp. 155-159) and Final EIS (pp. 109-112) are adequate.

## Fish

**Comment:** While there are no inventoried roadless areas (IRAs) within the West Maurys project area, there are unroaded areas (p. 247) identified by the Oregon Natural Resources Council (ONRC), and there are redband trout, which is the only salmonid species currently present. In Oregon, 54 percent of watersheds containing strong, healthy populations of redband trout derive their habitat quality from IRAs. The Forest Service should reconsider management of the ONRC identified unroaded area. The Final EIS should display the environmental impacts and benefits that could be derived from eliminating the 43 acres of commercial logging proposed within the ONRC identified unroaded area. (EPA p. 1)

**Response:** The proposed commercial harvest in the area identified by the ONRC is on a ridge and is not near any redband trout habitat. There has been previous harvest and road building in the area identified. Existing roads would be used to harvest timber in this proposal. Within the 43 acres of timber harvest, there is one Class IV stream (intermittent flow with no fish or fish habitat). There is no commercial harvest within the Class IV Riparian Habitat Conservation Area (50 feet each side of the Class IV).

Thus, there is no redband habitat or redband trout that would benefit from modifying or eliminating the 43 acres of commercial harvest as suggested. There is no perennial water within these commercial harvest units. Perennial flow would not be affected by the treatment. These units are more than 0.75 mile from Pine Creek to the west, more than 0.25 mile from a tributary to Hammer Creek to the southeast, and more than 3 miles to the Crooked River.

## Fuels

**Comment:** Aggressive fuel treatments need to be accomplished because fuel loadings are extremely high. Fuel treatments are necessary to protect other resources that could be lost to wildfires. Hand piling is expensive and should be used at a bare minimum. Other mechanical operations or prescribed fire are better alternatives. Low-



intensity fire conditions are necessary to reduce fuel loads down to historic levels. Catastrophic fires need to be prevented. (AFRC p. 2; OLC p.2).

**Response:** One of the purposes of the West Maury project is to reduce fuel loadings in areas where they are high (i.e. decrease the amount of high-intensity fire conditions). The Proposed Action includes 17,886 acres of fuels treatments (Draft EIS, p. 34). Handpiling is proposed on only 79 acres. The bulk of fuels treatments are prescribed fire; these treatments are designed to reduce areas with high fuel loadings and maintain areas that are currently within the low-intensity fire regime.

**Comment:** The consequences of no action are given short shrift. A clear picture must be developed of stand progression and the consequences of taking no management actions. One of the logical outcomes of no action is a major conflagration at some unpredictable time. This outcome must be foreseen and described. When and if that conflagration occurs it could have serious impacts. The Biscuit Fire on the Siskiyou National Forest provides clear evidence of the detrimental effects on wildlife from large-scale wildfires. Without making it clear that it is those large-scale wildfires that the action is intended to avoid, the reader is given inadequate information on which to base reasonable analysis and conclusions. It is reasonable to assume for purposes of analysis that a large-scale wildfire will occur. (CCNRPC p. 2)

**Response:** Table 3.25 on page 153 of the Draft EIS describes the current condition (distribution) of fire regimes in the West Maurys. An analysis using the Viable Ecosystems Management Guide shows that 31 percent of the forested landscape is in the low-intensity regime, 53 percent is in a mixed-intensity regime, and 16 percent is in a high-intensity regime.

As ingrowth continues and forest fuels accumulate, the current trend is for low-intensity acres to move to the mixed-intensity regime, and for mixed-intensity acres to move to the high-intensity regime. The increased likelihood of high-intensity wildfire with continued stand development without density control under the no action alternative is disclosed in several places in the Draft EIS (see pp. 95, 101, 104, 110, 118, 120, 172, 189, 194, and 196).

The Hash Rock Fire in the Mill Creek Wilderness on the Ochoco National Forest in August 2000 provides an example of changes in fire effects caused by altered fire regimes. An analysis using the Viable Ecosystems Management Guide showed that prior to the Hash Rock fire, the proportion of the Wilderness where vegetation conditions would have supported a low-severity fire regime had been altered from a historic range of 45-100 percent to an existing level of 21 percent. The vegetative conditions that would have supported a high-severity fire regime had been altered from a historical range of 6-14 percent to an existing level of 45 percent.

Fire intensity mapping of the Hash Rock Fire was completed on October 16, 2000 (Fontaine and Seymour). The fire intensity mapping was compiled from aerial and ground reconnaissance and post-fire photography. The percentages do not equal 100 percent because some areas are non-forested.

Mill Creek Wilderness Fire Regimes	Historic Range of Fire Regimes (%)	Existing Fire Regimes before Hash Rock Fire (%)	Post Fire Mortality by regime (%)
Low Severity	45-100*	21	32
Mixed Severity	24-55	28	20
High Severity	<b>6-14</b>	<b>45</b>	<b>43</b>

\*The upper parameter of 100 percent implies the possibility of a disturbance event of a great enough magnitude that would have returned the entire Wilderness to an early seral stage and a low-severity fire regime. Fires of that magnitude have occurred on the Ochoco as recently as 1990.

A comparison of pre-fire values and post-fire values (see above) validates the process used to identify fire regimes, confirms the changes in fire effects due to altered fire regimes, and validates the need to return fire regimes to their historic ranges of variation.

The Hash Rock fire caused substantial damage to ecosystem components and natural resources, which were already scarce compared to historic conditions, and which require long timeframes to re-establish (Simpson 2001). This high-severity fire produced the kind of fire effects that a return (of fire regimes) to HRV would modify.

**Comment:** The Draft EIS states it is not possible to reduce the possibility of wildfire, only decrease the possibility of high-intensity wildfire. That statement should be expanded in all descriptions of the “no action” alternative. (CCNRPC p. 2)

**Response:** Where appropriate, the discussion of the environmental consequences of the no action alternative discloses that it is not possible to reduce the possibility of wildfire, only decrease the possibility of high-intensity wildfire. For example, the effects to wildlife habitat of the increased likelihood of high-intensity wildfire with continued stand development under the no action alternative is disclosed in the Draft EIS (pp. 95, 101, 104, 110, 118, 120, 172, 189, 194 and 196).

**Comment:** In noncommercial thinning areas, there is concern about the high risk associated with leaving lop and scatter residue in the stands for up to 3 years before burning. While this is a common practice, the Forest Service should carefully consider other options that would remove fuels, and display the costs of those options compared to the lop and scatter prescription. (CCNRPC p. 5)

**Response:** The complete removal of forest fuels from a treatment area is limited by the current lack of economic viability of bio-mass programs; the current value of the product is not greater than the cost of its removal, so there is currently no market for noncommercial thinning slash. Should market conditions change, there is flexibility during project implementation to allow for the removal of noncommercially thinned material.

**Comment:** The fuels reduction in late and old structure (LOS) stands, RHCAs, and connective corridors should be done as much as possible by hand rather than with the use of prescribed fire to lessen the risk to these important areas. (EPA p. 3)

**Response:** The West Maurys project area was historically maintained by frequent, low-intensity surface fire. Using prescribed fire activities to reduce fuels in LOS stands, RHCAs, and connective corridors emulates natural-occurring low-intensity fire. The Draft EIS (p. 74) states “To meet riparian vegetation objectives and avoid the possibility of high-intensity fire running up-drainage during prescribed fire operations, fire may be purposely ignited within RHCAs. Ignitions would create a mosaic of burned and unburned ground to maintain effective ground cover in riparian areas. Other ignitions, such as burning within meadow systems adjacent to creeks to retard conifer encroachment, will be coordinated with the District Botanist, Fisheries Biologist, and/or Hydrologist. By reducing conifer encroachment in RHCAs, prescribed fire would encourage the growth of deciduous shrub species.”

**Comment:** Ponderosa pine and other trees are known to lift water from deep soil layers closer to the surface where it becomes available to the roots of bitterbrush. The effect of this water redistribution is to reduce the drought stress experienced by shrubs. By removing the trees that provide hydraulic lift, thinning will likely reduce the moisture content of the shrubs and other ladder fuels and increase the fuel hazard. The loss of hydraulic redistribution poses a significant fire hazard that the NEPA document fails to disclose. The NEPA analysis erroneously concludes that the treatments will effectively reduce fire hazard. (ONRC pp. 30-31)

**Response:** All proposed commercial and noncommercial thinning would retain forest cover at or near recommended stocking levels (Draft EIS, p. 29). Remaining trees and associated vegetation will have more of the site’s resources available resulting in increased growth (Draft EIS, p. 29). Brooks and others (2002) did not specify why the upper soil profile was drier than deeper soil layers, but based on general knowledge of plant physiology the initial drying was probably due to the uptake of water by the roots of the same trees that later in the season help to redistribute water from lower in the soil profile. Soil moisture depletion by plants in the project area occurs first in the upper portion of the soil so less of the plant’s energy is needed to grow deeper roots to access water. In the short term, proposed thinning treatments will decrease the rate of water depletion in the upper portion of the soil profile allowing remaining vegetation, both trees and shrubs to utilize that moisture. An effect of thinning is an increase in grass, forb, and shrub vegetation due to an increase in light and moisture availability. Shrubs would not become drier as a result of thinning. Hydraulic redistribution will continue to function. In time, with stand growth, hydraulic redistribution would match current levels. Brooks and others (2002) make no connection between hydraulic redistribution and fire hazard. Effects of treatments on fire hazard are disclosed in the West Maury Draft EIS (pp. 150-155).

**Comment:** The Draft EIS does not acknowledge the fire/fuel hazard represented by understory vegetation that is stimulated by thinning. Thinning that removes canopy trees:

1. increases fine fuels on the ground which are typically only partially treated.
2. increases temperature and decreases humidity under the canopy.
3. increases wind speeds under the canopy.
4. exposes mineral soil and stimulates the growth of weeds that can be fire hazards.
5. increases availability of light, moisture, and nutrients which stimulates growth of future ladder fuels.
6. increases costs of future treatments to reduce ladder fuels (and commercial options to off-set the costs). (ONRC pp. 2, 5, 22, and 26-27)

**Response:** The semi-arid, low elevation, ponderosa pine-dominated, open forests in the West Maurys area were historically maintained by frequent, low-intensity surface fire (Draft EIS, p. 151). Opening the forest canopy in the West Maurys will increase the availability of light, moisture, and nutrients to the forest floor; this will increase the quantity and quality of native grasses, forbs, and shrubs. This increase in fine fuels will increase the probability of low-intensity, high-frequency surface fire (the historic fire regime) and decrease the probability of high-intensity crown fire.

**Comments:** The impacts of livestock grazing on forest health, vegetation structures, fire ecology, and ladder fuel development must be disclosed and considered. (ONRC pp. 7 and 32)

**Response:** Livestock grazing does not effect the distribution of fire regimes because grazing does not alter stand structure and density (Draft EIS, p. 153). Livestock grazing does not affect potential fire intensity in closed canopy, multi-storied stands with a heavy surface fuel loading of coniferous material. However, livestock grazing could impede meeting prescribed fire objectives in open stands with light surface fuels by reducing the surface fuel layer needed to carry fire through the stand.

**Comment:** Roads cause more fires and bigger fires. Roads also alter fire patterns and increase the risk of human-caused fires. (ONRC pp. 12 and 15-16)

**Response:** Roads do not cause more and bigger fires as suggested. The 10-year average for acres burned on the Ochoco National Forest between 1992-2001 is 3,015 acres. Of those acres, 2,524 were burned by lightning-caused fires, and 491 were burned by human-caused fires. The two largest fires on the Ochoco since 1991 were lightning-caused fires in areas without roads: the 18,000-acre Hash Rock fire in the Mill Creek Wilderness in 2000, and the 13,000-acre 747 fire in the Black Canyon Wilderness in 2002.

**Comment:** The EIS fails to disclose that during extreme weather conditions (hot, dry, and windy) a canopy fire could easily kill the forests areas whether they are treated or not. (ONRC p. 20)

**Response:** The Draft EIS (p. 10) states that “It is not the purpose of this project to reduce the possibility of wildfire occurring in the West Maurys (this is not possible). It is the purpose of this project to decrease the possibility of high-intensity wildfire occurring across the landscape.” The Draft EIS does not state or otherwise imply that its purpose is to eliminate the possibility of high-intensity wildfire. Under extreme weather conditions, high-intensity wildfires can occur in any forest.

**Comment:** The agency must disclose that logging will at least temporarily increase some forms of hazardous fuels. (ONRC p. 20)

**Response:** The agency has disclosed that logging will temporarily create a short-term risk. The Draft EIS (p. 152) states that “Mechanical thinning creates a potential short-term increase in hazard (more fine fuels) in exchange for a long-term reduction in hazard.” The Final EIS (p. 106) also discloses that thinning “creates a potential short-term increase in hazard in exchange for a long-term reduction in hazard.”

**Comment:** The Final EIS should disclose the effect of removing trees over 12 inches. (ONRC p. 21)

**Response:** The Ochoco National Forest uses the Viable Ecosystems Management Guide (VEMG) (Simpson et al. 1994) to analyze vegetation across the landscape. The VEMG classifies vegetation by plant association, seral structure, canopy closure and fire regime, and was used to analyze the effects of the proposed action. The effects of the proposed action (including the thinning of *some* trees over 12 inches dbh) on the distribution of fire regimes, stand condition and the risk of high-intensity fire are disclosed in the Draft EIS (pp. 153-154). Fire hazard reduction is not the sole purpose of the project (Draft EIS, p. 7).

**Comment:** Logging slash can fuel future fires and logging can harm wildlife habitat by increasing the risk of fire. Logging creates “extreme levels of flammable slash.” (ONRC p. 27)

**Response:** The Proposed Action includes 17,886 acres of fuels treatments (Draft EIS, p. 34). Of those acres, 7,662 are underburning activity fuels (logging slash). Grapple piling of activity fuels would occur on 3,833 acres. Cutting trees (mechanical thinning) creates a potential short-term increase in hazard in exchange for a long-term reduction in hazard. Although the threat of high-intensity fire is greatly reduced by thinning, the slash created by thinning is a potential hazard until it is treated by burning. For the first year after thinning, the fuel moisture in green slash makes it unavailable to burn, unless a wildfire occurs under extreme conditions (Rothermel et al. 1986). After approximately 1 year, the slash has dried out and turned red, and is available to burn. Should a wildfire occur during this time, the additional heat generated by the increased fuel load has the potential to cause undesired effects to the surrounding stand, soils, and other resources. This hazard is mitigated by either lopping (cutting) the slash to reduce the height of the fuel bed (less than 24 inches), or by piling the slash; both treatments reduce fire intensity. In units that have been lopped, after 2 or 3 years the slash gets further compacted by winter snows and can be burned with a low-intensity fire without causing undesired effects. This delay also allows for the redistribution of nutrients from the slash back into the soil (Graham et al. 1999). (Draft EIS, p. 152)

**Comment:** The NEPA document shows bias because it describes the no-action alternative in terms of its inherent high risk of intense future fire. The Draft EIS lacks any recognition that during favorable conditions of weather and fuel moisture a low-severity or mixed-severity fire could occur in the project area and such a fire would likely accomplish much of what this project is attempting to accomplish without all the adverse consequences from ground disturbance. (ONRC p. 19)

**Response:** The proposed action includes 6,312 acres of low-intensity prescribed fire. The purpose of this low-intensity fire is to reduce stocking of seedlings and saplings (less than 1 inch dbh) and natural fuels in open stands with few ladder fuels. Prescribed fire alone would not meet the purpose and need to reduce fuel loadings in closed canopy, multi-storied stands. These stands have missed one or more fire cycles and have high ladder and surface fuel loadings. The Draft EIS (p. 26) disclosed that “Prescribed fire within these stands prior to understory thinning would lead to unacceptable damage to trees meant to be left in the residual stand.” An alternative consisting of only prescribed fire would not meet the purpose and need of changing the distribution of fire regimes in the West Maurys project area. A prescribed fire only alternative would likely cause unacceptable damage to the stand, especially to large trees, because of the closed canopies, abundant ladder fuels, and heavy surface fuel loading.

**Comment:** It would be better to just do a controlled prescribed burn at the right time of year without logging. The EA should have considered such an alternative. (ONRC p. 28)

**Response:** Alternative 4 would use noncommercial thinning of trees less than 9 inches dbh, and prescribed fire. This combination of treatments would maintain low-intensity fire conditions where they exist. This combination of treatments would not substantially lower the risk of high-intensity wildfire in forested stands that have missed one or more fire return intervals. Treating the fuels generated by noncommercial thinning in closed canopy stands will be more expensive, and potentially more damaging to the stand (Draft EIS, p. 155).

**Comment:** The NEPA analysis must disclose and analyze spatial priorities for fuel treatments. Work by the Forest Service’ Mark Finney shows that effective fuel reduction requires careful consideration of how fire moves across landscape and spatially prioritizing treatments to interrupt likely fire travel routes. (ONRC p. 28) The NEPA analysis must also recognize the caveat that spotting was excluded from Finney’s work and that spotting fires behave independent of the treatment pattern unless whole-area treatment is utilized. (ONRC p. 29)

**Response:** The placement of vegetation and fuel treatments is based on stand condition and the goals and objectives which will be met by those treatments, which include activity fuels reduction, natural fuels reduction and thinning with fire (Draft EIS, pp. 11-12). It is not the purpose of the West Maurys project to create fuelbreaks. It is not the purpose of this project to reduce the possibility of wildfire occurring in the West Maurys (this is not possible). It is the purpose of this project to decrease the possibility of high-intensity (stand replacement) wildfire occurring across the West Maurys landscape (Draft EIS, p. 10) by moving the distribution of fire regimes towards their historic range of variability. It is also the purpose of this project to move the seral and structural conditions of forest stands towards their historic range of variability (Draft EIS, p. 7). Finney's landscape treatment patterns are designed for homogeneous landscapes; the West Maurys project area is a heterogeneous landscape, fragmented by a variety of management activities during the last 30 years.

**Comment:** The NEPA analysis must acknowledge that random/arbitrary placement of fuel treatments will have little effect on large fires unless high proportions of the landscape are treated. (ONRC p. 28)

**Response:** The West Maurys project would treat a high proportion of the landscape; the West Maurys project area is 37,974 acres, and the Proposed Action would treat 18,508 acres (48.7%) of the project area (Draft EIS, p. 34).

**Comment:** The NEPA analysis fails to balance the minute level of benefit in terms of fire risk against the great level of soil, water, and wildlife impacts. The small amount of fuel reduction benefits from this project are also short-lived and will last only about 10-15 years at which point another entry will be required. So all the soil, wildlife, and watershed impacts will be repeated again and again and probably still not stop the big fire from burning during extreme weather conditions. (ONRC p. 29)

**Response:** Chapter 3 of the Final EIS discloses the environmental consequences of the four alternatives considered. Alternative 2 reduces fire risk more than the other two action alternatives. Alternative 2 reduces fire risk on approximately 7,500 acres. Alternative 4 reduces fire risk on the fewest number of acres of the action alternatives, approximately 4,500. The Forest Service agrees that maintenance of low-intensity fire conditions in the low-elevation, semi-arid, ponderosa pine-dominated stands in the West Maurys needs to be repeated every 10-15 years, which is the historic fire return interval for these kinds of forests across the American West (Agee 1993).

**Comment:** The agency should focus fuel reduction efforts within 1/4 mile of the homes and communities and prepare an EIS to more carefully balance the competing interests here (soils, fuels, etc). Outside the community zone, the Forest Service should focus on restoration using non-commercial treatment using hand crews and prescribed fire. The Forest Service must focus on treatments that can be maintained and do not require repeated entries with heavy equipment. (ONRC p. 30)

**Response:** The West Maury project area is not within a wildland urban interface area or community zone. One of the purposes of the West Maury project is to move the distribution of fire regimes towards their historic ranges. To meet that purpose, a variety of treatments are included in the action alternatives. As previously discussed, prescribed fire alone would not achieve the purpose and need. It is not feasible or possible to focus only on treatments that can be maintained and do not require repeated entries. The West Maury project area is a dynamic ecosystem that will continue to change over time.

**Comment:** Much of the project area is made up of plant communities that naturally burn at high intensity. No amount of thinning is going to radically alter this natural phenomenon over the scale of the next 50-100 years. (ONRC, p. 30)

**Response:** As disclosed in the Draft EIS (p. 151) and the Final EIS (p. 105), the West Maury project area is made up of a variety of plant communities that naturally burned at varying intensities. The predominant fire regime in the project areas was low intensity which ranged from 14,791 to 27,665 acres. The high-intensity fire regimes historically ranged from 1,004 to 10,511 acres. Management activities such as prescribed fire and thinning can and will alter the amount of fuel loadings and increase the area within the low-intensity fire regime.

**Comment:** The agency should do an EIS to consider that fuel reduction in this project area and elsewhere will not be realized during the most extreme fire conditions. Sometime during the next 50-100 years, there will likely be a

large fire during extreme conditions. If there is a significant risk of that occurring, then all the soil damage, hydrologic degradation, weed infestations, and wildlife disturbance will be for naught. (ONRC p. 30)

**Response:** EISs are prepared to disclose the environmental consequences of major federal actions that significantly affect the quality of the human environment (40 CFR 1502). Writing an EIS to speculate about future wildfires that might occur sometime, somewhere during extreme weather and/or fire conditions would not provide any meaningful information to agency decision-makers. As stated in elsewhere in this comment appendix, fuel reduction efforts are not likely to reduce severe wildfires under extreme conditions. However, one of the purposes of this project is to reduce fuel loadings and reduce the risk of high-intensity wildfire. High-intensity wildfires can and do occur under less than extreme fire conditions. Reducing fuel loadings and moving toward historic fire regimes means that when wildfires do start, initial attack efforts have a much higher likelihood of success and that wildfires are more likely to remain low-intensity fires that burn a mosaic of ground vegetation.

**Comment:** Fire management must be carefully planned so as to minimize effects on wildlife, soil, site productivity, large trees, down woody debris, and snags. Fall burning should be considered because that is when nature would have done most of the burning. The effects of spring burning on the life-cycles of plants and wildlife must be fully considered in the NEPA process. (ONRC p. 31)

**Response:** Most natural (lightning) fire starts on the Ochoco National Forest occur in July and August. Prescribed fire is used in the spring before greenup, and from late summer, through fall, to winter. The potential for effects on some forest resources, including wildlife, soil, large trees, down woody debris and snags, is greater in the fall (when conditions are drier) than in the spring. The potential for effects on other forest resources, such as site productivity, can be greater in the spring. The effects of spring burning on the life-cycles of plants and wildlife are considered in the Design Criteria and Resource Protection Measures section of the Final EIS.

## Heritage

**Comment:** The Draft EIS (p. 75) states there is a data gap involving 10 units. Will the data be available before any management actions are taken? (ASCO)

**Response:** The cultural resource survey for the data gap areas involving 10 units identified in the Draft EIS was completed during the 2004 summer field season. No heritage sites were identified in the 10 units surveyed. The data is currently available and has been incorporated into the final West Maury EIS (Heritage Resource Report December 2004). The results have been included in the revised SHPO report and determination of effect (SHPO Report December 2004). The results of the additional survey were added to the total acres surveyed for the West Maury project. No units were added to the treatment recommendations for heritage resources since no sites were identified in the areas previously lacking survey coverage.

**Comment:** The Draft EIS did not contain evidence of monitoring for heritage resources to determine whether mitigation measures were taken as specified and were effective. Monitoring would include measures for data recovery, if damage to heritage resources did occur. (ASCO)

**Response:** The Draft and Final EISs do not contain monitoring for heritage resources. There are several stages where coordination to protect and manage heritage resources would occur and would function like monitoring. The West Maury EIS design criteria has been developed to identify specific areas where coordination to manage and protect heritage resources is needed. During implementation, the heritage specialist would work with various other specialists to identify these areas on the ground and implement the design criteria to protect the resource. Heritage resources are unique because there is a need to protect the resource and not focus attention on the location.

Design criteria would be used to develop projects like timber sale contracts. The sale administrator becomes responsible for carrying out contract specifications, working with the contractor and with the heritage specialist. Heritage specialists work with the sale administrator through the life of the sale to “monitor” the effectiveness of treatment recommendations. If there are failures or new discoveries, an assessment would be made by the heritage specialist. Based on the assessment, treatment methods would be adjusted and additional consultation with SHPO may be necessary. A data recovery plan may be developed and submitted to SHPO for concurrence. Ideally, a data

recovery plan would be submitted prior to an anticipated adverse effect. Working with the sale administrator or project leads, the heritage specialist would be able to evaluate or monitor the effectiveness resource protection methods.

The success or failure of our design criteria or mitigation measures may not be realized until the project(s) is completed. New science or treatment recommendations tied to ongoing projects would be used to improve the effectiveness of meeting resource objectives. Treatment recommendations are based on meeting resource objectives and at any time resource objectives are not being met, there would be a need to adjust the treatment recommendations to be successful and effective.

## Non-native Invasive Species

**Comment:** The invasive weed sites in the analysis area and along all log and gravel haul routes should be fully inventoried and documented as part of the NEPA process for this project. The agency should consider how weeds were addressed in the Middle North Umpqua Watershed Analysis (January 2001). That watershed analysis considered aggressive non-native plant species, in addition to species listed as noxious. The Draft EIS (map 15) fails to show the location of noxious weeds relative to roads, grazing sites, facilities, OHV tracks, etc. The map and discussion must address all invasive plant species, not just those currently considered noxious. The Draft EIS does not reflect concern over non-native invasives. (ONRC pp. 6 and 49)

**Response:** Noxious weeds sites have been inventoried and are documented as part of the analysis for this project. As stated in the Final EIS (p. 185) pre-project inventories of non-native invasive species have been completed. The noxious weed map has been updated between the Draft and Final EIS. The updated map includes secondary roads and all known infestations.

In 2003, a noxious weed/invasive plant inventory was completed along both open and closed roads, where most weeds are commonly found. Not all sites with species listed as “noxious” were documented. An example is bull thistle (*Cirsium vulgare*). Though this species is listed by the State of Oregon as noxious, on the Ochoco NF it commonly occurs as scattered plants or small patches along roadsides, burn areas, and other disturbed sites. Because it is not highly competitive, and normally fades from the landscape as other plants colonize the site, it is regarded as having relatively little environmental impact.

The Ochoco NF is also concerned with “non-native invasive” plants. However, defining “non-native invasive” is subjective. Some may consider cheatgrass (*Bromus tectorum*) as “non-native invasive,” but this species is so widespread that it is not listed as noxious by the State of Oregon. On the Ochoco NF, it is so common that inventory would have little value. It also appears to be less aggressive than other plants in the forest setting due to higher precipitation. Therefore, it is not considered a “non-native invasive” on the Ochoco NF and has not been included in inventories.

The botany report, incorporated in both the Draft and Final EISs by reference, includes a list of both “listed noxious weeds” such as spotted knapweed (*Centaurea biebersteinii*), and other species regarded as “non-native invasive” plants, such as teasel (*Dipsacus*) within and near the analysis area. Plants considered by the district botanist to be “non-native invasive,” were not found during inventory.

Infestations found during the 2003 non-native invasive plant inventory were considered during project design, and incorporated in the design criteria and resource protection measures included in the Chapter 2 of the Final EIS. Examples of design criteria include requiring weed-free seed for re-vegetation, and unit-specific measures such as avoiding the re-use of weed-infested log landings associated with listed treatment units.

**Comment:** It is highly unlikely that conducting ground-disturbing activities over so many acres will not make the weed problems worse instead of better. It is often better to just close roads and avoid ground-disturbing activities while sending crews in to do hand-pulling of weed infestations as necessary. (ONRC p. 51)

Please comply with Executive Order 13112, which provides that each Federal Agency whose action may affect status of invasive species shall, to the extent practicable and permitted by law

*(1) identify such actions;*

*(2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and*

*(3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.*

**Response:** Executive Order 13112, Forest Service Manual (FSM 2080), the Mediated Agreement for Managing Competing and Unwanted Vegetation (1989), and Ochoco NF Forest Plan (1995) direct the Forest Service to prevent the introduction and spread of non-native invasive plants. However, the Forest Service is also directed to continue grazing authorizations, implement fuels reduction projects, maintain a road system for the recreating public, and other activities that increase the risks for introduction and spread of weeds. As a result of these activities, risks from non-native invasive plants is expected to continue.

Most recent direction from the Pacific Northwest Regional Office regarding Executive Order 13112 requires prevention measures such as pre-project inventories and contract requirements for cleaning off-road equipment associated with activities such as timber sales (Joyner 2002). Additional prevention guidelines were issued at this time.

The West Maury Draft EIS project alternatives (pp. 69-70), include mitigation measures, design criteria, and resource protection measures. Examples of design criteria include requiring weed-free seed for re-vegetation, and unit-specific measures such as avoiding the re-use of weed-infested log landings associated with listed treatment units.

## Soils

**Comment:** The EIS appears to lack any serious discussion of the problems associated with clay soils in the Maurys. (ONRC p. 6)

**Response:** The Final and Draft EISs and the incorporated Soils Reports describe the direct, indirect, and cumulative effects related to soils, including clay soils. For clay soils, the Final EIS states that “[r]ecover of existing soil (compaction) would occur through natural processes. These processes include frost heaving in the top 4 to 6 inches of soil. These natural processes can take 10 to 50 years or more to fully restore damaged ash soils, while clayey soils may recover in 1 to 2 years due to shrinking and swelling actions.”

The West Maury Soils Report has been incorporated by reference into the Final and Draft EISs. This report contains more detailed, voluminous information regarding the descriptions of existing landtypes listed in Table 3.43 and management interpretations for machinery impacts. The Soil Resource Inventory Landtypes are specifically discussed in the Soils Report on pages 2-7. Each individual landtype discussion specifically addresses the predominant soil textures of both the surface and subsoil. Each ground-based treatment unit has percentages by landtype listed in Appendix B, pages 47 - 52 of the Soils Report.

**Comment:** Does the Forest Service have any monitoring data to show that ground-based logging on clay soils (p. 217) like those in the project area will not violate soil protection standards? (ONRC p. 6)



**Response:** Yes. The Blackbear Monitoring Report is discussed in the West Maury Soils Report (pp. 35-37). Soils across the Picture Gorge Basalts (the P and Y landtypes) as specified in this report often have clay subsoils with ashy surface soils. Soils standards and guidelines were met on these units.

**Comment:** The Forest Service must count all detrimental compaction and not arbitrarily exclude certain “small” or linear features from the detrimental soil calculations. The Regional Guide says to maintain soil conditions, not degrade soil and (partially) mitigate the detrimental conditions. The Forest Service policy to ignore detrimental effects to soil in areas less than 5 feet wide and less than 100 square feet is arbitrary and capricious. Under this policy, many small areas could add up to significant detrimental soil conditions, yet not trigger any management concern. This violates NFMA requirements to “Conserve soil and water resources and not allow significant or permanent impairment of the productivity of the land.” This also violates NEPA by failing to disclose the true extent of detrimental soil conditions. (ONRC pp. 6 and 41-42)

**Response:** Regional soils standards were developed to minimize permanent impairment of land productivity and to maintain or improve soil and water quality (R6 Supplement 2500-98-1). A minimum degree, size, and shape of a particular disturbance (such as compaction, puddling, or displacement) was specified to exclude areas that have a high chance of natural recovery and are not horizontally contiguous. This is a reasonable interpretation which prevents unreasonable microsite level interpretations. We are managing at the treatment unit scale. The Regional Guide was withdrawn and is no longer in effect.

**Comment:** The Draft EIS (p. 221) states that 23 percent of the harvest units are more than 20 percent detrimentally affected but does not disclose to what extent the other 77 percent might also be compacted. If the other 77 percent of the area is also compacted (even if less than 20 percent) then this proposed action might violate the soil standard. (ONRC p. 6)

**Response:** Both the Draft and Final EISs contain a table displaying unit-by-unit determinations related to detrimental soil conditions.

**Comment:** The soil analysis does not account for the adverse soil impacts from fuel treatments especially burn piles which often destroy soil structure and are identified as initiation sites for erosion and weeds. The Draft EIS (p. 222) erroneously states that “other treatments” do not cause detrimental soil effects. This needs to be corrected in the Final EIS. (ONRC p. 6)

**Response:** The Draft and Final EISs adequately account for the adverse soil impacts from fuels treatments. The Draft EIS (pp. 221-222) states “Some detrimental soil charring would occur under the grapple piles but will be of a low percentage (estimated to be 5 to 6 piles per acre at 100 square feet/pile which yields 1.1 to 1.3 percent impacts which are mostly on existing trails and landings). Broadcast burning of natural fuels would produce some detrimental charring but is estimated to only be a fraction of a percent. There would be no net increase of detrimental soil conditions.”

**Comment:** The NEPA document did not address the consequences of erosion and sedimentation within a proper framework of sediment dynamics. Estimation of sediment budgets for historical and current conditions can be used to evaluate the ongoing effects of human activities on sediment supply, transport, and storage characteristics and how such changes may affect aquatic and riparian habitats. (ONRC p. 41)

**Response:** The analysis of the West Maurys Fuel and Vegetation Management Project indicates that small to not measurable increases in flow and sediment yield are expected. These small changes are well within natural variability and should not result in stream dimension, pattern, or profile changes. Since there would not be a change in stream dynamics, there should not be a change in sediment dynamics. Sediment is addressed in Chapter 3 under water yield, fisheries, and sediment.

**Comment:** This project will cause unacceptable impacts to soil resources. Use of ground-based logging equipment compacts soil causing reduced site productivity, altered soil food web relationships, reduced infiltration, and increased surface runoff. Spring burning can also be harmful to soil. The EA needs to consider these impacts and consider alternative ways of avoiding these impacts. (ONRC p. 42)

**Response:** The direct, indirect, and cumulative impacts of this proposal to soils have been disclosed both in the Draft EIS (pp. 217-227) and in the Final EIS. These proposed activities will meet Regional Standards for Soils (R6 Supplement 2500-98-1).

**Comment:** The existing level of soil disturbance has not been measured and disclosed in the EA. The Agency cannot say with any factual basis whether forest plan standards will be met. Existing soil impacts must be measured and future impacts estimated so that an adequate cumulative effects analysis can be prepared and included in a supplemental EIS. (ONRC p. 42)

**Response:** The existing levels of soil disturbance have been measured and were disclosed in the Draft EIS (see Table 3.47 pp. 223-227) which displays detrimental soil disturbance on a unit-by-unit basis.

**Comment:** The cumulative effects of standard logging practices are likely to violate soil standards. (ONRC, p. 43)

**Response:** The proposed treatments will meet Regional Standards for Soils (R6 Supplement 2500-98-1) on a unit-by-unit basis. See Draft EIS (pp. 223-227).

**Comment:** The Forest Service soil quality standards underestimate soil impacts. Soil degradation occurs at thresholds that are not detected by the definition of "detrimental soil conditions." Any NEPA analysis based on these criteria will underestimate the effects of management. NEPA requires the agency to disclose all soil impacts. (ONRC p. 43)

**Response:** The analysis of environmental consequences for soils is adequate. Local monitoring, such as that completed for the Blackbear Timber Sale, demonstrates that the soil quality standards do not underestimate impacts to soils.

**Comment:** The NEPA document fails to consider the significant effects of burning slash piles and soil compaction on habitat for soil dwelling species. (ONRC p. 44)

**Response:** The soils analysis does include accounting for the adverse soil impacts from fuels treatments. See Draft EIS (pp. 221-22) which states "Some detrimental soil charring would occur under the grapple piles but will be of a low percentage (estimated to be 5 to 6 piles per acre at 100 square feet/pile which yields 1.1 to 1.3 percent impacts which are mostly on existing trails and landings). Broadcast burning of natural fuels would produce some detrimental charring but is estimated to only be a fraction of a percent. There would be no net increase of detrimental soil conditions." The Draft EIS also incorporated the Soils Report by reference. The Soils Report (p. 15) describes effects to mycorrhizal associations. In addition the Soils Report (pp. 15-18) discusses Site Productivity and Organic Matter and microbiotic crusts.

## Transportation System (Roads)

**Comment:** New roads should not be developed where problem roads and a lack of funds to address them exists. A number of the problems currently affecting the project area's environment, and potential impacts associated with the proposed action stem from existing and proposed roads. As stated in the Final EIS for the Roadless Conservation Rule (2001), even the best designed roads produce sediment, and unpaved roads continue to produce sediment as long as they remain unvegetated. Whenever there are means to meet the project needs without additional road construction, or with reduced road construction, that alternative should be selected. (EPA p. 1)

**Response:** Roads are a necessary part of the logging systems for harvest of units in the proposed alternatives. By closing or decommissioning newly constructed and temporary roads soon after harvest activity, long-term impacts and costs would be minimized.

**Comment:** The Final EIS should be specific about the proposal for decommissioning roads. For example, the EIS should indicate whether or not all roads planned for decommissioning will be tilled and replanted with native vegetation and monitored to prevent and control noxious weed infestations, or whether other methods or measures are planned. We also recommend that the EIS disclose how the decommissioning of roads in the three action

alternatives will be funded, and when it will be performed relative to the timing of other proposed project activities. (EPA p. 1)

**Response:** The Final EIS clarifies the description of road decommissioning (see Appendix B). Activities included in decommissioning a road are (1) remove culverts and associated fill from stream channels; (2) remove fill from the floodplain of stream channels; (3) scarify, subsoil, or deep rip roadbeds as appropriate; (4) remove side ditches; (5) shape the roadbed to drain; (6) construct water bars; (7) remove unstable fill slopes; and/or (8) apply seed and mulch. Activities are prescribed depending on the needs of the individual road with the objective to stabilize and revegetate the roadway to minimize erosion, return the ground to productivity, and eliminate use by motorized vehicles. Decommissioning work will be done after harvest and thinning activities. The NEPA does not require the Forest Service to disclose funding sources.

**Comment:** The Draft EIS (p. 244) indicates that when all road management actions are complete, the road density would be 2.9 miles per square mile for all action alternatives. It is unclear why the road density would not be less for Alternative 4. This should be clarified in the Final EIS. (EPA p. 1)

**Response:** Road decommissioning in the Draft EIS was tied to commercial harvesting to lessen impacts of connected road and temporary road construction. Because Alternative 4 does not contain any commercial harvest or road construction, the inclusion of road decommissioning was an error in the Draft EIS. The Final EIS accurately portrays Alternative 4 with no road work. The Final EIS discloses that the open road density under Alternative 4 will remain 2.4 miles, the same as Alternative 1, because there is no road management activity.

**Comment:** If the Forest Service commercially logs 43 acres in the Hammer Creek unroaded area, the Final EIS must disclose the location and character of the area to be logged and fully analyze the effects of such logging on all roadless values described in 36 CFR 294. The Final EIS also needs to compare the effects of logging to the effects on non-commercial treatment focusing on small fuels. (ONRC, p. 6)

**Response:** Harvest units that are within the ONRC identified unroaded area comprising the 43 acres are unit 12 and a small portion of unit 20. Both units are in T. 17 S., R. 16 E., Section 22, and are on the northeast edge of the ONRC identified unroaded area. Both of these units are east of the Hammer Creek Wildlife and Recreation management area. All of Units 12 and 20 are within the General Forest management area. None of the 43 acres is in a designated roadless area or within the Forest Plan Hammer Creek Wildlife and Recreation Management Area. All proposed activities are within previously managed areas.

Effects to Roadless values described in 36 CFR 294:

1. High quality or undisturbed soil, water, and air: The units have been previously managed (Draft EIS, p. 248) and contain disturbed soils and remnants of skid trails. Unit 12 contains a class IV, intermittent stream.
2. Sources of public drinking water: The West Maury project area contains no sources of public drinking water.
3. Diversity of plant and animal communities: The ONRC identified unroaded area, including the 43 acres proposed for treatment, is not unique to the overall landscape values of the project area. The area is a Ponderosa pine/Douglas-fir small tree habitat type. There are no LOS blocks greater than 5 acres, no elk security or calving areas, no goshawk, PFA, or pileated woodpecker feeding habitat. Proposed treatment will not reduce diversity of habitat in the project area.
4. Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land: There are no threatened, endangered, or sensitive species in the vicinity of the 43 acres proposed for treatment. The nearest mapped bald eagle winter roost is more than 1.5 miles away and the nearest nest is 5 miles away. The effects to threatened, endangered, and sensitive species are disclosed in the both the Draft and Final EISs.
5. Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation: No recreation activities were inventoried in the 43 acres.
6. Reference landscapes: As previously stated, the area has previously been harvested and provides no reference landscape for wildlife or aquatics.

7. Natural appearing landscapes with high scenic quality: The Draft EIS (p. 246) identifies that “All treatments prescribed under the action alternatives meet the visual quality objectives for the management areas.”
8. Traditional cultural properties and sacred sites: Inventories have been completed and there are no known sites or designated cultural properties (district archeologist and GIS mapped inventory).
9. Other locally identified unique characteristics: None.

The Draft EIS (p. 249) discloses that, “...the majority of the area would still retain the characteristics of naturalness needed for consideration for potential wilderness or inventoried roadless designation.”

**Comment:** The NEPA analysis must address significant new information about the impacts of roads since the Forest Plan was adopted. Road effects are far more pervasive than originally believed. Road reconstruction could result in substantial changes in the kinds and amount of human uses in an area. (ONRC pp. 13-14)

**Response:** The effects of roads have been adequately considered. By definition in FSM 7700 and CFR 36 Part 212, reconstruction is “Activity that results in an improvement or realignment of an existing classified road” The definition goes on to define improvement as “Activity that results in an increase of an existing road’s traffic service level, expands its capacity, or changes its original design function.”

“Reconstruction” as used in the Draft EIS (p. 32) is road work necessary to protect resources from unacceptable levels of damage and work necessary for the road to accommodate log haul and unit access by logging equipment. The timber sale contract uses the term reconstruction for this type of work. The proper term in the manual and CFR would be road maintenance, defined as the “upkeep of a road necessary to retain or restore the road to the approved road management objective.” In those terms, the work needed for commercial harvest would fall under restoration work.

In effect, the road work proposed for the West Maury project will restore existing roads to a condition necessary for commercial harvest and log haul. The road work will not increase the road’s traffic service level, expand its capacity, or change its original design function. The end result may leave a road more drivable with a somewhat smoother travel way, improved drainage, brush not scraping the sides of the vehicle, and damaged areas repaired, but a large increase in traffic is not anticipated.

**Comment:** The Draft EIS fails to address trade-offs inherent in road construction. Decisions about roads, including construction, reconstruction, closure, obliteration, or decommissioning, are complex because they affect a multitude of resources, not just wildlife. (ONRC pp. 14-15)

**Response:** The proposed action calls for commercial harvest. For the logging systems proposed for those units, additional roads are needed to access landing sites. The ecological impacts, while still existent, are minimized through design criteria (Final EIS, Chapter 2) and best management practices (Final EIS, Appendix D) relevant to road construction. Temporary roads will be decommissioned by the timber purchaser at the conclusion of logging operations (Draft EIS, p. 32). To further clarify, the temporary roads would be decommissioned prior to the final acceptance for the completion of the unit. This typically happens within the same operating season as the road was constructed. New system roads will be closed after associated treatments (noncommercial thinning and fuels treatments) are completed if not closed earlier with the completion of harvest activities. When roads are treated to stabilize erosion, no long-term economic costs are anticipated. Both the Draft and Final EISs describe treatments to close and decommission roads. The economic cost of the construction and post-haul treatments to close and decommission the new roads is part of the cost of commercial harvest.

The effects of roads on resource values were considered by the IDT in preparation of the West Maury Roads Analysis. Effects of roads are discussed in Chapter 3, Affected Environment and Environmental Consequences. Those effects were determined to be within the standards and guidelines of the Forest Plan.

**Comment:** Roads may directly or indirectly affect wildlife and ecosystem processes in many ways. The Draft EIS fails to fully consider the cumulative effect of all road impacts. Roads may:

1. cause dispersal bottlenecks or fragmentation

2. become a conduit for dispersal of invasive species
2. change drainage patterns and stream morphology
3. degrade fish habitat
4. cause mass wasting events and slope instability (especially on steep slopes)
5. increase human disturbance such as poaching, over-hunting, and trapping, as well as vehicle collisions with wildlife. (ONRC, pp. 15-16)

**Response:** The Draft and Final EISs disclose the expected direct, indirect, and cumulative effects from roads.

*Dispersal bottlenecks for fragmentation sensitive species:* The classic examples of bottlenecks and fragmentation are highly developed, high volume traffic road systems such as freeways and highways, and physical barriers such as medians. The road system in the Maury mountains is low standard, low volume, and slow speeds. Even relative to low mobility species, there would be no effect of fragmentation to the extent of isolating populations.

*Conduits for dispersal on invasive species:* The location pattern shows concentrated sites (of noxious weeds) along primary travel corridors. The primary vector for noxious weeds appears to be vehicles (Draft EIS, p. 241). Present and reasonably foreseeable effects were considered. Prevention techniques for weed risk associated with the action alternatives have been identified. Prevention techniques for reasonably foreseeable activities would be expected because of Forest Plan and other requirements such as cleaning equipment.

*Degradation of fish habitat:* The Draft EIS disclosed the effects to both fish habitat and water quality.

*Mass wasting events and slope instability:* Visible landslides and related debris cover an estimated 5 percent of the project area. These areas, depending on slope and aspect, are in a moderate to high risk for reactivation by management activities such as road construction or harvest (Draft EIS, p. 214). Approximately 4 percent of the treated acres in Alternative 2 are within dormant landslide terrain. One road (0.4 miles) is proposed for construction to access Unit 133 over mapped dormant landslide terrain. The effects of those activities are disclosed in the EIS.

*Poaching, over-hunting, trapping, and collisions with wildlife:* Human disturbance to wildlife is relative to the use of the road system. The project area is low use compared to other areas. Roads in the project area are low volume and low speed (less than 35 mph). Collisions with wildlife are more likely to happen on higher speed roads. New roads would be closed or decommissioned after use. Reconstruction would not increase the standard of the roads and it is not anticipated the area will have higher levels of use after project activities are complete. Human disturbance relates to habitat security described in the Draft EIS on page 110. Hunting and trapping levels are regulated by the state of Oregon Department of Fish and Wildlife and would not be affected by the action alternatives.

**Comment:** The NEPA analysis must account for the increased risk of temporary roads compared to permanent roads. The agency assumes that temporary and semi-permanent new roads will have no effect because they are temporary. Scientific research has shown exactly the opposite. (ONRC, pp. 16-17)

**Response:** The 2000 Forest Service Roadless Area Conservation Final EIS (p. 3-30) states that temporary roads “can be a higher risk of environmental impacts.” The Final EIS also states that “by closing or decommissioning roads after use, the long-term effects on the environment are reduced.” Temporary roads do not have to be constructed to the same standard as classified roads. The description of temporary road development (Draft EIS, p. 32) says temporary roads for this project will be built on relatively flat ground and to the lowest possible standard to support haul in order to minimize ground disturbance. Classified roads must be constructed to a minimum width of 12 feet with clearing limits normally set at the toe of fill and beyond the top of the cut slope. A temporary road could be constructed with a narrower roadbed and narrower clearing limits resulting in less area being cleared and excavated. The criteria that temporary roads would be on relatively flat ground would result in minimal constructed road fill. Treatments to decommission the temporary road would probably be accomplished within the same operating season the road is constructed as opposed to the 10 years mentioned in the Roadless Area Final EIS. Temporary road locations are approved by the Forest Service sale administrator prior to construction. If sensitive issues are present in the temporary road location, the road would be relocated, the issues mitigated, or the road not constructed. Just as existing skid trails are reused to minimize ground disturbance and soil compaction, existing roadbeds would be also. Often, temporary roads are located on segments of old skid trails to minimize the clearing

of vegetation and new ground disturbance. The criteria used to determine if a new road will be temporary or classified is if the need is long term or one-time use, and if the location will create impacts that need specified construction requirements.

**Comment:** The agency assumes that temporary and semi-permanent new roads will have no effect because they are temporary. Scientific research has shown exactly the opposite. (ONRC p. 17)

**Response:** The agency does not assume temporary roads have no effect. The Draft EIS analyzes the effects of temporary roads similar to the analysis of newly constructed roads. Implementation using the design criteria and best management practices reduces the effects of temporary roads.

While ripping of roadbeds does not erase the road or restore hydraulic conductivity, ripping is a “reasonably effective step in the restoration process. Even considering the effects of settling and surface sealing, ripping increases hydraulic conductivities sufficient to prevent runoff and erosion from most rainfall and snowmelt events” (Luce 1997).

**Comment:** Roads pollute clean drinking water. (ONRC p. 13)

**Response:** The project area does not contain any watersheds that provide municipal drinking water.

## Vegetation

**Comment:** Risk reduction to maintain large tree habitat can be done without cutting trees up to 21 inches dbh. The Forest Service failed to consider an alternative using a 12-14 inch dbh cutting limit which would be more likely to move the forest toward rather than away from the HRV. (ONRC p. 4)

**Response:** Alternative 4 is similar to the alternative suggested, because it would cut trees up to 12 inches dbh and the diameters of most excess trees are between 9 and 12 inches dbh. The range of alternatives contained in the Draft and Final EISs are reasonable and cover the full spectrum of alternatives.

All alternatives move the forest toward HRV. The differences between the alternatives lie in the rate of change. The analysis and effects on seral structural change over time are described in the Final EIS (pp. 96-99). In stands identified for harvest, most excess trees have diameters between 9 and 12 inches dbh. The occasional removal of trees between 12 and 21 inches dbh is expected to benefit adjacent larger trees and reduce disease. Alternatives 2 and 3 would harvest some trees between 12 and 21 inches dbh. Alternative 4 would not harvest any trees but would cut excess trees up to 9 inches dbh and some diseased and or deformed trees up to 12 inches dbh. Alternative 1 (No Action) would not cut any trees. The rate of change toward HRV in the alternatives is: Alternative 2 (most change), Alternative 3, Alternative 4, Alternative 1 (least change).

**Comment:** The legacy of past management has pushed the eastside forest ecosystems far beyond the HRV for mature and old-growth forests. The Forest Service must protect all large trees, especially those that are naturally fire tolerant. The eastside forests lack any completed NEPA process to account for this fact. Until Forest Plans are properly amended to account for all the new information and cumulative effects, all the remaining medium and large trees should be retained. (ONRC p. 8)

**Response:** There is no need to amend the Forest Plan as suggested. In 1995, the Regional Forester issued a Decision Notice for the continuation of the Eastside Screens and amended Forest Plans to determine the best approach for maintaining options for old forest abundance. The primary purpose for revising the Eastside Screens was “to conserve those components of the landscape -- old forest abundance, wildlife habitat in Late and Old structural stages -- in relation to larger ecosystem management to protect habitat for certain species of wildlife and to promote the vigor and health of the forests” (1995 Revised EA, p. 5). The Eastside Screens provide direction on retaining large trees.

**Comment:** How has the Draft EIS addressed the fact that the historic condition of the north slopes consisted of “heavily timbered [and] covered with down timber and undergrowth?” (Ingram 1918, Draft EIS, p. 151). Trying to push these areas toward more open conditions is not consistent with the HRV. (ONRC p. 4)

**Response:** Alternatives 2 and 3 do not attempt to “push” the north slope areas toward more open conditions. The Viable Ecosystems analysis recognizes that “heavily timbered” areas exist within the project area. “Heavily-timbered” areas are those identified as dense, multi-strata seral structural stages. In the Dry Grand Fir and Douglas-fir Plant Association Groups which are common on the north slopes of the Maury Mountains, the combined HRV for dense multi-strata stands is between 2,618 and 5,134 acres. The existing level of this condition is 3,707 acres. The level resulting from implementation of Alternative 2 would be an estimated 2,669 acres. While the existing condition is within the HRV, the single-strata, large-structure condition is proportionately more limited at this time. Treatments proposed in Alternative 2 would change the multi-strata condition to single strata with the purpose of retaining the large tree component in these stands while younger stands develop the large tree structure. The figures on page 136 in the Draft EIS illustrate the change from multi-strata to single-strata condition. The proposed treatments in all of the actions alternatives move the project area toward the HRV.

**Comment:** The purpose of increasing LOS habitat should focus on maintaining and increasing a *healthy* LOS forest habitat. This could be accomplished by managing all trees regardless of age or diameter using proactive management activities designed to improve upon or at least maintain the health of the desired old structure habitat. Not harvesting trees over 21 inches unless they are danger trees has no scientific basis and leads to poor management and future problems. Forest health is on a rapid decline with larger trees being attacked by bark beetles and dying throughout the entire forest. The old structure habitat is in jeopardy of being adversely affected or totally lost. (AFRC pp. 1-2; OLC pp. 1-2)

**Response:** Analysis of the vegetation condition in the West Maury project area shows a deficient number of large trees as compared to the historic range of variability. Proposed treatments are designed to improve vigor and longevity of existing large trees and to increase growth of smaller trees to replenish the amount of large trees (Draft EIS, p. 8). An alternative that considered harvest of trees larger than 21 inches dbh was considered, but was eliminated from detailed study. Because of the magnitude of the deficiency of large trees, cutting trees larger than 21 inches dbh would not contribute to restoring LOS (Draft EIS, p. 26).

**Comment:** This project area is being staged for increased insect attack and catastrophic wildfire. Both of these areas of concern have an important impact on the protection and enhancement of old structure forest habitat that you are trying to maintain and improve. (AFRC p. 1; OLC p. 1)

**Response:** Treatments described in the proposed action are designed to reduce stand susceptibility to insect attack and to reduce the potential for high-intensity fire by thinning (Draft EIS, p. 10). Thinning would reduce the risk of mortality for the remaining large trees and speed development of additional large trees, increasing the rate of development of LOS conditions. Aggregated treatments including prescribed fire and grapple piling are designed to reduce hazardous fuels (Draft EIS, p. 11)

**Comment:** Thinning should consist of both noncommercial and commercial activities. The overall objectives will not be met by just thinning or treating small-diameter trees. Reducing stand density to an adequate spacing should be accomplished in all ages and diameters. Species preference should be considered depending on size and vigor including consideration of various diseases. (AFRC p. 2; OLC p. 2)

**Response:** Both noncommercial and commercial thinning are proposed. Complete descriptions of proposed activities are included in Chapter 1 of the Draft EIS (pp. 10-13). Treatment in ponderosa pine communities with in-growth of fir would reduce the amount of shade-tolerant species to move stands toward early-seral species composition (Draft EIS, p. 8).

**Comment:** The Draft EIS states that trees larger than 21 inches would not be cut for any purpose except road clearing. The Crook County Natural Resources Planning Committee (CCNRPC) on April 9, 2003, submitted a lengthy letter to the County Court and then to the Ochoco NF concerning the use of arbitrary diameter limits. We would urge consideration of our key points 1-5. (CCNRPC p 3)

**Response:** On May 12, 2003, Ochoco National Forest Supervisor Larry Timchak responded to the April 9, 2003, CCNRPC letter. The focus of key point 1-5 is on managing for healthy forests. As Mr. Timchak stated, the focus of current forest management activities are designed to restore and maintain healthy forest conditions. Treatments described in the proposed action are designed to reduce stand susceptibility to insect attack and to reduce the potential for high-intensity fire by thinning (Draft EIS, p. 10). Thinning would reduce the risk of mortality of large trees and speed development of additional large trees, increasing the rate of development of LOS conditions. Aggregated treatments including prescribed fire and grapple piling are designed to reduce hazardous fuels and the risk of high-intensity fire (Draft EIS, p. 11). The proposed activities are consistent with the Forest Plan goal of “maintain[ing] the health of the Forest for present and future uses, within management’s ability to do so.”

**Comment:** The rationale for timber harvest needs to be clear, as many environmental groups oppose timber harvest even though they may support thinning to improve forest health. Improved discussion of how the planned commercial harvest meets the Purpose and Need for the project would assist the reader in understanding the full proposal. Additionally, it would be helpful to display stand table analysis pre and post treatment. This graphic information would show the number of stems by diameter class before treatment, and then the remaining stems by diameter after treatment. An understanding of what will be left is much more important than just what is present now, and having stand table graphics for each unit would effectively display the variety in management options. (CCNRPC p 5)

**Response:** Diameter distribution tables and graphs showing pre and post treatment stocking for selected stands in the project area are located in the analysis file (/reports/silv/dia\_dis.xls).

**Comment:** Horse logging is too expensive and is unnecessary given the advanced logging technology available today. As much ground-based logging as possible should be used. Ground-based logging returns more money to the government for K-V work in thinning, fuel reductions, and other rehabilitation activities. (AFRC pp. 2-3; OLC pp. 2-3)

**Response:** A small amount of horse logging is proposed to meet specific resource objectives of less tracking and lower disturbance (Draft EIS, p. 30). These objectives would not be met by other available ground-based systems.

**Comment:** The purpose and need includes resistance to disease, but the Draft EIS does not specify which disease. If the concern is root rot, then thinning can accelerate the spread. The Final EIS should identify the specific disease(s) of concern and the prescribed treatments. (CCNRPC p. 2)

**Response:** The Draft EIS (pp. 143-144) discusses the incidence and effect of treatments on dwarf mistletoes and root diseases. The most common root disease is *Armellaria* sp., the development of which can be slowed by thinning.

**Comment:** Many people often assume that “no action” implies no change. Forests are dynamic ecosystems and will continue on a trajectory of more and more biomass until it surpasses the ability of the site to adequately provide nutrients and water. Then a combination of insects, disease, and/or wildfire will reduce the stand density or even kill most of the trees on site. It is predictable in the longer term that stands will grow to a certain point and then come apart without management. (CCNRPC pp. 2-3)

**Response:** The effects of the No Action Alternative are disclosed in the Draft and Final EIS. No action does not mean no change. Under the no action alternative, the Final EIS discloses that the departure from the historic range of variability will increase and the risk of mortality from insects, diseases, and high-intensity wildfire will also increase.

**Comment:** The Final EIS should demonstrate a scientific definition that supports the proposal to leave “old growth” in juniper removal areas. Large and old-growth are not synonymous. Old-growth juniper occurs in areas that historically have not been subject to frequent wildfires such as productive shrub-steppe sites. (CCNRPC p. 4)

**Response:** The role of frequent wildfires within western juniper sites is recognized in the Viable Ecosystem guidelines in the large percentage of grass, forb, and shrub dominated area (up to 70 % of juniper potential area) and amount of the low density juniper cover (as low as 20%) expected (Simpson et al. 1994). Larger structural stages



were typically located in areas with thin rocky soils and basalt rims (Simpson et al. 1994). In the West Maury project area large, old junipers are usually found on rocky ridge areas with shallow soils where fuel accumulations were too low to carry fire. The HRV for areas dominated by large, old juniper ranges from 5 to 12 percent (Simpson et al. 1994). These junipers would not be cut in this project. Juniper thinning treatments target sites with deeper soils where potential grass, forb and shrub cover restoration is higher.

**Comment:** Unit 334 (29 acres) is already below recommended stocking in acceptable trees. It is possible there will be a minimum of acceptable seedlings and saplings remaining after logging and slash disposal. It would seem prudent to plan on reforestation (either natural with site preparation or planted stock) to ensure desired stocking after treatment. (CCNRPC p. 5)

**Response:** The residual stocking following treatment will be between minimum and recommended stocking levels (Draft EIS, p. 29). Forest Plan standards and guidelines do not recommend reforestation if stocking is above minimum levels (Forest Plan, p. 4-205). Additional natural regeneration is expected.

**Comment:** There is inadequate LOS and large trees. Where stand density would be excessively diminished by prescriptions, the Forest Service should consider using a smaller dbh as the threshold for leaving trees uncut. Adequate stocking levels are necessary to provide large woody debris in riparian areas and to provide conditions that reflect mature forest conditions, including provisions for future snag and down wood recruitment. The Final EIS should identify the stocking levels needed and then add a minimum number of trees per acre to the treatment prescriptions. (EPA p. 3)

**Response:** Thinning treatments in upland stands in all alternatives would reduce stand densities to recommended stocking levels (December 2004 Forest Vegetation Analysis Report, p. 6). Recommended stocking levels allow for growth of additional large trees as well as retention of some mid and low canopy trees to provide structural diversity and replacement stock for mortality in the overstory. Post-treatment stand density would be higher within the RHCA than in upland areas (Draft EIS, p. 147). Harvest in riparian areas is limited to conifers in and around aspen stands to maintain this important plant community. Noncommercial thinning is designed to promote development of large trees near streams for future shade, channel stability, large woody material recruitment, and broadleaf shrub development. Stocking level guidelines for LOS have been established in "Proposed Interim Process for Determining LOS (Draft)" and described in the Forest Vegetation Analysis Report. Stocking level criteria are established by plant association group and single or multi-strata LOS conditions.

**Comment:** There should be no commercial logging under Alternative 2, if it will result in a decrease in habitat quality in LOS stands. Ground disturbance would potentially lead to noxious weed infestations; therefore, there should be no commercial logging in LOS. (EPA p. 3)

**Response:** LOS stands currently display a high level of mortality of large trees and a high risk of continued mortality in the large tree component. Dense, multi-strata conditions present a high risk of stand replacement fire. Treatments would reduce the risk of mortality of large trees and would maintain this component of LOS habitat. All LOS habitat types are deficient in the project area. Early-seral, single-strata stands dominated by large trees are proportionately more deficient than dense, multi-strata stands. The purpose of treatments is to maintain the large tree component in the treated LOS while new LOS develops. It is expected that in untreated LOS stands, habitat quality will decline as the large overstory trees die from competition stress (Draft EIS, pp. 94-97). Design criteria and resource protection measures are incorporated into all treatments to prevent the spread of noxious weeds (Draft EIS, pp. 69-70).

**Comment:** The Draft EIS failed to consider the beneficial effects of insects and disease. Mistletoe brooms have value as wildlife structures. Root rot pockets have value because they create down woody debris which enhances biodiversity and creates gaps with complex canopy architecture. Bark beetles have value as food sources for diverse wildlife and as vectors of sapwood decay fungi rendering the tree more suitable for wildlife habitation. (ONRC p. 9)

**Response:** The Draft and Final EISs acknowledge the beneficial effects of insects and disease. Bark beetle foraging contributes to snag habitat and foraging opportunities for wildlife (Final EIS, pp. 100-101), dwarf mistletoes cause branch structure to broom creating nest and hiding sites for many animals (p. 101), and root rots and stem decays improve the quality of certain wildlife habitats (p. 103). Proposed treatments will reduce susceptibility to mortality

due to insect and disease factors in treated stands but will not eliminate endemic populations in any stand. At-risk stands not treated will continue to provide quality habitat for bark beetles, dwarf mistletoes, root and stem diseases, and other life-forms that feed on trees. Table 3-20 shows that 55 percent of high risk and 51 percent of moderate risk stands would not be treated in the proposed action.

**Comment:** Some species, such as snowshoe hares and lynx, like thickets and snags. Many species, including woodpeckers, bats, and martens like an abundance of snags and down logs, so a forest that is literally falling apart might be great for them. We should not impose our human vision of neatness and order on the sometimes chaotic and “messy” patterns of nature which work just fine for many species. (ONRC pp. 17-18)

**Response:** Table 3-20 in the Draft and Final EISs shows the proportions of dense multi-strata to be treated by alternative (see “Stands at high risk” and “Moderate risk”). Acres not treated would provide dense forest habitat. Recommended levels of dense stand conditions are provided by the Viable Ecosystem Management Guide and displayed in figures 3.1, 3.2, 3.3, 3.4, 3.5, and 3.6. Codes used including those for dense stand conditions are described on page 92. The figures show changes in seral structural distribution by alternative for each plant association group. The project area does not contain habitat snowshoe hare, lynx, or marten.

**Comment:** The Draft EIS repeatedly invokes the concept of “historic range of variability” (HRV) to justify industrial intervention such as logging and roading. The HRV concept is meaningless unless a scale is specified (preferably both a temporal and spatial scale). The scale of determining the HRV is critical. HRV must be described as a range of values, not just a single midpoint value. If the agency only looks at the 5th field watershed scale, the larger pattern of loss of old forest structure will be missed. All HRV references in the NEPA document must be clarified to specify a geographic and temporal scale and note whether the same parameter is within the HRV at the regional scale. (ONRC p. 19)

**Response:** The Viable Ecosystem Management Guide is designed to be applied at the forest and sub-watershed scale (Simpson et al. 1994). The West Maury project area is approximately 38,000 acres. The HRV used to develop Viable Ecosystem guidelines are based on conditions of local lands in the period from approximately 1820 to 1900 (Simpson et al. 1994). Similar to findings in the Interior Columbia Basin, late and old seral (LOS) structural stages are also deficient in the West Maury project area and restoration of LOS became part of the Purpose and Need (Draft EIS, p. 7). HRVs are a range of values. Figures 3.1, 3.2, 3.3, 3.4, 3.5 and 3.6 display these ranges (Draft EIS, pp. 136-138). HRVs are also displayed in tabular form in the Forest Vegetation Analysis Report, Appendix A, Tables 4, 5 and 6.

**Comment:** Thinning activities attract beetles through the release of terpenes from fresh wood chips, slash, or wounded green trees. If insect attack is a concern, the agency must consider and disclose the factors that tend to attract insects and determine whether thinning will make things better or worse. (ONRC p. 19)

**Response:** The major factor that attracts bark beetles to attack trees is low tree vigor. Bark beetles are attracted to trees in overstocked stand conditions that created competition stress and reduce tree vigor (Draft EIS, p. 142). Thinning has been shown to be effective in reducing bark beetle susceptibility in stands by increasing vigor. Larsson and others (1983) recognized that ponderosa pine tree susceptibility is closely related to tree vigor and responds positively to thinning. Barrett (1979) summarizes other studies of the relationship between vigor and bark beetle susceptibility. Thinning slash and wounded trees are minor bark beetle attractants. In similar projects conducted on the Ochoco National Forest, minor amounts of bark beetle caused mortality have been observed in project areas immediately following treatments. Susceptibility in these cases is short-lived, generally only through the summer months following the creation of slash or wounding. These mortality events are minor compared to the potential mortality due to current stand conditions in the project area.

**Comment:** Thinning trees smaller than 12 inches can help reduce fire risk. In stands that currently have moderate-to-high fire risk due to fire suppression, removing half the basal area by thinning from below resulted in greatly reduced fire risk. On typical stands in the Fremont NF, this treatment removed trees no larger than 12 inches. Although this modeling did not use an explicit upper diameter limit, the agency should use a 12-inch diameter limit to enhance public confidence that this project is about restoring fire regimes. (ONRC p. 20)

**Response:** Thinning would include trees up to 21 inches dbh and would support the Purpose and Need for Action including the need to move seral structural conditions towards their HRV, maintaining and increasing broadleaf and shrub communities, maintaining and increasing LOS stands, and increasing the resistance of forest stands to insects, disease, and high-intensity wildfire, as well as, to provide wood products to local and regional communities (Draft EIS, pp. 7-10).

**Comment:** The ingrowth must be treated in order to retain the fuel reduction benefits of the original thinning. If ingrowth is not treated, the model clearly showed that thinning is worse than doing nothing at all. This is because thinning stimulates ingrowth of vegetation that can act as ladder fuels. The NEPA analysis must:

1. Disclose whether and how ingrowth will be treated;
2. Disclose the cumulative effects of such treatments;
3. Disclose the uncertainties of future funding and the consequences if the ingrowth is not treated. (ONRC p. 20)

**Response:** Ingrowth is defined as the number, basal area, or volume of trees that grow into measurable size during a given period. Ingrowth will continue in all stands, treated and untreated. Ingrowth to date has created the need for density control. By 50 years (in treated stands) without further disturbance, dense stand conditions would reduce growth slowing the further development of large structure. In Alternative 2, density control between 20 and 50 years would need to be continued in order to maintain progress (Draft EIS, p. 139). Describing the cumulative effects of future vegetation management projects would be speculative because we do not know when, where, or how the projects would be done.

**Comment:** Removing trees over 12 inches can actually increase fire risk. In stands with moderate and high fire risk, removing trees over 12 inches and leaving trees under 12 inches resulted in much higher fire risk in 20 years. While this is not a typical treatment, large trees should be retained, because they are fire resistant and they help suppress ladder fuels, and maintain more favorable fuel conditions below the canopy (e.g., moist, cool, less windy). (ONRC p. 20)

**Response:** In the prescription used in the fuel reduction research referenced by ONRC, all trees over 12 inches were removed and no trees less than 12 inches were removed (RTI p. 10). Prescriptions for the proposed commercial harvest in the West Maury project (Draft EIS, p. 29) are similar to the “Remove 50% BA from below” and “Leave 45 sq. ft. BA from below” treatment prescriptions described in the RTI modeling (RTI pp. 9-10). The report concluded that both of these prescriptions were the most effective treatments for fire risk reduction (RTI p. 69)

**Comment:** Fuel reduction efforts should focus on live green stands, not post-fire salvage. (ONRC p. 20)

**Response:** Post-fire salvage is not proposed in the West Maury Fuels and Vegetation Management project.

**Comment:** Fuel reduction thinning must retain enough trees to ensure long-term recruitment of future old-growth. The Forest Service should consider some of the information from The Klamath Tribes’ December 2003 proposed forest management plan for the Winema National Forest, in particular the uncertainty regarding how many small and medium trees need to be retained in order to achieve desired numbers and sizes of large trees in the future. (ONRC p. 21)

**Response:** The Forest Vegetation Analysis Report to the West Maury Final EIS contains the criterion for numbers of large trees (greater than or equal to 21 inches dbh) by plant association group needed to meet LOS habitat requirements (p. 13). Post-treatment stocking levels are also described and would be managed within the recommended range for uneven-aged stands which retains growing stock of small trees that will eventually augment the large tree stocking (December 2004 Forest Vegetation Analysis Report, p. 6).

**Comment:** The scientific basis for juniper control is questionable. The commenter suggested that “... while the expansion of juniper might alter species composition and decrease herbaceous biomass in grasslands and shrublands, [juniper] have few detrimental effects on streamflow, aquatic organisms, soil properties, or wildlife habitat.” Belsky (1996) suggests that popular conclusions about junipers ignore many of the complexities of natural ecosystems. The agency should consider removing livestock and reintroducing fire before controlling juniper. By removing

livestock, the herbaceous component might increase enough to carry fire and kill some of the juniper trees to reestablish a mosaic of fire driven seral development. An EIS should be prepared to discuss whether removing livestock, reintroducing fire, and removing roads would be as effective (or more effective) than juniper control in restoring hydrologic function, fire ecology, and vegetation composition. (ONRC pp.33-34)

**Response:** Belsky (1996) states that studies showing that junipers intercept precipitation and transpire water cannot be used to conclude that this lost water would have ended up in streams and springs. Management guidelines based on seral structural stage HRVs for juniper were established within the Juniper Woodland and the portion of Dry Ponderosa Pine plant association groups (PAG) where juniper might be expected (Simpson et al. 1994). The Juniper Steppe PAG may be considered as a sub-group of the Juniper Woodland PAG because the HRVs are similar. The purpose of juniper thinning is to move the seral structural conditions of forest stands toward the HRV, in particular for juniper sites, the purpose is to maintain and restore upland grass, forb, and shrub sites (Draft EIS, p. 7). Upland shrub communities are important breeding and foraging habitat for a number of wildlife species including both habitat specialists and generalists (Simpson et al. 1994). Juniper treatments include thinning with and without associated prescribed fire and prescribed fire only and are designed to provide a variety of post-treatment habitats. Juniper development and shrub decline in many stands is such that objectives could not be met by fire alone.

It is true that juniper can concentrate high proportions of the nutrients on a site within the juniper and directly beneath the juniper by “mining” nutrients from the soil between trees. The nutrients are stored and cycled within the juniper’s own sphere of dominance. In the same process, junipers deplete the soil moisture between trees reducing the potential for soil biological activity that results in making nutrients available to other plants (Bedell et al. 1993). Local studies have found juniper to be able to utilize much of the soil moisture recharged during the winter months reducing moisture available later in the spring and summer to plants dormant during the winter (Jeppeson). In the West Maury project, some cut juniper may be removed (burned) during prescribed burning but there are no other plans to remove the cut juniper. Prescribed burning would be conducted 3-5 years following the juniper cutting allowing recycling of the juniper foliage and fine roots and for herbaceous vegetation to recover and to reproduce.

Long-term paired plot studies in western juniper woodlands in Central Oregon begun in 1982 show increased grass, forb, and shrub development following juniper cutting over uncut juniper (Eddleman 2002). Observations of previous juniper cutting projects conducted within this project area and adjacent areas showed increased grass, forb, and shrub cover within areas with grazing allocations. Removing livestock grazing and roads would not move juniper seral structural stages toward HRV.

## Water Quality

**Comment:** The use of Equivalent Harvest Area (EHA) is inadequate to predict effects on streams absent information about the current condition of the riparian areas (and uplands) through some methodology such as “Proper Functioning Condition.” EHA may be appropriate for forest plan level assessments but not for site-specific proposals. EHA may also provide better information for heavily-timbered north slope conditions as compared to the drier sites of this project area. (CCNRPC p. 4)

**Response:** The Lookout Mountain Ranger District accomplished Bottom Line Surveys (BLS) on several streams in the West Maury project area. This is a quantitative monitoring system that evaluates shade, cutbank, and large wood over 100-foot intervals which allows relatively accurate plotting of sensitive areas (including headcuts) relative to proposed actions. The EHA model was designed for use on third, fourth, and fifth order streams (Draft EIS, p. 125). However, almost all of the studies of water yield and peak flow have been based on much smaller (first and second order) drainages (Anderson 1989). The research upon which the model is based came from a range of climatic conditions. While the information collected from these areas may have different physical, climatic, and hydrological conditions, the concepts are applicable to the West Maury project area. Increases in flow have been measured during monitoring on Mill Creek (within 20 miles of the project area) following the Hash Rock Fire.

**Comment:** The fisheries section in Chapter 3 discusses some of the site-specific impacts and causes associated with the streams; this should be more visible in the water section. Headcuts are one major degrading factor that should be corrected when they occur. It is often necessary to change the management factors that caused the headcutting.

Headcuts are often a symptom of improper management from roads, uplands, and grazing. Headcuts cause major degradation to the stream channel and drain stored water in the banks. (CCNRPC p. 4)

**Response:** The West Maury Draft and Final EISs document the evaluation of a fuels and vegetation management project. It is not designed to be a stream or riparian restoration project even though thinning conifers from aspen stands improves riparian conditions and treating a headcut on Gibson Creek is one of the mitigation measures. The water yield and water quality sections address parameters that were surveyed in all monitoring back to 1992 and that are used either in assigning risk or evaluating BMPs to meet state water quality standards. Most of the identified headcuts in the project area have migrated onto the National Forest from downstream. Headcuts have been field reviewed, prioritized, and are being treated as funds become available. Reasonably foreseeable riparian planting and headcut repairs are described in the Final EIS.

**Comment:** The Draft EIS (p. 127) states “Area does not include juniper associations because the small amount of water yield increase resulting from juniper thinning is rapidly taken up by grasses, forbs, and shrubs, and it does not have much effect on peak flows.” Where is the scientific evidence for the statement? There is disagreement and the statement may be true on a watershed basis, but we doubt there is research on paired watersheds to demonstrate it. On point sources, such as springs, there is no question that removal of invasive juniper can improve stream flow. (CCNRPC p. 4)

**Response:** After a review of literature, Schmidt (1987) concluded there was little reason to expect a substantial increase in stream flow resulting from thinning pinyon-juniper. Bedell et al. (1993) concluded that water loss to junipers represented a potential water loss to other plants, and vegetation close to the soil surface decreased freezing, increased infiltration and percolation, and decreased overland flow. Svejcar (2004) found that juniper thinning in the Steen Mountains in southeast Oregon increased infiltration, decreased overland flow, and decreased flow volume. The EIS does not state there will be no increase, it simply acknowledges that if there is an increased flow, it will be small and is not likely to increase the risk of bank erosion. The largest increases would be expected to occur during high-intensity, short-duration storms, on depaupered sites, where it may take several years for grasses, forbs, and shrubs to become re-established.

**Comment:** The treatments within RHCAs together with continued cattle grazing may negatively affect water quality. Several project area streams do not meet water quality standards for temperature (Bear, Cow, Klootchman, and Deer Creeks). There are “reasonably foreseeable riparian planting and headcut repair” projects in the project area, but shading benefits are not expected for at least 10 years. In addition, “past deciduous riparian plants outside of exclosures on the south slope of the project area are being heavily browsed by livestock and wildlife.” The Draft EIS does not support the conclusion that temperatures will not be elevated, that temperature exceedances will not be exacerbated, or that all state and INFISH water quality temperature standards will be met. This explanation should be provided in the Final EIS. (EPA p. 2)

**Response:** The Lookout Mountain Ranger District realizes livestock grazing has affected the West Maury project area and has addressed this under affected environment, current condition, and cumulative effects in Chapter 3. However, State Water Quality Rules state that recurring activities, including rotating grazing pastures, are not to be considered new or increasing discharges which would trigger an anti-degradation review as long as they do not increase in frequency, intensity, duration, or geographic extent (OAR 340-041-0004(4)(a)). The Draft EIS states that the activities proposed under the West Maury Fuels and Vegetation Management Project would not result in any measurable increase in water temperature, and it is not using reasonably foreseeable riparian planting as mitigation.

**Comment:** The Draft EIS indicates that there are historic and existing problems with bank erosion, headcuts, channel scour, elevated peak flows, re-occurring rain-on-snow events, loss of floodplain storage due to entrenched channels and soil loss, soil compaction, timber removal that has historically focused on large tree removal, and road construction. Thirty-two (32) percent of the project area has highly erosive volcanic ash soils and the remaining two-thirds has clay-loam or clay texture soils. Information is lacking as to how bad a problem sediment currently is, how easily the project area streams do or do not recover from sedimentation, and what the consequences may be with respect to meeting water quality standards for sediment if the proposed actions are implemented. This information needs to be included in the Final EIS. (EPA p. 2)

**Response:** As indicated, the Draft EIS recognizes existing problems and risks associated with sediment delivery in the West Maury project area. The Ochoco National Forest is currently monitoring to determine what sediment loads are like in the Maurys compared to previous monitoring accomplished in other subbasins on the National Forest. Monitoring and field reviews were accomplished to determine where the problems were and to assign risk. Based on previous monitoring of other timber sales on the Lookout Mountain Ranger District over the last 8 years, proposed fuels and vegetation management treatments with identified BMPs, design criteria, and resource protection measures, are expected to meet state water quality standards.

**Comment:** The Forest Service uses an EHA model to evaluate risk to water quality and streambank stability as a result of hydrological effects of vegetation removal. Without baseline information about stream sedimentation, the high, medium, and low risk outputs do not adequately inform the public or decision makers. Baseline information should be provided and the EHA model outputs be used together with calculated sediment budgets to describe project effects, at least for high risk streams. (EPA pp. 3-4)

**Response:** For the West Maury project area, second and third order drainages at the National Forest boundary were evaluated for the percent of cutbank and the number and activity of headcuts below proposed treatments to derive their relative sediment delivery potential. The decision to make water yield an issue on Newsome and Gibson Creeks was based on this analysis. The Ochoco National Forest has been collecting sediment data (turbidity and Total Suspended Solids (TSS)) on drainages in the Lower Crooked River and Lower Deschutes Subbasins for the last 7 years, but it is not known if this data is representative of the West Maury project area. There is no bedload data available. The Ochoco National Forest is also collecting flow data and plans on using monitoring results from the Hash Rock Fire to calibrate the EHA model for the Ochoco Mountains. Since the Ochoco National Forest is required to meet state water quality standards and not degrade water quality, the Forest Service activities are designed to maintain low risk. RHCAs are effective at filtering sediment and sediment delivery is kept within the normal range of variability. Therefore, it is not necessary to calculate sediment budgets. The Lookout Mountain Ranger District did not find any measurable increase in turbidity or TSS in Trout Creek, Cartwright, or Dutchman Creeks as a result of monitoring of the Trout Timber Sales (1998-2002).

**Comment:** BMPs, by themselves, are not sufficient to ensure compliance with the Clean Water Act. The agency assumes that the implementation of BMPs will sufficiently mitigate any problems that the proposed project will have on aquatic systems, but offers no proof of this assertion. (ONRC pp. 37-38)

**Response:** The EPA (referenced in USDA Forest Service 1988) stated that BMPs are the primary mechanism to achieve water quality standards. The Lookout Mountain Ranger District accomplishes BMP effectiveness monitoring and has adjusted BMPs when it was found that water quality standards were not being protected to the desired level. One example of changes based on monitoring is the Lookout Mountain Ranger District non-commercial thinning guidelines that were updated after monitoring in Auger Creek. The Oregon Department of Environmental Quality (DEQ) determined in their sufficiency analysis of the state Forest Practices Act (2002) that (with the exception of wet-weather use) complying with road construction and maintenance rules and guidelines currently in place in the state Forest Practices Act would likely result in meeting turbidity water quality standards. The West Maury EIS is meeting or exceeding the standards in the state Forest Practices Act. As noted in Chapter 2, haul would be restricted during extended wet periods and during spring breakup; this restriction mitigates the concern identified in the state Forest Practices Act sufficiency analysis. The Riparian Habitat Conservation Areas (RHCAs) on all perennial streams on Forest Service administered land are wider than the Riparian Management Area on Large F (fish bearing) streams which the state Forest Practices Act sufficiency analysis indicated were likely meeting water standards. District monitoring has found that thinning guidelines are not reducing shade on streams. Proposed thinning in aspen will be monitored to determine what, if any, effect it will have on shade and to verify that it is not resulting in a measurable increase in water temperature.

**Comment:** Until the agency is able to substantiate its proposed mitigation measures (i.e., that they are appropriate, will be implemented, and will be effective), it must withdraw the proposed project. (ONRC p. 39)

**Response:** The section of Evaluation Report No. 08801-10-AT (1999) referred to by ONRC (Chapter 4, Mitigation Measures) concluded that "Findings of No Significant Impact" were questionable. This applies to an Environmental Assessments (EA). The analysis for the West Maury project is documented in an Environmental Impact Statement (EIS) which does not make this conclusion.

The key resource areas referred to include riparian areas and streamside management zones, wildlife habitat, heritage sites, visual quality, and soils. Riparian zones were defined as land and vegetation lying within 100 feet from the edge of all perennial streams, lakes, and other bodies of water. To ensure resource protection measures are implemented, the West Maury EIS compiles all design criteria and resource protection measures in one location for easy access (see Final EIS Chapter 2). This section of the EIS identifies the specific resource protection measure, the alternative it applies to, and, if less than the entire project area, the affected units and roads. Resource specialists coordinate with the layout crews and sale administrators when questions arise. Resource specialists have also accomplished training sessions to ensure projects are carried out as intended. The design criteria and resource protection measures are used during contract preparation. Monitoring that would be accomplished is documented in the EIS (see Chapter 2). Implementation is monitored by resource specialists during plan-in-hand reviews, road reviews, field trips with the sale administrator, and post-sale reviews.

**Comment:** Further logging in this watershed threatens violations of state water quality standards. This triggers an EIS and requires that a TMDL/water quality management plan precede further actions that could increase stream temperature, nutrients, or sediment. (ONRC p. 39)

**Response:** Oregon Water Quality Rules (OAR-41) specify standards prior to completion of TMDLs (for example OAR 340-41-0028(12)(b)(A)). The DEQ target date for completion of TMDLs for the Crooked River is 2006. A Water Quality Management Plan (WQMP) tells how the TMDLs will be accomplished. If a WQMP is prepared before completion of the TMDLs, it has to be amended when they are implemented. WQMPs are only needed for watersheds with streams on the state 303d list. The only streams listed are in the Bear Creek Watershed and are listed for summer water temperature. Monitoring of these stations, in 2004, has shown that the water temperatures in Cow Creek at the National Forest boundary are cooler than the state threshold. The EIS concludes that none of the alternatives will result in measurable increases in water temperature.

**Comment:** Antidegradation provisions of the Oregon's water quality standards apply to water bodies that are currently meeting water quality standards. The NEPA analysis should explain how the antidegradation provisions would be met by each alternative. (ONRC p. 39)

**Response:** State water quality rules (340-041-0004(3)(c)) identify that, "Insignificant temperature increases authorized under OAR 340-041-0028(11) and (12) are not considered a reduction in water quality."

**Comment:** The NEPA analysis must address the cumulative effects of logging and grazing on water quality and discuss the fact that further grazing will retard the attainment of riparian and aquatic management objectives in violation of the Forest Plan. (ONRC p. 39)

**Response:** The EIS addresses the cumulative effects of logging and grazing to water quality in Chapter 3. It should be noted that recurring activities, including rotating grazing pastures, are not to be considered new or increasing discharges which would trigger an anti-degradation review as long as they do not increase in frequency, intensity, duration, or geographic extent (OAR 340-041-0004(4)(a)). The West Maury project does not alter existing livestock grazing practices, so no anti-degradation review is triggered.

**Comment:** This project will cause erosion and discharge polluted ditch water to streams. The agency should obtain a NPDES permit. (ONRC p. 40)

**Response:** The West Maury Fuels and Vegetation Management Project is not lowering water quality pursuant to OAR 340-0041 and an NPDES permit is not needed.

**Comment:** Scientific assessments have repeatedly concluded that there is no reliable empirical evidence that BMPs reduce impacts of logging and roads to ecologically insignificant levels. (ONRC pp. 40-41)

**Response:** Science does show that BMPs reduce impacts. For example, Megahan and Kidd (1972) show stabilization measures that can greatly reduce erosion from road fills. Robichaud, Beyers, and Neary's (2000) evaluation of postfire rehabilitation treatments appraised measures that are also used to reduce the effects of logging and roads. Monitoring on the Ochoco National Forest also demonstrates BMPs reduce impacts. For example,

monitoring in Trout Creek did not find any measurable increase in turbidity or suspended sediment (Seymour 2004a), found less than a 1 percent reduction in shade (Fontaine 1998), and did not show any measurable increase in water temperatures (Seymour 2004b) as a result of silvicultural practices. Monitoring of horse logging in the Mill Creek watershed (David 2002) found that it reduced skidtrail widths by a half and off-trail ground disturbance by about three-quarters compared to tractor logging. Post-fire management on Forested Public lands of the Western USA (Beschta et al. 2004) is not relevant because the West Maury project is not post-fire treatment. The Ochoco National Forest is not within the range of the northern spotted owl and is not covered by the Northwest Forest Plan. No significant effects were identified to aquatic or riparian dependent species in the West Maury EIS.

## Wildlife

**Comment:** Did the analysis determine what vegetative structure is on shortest supply on the landscape (i.e. dense cover)? Will treating connectivity corridors reduce the vegetative structure in shortest supply? What is the risk of losing connectivity corridors to disturbance before the next entry cycle? (ODFW)

**Response:** The Viable Ecosystems analysis found that LOS was most limiting and in particular, open single strata large structure was proportionately most limited in abundance. Treatments in connectivity corridors are designed to promote growth and development of large trees so that in the long-term LOS stands would be connected by corridors of LOS. The highest risk of loss occurs in the connective corridor because they contain the densest stands available.

The density of cover for elk was evaluated using the HEI model. Percent cover and cover quality indices reflect total cover and the relative proportions of satisfactory and marginal cover. As disclosed in the Final EIS satisfactory cover is limited, while total cover is not. Effects to satisfactory and marginal cover are disclosed for each alternative in the Final EIS. Alternative 3 was developed in part to provide an alternative with lesser impact to cover, particularly satisfactory cover, as described under Issue 1D. Effects to connectivity corridors are disclosed for each alternative. Alternative 3 was developed in part to provide an alternative with lesser impact to connective corridors.

**Comment:** Goshawks are listed as sensitive critical by ODFW due to loss of mature and old-growth type habitats. See the ODFW's Sensitive, Threatened and Endangered Vertebrates of Oregon 2/24/92. ODFW recommends meeting or exceeding the following criteria: (1) preserve 30 acres around nests including as much north-facing slopes as possible; (2) retain overstory on two or more sides of the nesting grove; (3) prohibit logging within 1/2 mile of nests from late March to fledging; and (4) retain four nest sites per township. (ODFW)

**Response:** Nest core areas of 30 acres have been delineated around each known nesting area with confirmed occupancy within the last 20 years. The aspect of these nest stands depends on the location of the nest(s) and habitat availability and quality at each site. Each pair with confirmed reproduction within the last 20 years has a Post Fledging Area (PFA) delineated. The PFAs incorporates the best available habitat on National Forest System land, and surrounding the nest area to the extent possible, except PFA 5091. All nest cores are bordered by PFA on two or more sides except PFA 5091 which has a contiguous block of habitat adjacent to the nest stand on one side of the nest stand. A northeast facing slope adjacent to the 5091 nest stand is included in harvest units 125, 162.1, and 173. Seasonal restrictions are in place for all disturbance activities within 1/2-mile of known goshawk nest sites as described in the Design Criteria in the Draft EIS (pp. 66-67). The number of nest sites currently delineated within the project area by township are T17S.R18E: 3 known nest cores (28% of this township is NF land); T17S.R19E: 3 known nest cores (38% of this township is NF land); T17S.R20E: 0 known nest cores (12% of this township is NF land within the project area); T18S.R18E: 3 known nest cores (23% of this township is NF land); T18S.R19E: 6 known nest cores (52% of this township is NF land); T18S.R19E: 0 known nest cores (5% of this township is NF land within the project area).

**Comment:** The project would reduce elk security cover by 23 percent and elk calving area by 39 percent. Did the Forest Service consider that reduction in cover might increase damage on adjacent private lands? (ODFW)

**Response:** Potential for alternatives to result in changes to elk use of private lands has been included in the effects disclosures in the Final EIS.



**Comment:** Reducing cover will increase human harassment of elk. Is the Forest Service proposing to off-set these effects by reducing open road density and cross-country motorized travel? Is the Forest Service considering reducing other forms of cross-country travel such as mountain bike or equestrian events? (ODFW)

**Response:** As described in the effects analysis of the Draft EIS (pp. 112-114), road density will be reduced by Alternatives 2 and 3. As described in the Draft EIS (p. 45), retention of cover in elk security habitat is one part of the strategy included in the development of Alternative 3. This project does not propose to reduce cross-country motorized or non-motorized travel. Off-road travel is not within the scope of this project, but is tentatively scheduled to be addressed separate from this project in the near future.

**Comment:** The widespread reduction of tree canopy and vegetative understory, road building, and increased human access will compromise wildlife security habitat. The Draft EIS does not provide a strategy or mitigation that will ensure that the timing, extent, and location of these activities will enable wildlife to have adequate corridors, foraging, and security habitat on a project area-wide basis over the time period projected for completing project activities. The Final EIS should include a strategic habitat management and mitigation plan for wildlife. The mitigation plan should minimize human access and disturbance to wildlife, such as by strategically locating and timing the decommissioning of roads and road closures, and the regulation and monitoring of human recreational activities, which includes but is not limited to use of on- and off-road vehicles. (EPA p. 3)

**Response:** As described in the Draft EIS (pp. 44-45), retention of cover in LOS stands, connectivity corridors, goshawk territories, in elk security habitat and Old Growth Management Areas is the basis of the strategy included in the development of Alternative 3.

**Comment:** The Forest Service lacks monitoring data to show that the goshawk population on the forest is viable. The Draft EIS fails to disclose the effects of the project on goshawk populations and future viability. This project must be designed to avoid impacts to this at-risk species. (ONRC pp. 3 and 68)

**Response:** As described in the Final EIS, there are 15 goshawk nesting territories in the West Maury project area. There are 6,221 acres of mapped post fledging areas (PFA). Goshawk surveys were conducted in the project area in 2003 and 2004. Previous records for goshawks observed in the project area between 1977 and 2002 were also evaluated. Monitoring data was used to establish nest core area and PFA boundaries, as well as to describe the nesting history for these sites. Impacts to each individual territory and to PFA acres as a whole within the project area are appropriate scales for this analysis, and is described for each alternative. In 1998, the U.S. Fish and Wildlife Service denied a petition to list this species under the Endangered Species Act. No decline in the population has been documented through Breeding Bird Surveys. Viability on National Forest land is addressed through the Sensitive Species Program. The Oregon Natural Heritage Program reviews species status and assigns rankings that are used to identify species with viability concerns. The northern goshawk was reviewed and was not identified as a viability concern. The goshawk was not listed on the Regional Forester's Sensitive Species list. This project treats acres within twelve goshawk territories, which represents 38 percent of the known goshawk territories in the Maury Mountains, or 11 percent of the known goshawk territories on Ochoco National Forest. Of these twelve territories, Alternative 2 would decrease habitat quality in two territories, based on the extent of treatment. These represent 6 percent of the known goshawk territories in the Maury Mountains, or 2 percent of the known goshawk territories on Ochoco National Forest. This effect represents an impact to individual territories, but would not trigger a loss of viability of the species. Acres of PFA treated under each alternative are disclosed and displayed in Table 3.8.

**Comment:** Table 2.42 (p 115) regarding elk impacts is virtually unintelligible unless the relevant "treatments" are described. Commercial logging treatments are far different than prescribed fire or non-commercial thinning but they appear to be all lumped together. (ONRC p. 3)

**Response:** Different treatments affect percent cover and cover quality in different ways. Treatments expected to reduce canopy closure from above 70 percent to between 40-69 percent would reduce satisfactory cover while concurrently increasing marginal cover. These would not change the percent cover, but could reduce the cover quality index (which is based on relative proportions of satisfactory and marginal cover). Treatments that reduce canopy closure from above 40 percent to less than 40 percent remove cover, potentially affecting both percent cover and cover quality. Treatments that retain 70 percent crown closure where it is present, or 40-69 percent crown

closure where it is present, do not affect percent cover or cover quality. Treatments in stands with less than 40 percent cover prior to treatment do not impact big game cover, though they may improve forage production. The changes in marginal and satisfactory cover displayed in Table 2.42 in the Draft EIS are based on predicted canopy closure after treatment. Conversion of satisfactory cover to marginal cover, or from marginal cover to forage are based on canopy closure reduction regardless of the tools that were employed to reduce the canopy closure.

**Comment:** Pileated woodpecker is a Management Indicator Species (MIS) that has not been adequately monitored. The EIS fails to account for this new information. (ONRC pp. 3 and 68)

**Response:** The Final EIS describes the effects to pileated woodpecker. Lack of monitoring data is not new information as suggested.

**Comment:** The Draft EIS (p. 189) states that snag retention will be applied on a landscape basis, which means snags will be averaged over wide areas and some large areas will be left with virtually no snags at all. This is inconsistent with current science which indicates that snags and down wood have significant value and their absence has adverse consequences on every acre that lacks snags. Current science indicates that the distribution of snags and down wood is patchy and uneven, but also that the patchiness is exhibited at a variety of scales and there are few places that are naturally devoid of snags. The Forest Service lacks monitoring data to show that their snag retention methods will comply with the NFMA viability requirement. The Eastside Screens require that 100 percent potential population levels be maintained within harvest units, not applied across the landscape as this EIS proposes. (ONRC pp. 4, 5, and 62-63)

**Response:** Snag and down wood would be retained in all harvest units in accordance with the guidelines stated in Tables 3.31 and 3.32. Large snags and down wood levels would not be substantially reduced within harvest areas because this project does not propose to harvest large snags and hazard tree identification will be limited to those trees that meet the criteria of danger tree and hazard area in the Oregon Guidelines for Selecting Reserve Trees (1995). The loss of medium and large snags due to safety concerns and logging feasibility is not expected to exceed 10 percent of existing snags within cable harvest units or 5 percent in ground-based harvest areas, based on experience with recent timber sales on the Ochoco National Forest. Large areas will not be left with virtually no snags at all as suggested, because snag and down wood guidelines will be adhered to on every harvest unit. Because the proposed harvest activity is thinning from below and post-treatment basal area will be above the minimum desired stocking level, there are opportunities to designate replacement trees in the event that any large snags are felled due to safety concerns. The commenter did not provide the source of current science claimed to indicate few places are naturally devoid of snags and that there are adverse consequences on every acre that lacks snags. Current science does indicate that distribution is patchy and uneven as described in the February 2005 Wildlife Report. However, data from research on snag size and abundance does indicate that the patchy nature of snag distribution and variability in snag density includes areas low density and no snags (especially in ponderosa pine/Douglas-fir habitat types), even under unharvested conditions. Refer to DecAID Inventory Histograms for Snags in unharvested plots (e.g. Figures inv-14 and inv-15 in all of the following habitat types: PPDF\_L, PPDF\_S and PPDF\_O). Similar density distributions for down wood are also available through DecAID (Figures inv-16 and inv-17 in all of the previously listed habitat types). The 36 CFR Part 219 Interpretive Rule (Federal Register, Sept. 29, 2004) allows for analysis of habitat effects based on best available science to be used in addressing effects to MIS species under the transition provisions of the 2000 Planning Rule. This supercedes the requirement for using population data to address effects to MIS species contained in the 1982 Planning Rule. The habitat relationships between snag size and density and the primary cavity excavator species in various forest types, and the data synthesized in DecAID represent the best available science at this time. These sources are the foundation for the analysis of effects to primary cavity excavator species. The local data used to develop stand-level guidelines for each Plant Association Group in the Viable Ecosystem Management Guide represent the best available site-specific data, which was used for developing the minimum snag and down log retention standards.

**Comment:** The Draft EIS (p. 190) states that habitat for white-headed woodpecker, another MIS, is also outside the HRV. The Draft EIS fails to specify a spatial scale for this (white-headed woodpecker) HRV statement. The Forest Service must disclose that white-headed woodpecker habitat will remain outside HRV at the watershed and regional scale. (ONRC p. 4)

**Response:** White-headed woodpecker habitat is currently below HRV within the project area due to the limited amount of forested sites that are currently occupied by mature and old ponderosa pine in open forest, single-strata conditions. The action alternatives increase habitat for white-headed woodpeckers by increasing the dominance of ponderosa pine in the overstory species composition and by opening up the canopy through thinning from below. All action alternatives move white-headed woodpecker habitat toward HRV, but no alternative treats enough acres to return this habitat to within HRV, immediately after harvest. This is disclosed in the Draft EIS (pp. 189-191). At year 25, there will be enough diameter growth to move additional stands into suitability as white-headed woodpecker habitat, and thus HRV will be attained as described in the Draft EIS (pp. 189-191).

**Comment:** Large snags are a critical element of white-headed woodpecker habitat requirements, but maintaining and expanding the road system will require the Forest Service to continuously maintain a virtual snag-free zone along most roads. In order to maintain viable populations of snag associated species like white-headed woodpecker, the Forest Service must scale back the road system (to eliminate the need for hazard tree removal) or change their hazard tree policy to tolerate large snags along unpaved roads (where people might expect some wildland hazards). (ONRC p. 3)

**Response:** The Forest Service does not routinely remove snags on all open roads; hazard trees are routinely removed on roads that are subject to the Highway Safety Act (maintenance level 3-5) and around developed or improved recreation sites. There are 18.3 miles of roads in the project area subject to the Highway Safety Act. Hazard trees do not include all snags. Along roads, hazard trees are dead trees or unstable live trees which would reach the roadbed if they fell. Hazard trees must be removed along haul roads during industrial use per OSHA requirements. Generally, snags do remain uncut for safety purposes on the maintenance level 2 and 1 roads (158 miles) between industrial use periods.

**Comment:** The Draft EIS does not disclose the consequences for populations of wildlife associated with dense forest habitat types. (ONRC p. 5)

**Response:** The effect of reducing canopy density on species that prefer dense forest habitat types is described in the Draft EIS (p. 194) “treatments may reduce the suitability, in the short term, for forest dwelling accipiters and the small, forest dwelling owls” and (p. 197) “treatments would cause a short term reduction in the amount of habitat for species that select for denser forests or later seral conditions” and for Alternative 2 “habitat for hermit thrush becomes below HRV post-treatment.” Acres of habitat by alternative are displayed in the February 2005 Wildlife Report (Tables 18 -21). The focal species analyzed that prefer relatively dense forest types are varied thrush, Townsend’s warbler, and hermit thrush.

**Comment:** The Draft EIS fails to acknowledge that both livestock and many raptor prey species are herbivores which compete with each other for limited resources. (ONRC p. 5)

**Response:** The Final EIS includes a discussion related to the potential for livestock grazing to impact raptor prey species.

**Comment:** The Draft EIS (p. 190) notes a likely loss of hollow snags but the Draft EIS does not disclose the impact on Vaux’s swifts or other species associated with hollow snags and logs. (ONRC p. 5)

**Response:** Discussions of impacts to Vaux’s swift and other species that rely on hollow snags have been included in the Final EIS.

**Comment:** The Final EIS should consider and disclose the effects of thinning on late-successional bird species. (ONRC p. 22)

**Response:** The pileated woodpecker is the MIS for late-successional grand fir and Douglas-fir sites. The white-headed woodpecker represents old-growth ponderosa pine. The flicker is MIS for old-growth juniper. All of these species are addressed in the Draft EIS (pp. 116-124 and 188-193). In addition, several focal species are good indicators of old forest conditions (pp. 195-199). Lewis’ woodpecker and olive-sided flycatchers are representative of open forest conditions with large trees, while varied thrush and Townsend’s warbler are representative of dense forest conditions with large trees.

**Comment:** The potential effects of prescribed burning on a landscape scale should be examined carefully to determine if the changes cause by prescribed burning are compatible with other management objectives for wildlife. (ONRC p. 31)

**Response:** Effects of prescribed burning on wildlife habitat were evaluated and disclosed in the Draft EIS (pp. 96, 98, 101, 105, 112, 118, 121-123, 172-173, 178-179, 187, 190-191, and 197-198). Some areas originally proposed for treatment were not included in the proposed action or the other action alternatives due to conflicts with wildlife objectives. In other areas, prescribed burning is included as a tool to achieve wildlife objectives.

**Comment:** The Forest Service has a choice to either monitor actual populations of MIS or to develop and rigorously validate habitat models that allow the Forest Service to use habitat as a proxy for populations of these species. If the Forest Service is not monitoring MIS populations directly, please explain in detail the model the Forest Service is using to correlate populations and habitat. (ONRC p. 46)

**Response:** Using the provisions of the planning rule in effect and the clarification provided in the 36 CFR Part 219 Interpretive Rule (Federal Register, Sept. 29, 2004), the Responsible Official may comply with obligations relating to MIS by considering the best available science, including, but not limited to, data and analysis relating to habitat unless the Forest Plan specifically requires population monitoring or population surveys for the species. Site-specific monitoring or surveying of a proposed project or activity area is not required, but may be conducted at the discretion of the Responsible Official (Terney, pers. comm. 2004). MIS habitat management on Ochoco National Forest is based on a combination of known wildlife location data and habitat assessment using the WILDHAB model. The WILDHAB model predicts the amount of habitat suitable for various species of wildlife based on known habitat relationships according to Plant Association Groups and structural and seral stages. A document providing detailed information on the WILDHAB model is included in the project file.

**Comment:** NFMA, its implementing regulations, and subsequent case law require the Forest Service to know what the viable populations of MIS located in the project area are before management prescriptions are applied. The NEPA document and the underlying specialist reports never explain what the population levels are for the MIS. The Forest Service must refrain from destroying habitat until they have completed population monitoring and documented viable populations of native species. (ONRC p. 47)

**Response:** The 36 CFR Part 219 Interpretive Rule (Federal Register, Sept. 29, 2004) allows for analysis of habitat effects based on best available science to be used in addressing effects to MIS species under the transition provisions of the 2000 Planning Rule. This supercedes the requirement for using population data to address effects to MIS species contained in the 1982 Planning Rule.

**Comment:** The 10th Circuit recently affirmed the Forest Service's duty to quantitatively measure changes in MIS populations and not just habitat trends. (ONRC p. 47)

**Response:** For pileated woodpecker the Breeding Bird Survey data from 1966-1991 showed no significant change in the western United States, but there was a significant increasing trend in the Rocky Mountains (1966-1996 and 1980-1996). For the northern flicker, Breeding Bird Survey data from 1966-2000 shows a statistically non-significant decrease of 0.6 percent per year in Oregon, but a significant increasing trend in the Rocky Mountains (1980-1996). The following primary cavity excavators are expected or known to occur on Ochoco National Forest: white-headed woodpecker, black-backed woodpecker, Williamson's sapsucker. Breeding Bird Survey trend data is not available for these species. The red-breasted nuthatch shows a significant increasing trend in the Rocky Mountains (1966-1996 and 1980-1996). The Breeding Bird Survey data (from 1966-2000) for hairy woodpecker – show a non-significant decline of 0.5% per year in Oregon, but a significantly increasing trend in the Rocky Mountains (1966-1996). The Breeding Bird Survey data (from 1966-2000) for red-naped sapsucker show a non-significant increase of 0.5% per year. The Lewis' woodpecker population is declining particularly west of the Cascades. Trend data for pygmy nuthatch is inconclusive. Population densities of flickers, white-headed woodpeckers, sapsuckers, hairy woodpeckers, black backed woodpeckers and pileated woodpeckers were measured at several sites on Deschutes, Ochoco, and Winema National Forests in 1991 (Dixon 1995). Woodpecker surveys were also conducted within Old Growth Management Areas on the Forest in 1992. Subsequently, data on nest locations of various primary cavity excavator species is being collected and where possible incorporated into feeding

habitat delineations or considered for deferral (Draft EIS, p. 123). The population trend for golden eagles in Oregon is unknown, while the population trend of prairie falcons in Oregon is stable. The mule deer population is just under the Game Management Unit Objective (5,200) in the Maury Unit. Population status information for the bald eagle and big game are disclosed in the Draft EIS (pp. 110 and 172).

**Comment:** Federal agencies must obtain permits from the Department of Interior to take migratory bird species. If conducted during the nesting season, the proposed timber harvest will likely kill nesting migratory birds in violation of the Migratory Bird Treaty Act. (ONRC p. 48)

**Response:** The Migratory Bird Treaty Act (MBTA) contains prohibitions and protections of migratory birds from “take.” The U.S. Fish and Wildlife Service has interpreted take “to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing or transporting any migratory bird, nest, egg, or part thereof” (<http://migratorybirds.pacific.fws.gov/mbta.htm>). This statement has long been interpreted by both the U.S. Fish and Wildlife Service and the Forest Service as a prohibition against intentional taking. Section 703 of the MBTA allows intentional taking of a migratory bird through a permitting process. The U.S. Fish and Wildlife Service does not provide for permitting for unintentional take. There is no process to apply for or receive a permit to cover unintentional take of wildlife species not covered under the Endangered Species Act. The U.S. Fish and Wildlife Service also does not require or authorize permits for actions that are not violations of the MBTA (50 CFR Part 20).

**Comment:** The U.S. government has taken the position in international tribunal that logging activities can lead to MBTA liability. (ONRC p. 48)

**Response:** The reference cited refers to prosecution under specific circumstances, where MBTA violations can be proven and dependent on the nature of the violation and the species involved. The reference further clarifies appropriate circumstances as levels of impacts such as to rookeries of colonial nesting birds such as herons, and to raptors such as osprey. The Forest Plan has specific standards and guidelines for raptors (pp. 4-248 to 4-249). Buffers and seasonal restrictions are in place for all known raptor nests within the project area. No heron rookeries are known to be present in this project area. If new raptor nests or any rookeries are located during lay-out or implementation, restrictions will be put in place in accordance with the Forest Plan or the Biological Assessment (for listed species).

**Comment:** Executive Order 13186 requires that all federal agencies support conservation of migratory birds. (ONRC p. 48)

**Response:** The Forest Service strives to protect migratory birds as well as other wildlife species through the adoption of several policies including, but not limited to; the sensitive species requirements (FSM 2670), Forest Plan standards and guidelines for other species needing additional protection, and through the USDA Forest Service Landbird Strategic Plan issued in 2000. As described in the Draft EIS (pp. 66-68), protection measures are in place for treatments around raptor nest areas; (pp. 69-71) special habitats; and (73-74) riparian areas. The Draft EIS also discusses effects to neotropical birds (pp. 193-198) including beneficial effects of the action alternatives to species associated with more open forest types, stands with large tree structure, stands dominated by pine, aspen stands, upland shrub, or grassland habitats.

**Comment:** Be sure to protect bird species on the U.S. Fish and Wildlife Service’ Birds of Conservation Concern (2002) Table 8, BCR 5 (Northern Pacific Forest - U.S. portions only). (ONRC p. 48)

**Response:** The list cited by the commenter is for a geographic area that does not include this project area. Conservation of coastal and pelagic birds is not within the scope of this project. However, the U.S. Fish and Wildlife Service conservation priorities for Northern Rockies and Great Basin Bird Conservation Areas, which include the area influenced by actions on this Forest, was considered. These species on Tables 9 and 10 were considered when the list of focal species to be analyzed was developed. Each of these species is either a focal species, or is represented by a focal species for the habitat type in which it is expected to occur, or it is a special habitat obligate. So these species are considered in the analysis either by focal species or by species that select for special habitats, such as aspen, upland shrub, or grassland.

**Comment:** Before relying on DecAID, the agency must prepare a comprehensive NEPA analysis to consider alternative ways of ensuring viability of all species dependent upon snags and dead wood. The agency's analysis of snag retention and habitat for cavity dependent species is faulty at both a programmatic level and at a project level (ONRC pp. 60, 61, and 64).

**Response:** As described in the Draft EIS (p. 191) DecAID is an analysis tool used to help evaluate effects. DecAID does not predict viability. DecAID does provide information about the sizes and densities of dead trees that were present in stands that have had inventories, and about how wildlife might use the sizes and densities of snags and logs present in the landscape. DecAID was used to compare existing stand conditions (based on stand exams) to reference conditions based on inventory data contained in DecAID. A more detailed description of snag size and density distributions and estimated species use of snags and down logs is contained in the Wildlife Report. Cumulative species curves can be view in DecAID under each applicable habitat type. DecAID was not used as a basis for prescription of snag retention on this project as snags are not proposed to be harvested in this project. DecAID was only used to facilitate a comparison of existing conditions to reference conditions for the cumulative effects analysis. Viability is addressed through the Sensitive Species Program. None of the primary cavity excavators were identified as having a viability concern and they are not listed on the Regional Forester's Sensitive Species List. Of the secondary cavity users, only the bufflehead has been listed on the Regional Forester's Species List for Ochoco National Forest. Bufflehead is addressed in the Draft EIS (pp. 173 -174).

**Comment:** Current management at both the plan and project level does not reflect new information about the value of abundant snags and down wood. DecAID relies on a wide range of sources in the literature, some of which recommend much higher levels of snag retention than reflected in the advisor. The agency NEPA analysis should disclose the published literature with higher levels of snag and wood retention and discuss their potential relevance for the project (ONRC pp. 60-62).

**Response:** The Draft and Final EISs used many sources of information to analyze project effects to dead wood habitat. Included in the sources was the use of the DecAID advisor. The commenter did not provide a citation(s) for research claimed to recommend much higher snag levels than contained in the advisor. The DecAID advisor is a synthesis of **all** information regarding habitat selection and use by wildlife associated with dead wood habitats (Mellen 2004 pers. comm.). The information included in DecAID included published (and some unpublished), regionally applicable information through December 2000. Regional information included research results from Idaho, Montana, and northern California along with information gathered in Oregon and Washington. There was **no** exclusion of information from the DecAID advisor that indicated higher levels of snag and wood retention (Mellen 2004 pers. comm.). If information does exist to indicate these high levels, the Forest and the DecAID authors would appreciate being informed on this source.

**Comment:** Large snags are outside the natural range of variability across the landscape. The agency must manage for decadence and help encourage future recruitment of medium and large snags. See Jerome J. Korol, Miles A. Hemstrom, Wendel J. Hann, and Rebecca A. Gravenmier. 2002. *Snags and Down Wood in the Interior Columbia Basin Ecosystem Management Project*. PNW-GTR-181. The Final EIS must quantify the expected loss of snags and its consequences. Logging may affect future recruitment of snags, but the EIS does not disclose or discuss the consequences of this loss of recruitment. The EIS fails to disclose the cumulative effects on snag associated species. The NEPA document does not adequately address the need to protect and provide snag habitat (ONRC pp. 3, 5, 61, and 63).

**Response:** Table 6 in the February 2005 Wildlife Report displays the current densities of snags at least 20 inches dbh. Table 10 in the same report displays the reference condition of snag densities of snags greater than 20 inches dbh. A comparison of these tables indicates that large snags are below reference conditions in some habitat type/snag density combinations and higher in others. For example, low density (0-6 per acre) large snag conditions are less abundant in the current landscape for EMC\_ECB open and large tree conditions and in all PPDF conditions, while low density large snag conditions are higher currently than they were in the reference condition in the EMC\_ECB small/med tree habitat type. Medium density (6-12 per acre) large snag conditions are currently less common than in the reference condition across all habitat types, except PPDF small/medium tree condition which did not have medium density large snags in the reference condition. High density (over 12 per acre) large snag conditions are lower in the current environment than in the reference condition in all EMC\_ECB habitat types. High density large snags did not occur in any PPDF habitat types in either the current or reference condition.

This project does not propose to harvest existing snags. Hazard tree identification will be limited to those trees that meet the criteria of danger tree and hazard area in the Oregon Guidelines for Selecting Reserve Trees (1995). In addition, during sale layout and marking, some trees that would otherwise be marked for harvest are retained if falling them would be too hazardous due to entanglement with existing large snags or their position within a snag patch. Based on recent timber harvest operations, the district estimates that 10 percent or less of the existing large snags within harvested areas would be felled due to safety concerns, corridors, or landings. Within RHCAs all snags would be retained unless they are within striking distance of work areas.

As stated in the Draft EIS (p. 192), timber harvest could have an effect on the abundance of trees available for recruitment of snags in the future; however, the project would not affect the ability of the project area to meet the Eastside Screens requirement for snags because trees would be marked for removal with a residual tree density range rather than at the minimum desired stocking level for each site. There would be trees available for snag recruitment above and beyond the minimum desired stocking level post-treatment in increasing numbers as the stand develops. Treated areas would have reduced potential to develop high snag densities in the smaller size classes. However, the reduced density of trees post treatment will improve diameter attainment, allowing for larger snags to be recruited in the future. High density snag categories are currently below what would be expected based on the data in DecAID in the eastside mixed conifer habitat types. The thinning prescription for these sites retains conifer densities well above the desired future densities and some mortality is expected to occur in these stands even after thinning. The thinning is expected to reduce the amount of mortality in the stands (refer to the purpose and need for this project), and therefore the development of high snag density conditions within treated stands will be reduced. However, as displayed in the Draft EIS (Table 3.18) not all high risk and moderate risk stands are proposed for treatment. Mortality is expected to continue, at a higher rate than in treated stands, in the high and moderate risk stands not treated under any alternative. Since a portion of the area in the high and moderate risk categories is eastside mixed conifer, high snag density conditions are likely to develop in untreated stands within this habitat type. The fact that insect activity is occurring in the project area with a trend of increased mortality from 1995 through 2003 (see Forest Vegetation Analysis Report, Figure 4), supports the expectation that snag recruitment will occur within these untreated stands. The Draft EIS discussed the cumulative effects on snag associated species (pp. 189 and 191-193). The Draft EIS also addressed the need to protect and provide snag habitat (pp. 68 and 188-193).

**Comment:** The snag retention requirements in the Forest Plan standards and guidelines fail to retain enough snags to provide habitat for viable populations of cavity-dependent species. The agency has underestimated the number of snags necessary to protect species. This new information must be disclosed and documented in an EIS and it requires a forest plan amendment. (ONRC p. 63).

**Response:** The Draft EIS (p. 192) describes project area snag level in terms of potential population level across the project area to demonstrate compliance with the Forest Plan Standards and Guidelines. The Draft EIS (p. 192) then describes snag retention standards for harvest units required under the 1995 Regional Forester's Forest Plan Amendment 2 (aka the Eastside Screens). The Draft EIS (p. 192) then describes guidelines contained in the Viable Ecosystems Management Guide, which provides additional snag retention information based on more site-specific factors. In all harvest units, the Eastside Screens standards apply; however, the Viable Ecosystems information was used when it indicated higher levels were appropriate. Post-treatment monitoring would be conducted to determine if snag requirements are met, and to identify areas for snag habitat creation if needed (Draft EIS, p. 193).

**Comment:** Closed canopy stands with large trees preferred by pileated woodpecker are currently below HRV (Draft EIS, p. 189). The pileated woodpecker is an MIS that has not been adequately monitored. In the absence of monitoring data to show that logging will not result in loss of viability for pileated woodpecker, it is unacceptable to push habitat further away from the HRV. Pileated woodpecker need not only large nest trees but even more abundant roost trees and foraging substrate (carpenter ant habitat) in the form of down logs and snags. The Draft EIS fails to account for this significant new information. Determining pileated woodpeckers population potential based on nesting sites alone will not provide adequate habitat for viable populations of this species. (ONRC pp. 3 and 65)

**Response:** Habitat selection for pileated woodpeckers is well described in the Draft EIS (pp. 116-117). Nesting, foraging, and roosting habitat features and substrate were all described in the Draft EIS under the sub-heading "Pileated Woodpecker Feeding Habitat Areas (Management Indicator Species)." Impacts to potential reproductive

habitat are described by alternative in the Draft EIS (p. 118), as well as to adjacent feeding habitat (pp. 120-124). These discussions disclose impacts to a variety of habitat features such as canopy closure, foraging substrate and large trees. Impacts to nesting or roosting trees in themselves should be minimal as this project does not propose to harvest snags or large hollow trees. The majority of the effects described on the pages cited are related to changes in canopy closure, structure, species composition, foraging substrate abundance, acres of treatment in reproductive habitat (Table 3.11) and in mapped feeding habitat (Table 3.12). The analysis of impacts was not limited to nesting sites alone. The Breeding Bird Survey data from 1966-1991 showed no significant change in pileated woodpecker populations in the western United States. The Oregon Natural Heritage Program reviews species status and assigns rankings that are used to identify species with viability concerns. The pileated woodpecker was not identified as a species having a viability concern, and it is not listed on the Regional Forester's Sensitive Species List. Pileated woodpecker habitat was identified in the Ochoco Forest Plan based on regional guidance. The regional strategy designed to provide habitat for pileated woodpeckers was included in the Forest Plan as reproductive habitat in Old Growth Management Area and feeding habitat in adjacent stands.

## Miscellaneous

**Comment:** It appears that Alternative 3 best achieves the project objectives. Alternative 3 could be modified to better address both short- and long-term goshawk post-fledging habitat, conservation of LOS-obligate species, and conservation of elk security and calving habitat. (DOI pp. 2-3)

**Response:** All three action alternatives were designed to meet the purpose and need for this project. The Forest Supervisor will decide which alternative best achieves project objectives.

**Comment:** The Final EIS should spatially and temporally prioritize all restoration actions at the landscape scale in order to maximize available habitat quality and quantity for goshawk, elk, and LOS-obligate species. (DOI p. 3)

**Response:** The Forest Plan lays the framework for managing the Ochoco National Forest, including the West Maury Project area. The Ochoco National Forest is managed for multiple uses, it is not managed to maximize habitat quality and quantity for goshawk, elk, or LOS-obligate species. The suggested prioritization of activities is not needed to make an informed decision. The Final EIS discloses the environmental consequences of the proposed activities on elk, goshawk, and LOS species such as the pileated woodpecker so that the Forest Supervisor can make an informed decision.

**Comment:** The Final EIS should include clearly articulated management objectives to ensure restoration activities contribute toward these objectives. (DOI p. 3)

**Response:** The Final EIS includes a clear description of management objectives (see Planning Framework section in Chapter 1).

**Comment:** The Forest Plan requires the agency to monitor the status and trend of various resources and the implementation and effectiveness of standards and guidelines. The Final EIS should provide for (1) an annual status assessment to evaluate the effectiveness of restoration and management efforts, (2) the calculation of the wildlife trend over time as a result of actions within key goshawk, elk, and LOS habitat, and (3) an evaluation of restoration and management efforts. The Forest Service should collaborate with the U.S. Fish and Wildlife Service and the Oregon Department of Fish and Wildlife when developing the monitoring and evaluation program. The Final EIS should incorporate validation monitoring. (DOI p. 3; ONRC p. 68)

**Response:** The CEQ regulations (40 CFR 1505.3) identify that agencies may provide for monitoring to assure that decisions are carried out; monitoring is not required. The Final EIS (Chapter 2) does describe project-related monitoring which focuses on implementation monitoring to assure the selected alternative is implemented as designed and achieves the desired results. The broad-scale monitoring suggested is not needed to make an informed decision and may be impractical at the project scale. However, the Ochoco National Forest does conduct monitoring at the forest planning scale, where the evaluation of management efforts across a large landscape can be assessed and measured.



**Comment:** The purpose and need should incorporate most of the management goals/activities that were legislated and passed in the 2003 Healthy Forest Restoration Act (HFRA). Many tools are available in this legislation package to enhance forest health. (OLC p. 1; CCNRPC p. 1)

**Response:** The purpose and need for this project was established more than a year before the passage of the HFRA. The HFRA was designed to improve the capacity to conduct hazardous fuels reduction projects aimed at protecting communities, watersheds, and other at-risk lands from catastrophic wildfire. The purpose of the West Maury Fuels and Vegetation Management Project includes decreasing the amount of high-intensity fire conditions and increasing the amount of low-intensity fire conditions. In simple terms, one of the purposes of the West Maury Project is to reduce hazardous fuels. Changing the purpose and need at this time to utilize the tools under the HFRA is likely to delay implementation of the hazardous fuels reduction projects. This delay would be caused by redefining the purpose and need, redesigning the project and developing a collaborative proposed action, and reanalyzing project effects.

**Comment:** Social and economic impacts are not given enough consideration. Crook County has the highest unemployment rate in the state. (AFRC p. 3; OLC p. 3).

**Response:** Socio-economics impacts were considered during the analysis process. Both the Draft EIS (p. 156) and the Final EIS (p. 110) recognized the unemployment rate in Crook County.

**Comment:** Meeting a multitude of present day social values, while not implementing management practices that preclude future options should be the driving theme for management activities. HRV is one component of this concept, but should not be a decision-maker's determinate factor. (ODFW)

**Response:** The Forest Plan (p. 4-12) identifies a goal of maintaining forest health for present and future uses. The Forest Plan (p. 4-3) also has a goal to "maintain or enhance ecosystem functions to provide long-term productivity of forest resources and biological communities." The objective associated with this goal is to provide for all seral stages of plant associations, with a distribution that is ecologically sound. The Ochoco National Forest Viable Ecosystems Management Guide (Simpson et al. 1994) is a tool for analyzing each seral/structural stage for the plant associations found on the Ochoco National Forest. Managing an ecosystem within its range of natural (or historic) variability is a scientifically defensible way to maintain diverse, resilient, productive, and healthy systems (Swanson et al. 1994). One of the purposes of this project is to move seral and structural conditions towards their historic ranges of variability. The decision-maker will consider how well each of the alternatives move seral/structural conditions toward the HRV, along with other factors described in the Decision Framework section of the Final EIS.

**Comment:** Chapter 2 is confusing because it does a cursory job of describing the no action alternative and proposed actions to be taken, along with an equal emphasis on discussing the effects of the action. Environmental effects should be relegated to Chapter 3, and the actions more clearly explained. All of the alternative descriptions should be reviewed and edited to provide improved clarity of what is proposed versus what is an outcome. (CCNRPC p. 3)

**Response:** As suggested, the alternative descriptions have been edited to improve clarity. Discussions related to key issues and environmental consequences have been moved to the Comparison of Alternatives section of Chapter 2 or the pertinent section of Chapter 3. Descriptions of the individual activities have been combined with descriptions contained in Chapter 1 and moved to an appendix.

**Comment:** The Final EIS should contain a more reasoned discussion of the analysis leading to the choice not to cut trees larger than 21 inches dbh and not mere reliance on a broad-scale environmental assessment such as the eastside screens. One of the primary purposes of NEPA is for the decision-maker to fully disclose the alternatives and consequences of choices, and merely citing back to outdated and supposedly interim direction is inadequate. (CCNRPC p. 3)

**Response:** The decision to not cut trees larger than 21 inches dbh was previously analyzed and need not be re-analyzed here. Cutting trees larger than 21 inches dbh would require a Forest Plan amendment. As stated throughout both the Draft and Final EISs, the project areas is currently below the HRV for LOS stands. In the Decision Framework section, one factor that will be considered by the decision-maker is whether the overall amount

of LOS would be maintained. Removing trees larger than 21 inches dbh would reduce the overall amount of LOS stands and would be inconsistent with the purpose and need of this project.

**Comment:** One objective of this project should be to keep water on the land longer. Invasive juniper is detrimental to attaining that objective. (CCNRPC pp. 4-5)

**Response:** The purpose and need for this project does not include retaining water on the land longer. The purpose and need does include moving seral/structural conditions toward the HRV. Juniper cutting is included in the suite of activities, because juniper is more dominant today than it was historically. Alternative 2, the proposed action, includes thinning approximately 2,700 acres of juniper stands.

**Comment:** This project may not receive any bids, or could be modified to make it more appealing to bidders by adding big trees or forgoing the removal of small trees. This would be a serious breach of the NEPA disclosure and purpose and need identified for this project. The EA must disclose this risk and its consequences. (ONRC p. 73)

**Response:** The CEQ regulations (40 CFR 1500.1) identify that NEPA documents should concentrate on issues that are truly significant to the action in question, and should not amass needless detail. Speculating on whether a contract package will or will not receive any bids would not provide any meaningful information to the decision-maker or the public. The Forest Service intends to implement the activities in the selected alternative as disclosed in the Final EIS. The Forest Service routinely offers timber sale contracts to remove commercial-sized trees. As disclosed in the Final EIS, both Alternatives 2 and 3 include commercial timber harvest. The Forest Service has some flexibility in how timber sale contracts will be offered. As suggested, there is uncertainty related to bids on timber sales. If no bids are received, the timber sale contract package could be modified and reoffered. One of those changes could be forgoing removal of small trees as part of the timber sale, but then removing those small trees as part of a noncommercial thinning contract. This type of flexibility is not a breach of the NEPA disclosure requirements. The Final EIS discloses that both commercial and noncommercial sized trees will be removed and the Final EIS discloses the environmental consequences of removing those trees.

**Comment:** The Forest Service has a NEPA obligation to disclose the risk of running out of K-V funds before they are done with the mitigation projects identified in the alternatives. If the mitigation and restoration is not completed, the NEPA analysis is no longer accurate and in fact it becomes misleading. (ONRC p. 72)

**Response:** The Final EIS discloses the design criteria and resource protection measures included in each alternative. The Forest Service intends to implement all of the resource protection measures identified in the Final EIS. These design criteria and resource protection measures can be implemented and/or funded in several different ways and do not rely on K-V funding. The NEPA does not require the Forest Service to disclose funding sources.

**Comment:** The agency should disclose and describe the full environmental impacts of the proposed action without compensatory mitigation, then describe proposed mitigation and how it would compensate for the predicted impacts. The agency should specifically describe how mitigation would operate to preclude a resource impact, and clearly differentiate between avoidance and minimization measures from mitigation. The source and certainty of mitigation funding should also be discussed in the NEPA analysis, as well as the consequences if funding and implementation are not forthcoming. (ONRC p. 68)

**Response:** The action alternatives do not contain any compensatory mitigation. The Final EIS discloses the full environmental impacts of the proposed action along with two other action alternatives.

**Comment:** Project-level NEPA analyses that combine commodity production and restoration must be deferred until the forest plans are amended to address the significant issue of cumulative effects. The Forest Service cannot rely on the outdated Forest Plan and especially the management allocations related to timber production. (ONRC p. 72)

**Response:** The deferral you suggest is not necessary. The direct, indirect, and cumulative effects of the action alternatives are adequately disclosed in the Final EIS. The Ochoco National Forest was adopted in 1989 and has been amended several times.

**Comment:** The agency has an obligation to respond in the final NEPA document to responsible opposing viewpoints concerning the consequences of the proposed action. (ONRC pp. 71-72)

**Response:** The commenter does not provide any opposing scientific evidence. Instead the comment references court cases related to the unsupported claim that goshawks are habitat generalists and that in another NEPA document the Forest Service failed to disclose evidence that logging generated slash could increase fire hazard. The West Maury Project EIS makes no claims as suggested by the commenter. As disclosed in the wildlife section, goshawks utilize mixed conifer forests with relatively high canopy closure. In the fuels section, the Draft and Final EISs disclose that logging-generated slash can and does increase fire hazard for 3-5 years until the logging slash is burned.

**Comment:** The agency must do away with the caveat that they will protect snags “except where they create a safety hazard.” The agency can just buffer snags from activities that involve workers, then all ecologically important snags can be protected. The NEPA analysis also fails to acknowledge that the public assumes certain risk when recreating on public lands so not every hazardous tree on every dead end spur road needs to be felled and removed. (ONRC p. 65)

**Response:** There is no requirement to do away with the caveat that snags “would not be marked for removal, except for safety measures or road construction.” There is no law, regulation, or policy that indicates every snag must be protected. The West Maury project does not proposed to remove “every hazardous tree on every dead end spur road.”



# Appendix F

## Letters from Government Agencies

## **Changes Between Draft and Final EIS**

This is a new appendix.

This appendix contains copies of letters from government agencies. These letters were received in response to the 45-day comment period.

The letters contained here may not appear exactly as submitted because of conversions between software. They do contain the exact words from the letters.



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 10**  
1200 Sixth Avenue  
Seattle, WA 98101

November 4, 2004

Reply To  
Attn Of: ETPA-088

Ref: 04-008-AFS

Mr. Larry Timchak, Forest Supervisor  
Ochoco National Forest  
3160 N.E. Third Street  
Prineville, Oregon 97754

Dear Mr. Timchak:

The U.S. Environmental Protection Agency (EPA) has reviewed the **West Maurys Fuels and Vegetation Management Project** Draft Environmental Impact Statement (DEIS) (CEQ No. 040413). We are submitting comments in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Thank you for agreeing to accept our comments at this time.

The DEIS proposes to manage vegetation and fuels on 18,508 acres within the 37,974 acre project area to move the seral and structural conditions of overly dense forest stands towards their historic ranges of variability (HRV), to maintain and increase broadleaf and shrub communities, to maintain and increase late and old structured (LOS) stands, to increase the resistance of forest stands to insects, disease and high intensity wildfire, and to provide wood products and jobs. Of the three action alternatives, the preferred is Alternative 2, which proposes the use of commercial timber removal, noncommercial thinning, and prescribed fire to move conditions towards earlier seral or fire climax species such as ponderosa pine.

The proposed actions in Alternative 2 would require new road construction, road reconstruction, and three Forest Plan amendments. For the purposes of this proposed project, the amendments would remove the forest plan restrictions (1) on commercial logging in late and old structure (LOS) stands when the amount of LOS is below the historical range of variability (HRV); (2) on commercial logging in connective corridors when all the criteria for connective corridor habitat cannot be met; and (3) on the use of prescribed fire in old growth unless it can be supported by research, directives and desired condition, wherein it can be used following appropriate environmental analysis.

Alternative 3, which responds to wildlife issues and water yields, proposes new roads and road reconstruction, leaves more trees and untreated areas, does not commercially cut LOS areas, and would not require Forest Plan amendments. Alternative 4 includes no commercial logging, limits actions to noncommercial thinning and fuels reduction, and requires no road construction, road reconstruction, or Forest Plan amendments.

Based on our review, we have assigned the DEIS a rating of EC-2 (Environmental Concerns - Insufficient Information.) An explanation of this rating is enclosed. Our main concerns pertain to:

- road building;
- the effects of extensive vegetation removal and loss of canopy closure combined with continued cattle grazing on water quality and aquatic habitat;
- the need for further information and analysis concerning stream sedimentation;
- impacts to wildlife corridors and security habitat; and
- the spread of noxious weeds resulting from widespread ground disturbance.

We recommend that, rather than adopting Alternative 2, the selected alternative be a modified alternative derived from Alternatives 3 and 4, or Alternative 4.

If you have questions or would like to discuss these comments, please contact Elaine Somers of my staff at 206/553-2966. Thank you for the opportunity to provide these comments and for your patience as we prepared them.

Sincerely,

/s/

Christine B. Reichgott, Manager  
NEPA Review Unit

Enclosures



**U.S. Environmental Protection Agency**  
**West Maurys Fuels and Vegetation Management Project DEIS**  
**Detailed Comments**

**Roads.** A number of the most significant problems currently affecting the project area's environment, and potential impacts associated with the proposed action stem from existing and proposed roads. This is because the roads enable access for the full range of human recreational, land use, and land management activities; exacerbate the spread of noxious weeds; diminish the security of wildlife from hunters, increase wildlife disturbance, habitat loss and fragmentation; and contribute to surface disturbance, erosion, water quality degradation, and sedimentation of aquatic habitats. In addition, the Forest Service has a substantial backlog of unfunded road maintenance for existing problem roads. We recommend that new roads not be developed where problem roads and a lack of funds to address them exists.

EPA appreciates the need to reduce fuels and improve stand vigor, and to address all of the aspects of the project purpose and need. However, as stated in the Final EIS for the Roadless Conservation Rule (2001), even the best designed roads produce sediment, and unpaved roads continue to produce sediment for as long as they remain unvegetated. Whenever there are means to meet the project needs without additional road construction, as with Alternative 4, or with reduced road construction, as with Alternative 3, we urge that such alternatives be selected. In this case, we recommend that efforts be made to eliminate new road building, or limit road building to temporary roads only, or build new system roads only where re-alignment is needed to avoid sensitive areas.

We are pleased that roads are also proposed to be decommissioned. We recommend that the EIS be specific about the plans for decommissioning these roads. For example, the EIS should indicate whether or not all roads planned for decommissioning will be tilled and replanted with native vegetation and monitored to prevent and control noxious weed infestations, or whether other methods or measures are planned. We also recommend that the EIS disclose how the decommissioning of roads in the three action alternatives will be funded, and when it will be performed relative to the timing of other proposed project activities.

The DEIS (p. 244) indicates that when all road management actions are complete, the road density would be 2.9 miles per square mile for all action alternatives. It is unclear why the road density would not be less for Alternative 4, since no new roads are proposed for construction under Alternative 4, yet 10.2 miles would be decommissioned under this Alternative. This should be clarified in the Final EIS.

**Redband Trout.** While there are no inventoried roadless areas (IRAs) within the West Maurys project area, there are unroaded areas (p. 247) identified by the Oregon Natural Resources Council (ONRC), and there are redband trout, which is the only salmonid species currently present. In Oregon, 54% of watersheds containing strong, healthy populations of Columbia Basin redband trout derive their habitat quality from IRAs. We believe this is important to consider with respect to management of the unroaded areas of West Maurys. We suggest that the Final EIS evaluate the environmental impacts and benefits that could be derived from eliminating the 43 acres of commercial logging proposed within the unroaded area.

**Cattle grazing.** As stated on page 211 of the DEIS, the primary impact from cattle grazing in the project area appears to be on riparian vegetation and channel condition. Because cattle grazing affects hydrology, riparian vegetation, stream morphology, sedimentation, and stream temperature, as well as the spread of noxious weeds, the effects and management of cattle grazing need to be more fully integrated into the analysis and disclosure of cumulative project impacts. If possible, revised grazing management should be integrated with this project in order to better predict and manage the overall impacts. Otherwise, predictions, such as on page 209 that noncommercial thinning in RHCAs would not result in temperature increases on perennial streams, may not be accurate where cattle grazing removes the deciduous vegetation.

**Water quality.** The DEIS states (p. 211) that, "All alternatives, even considering cumulative effects, would not produce measurable increases in the maximum water temperature and would meet state and INFISH water quality temperature standards." As we stated above, the treatments within RHCAs together with continued cattle grazing may negatively affect water quality. This is of particular concern because several project area streams do not meet water quality standards for temperature (Bear Creek, Cow Creek, Klootchman Creek, and Deer Creek).

There are “reasonably foreseeable riparian planting and headcut repair” projects listed on 5 of the project area creeks (p. 210 – of the 303(d) listed streams, only Cow Creek is included among the 5), but shading benefits are not expected for at least 10 years. In addition, “past deciduous riparian plants outside of exclosures on the south slope of the project area are being heavily browsed by livestock and wildlife.” As a result, the DEIS does not provide a compelling case to support the conclusion that temperatures will not be elevated, that temperature exceedances will not be exacerbated, or that all state and INFISH water quality temperature standards will be met. This explanation should be provided in the Final EIS.

Project area streams are not listed for sedimentation, although the DEIS indicates that there are historic and existing problems with bank erosion (particularly from cattle grazing), head cuts, channel scour, elevated peak flows, re-occurring rain-on-snow events, loss of floodplain storage due to entrenched channels and soil loss, soil compaction, timber removal that has historically focused on large tree removal, and road construction. In addition, 32% of the project area has highly erodible volcanic ash soils and the remaining two-thirds has clay-loam or clay texture soils. Information is lacking, however, as to how bad a problem sediment currently is, how easily the project area streams do or do not recover from sedimentation, and what the consequences may be with respect to meeting water quality standards for sediment if the proposed actions are implemented. This information needs to be included in the EIS.

The DEIS (p. 175) indicates that most of the sediment in the West Maurys project area is generated from bank erosion, head cuts, and channel scour as a result of peak flows such as rain-on-snow events. The Forest Service uses an Equivalent Harvest Area (EHA) model to evaluate risk to water quality and stream bank stability as a result of hydrological effects of vegetation removal. Without baseline information about stream sedimentation, the high, medium, and low risk outputs do not adequately inform the public or decision makers. We recommend that baseline information be provided, and that the EHA model outputs be used together with calculated sediment budgets to describe project effects, at least for high risk streams. Analyses of this sort could enable the Forest Service to make informed, strategic modifications to existing alternatives and management prescriptions that pertain to the location, amount, and timing of vegetation removal and fuels treatment in order to protect water quality and aquatic habitat.

**Tree and understory removal.** Logging prescriptions direct that no trees greater than 21" dbh will be removed. As stated in the DEIS, from 1960 to about 1995, management direction of major timber sales within the project area concentrated on the cutting of large trees. Hence, there is inadequate late and old structure stands (LOS), and large trees may be few in number. Where stand density would be excessively diminished by this prescription, we recommend that the Forest Service consider using a smaller dbh as the threshold for leaving trees uncut. Adequate stocking levels are necessary to provide large woody debris in riparian areas and to provide conditions that reflect mature forest conditions, including provision for future snag and down wood recruitment. We recommend that the final EIS state what these adequate stocking levels need to be and add a minimum number of trees per acre to the treatment prescriptions.

We understand that the proposed treatments are intended to improve the vigor and structure of the LOS areas and to prevent wildfire. In the effort to provide wood products and jobs, however, we urge that there be no commercial logging under Alternative 2 if it will result in a decrease in habitat quality in LOS stands. The ground disturbance alone would potentially lead to noxious weed infestations, therefore we recommend that there be no commercial logging in the LOS as is proposed in Alternative 3 and Alternative 4. Also, we recommend that fuels reduction in LOS, RHCAs, and connective corridors be done as much as possible by hand rather than with the use of prescribed fire to lessen the risk to these important areas.

**Corridors and wildlife security habitat.** We are concerned that the widespread reduction of tree canopy and vegetative understory, road building, and increased human access within general management areas as well as in LOS stands, riparian habitat conservation areas (RHCAs), and within habitat connective corridors will compromise project area wildlife security habitat. The DEIS does not provide a strategy or mitigation that will ensure that the timing, extent, and location of these activities will enable wildlife to have adequate corridors and foraging and security habitat on a project area-wide basis over the time period projected for completion of project activities. We strongly recommend that the Final EIS include a strategic habitat management and mitigation plan for wildlife as described above. The mitigation plan should also minimize human access and disturbance to wildlife, such as by

strategically locating and timing the decommissioning of roads and road closures, and the regulation and monitoring of human recreational activities, which includes but is not limited to use of on- and off-road vehicles.

**Noxious weeds.** We appreciate the risk assessments included in the DEIS for noxious weeds. Because the spread of noxious weeds is virtually inevitable with ground disturbance and because of the significance of the impact with respect to habitat and ecological integrity, and because of the directives in Executive Order 13112 on Invasives, we recommend that Alternative 4, or a modified alternative that approaches the lesser acreage of ground disturbance as in Alternative 4, be selected.

**Horse logging.** We wish to commend the Forest Service for incorporating horse logging into the alternatives. We encourage the use of this low impact logging method as much as possible wherever conditions allow.

**U.S. Environmental Protection Agency Rating System for  
Draft Environmental Impact Statements  
Definitions and Follow-Up Action\***

**Environmental Impact of the Action**

**LO - - Lack of Objections**

The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

**EC - - Environmental Concerns**

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

**EO - - Environmental Objections**

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

**EU - - Environmentally Unsatisfactory**

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

**Adequacy of the Impact Statement**

**Category 1 - - Adequate**

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

**Category 2 - - Insufficient Information**

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

**Category 3 - - Inadequate**

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA

does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

\* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.



## United States Department of the Interior

OFFICE OF THE SECRETARY  
Office of Environmental Policy and Compliance  
500 NE Multnomah Street, Suite 356  
Portland, Oregon 97232-2036

IN REPLY REFER TO:

November 29, 2004

ER04/678

Mr. Larry Timchak  
Forest Supervisor  
Ochoco National Forest  
3160 NE Third Street  
Prineville, Oregon 97754

Re: SUPPLEMENTAL COMMENTS – Review of Draft Environmental Impact Statement for the West Maurys Fuels and Vegetation Management Project, Ochoco National Forest, Crook County, Oregon

Dear Mr. Timchak:

The Department of the Interior has reviewed the Draft Environmental Impact Statement (DEIS) for the West Maurys Fuels and Vegetation Management Project, Ochoco National Forest, Crook County, Oregon. The Department offers the following comments for use in developing the Final Environmental Impact Statement (FEIS) for this project:

### GENERAL COMMENTS

The Department's primary concern for the Project is to assure that the proposed restoration and management actions allow for both short- and long-term maintenance and restoration of locally important wildlife habitats. Vegetative treatments, including prescribed fire, may impact habitat effectiveness for a variety of wildlife species and/or habitat within the West Maurys Project area. These habitats include late and old structure (LOS) stands, old-growth connective corridors, goshawk post-fledging areas (PFAs), and elk security and calving habitat, and are associated with goshawk, pileated woodpecker, elk, and LOS habitat dependent species. Our review of the DEIS suggests that it is possible to increase the treated area while decreasing the impacts to these habitats and species. Site specific vegetative treatments should be evaluated to address important wildlife habitat deficiencies within the project area. The Department recommends that the FEIS include a more thorough analysis of the potential impacts to these species and habitats.

Based on the information provided in the DEIS, it appears that project objectives are best achieved by Alternative 3. During site visits and other personal communications, the Department, through the U.S. Fish and Wildlife Service (Service), has informed the Forest Service that there are alternative modifications which would better address both short- and long-term goshawk post-fledging habitat viability, conservation of LOS-obligate species, and

conservation of elk security and calving habitat. The following is a list of proposed modifications to Alternative 3:

- § Establish a density and distribution baseline and clearly articulate management objectives for goshawk habitat use within the project area and relative importance within the basin.
- § Develop and implement a collaborative, strategic approach to address and prioritize site-specific management actions that maintain or restore habitat for goshawk, elk, and LOS-dependent species.
- § Establish a collaborative adaptive management process that includes interested and affected parties.
- § In appropriate habitat types, designate and maintain, over the short and long-term, connectivity corridors suitable for LOS-obligate species dispersal. Maintenance should include commercial or prescribed fire treatments when appropriate.
- § Maintain all white fir and Douglas fir trees greater than 14 inches in diameter that provide a mid to upper canopy within all stands within the connectivity corridors to maintain a variable multi-strata stand structure. The stand structure should maintain LOS-obligate species dispersal conditions through moist and dry ponderosa pine stands designated within the corridors.
- § Where the opportunity exists, accelerate recovery of LOS characteristics in mixed conifer, ponderosa pine stands exhibiting high mortality or high levels of insect and disease.
- § When appropriate, decrease the level of human disturbance within designated PFAs and elk security and calving habitat. The development of more open stands may require additional actions (e.g., road closures) to limit human disturbance within PFAs or elk security and calving habitat areas.
- § Administratively establish four 30-acre alternate nest sites within the designated PFAs where treatments would not occur. Designated by the District Wildlife Biologist, these alternate nest sites should include the highest quality and most likely utilized nesting habitat within the PFA. The alternate nest sites should be scattered throughout the PFA to maximize edge habitat when conditions allow.

### **Restoration and Prioritization**

The Department recommends that the FEIS spatially and temporally prioritize all restoration actions at the landscape scale in order to maximize available habitat quality and quantity for goshawk, elk, and LOS-obligate species. For example, specifications for treatment should be to maintain or improve existing conditions, to promote development of large-size trees, and enhance long-term viability of PFAs. The FEIS should also include clearly articulated management objectives to ensure restoration activities contribute toward these objectives. The

proposed alternative modification would establish four 30-acre alternate nest sites and will withhold approximately 35 percent of the highest quality PFA habitat from treatment(s). The viability of this approach relies upon maintaining the highest quality alternate nest sites, and maximizing edge habitat within the PFA as a result of treatment(s).

The Department's concern for the loss of goshawk habitat is emphasized by the fact that three of the fourteen PFAs that have had commercial or prescribed burning treatments have not shown goshawk activity since the treatment. Two other PFAs have been occupied by red-tailed hawks that have been shown to preclude goshawk activity. Under Alternatives 2 and 3, four additional PFAs are proposed for treatment. Also, the DEIS did not evaluate the condition of currently occupied habitat, and the Department recommends that this habitat be evaluated in the FEIS. While not all identified goshawk habitat is sustainable over the long-term, the DEIS does not differentiate between habitat that is sustainable and habitat that is not likely to be sustainable for goshawk when determining acres of habitat loss as a result of implementing the various project alternatives. This distinction should be identified and considered in the FEIS.

### **Monitoring and Adaptive Management**

The Department recommends that the FEIS provide for (1) an annual status assessment to evaluate effectiveness of restoration and management efforts, (2) the calculation of the wildlife trend over time as a result of actions within key goshawk, elk, and LOS habitat, and (3) an evaluation of restoration and management efforts. The Department also recommends that the Forest Service collaborate with the Service and the Oregon Department of Fish and Wildlife when developing the monitoring and evaluation program. Due to the unique nature of the landscape and management history of the Project area, a critical component for effective and efficient maintenance and restoration of important wildlife areas will be the incorporation of validation monitoring testing restoration methods into the FEIS. The Department, through the Service, is willing to assist the Forest Service in developing a monitoring and evaluation plan for the area.

If you have any questions regarding these comments, please contact Mr. Jerry Cordova or Ms. Nancy Gilbert at (541) 383-7146 at the U.S. Fish and Wildlife Office in Bend, Oregon.

We appreciate the opportunity to comment.

Sincerely,



Preston A. Sleeper  
Regional Environmental Officer





# Oregon

Theodore R. Kulongoski, Governor

OCT 27 '04 RCUD

## Department of Fish and Wildlife

Deschutes Watershed District

High Desert Region

61374 Parrell Road

Bend, Oregon 97702

541-388-6363

Fax: 541-388-6281

October 26, 2004

Larry Timchak  
Ochoco National Forest  
3160 NE Third Street  
Prineville, OR 97754

RE: West Maurys Fuels and Vegetation Management Project

Oregon Department of Fish and Wildlife (ODFW) has broadly reviewed the West Maurys Fuels and Vegetation Management Project Draft Environmental Impact Statement (DEIS). Unfortunately, we were unable to review the document as closely as we would have liked, and instead offer the following general comments from which to consider when finalizing the DEIS.

### Historic Range of Variability (HRV)

- The Ochoco forest of yesterday has been altered considerably resulting in a forest made up of second growth, in many cases with dominant forest species that were *not* dominant in the mid-1800s. Today management of the Ochoco National Forest is a social construct – its *not* maintenance or preservation of a forest from an earlier time, but instead forest management is driven by a particular set of today's social values. It'll take decades and maybe centuries to reconstruct a semblance of the forest of yesterday, while present day social values will definitely undergo significant changes of their own. Meeting a multitude of present day social values, while not implementing management practices that would preclude future options should be the driving theme from which management decisions stem. HRV is one component of this concept, but it shouldn't be a decision maker's determinate factor.

### Connectivity Corridors

- Did the analysis determine what vegetative structure is in shortest supply on the landscape today (i.e., dense cover).
- By treating connectivity corridors will vegetative structure in shortest supply become even less prevalent on the landscape?
- By not treating proposed connectivity corridor sections, what is the risk of losing them to disturbances before the next entry cycle?

### Goshawks

- Listed sensitive critical by ODFW due to loss of mature and old-growth forest types.
- Recommended conservation 1) preservation of 30 acres around nests including as much of north-facing slopes as possible, water source, and plucking sites; 2) retention of overstory and refraining from clearcut logging on two or more sides of the nesting grove; 3) prohibition of logging activity within one-half mile of nests from late March to time of fledging; and 4) retention of a minimum of four nest sites per township (ODFW Sensitive, Threatened and Endangered Vertebrates of Oregon 2/24/92).
- ODFW recommends meeting or exceeding these criteria, especially in association with any active nesting territories.

### Elk Habitat

- The Forest proposes to reduce elk security cover by 23% and elk calving area by 39% of which a portion also functions as security cover.
- Did the Forest consider if the reduction in cover might result in increased damage on adjacent private lands?
- Is the Forest proposing to off-set increased human harassment effects of cover reduction by reducing roads open to motorized vehicles and closing cross country travel by motorized vehicles? How about regulating other forms of cross country travel such as mountain bike or equestrian events?

- Likewise, prescribed burning the amount of acres proposed will create a much more open landscape, thereby increasing human harassment. Again, is the Forest proposing to off-set this impact by reducing roads open to motorized vehicles and closing cross country travel by motorized vehicles? How about regulating other forms of cross country travel such as mountain bike or equestrian events?

We'd be happy to discuss any of our concepts further with your staff.

Sincerely,



Glen Ardt  
Wildlife Habitat Biologist  
Deschutes Watershed District

**CROOK COUNTY, OREGON  
NATURAL RESOURCES PLANNING COMMITTEE**

**October 13, 2004**

**To:** County Judge, Crook County, OR

The following comments are made by the CCNRPC in response to the West Maurys Fuels and Vegetation Management Project DEIS. Comments must be received by the Forest Service by October 19, 2004. While it is a minor point, the Summary of the DEIS fails to document the date by which comments must be received, and it will likely be the most widely read description of the analysis. We hope this does not reduce the comments received or cause comments to be late.

The Crook County Natural Resources Planning Committee (CCNRPC) was established by County Order 2002-72 on September 4, 2002. Its 25 members represent a diverse cross-section of the citizens of Crook County. Part of our purpose is to advise the County Court on natural resource issues, while working to foster cooperation and collaboration with Federal agencies that have responsibility for administering those natural resources. Membership includes professional foresters, silviculturists, fisheries and wildlife biologists, agriculture scientists, conservationists, large and small business people, farmers and ranchers, and others. One of our members has a family ranch adjacent to the area, and runs cattle. Her family operation will be directly affected by the consequences of future actions (or inaction) due to the increasing threat of catastrophic wildfire, the dense overstocked stands which are reducing the opportunities for range forage and making livestock operations difficult. Our comments deal with both process and substantive issues.

**Purpose and Need** – The Purpose and Need for this proposal should connect with the important legislation passed in 2003, the Healthy Forests Restoration Act. While this project was initiated prior to passage of that Act, the proposal clearly is in keeping with the need and intent of the legislation and should be viewed as part of enacting actions to meet a national priority for improving forest health and reducing the effects of wildfire. As stated in the Purpose of that Act, there are some very clear national priorities being met in this proposal, and in particular items 1, 3, and 6 should be emphasized. Clearly the Federal lands are at-risk of catastrophic wildfire, need protection from such wildfires by improving forest health and biological diversity is in need of being enhanced through reduction of risk of catastrophic wildfire.

**“HFRA SEC. 2. PURPOSE.**

The purpose of this Act is--

- (1) to reduce the risks of damage to communities, municipal water supplies, and some at-risk Federal lands from catastrophic wildfires;
- (2) to authorize grant programs to improve the commercial value of forest biomass for electric energy, useful heat, transportation fuels, petroleum-based product substitutes and other commercial purposes;
- (3) to enhance efforts to protect watersheds and address threats to forest and rangeland health, including catastrophic wildfire, across the landscape;
- (4) to promote systematic information gathering to address the impact of insect infestations on forest and rangeland health;
- (5) to improve the capacity to detect insect and disease infestations at an early stage, particularly with respect to hardwood forests; and
- (6) to protect, restore, and enhance degraded forest ecosystem types in order to promote the recovery of threatened and endangered species as well as improve biological diversity and enhance carbon sequestration.”

The Purpose and Need item one includes resistance to disease as one item, but the DEIS is never specific as to what disease it is referring to. If the concern is root rot, then thinning often accelerates the spread. Since the spread of root rot could negate the beneficial effects of treatment, we recommend identification of the specific disease(s) of concern and appropriate treatments prescribed.

**Describing the situation and impacts of “no action”.** The description and consequences of “no action” are given short shrift. “No action” must be the platform against which the effects of the action alternatives are measured and compared. Thus a very clear picture must be developed of stand progression and the consequences of taking no management actions.

One of the logical outcomes of no action is a major conflagration at some unpredictable point in the future. That is a reasonable outcome that must be foreseen and described. It is not enough to simply say that growth will slow, insects and disease will increase, without taking the next step with which nature will inevitably follow. When and if that type of conflagration occurs, it could have serious impacts on big game cover of all types, old growth stands, pileated woodpecker habitat, goshawk habitat and all the others. The Biscuit Fire on the Siskiyou National Forest provides clear evidence of the detrimental effects on wildlife from large-scale fires. A significant portion of the habitat necessary for northern spotted owls, marbled murrelets and other species was eliminated by that wildfire complex. Without making it clear that it is those large scale wildfires that the action is intended to avoid, the reader is given inadequate information on which to base reasonable analysis and conclusions. It may not be possible to determine when in the 20 – 50 year planning horizon that major wildfires would occur; but it is very reasonable to assume for purposes of analysis that one will. Improving forest conditions in order to avoid the potential major detrimental effects of those wildfires is a major reason this project is proposed.

In the “Purpose and Need”, page 10, it is stated that it is not possible to reduce the possibility of wildfire, only decrease the possibility of high-intensity wildfire. That statement should be expanded in all descriptions of the “no action” alternative. Many people often assume that “no action” implies no change. However, forests cannot be preserved like jelly in a jar. They are dynamic ecosystems, and will continue on a trajectory of more and more biomass until it surpasses the ability of the site to adequately provide nutrients and water. All forest sites have a relatively finite ability to sustain tree growth and biomass over time, even stands in which there are only large trees competing with other large trees. Then a combination of insects, disease and/or wildfire will reduce the stand density or even kill most of the trees on site. While there may be no certainty of timing due to climate and weather, it is predictable in the longer term that stands will grow to a certain point and then come apart without management.

**Format** - From a format and process standpoint, Chapter 2, Description of Alternatives is confusing because it does a very cursory job of describing the no action alternative and proposed actions to be taken, along with an equal emphasis on discussing the effects of the action. Environmental effects should be relegated to Chapter 3, and the actions more clearly explained. An example of this problem is shown on page 31 under Juniper Thinning: “This prescription has been prescribed (*redundant wording*) for dry ponderosa pine .... and steppe sites to reduce the amount of post-1900 juniper stocking. All younger trees (*What is a younger juniper versus old growth?*) would be cut and all old-growth junipers would be retained. This usually results in a return to the grass and shrub stage or maintains the large structural component but in more open stages. Juniper cutting increases the growth and development of grass and shrub cover.” In this instance, it would be more helpful to describe the number and size of juniper stems to be removed on the average acre treated, the amount that would be left based on the notion of “old growth,” and the rationale that would be used for designating leave trees in juniper. This would also help in understanding the environmental consequences later displayed in Chapter 3. Nearly all of the alternative descriptions should be reviewed and edited to provide improved clarity of what is proposed versus what is an outcome.

**Diameter Limits, Allocation restrictions** - Under “Actions common to all Action Alternatives” and also throughout the remainder of the document it is stated that trees larger than 21” would not be cut for any purpose except road clearing. The Crook County Natural Resources Planning Committee on April 9, 2003, submitted a lengthy letter to the County Court and then to the Ochoco NF concerning the use of arbitrary diameter limits. We would urge consideration of our key points 1-5. They are very much in keeping with the Healthy Forests Restoration Act of 2003.

Given the relatively light stocking of large diameter trees in this area of the Maurys, it may well be the right choice to not remove any of them. However, we expect to see a more reasoned discussion of the analysis leading to that choice and not mere reliance on a broad scale environmental assessment such as the eastside screens. One of the primary purposes of NEPA is for the decision-maker to fully disclose the alternatives and consequences of choices, and merely citing back to outdated and supposedly interim direction is inadequate. On page 97 of the DEIS, the

discussion of the need for an LRMP amendment is provided, and we support the rationale for this project-specific amendment. Maintaining over time and/or developing more rapidly the stand structure and conditions called for under the direction of the east-side screens are better accomplished under the activities of Alternative 2 than any of the other alternatives.

**Page 124, Water yield** – The use of Equivalent Harvest Area is inadequate to predict effects on streams absent information about the current condition of the riparian areas (and uplands) through some methodology such as “Proper Functioning Condition.” Streams in good health from a physical standpoint are better able to handle increased water flows than ones either at risk or non-functional. As a planning tool for forest plan level assessments, EHA may be appropriate but not for site-specific proposals such as in this DEIS. EHA may also provide better information for heavily timbered north slope conditions as compared to the dryer sites of this project area.

The fisheries section in Chapter 3 discusses some of the site specific impacts and causes associated with the streams, but this should be made more visible in the water section. Headcuts are one major degrading factor that should be corrected when they occur, usually engineered processes are required. But even where engineered processes are used, it is often necessary to change the management factors that caused the headcutting. Headcuts are often a symptom of improper management from roads, uplands, grazing and cause major degradation to the stream channel and drain stored water in the banks.

On page 127, we would like to see the scientific evidence on which you based the statement: “Area does not include juniper associations because the small amount of water yield increase resulting from juniper thinning is rapidly taken up by grasses, forbs, and shrubs, and it does not have much effect on peak flows.” This statement may not reflect what was intended by the authors, but we do not believe it is supported by science. There is disagreement and it may be true on a watershed basis, but we doubt there is research on paired watersheds to demonstrate it. Tim Deboodt, one of our members is currently doing this research as part of his PhD program. On point sources, such as springs, there is no question but that removal of invasive juniper can improve stream flow. This is demonstrated locally on the ranch of another of our members, Doug Breese.

We disagree with the notion of “old growth” juniper in productive shrub-steppe areas and would like to see a scientific definition that supports your proposal to leave “old growth” in juniper removal areas. Large and old-growth are not synonymous; we have many junipers in eastern Oregon that are hundreds, maybe over a thousand years old. But those occur in areas that historically have not been subject to frequent wildfires such as productive shrub-steppe sites.

Junipers are physiologically adapted to the dry climate of central Oregon, and are transpiring water anytime the temperature is above 32 degrees. According to Rick Miller of OSU, on an 80 degree day, with soil at field capacity (all the water the soil can hold) a 50 year old juniper will transpire 35 gallons of water per day. Because juniper begins sucking up water so early in the spring, soils are often dried to the wilting point for desirable grasses and forbs before they have broken dormancy.

A healthy watershed has the capability of absorbing precipitation for slow release throughout the season, and invasive juniper stands damage healthy watersheds. The objective should be to “keep water on the land longer,” and invasive juniper is detrimental to attaining that objective. We recommend aggressive thinning of invasive juniper on all productive sites.

**Wildlife Effects** - We earlier noted the potential impact of “no action” on forest dwelling birds and animals, including the goshawk and other species of special interest. Their habitat could be drastically altered in the event of major wildfires. Likewise, the various suites of cavity developers and dependents could be heavily impacted under large-scale wildfire. While there would be a short term increase in snags, down wood and weakened trees that would create habitat and foraging conditions, areas so affected would then be deficit for long periods of time after those trees fall. We recognize there is no single approach to managing for wildlife, as the habitat conditions that favor one species may not be suitable for another.

**Ref. Pg. 29, HIM treatment** – these sites (unit #334, 29 acres) are already below recommended stocking in acceptable trees. It is possible there will be a minimum of acceptable seedlings and saplings remaining after logging and slash disposal. It would seem more prudent to plan on some reforestation (either natural with site preparation or planted stock) to insure desired stocking after treatment.

**Timber Harvest** – Alternative 2 proposes harvest of approximately 25mmbf. The rationale for timber harvest needs to be clear, as many environmental groups oppose timber harvest even though they may support thinning to improve forest health. Improved discussion of how the planned commercial harvest meets the Purpose and Need for the project would assist the reader in understanding the full proposal. Additionally, it would be very helpful to display stand table analysis pre and post treatment. This graphic information would show the number of stems by diameter class before treatment, and then the remaining stems by diameter after treatment. An understanding of what will be left is much more important than just what is present now, and having stand table graphics for each unit would effectively display the variety in management options.

**Fuels Reduction** – In the pre-commercial thinning areas, there is concern about the high risk associated with leaving lop and scatter residual in the stands for up to three years before burning. While this is a common practice, we believe the Forest Service should carefully consider other options that would remove fuels, and display the costs of those options compared to the lop and scatter prescription.

**Economic Analysis** – Overall we believe the analysis is weak, almost non-existent in portraying the costs and benefits of the proposed projects, and believe this is important information for the reviewing public and the decision-maker. What are the economics of changing stand conditions and other management activities on project areas in relation to such important values as recreation and wildlife? The Forest Service at the national level has given great emphasis to the value of outdoor recreation in the economy. How is it affected by management? The costs to implement forest health projects, versus the costs incurred under major wildfire incidents are an important factor. The public needs to have information that shows that achieving the Purpose and Need for the activities is being done in a cost-effective manner.

While exact costs for implementing activities won't be known until the projects are put out for bid, average costs for all of the activities (thinning, prescribed fire, planning, road construction/reconstruction, timber harvest, etc) are readily available and could be easily added to the document. Derived income from harvesting the approximately 25mmbf could also be shown. Timber harvest may not be a primary purpose of this proposal as it is not shown in the Purpose and Need, but the Forest Service has repeatedly stated that some of the Federal costs of treating stands for fuels reduction and forest health could be offset through commercial sale of forest products resulting from their treatments. This should be shown in the document.

**Page 157, Jobs and Personal Income Effects** – There is no justification for ignoring the job production related to road construction, road reconstruction, road decommissioning or prescribed fire treatment. Those are important family wage job activities, clearly add to the potential for local employment and income, and are a result of implementing an action alternative.

**Page 158, Direct and Indirect Effects** – While it may be currently true that many of the jobs associated with road work, vegetation and fuel treatments including noncommercial thinning and slash piling are accomplished through contracting and may be done by resources outside the County, a more aggressive and dependable program such as intended by the Healthy Forests Restoration Act of 2003 could go a long way towards making it feasible for the development of local contractor resources. There is a tremendous amount of work to be done locally on the Ochoco National Forest and also our neighbor forests the Malheur and Deschutes. Without reasonable assurances of a continuing program, local contractors including minority and women-owned businesses will remain unable to invest in development of effective tools and staffing to be competitive. There is currently underway a major initiative to increase juniper thinning in central Oregon, and at least one co-generation plant operating in Madras. The Ochoco has the opportunity to help develop local contracting workforces and is urged to do so.

Further, a well-rounded program of contract opportunities in prescribed fire and thinning could help offset the detrimental effects to current local contractors who are largely tied to wildfire activities. This previous season

caused major financial losses to local contractors who had little opportunity for fire assignments in the slow fire season. Over time, this could seriously degrade readiness for suppression in serious wildfire seasons.

Lynne Angland  
Chairwoman

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Department of  
Agriculture



Forest  
Service

Ochoco  
National  
Forest

Lookout Mountain  
Ranger District

Crook County,  
Oregon

April 2005

# West Maurys Fuels and Vegetation Management Project

## Record of Decision

and

## Final Environmental Impact Statement

Responsible Official –

Larry Timchak, Forest Supervisor  
Ochoco National Forest  
3160 NE Third Street  
Prineville, Oregon 97754  
(541) 416-6500

Abstract:

This Final Environmental Impact Statement (EIS) describes the effects of implementing four alternatives to manage fuels and vegetation in the western portion of the Maury Mountains. The project area is located about 20 miles southeast of Prineville, Oregon and encompasses nearly 38,000 acres. Proposed fuels and vegetation treatments reduce the risk of stand loss due to overly dense stand conditions, increase the resistance of forest stands to insects and diseases, and change the distribution of fire regimes.

Alternative 2 is the preferred alternative and would treat fuels and vegetation on approximately 18,500 acres and commercially harvest 25.9 million board feet (MMBF). Alternative 1 is the no action alternative and does not treat any acres. Implementation of Alternative 2 would necessitate amending the Forest Plan. Alternative 3 was developed in response to key issues related to wildlife and water quality and would treat approximately 14,400 acres and harvest 16 MMBF. Alternative 4 was partially developed in response to key issues and would treat approximately 17,000 acres and does not include any commercial timber harvest.

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# **Record of Decision**

## **West Maurys Fuels and Vegetation Management Project**

USDA Forest Service  
Lookout Mountain Ranger District, Ochoco National Forest  
Crook County, Oregon

### **Decision and Reasons for the Decision**

#### *Background*

This Record of Decision documents my decision and rationale for selecting a course of action to be implemented for the West Maurys Fuels and Vegetation Management Project.

The West Maurys Project Area is located 20 miles southeast of Prineville, Oregon, and covers approximately 38,000 acres. The project area falls within portions of the Bear Creek, Camp Creek, Prineville Reservoir, and Upper Crooked River Watersheds, which are part of the Upper Crooked River sub-basin and Deschutes River basin. It lies within portions of Township 17 South, Range 18 East, Sections 21-29 and 33-36; Township 17 South, Range 19 East, Sections 19-36; Township 17 South, Range 20 East, Sections 19-20 and 29-32; Township 18 South, Range 18 East, Sections 1-4, 9-12, 14, and 15; Township 18 South, Range 19 East, Sections 1-18; Township 18 South, Range 20 East, Sections 5-7; Willamette Meridian.

In 2000, the Lookout Mountain Ranger District completed the Maury Mountains Watershed Analysis. The watershed analysis documents that almost all the plant communities in the area have changed in the last 100 years and that many conditions are outside the historic range of variability (HRV). The HRV describes the range of conditions (structure and composition of plant communities) in an ecosystem prior to European settlement that began in the 1800's. The HRV concept assumes that the ecosystem and its wildlife populations were viable in the 1800's.

Today, forested stands are more susceptible to insects, disease, and wildfire on a landscape basis because of the deviations from the HRV (i.e. changes in plant communities). Stands today are denser with more shade-tolerant species than they were historically. Also, the amount of late and old structure (LOS) stands has decreased from a range of 10,500 to 19,600 acres dominated by large trees to about 880 acres today. Simply defined, LOS stands are forest stands that are dominated by large trees (trees greater than 21 inches diameter at breast height). Large trees are currently susceptible to mortality related to competition stress with smaller, understory trees. Fire suppression has allowed understory layers to develop with a resulting increase in stand density and an increase in competition stress. Fire suppression has also allowed the amount of

fuels to increase. The amount of area that historically would have burned at low-intensity ranges from 14,790 to 27,650 acres. Today, the amount of area that would burn at low-intensity is only about 8,400 acres.

Based on the findings from the watershed analysis and comparisons to the goals and objectives contained in the Forest Plan for the Ochoco National Forest, three needs were identified. There are needs for:

- moving the seral and structural conditions of forest stands towards their historic ranges of variability by (1) maintaining and increasing the amount of late and old structured stands, (2) increasing the resistance of forest stands to insects and diseases, and (3) maintaining and increasing broadleaf and shrub communities.
- moving fire regimes towards their historic ranges of variability by (1) increasing the amount of low-intensity fire conditions, (2) maintaining low-intensity fire conditions where they already exist, and (3) decreasing the amount of high-intensity fire conditions.
- providing wood products to contribute to the health of the local and regional economies (Forest Plan, pp. 4-31 to 4-32) consistent with Management Area and Forest-wide standards and guidelines and to provide opportunities for employment and income.

The final environmental impact statement (EIS) documents the analysis of four alternatives to meet the stated needs.

## *Decision and Rationale*

I have reviewed the West Maurys Fuels and Vegetation Management Project Final EIS and information contained in the project file, including but not limited to the Forest Plan; the Maury Mountains Watershed Analysis; the West Maurys Roads Analysis; public and other agency comments; and applicable laws and regulations. I have determined there is adequate information to make a reasoned choice among alternatives. I am fully aware of the possible adverse environmental effects that cannot be avoided, such as the adverse effects on soils. I am also fully aware of the irreversible and irretrievable commitment of resources, such as constructing roads. I have determined that these risks will be outweighed by the likely benefits such as moving forested stands toward the historic range of variability; reducing mortality of large diameter trees; and increasing the area within the low-intensity fire regime. Implementing this decision will not cause unacceptable cumulative impacts to any resource.

In making my decision, I considered how each alternative meets the stated purpose and need and complies with applicable laws, regulations, and policies. I have also considered the public and agency comments submitted in response to the 45-day comment period.

Based upon my review of the project file and all four alternatives, I have decided to implement Alternative 2 with some modifications to reduce adverse effects to goshawk habitat and water quality. The modifications reduce the amount of commercial timber harvest by 767 acres, noncommercial thinning by 524 acres, underburning by 311 acres, and grapple piling by 280

acres. These modifications also reduce the amount of road work. Alternative 2, with the modifications described in Appendix 1, would treat approximately 17,900 acres. Appendix 1 lists the modifications to Alternative 2 by unit and by road number. Alternative 2 modified also includes the Design Criteria and Resource Protection Measures listed in the Final EIS on pages 34-43. Needed monitoring activities are listed in the Final EIS on page 43.

Table 1 summarizes the activities in Alternative 2 modified and compares the changes to Alternative 2.

Table 1. Alternative 2 Modified compared with Alternative 2.

<b>Activities</b>	<b>Alternative 2</b>	<b>Alternative 2 Modified</b>
<b>Commercial Treatments</b> (acres)	7,763	6,996
<b>Noncommercial Thinning</b> (acres)	11,727	11,203
<b>Fuel Treatments</b> (acres)	17,886	17,295
Underburning	13,974	13,663
Grapple Piling	3,833	3,553
Hand Piling	79	79
<b>Road Management</b> (miles)		
Road Construction	14.9	11.9
Temporary Road Construction	6.1	5.6
Road Reconstruction	22.6	22.1
Decommission	10.2	10.7
<b>Estimated Volume</b> (million board feet)		
Commercial harvest	25.9	24.0

When compared to Alternatives 3 and 4, Alternative 2 with modifications better meets the purpose and need as described below. Alternative 2 modified also takes into consideration the key issues related to goshawks and water yield. The following section describes the factors I considered and the reasons for selecting Alternative 2 modified.

## **Vegetation**

The Final EIS describes a need to move the seral (species composition) and structural (size) conditions of forest stands towards their historic ranges of variability (HRV) by (1) maintaining and increasing the amount of late and old structured stands, (2) increasing the resistance of forest stands to insects and disease, and (3) maintaining and increasing broadleaf and shrub communities. I carefully considered this need statement in deciding what activities to undertake.

## **HRV**

I believe that moving towards a balance of seral/structural stages as described by HRV will move toward healthy, sustainable forest stands over time. For these reasons, I have concluded that it is important to undertake commercial harvest, noncommercial thinning, and prescribed fire activities that will move forest stands toward the HRV. These treatments are designed to increase the dominance of fire-tolerant species such as ponderosa pine and western larch and

increase the dominance of large size trees over time. All three of the action alternatives will move forest stands closer toward the HRV than the no action alternative.

Alternative 2 does the best job of moving forested conditions toward HRV because it reduces the highest proportion of dense stands which allows increased growth rates and faster development of large size trees. Alternative 2 also does the best job of increasing the proportion of ponderosa pine and western larch, while reducing the amount of shade-tolerant tree species such as fir. Alternative 2 modified does a better job of moving toward HRV than Alternatives 3 or 4. Alternative 1 is the no action alternative and the deviations from the HRV would be expected to increase over time.

### **Late and Old Structure (LOS) Stands**

All plant association groups within the West Maury project area have fewer LOS stands (stands dominated by large trees) than indicated by the HRV. Currently, there are 880 acres of LOS stands in the project area. The HRV indicates the amount of LOS should be between 10,500 and 19,600 acres. LOS stands in the project area have an overstory dominated by ponderosa pine and pine or mixed-conifer understories. LOS stands in the project area occur in small patches of 5 to 40 acres.

Many stands still have a component of large trees that can be maintained and augmented over time. However, most large trees within LOS in the project area are at risk due to high understory stocking levels and the resulting competition stress. These trees are often highly susceptible to insects and diseases. Other areas nearly meet the large tree criteria for LOS and present opportunities for expanding the size of existing LOS patches and developing new LOS by reducing the amount of smaller diameter trees and encouraging growth. Based on current conditions, the development of LOS can be accelerated by thinning now on approximately 23,000 acres. Within the 23,000 acres, 16,000 acres have pine overstory that is at risk because of overstocked conditions (includes stands with 3 or more trees per acre larger than 21 inches dbh). None of the action alternatives propose to treat all areas at risk because it is important to maintain a diverse variety of stand conditions.

Alternative 2 includes 157 acres of commercial harvest in LOS stands. Alternative 2 modified reduces the amount of commercial harvest in LOS stands by 5 acres. There would be no commercial harvest in LOS stands under Alternatives 3 or 4. Commercial harvest is designed to maintain large trees by thinning from below and changing LOS stands from multi-strata (dense stands with multiple canopy layers) to single-strata (open, single-storied) conditions. After harvest treatments, these stands would continue to have an uneven-aged (uneven-sized) structure. Commercial harvest would reduce the understory canopy layers and reduce competition stress in the older, larger overstory trees. Many large trees, both inside and outside LOS stands, exhibit low vigor from long-term competition stress. Large trees in treated stands, including LOS stands, would persist longer than in untreated stands. Due to the number of large trees, treated LOS would retain basal areas at the high end of recommended stocking which means that the effects of treatment would not last as long or produce as much growth as stands with lower densities. There would be no change in the amounts of LOS immediately after treatment.

Noncommercial thinning and prescribed fire treatments in LOS stands occur in all three action alternatives. The amount of these treatments ranges from 138 to 258 acres (see Table 3-3 in the Final EIS). Noncommercial thinning and prescribed burning would remove trees 9 inches dbh or less in the LOS stands. These activities help to reduce stand densities, but by themselves do not sufficiently reduce stocking that would allow continued growth and vigor of the overstory large diameter trees.

All three alternatives include treatments to promote development of LOS outside the existing LOS stands. Alternative 2 includes treatments (commercial, noncommercial thinning, and prescribed fire) on 11,679 acres (out of 23,000) to promote development of LOS. Alternative 2 modified reduces the treated area to 10,910 acres. The treatments included in Alternative 2 (and Alternative 2 modified) are effective at reducing stand densities to recommended levels and would promote growth and vigor of remaining trees. Alternative 3 includes treatments on 8,849 acres to promote development of LOS. Under Alternative 3, these treatments effectively reduce stand densities on 7,396 acres. Alternative 4 includes treatments on 9,471 acres; however, these treatments only reduce stand densities to recommended stocking levels on 2,440 acres. Alternatives 3 and 4 are less effective because they do not remove as many trees and do not reduce stand densities as much as Alternative 2.

Alternative 2 does the best job of maintaining existing LOS and increasing growth rates which would increase the amount of LOS over time. Of the action alternatives, Alternative 4 does the least effective job at maintaining and increasing LOS stands. Alternative 1 is unlikely to result in increasing the amount of LOS over time.

## **Insects and Diseases**

If the majority of the trees in a given area have densities that result in stagnated (overstocked) stands, they become vulnerable to insects and disease. This is important in the West Maury project area given the existing low amount of large trees, the overstocked stands, and the time and growth needed to develop large trees. Within the project area, an estimated 10,695 acres are at high risk of mortality from insects and disease. Another 10,561 acres are at moderate risk (see Table 2 below). Treating stands that are at high and moderate risk would increase the growth and vigor of the remaining trees and reduce their vulnerability to insects and diseases.

Alternative 2 treats the largest amount (nearly half) of moderate and high risk stands. Alternative 3 treats about one-third of these stands. Alternative 4 treats slightly more acres than Alternative 3; however, noncommercial thinning and prescribed fire treatments in many of the stands in the project area only result in small, sometimes insignificant, reductions in stand densities. Alternative 2 does the best job of reducing the high risk related to insects and diseases; this alternative reduces the amount of high risk stands from 10,695 acres to 5,916 acres. Moderate risk stands are reduced from 10,561 to 5,386 under Alternative 2. Alternative 2 modified reduces high risk stands to 6,683 acres (see February 17, 2005 Addendum to the Forest Vegetation Analysis Report); moderate risk stands are reduced to 5,386 acres (the same as Alternative 2). Under Alternative 3, high risk stands are reduced to 7,695 acres and moderate risk stands are reduced to 7,490 acres. Alternative 4 only reduces high risk stands by 374 acres (10,321 acres after treatment) and moderate risk stands by 870 acres. Alternative 4 does the least

of the action alternatives to reduce the risk of insect and disease mortality. Alternative 1 does not reduce the risk at all.

Table 2. Comparison of Condition and Risk of Forested Stand by Alternative

Condition and Risk	Total acres in project area	Acres Remaining after Treatment				
		Alt. 1	Alt. 2	Alt. 2 mod	Alt. 3	Alt. 4
Stands at high risk due to density (basal area greater than 115 sq. ft.)	10,695	10,695	5,916	6,683	7,965	10,321
Moderate risk (basal area greater than 75 sq. ft.)	10,561	10,561	5,386	5,386	7,490	9,690
Low risk at this time but stocking control will benefit long-term growth and vigor	2,470	2,470	747	747	875	1,275

### Broadleaf and Shrub Communities

The West Maury project area contains 3,961 acres in Riparian Habitat Conservation Areas (RHCAs). Desired vegetation characteristics in the RHCAs include variable stocking; large trees providing root strength; multiple-age classes; healthy, full crowns for shade; room for shrub and deciduous trees; and healthy aspen clones.

Units within RHCAs have been identified for treatments to maintain and increase broadleaf and shrub communities. Treatment areas have high stocking levels with multiple canopies and/or aspen or other deciduous vegetation at risk of replacement by conifers. Current stocking averages 360 trees per acre and ranges to more than 2,000 trees per acre. Stocking levels to maintain healthy stand conditions within RHCAs should be less than 200 trees per acre. At higher stocking levels, existing large trees are at risk of competition-related mortality. Broadleaf shrubs, trees, and ground vegetation are shaded out of stands with higher stocking levels.

Alternative 2 would treat 1,877 acres within RHCAs while Alternative 3 treats 1,376 acres and Alternative 4 treats 1,741 acres. In Alternatives 2 and 3 commercial harvest would occur in small portions of the RHCAs along Pine Creek and Antelope Creek and within aspen stands. Commercial harvest would occur on 65 acres under Alternative 2 and 59 acres under Alternative 3. Commercial harvest and noncommercial thinning activities are designed to maintain or improve existing shade conditions by removing conifers to promote deciduous trees and shrubs, to promote development of large-size trees by reducing competition, and to enhance long-term recruitment of large wood.

Prescribed fire in RHCAs would rejuvenate riparian plant species composition. Alternative 2 includes 572 acres of prescribed fire, while Alternative 3 includes 432 acres and Alternative 4 includes 501 acres. Fire would move in and out of the riparian areas, removing vegetation in a mosaic pattern. This would accelerate the improvement of riparian plant species. These activities would contribute to meeting Riparian Management Objectives (RMOs). Alternatives 2



and 4 have similar levels of treatments; however, Alternative 2 removes larger-size conifers than Alternative 4 and better reduces competition. All three action alternatives would result in similar effects on broadleaf and shrub communities. Alternative 1 would not change stocking levels in RHCAs, would not reduce competition, and would not improve conditions for broadleaf and shrub communities.

## **Fuels**

The Final EIS describes a need to move fire regimes towards the HRV by (1) maintaining and increasing the amount of low-intensity fire conditions, and (2) decreasing the amount of high-intensity fire conditions. I carefully considered this need in deciding what activities to undertake.

Prior to fire suppression over the last 90 years, the forests of the Maury Mountains were shaped by frequent, low-intensity fires. As a result of fire suppression, the amount of ground fuel and the density of forest stands have increased. This has changed fire regimes and increased the amount of area that would now support a mixed or high-intensity fire because fuel loadings are higher, stands are densely stocked with smaller trees, and fuel arrangements are more continuous

Based on these conditions, I concluded that reducing fire risk is an appropriate course of action. Implementing any of the action alternatives will reduce this risk. Commercial harvest, noncommercial thinning, and prescribed fire activities work in concert to reduce stand densities and decrease susceptibility to high-intensity wildfire. Both commercial and noncommercial thinning are species specific and will move species composition toward fire-tolerant species such as ponderosa pine and western larch. Prescribed fire treatments, both natural fuels and activity fuels underburning, reduce the amount of fuel loading.

Alternative 2 reduces the risk on the largest number of acres, followed by Alternative 3 and then Alternative 4. Alternative 2 modified reduces the risk on fewer acres than Alternative 2, but reduces the risk on more acres than either Alternative 3 or 4.

## **Low-intensity Fire Conditions**

Historically, the dominant fire regime in the Maury Mountains was a regime of low-intensity fire with an average fire return interval of less than 25 years. As fuel loadings and stand densities have increased, mostly due to fire exclusion, forest conditions have become more susceptible to high-intensity fires; the number of acres in the moderate and high-intensity fire regimes has increased, while the number of acres in the low-intensity fire regime has decreased. The historic range of the low-intensity fire regime in the West Maurys project area is estimated at 14,791 acres to 27,655 acres. The amount of the West Maurys project area currently in the low-intensity fire regime is 8,408 acres.

Alternative 2 includes more treatments than Alternatives 3 and 4 and would best increase the amount of area within the low-intensity fire regime. Alternative 2 increases the amount of low-intensity fire conditions from 8,408 acres to 12,142 acres. The modifications to Alternative 2 lessen the effects of Alternative 2 and is comparable to Alternative 3. Alternative 3 increases the

amount of area in the low-intensity fire regime to 11,467 acres. Alternative 4 increases the amount of area in the low-intensity fire regime to 10,655 acres. Alternative 1 does not treat any stands and would not increase the amount of area in the low-intensity fire regime.

### High-intensity Fire Conditions

The amount of the West Maurys project area currently in the high-intensity fire regime is 4,216 acres, which is within the historic range for high-intensity fire conditions. The action alternatives treat variable amounts of high-intensity stands, ranging from 4,779 to 374 acres. Stands in the high-intensity fire regime are those with a closed canopy, abundant ladder fuels, and heavy surface fuels. These stands have missed two or more fire cycles (i.e. naturally-occurring, low-intensity fires). Treating these areas would reduce the risk of high-intensity wildfire. Alternative 1 does not treat any of these stands and does not reduce the potential for high-intensity fire. Alternative 2 reduces the amount of area within the high-intensity fire regime from 4,216 acres to 2,641 acres. Alternative 2 modified does not treat some of these stands and would reduce the amount of area within the high-intensity fire regime to 2,952 acres. Alternative 3 reduces the amount to 2,894 acres and Alternative 4 reduces the amount to 3,312 acres. All alternatives, including no action, are within the HRV for the high-intensity fire regime.

### Mixed-intensity Fire Conditions

The amount of the West Maurys project area within the mixed-intensity fire regime is 14,105 acres, which is above the historic range of 3,934 to 13,850 acres. All three action alternatives reduce the number of acres within the mixed-intensity fire regime; however, the amount of area would remain close to the high end. Alternative 2 reduces the amount of area within the mixed-intensity fire regime from 14,105 acres to 11,920 acres. Alternatives 3 and 4 reduce the amount to 12,379 and 12,913 acres, respectively.

Table 3. Changes to Fire Regime by Alternative.

Fire Regime	HRV (acres)		Alternative 1	Alternative 2	Alternative 2 Mod	Alternative 3	Alternative 4
	Low	High					
Low Intensity	14,791	27,655	8,408	12,142	11,831	11,467	10,655
Mixed Intensity	3,934	13,850	14,105	11,920	11,920	12,379	12,913
High Intensity	1,004	10,511	4,216	2,641	2,952	2,894	3,132

### Forest Wood Products and Seasonal Jobs

The Final EIS describes a need to provide wood products to contribute to the health of the local and regional economies (Forest Plan, pp. 4-31 to 4-32) consistent with Management Area and Forest-wide standards and guidelines and to provide opportunities for employment and income.

In deciding what activities to undertake to meet this need, I considered whether the selected alternative would provide economic benefits. Providing economic benefits to the local and

regional communities is a specific purpose identified within the Forest Plan. These benefits are in the form of timber products and the jobs they create as well as employment from other activities. The Final EIS (Table 3-29, p. 112) includes an analysis of the jobs which would be created or maintained by each alternative.

Alternative 2 harvests the most timber volume and includes the most activities which would generate employment opportunities. This alternative is estimated to provide 25.9 million board feet of timber volume and create or maintain 452 jobs. Alternative 2 modified provides the second highest amount of both volume (24 MMBF million board feet) and jobs (409 jobs). Alternative 3 provides 16 MMBF and 284 jobs. Alternative 4 does not propose any timber harvest, but would provide 27 seasonal jobs related to precommercial thinning and prescribed fire. Alternative 1 would not provide either timber products or jobs.

I believe Alternative 2 modified provides a reasonable balance between achieving resource objectives and contributing economic benefits to communities.

## **Road Work**

Another important consideration in determining which alternative to select was related to road construction activities. Alternatives 2 and 3 include varying amounts of road work including road building, reconstruction, and decommissioning (obliterating) roads. Alternative 4 intentionally does not include road work. The levels of road construction (both system and temporary) seems high. Between the Draft and Final EISs, I specifically instructed the interdisciplinary team to review all road work. Many of the modifications to Alternative 2 are based on this review. For example, commercial harvest activities in Units 103 and 195 would have required the construction of 2.0 miles of new road to harvest 125 acres. This was just too much road construction and I have decided not to construct that new road. In other instances, the amount of new road construction seemed excessive at first. However, several new roads would replace roads that are in proximity to streams and are a chronic source of sediment. These new roads are well away from stream channels and would not be chronic sediment sources. All of the newly constructed system roads would be closed after use. All of the new temporary roads would be decommissioned after use. Both Alternatives 2 and 3 would reduce the amount of existing open roads, while Alternatives 1 and 4 would not because these alternatives do not include any road work.

## **Key Issues**

Several key issues were identified during the analysis process. These key issues were utilized to develop alternatives to the proposed action. Two of the key issues were important considerations in making my decision. Those key issues are Goshawk Habitat Treatments and Water Yield. The other key issues were not central considerations in making my decision. These issues were: Late and Old Structure; Connective Corridors; Elk Habitat Effectiveness, Security, and Calving Habitat; and Old Growth Management Areas. The Late and Old Structure key issue focuses on wildlife habitats.

The analysis indicated that the proposed treatments would not reduce the overall amount of LOS stands across the landscape, but would convert some multi-strata LOS stands to single-strata LOS. Wildlife species dependent on stand conditions with higher canopy closures, such as pileated woodpeckers, would have reductions in suitable habitat. Species dependent on more open canopy conditions, such as white-headed woodpeckers, would have increases in habitat. Both single-strata and multi-strata conditions are below the HRV. Treatments would increase the longevity of existing large diameter trees on sites that cannot sustain the current high stand densities. In connective corridors, treatments would maintain existing large trees and promote development of additional large trees through reduced density and competition. Treatments would reduce the vertical complexity and canopy closure within mapped connective corridors in the short term. However, treatments would retain adequate canopy closure and still provide adequate cover and structure to facilitate travel by most species that would use these corridors. Based on the analysis contained in Chapter 3 of the Final EIS, the key issues related to Late and Old Structure and Connective Corridors were not primary considerations in making my decision. These key issues did provide important information on whether to amend the Forest Plan (see Forest Plan Consistency section below).

Similarly, the Old Growth Management Area key issue also provided important information on whether to amend the Forest Plan (see below). The analysis demonstrates that prescribed fire is useful to reduce small surface fuels and stocking of seedlings and saplings within two old growth management areas. The underburning treatment would return fire to the ecosystem and provide an opportunity for more natural processes and functions to occur within the old growth management area in the future.

The Elk Habitat Effectiveness, Security, and Calving Habitat analysis demonstrated that the differences between alternatives for these considerations were small. The changes in the Habitat Effectiveness Index for elk only varied by a few points (see Table 2-8 in the Final EIS).

### **Goshawk Habitat Treatments**

Alternative 2 has the potential to reduce suitability of three occupied goshawk territories due to extensive treatments within individual PFAs. Key Issue 1C in the Final EIS noted the concern that reducing stand densities would affect goshawk post-fledging areas. Total treatment within these three PFAs exceeds 75 percent and reduces canopy closure in excess of recommended levels. As a result, I have decided to modify Alternative 2 and reduce the amount of treatments within the three affected PFAs. Treatment activities have been dropped from Units 317, 318, 329, 473, 484.1, 512, 533, and 578 as described in Appendix 1. Dense, multi-strata stand conditions will be retained; the risk of mortality to large trees in these areas will not diminish. However, these modifications result in all PFAs in the project area remaining suitable for occupancy by nesting goshawks and their young (see 3/8/05 Addendum to Wildlife Report in the project file).

### **Water Yield**

The Equivalent Harvest Area (EHA) model was used to evaluate the risk to water quality and stream bank stability in the project area. The analysis indicates that no watershed exceeds the

threshold of 35 in the Forest Plan standards and guidelines. However, the high incidence of headcuts in some streams in the project area indicates that some areas are sensitive to increases in water yield and pose a risk to water quality and stream bank stability. As a result, I have decided to modify Alternative 2 by dropping commercial harvest in Units 364, 384, 390, 411, 483, 533, and 578 (see Appendix 1) to reduce the risk of increasing water yield in areas with active headcuts.

## *Other Alternatives Considered*

In addition to the selected alternative, I considered three other alternatives in detail, which are discussed below. Alternative 3 was the environmentally preferred alternative. A more detailed comparison of these alternatives can be found in the Final EIS on pages 45-52.

### ***Alternative 1 - No Action***

Under the No Action alternative, the Forest Plan would continue to guide management of the project area. Proposed activities described in the Final EIS would not be implemented. There would be no stand density management treatments. Stands would continue to incur mortality and large diameter trees would continue to be at risk of loss due to competition among trees. There would be no fuels reduction treatments. Areas would continue to accumulate fuels with the potential for a wildfire causing unwanted damage to forested stands, wildlife habitat, soils, and water quality. There would be no jobs supported and there would be no economic benefit to the local or regional economies.

Routine activities such as road maintenance and suppression of unplanned fires would continue. Activities authorized under separate decisions would also continue. These activities include (1) continued grazing in the five allotments within the project area, (2) noxious weed treatments, (3) the Sherwood prescribed burn, and (4) headcut repair activities. Recreational use of the area would also continue including camping, hunting, and motorized and non-motorized uses.

### ***Alternative 3***

Alternative 3 was developed to respond to the key issues discussed in Chapter 1, while also meeting the stated purpose and need. To address wildlife issues, no treatments would occur in many of the stands with habitat for the species such as goshawk and pileated woodpecker. In other stands, treatment prescriptions were adjusted to retain habitat. In response to the water quality issue, the total amount of treatment has been reduced in the Upper Bear Creek watershed. Many of the stands deferred from treatment to meet wildlife issues also contribute to reducing impacts to water yield. This alternative focuses activities in stands with the objective to reduce stand densities, reduce hazardous fuels, and reduce the risk of stand loss due to high fuel loadings. Objectives also include maintaining desired fuel levels where they exist, increasing forested stands' resiliency to insects and disease, and maintaining and increasing LOS stands.

A complete description of Alternative 3 is contained in the Final EIS on pages 30-32 and 34-43.

## ***Alternative 4***

Alternative 4 was developed to address the purpose and need without the use of commercial harvest, and is similar to the proposed action that was developed in July 2002. This alternative focuses on activities that reduce hazardous fuels and the risk of stand loss to due high fuel loadings, maintain existing desired fuel levels, slightly increase forested stands' resiliency to insects and disease, and increase growth rates in smaller diameter stands. Generally, trees greater than 9 inches dbh would not be cut. In isolated cases of damaged or diseased trees, no trees greater 12 inches dbh would be cut.

A complete description of Alternative 4 is contained in the Final EIS on pages 32-43.

## ***Public Involvement***

As described in the background discussion, the need for this action arose during the Maury Mountains watershed analysis. A proposal to manage the fuels and vegetation in the west half of the Maury Mountains was provided to the public and other agencies for comment during scoping. Scoping activities began when a letter was sent on July 2, 2002, and continued when a revised proposal was sent in a letter dated February 6, 2003. After determining that an environmental impact statement would be prepared, a Notice of Intent was published in the *Federal Register* on January 16, 2004 (FR Vol. 69, No. 11). A revised Notice of Intent for this proposal was published in the *Federal Register* on February 4, 2004 (FR Vol. 69, No. 23). The West Maurys Fuels and Vegetation Management Project has also been listed in the quarterly schedule of projects since the Summer 2002 edition.

Using the comments from the public and other agencies (Final EIS, pp. 15-17), the interdisciplinary team identified several issues regarding the potential effects of the proposed action. Main issues of concern included effects to wildlife habitat components such as Late and Old Structure (LOS) stands (Issue 1A), connective corridors (Issue 1B), goshawk habitat treatments (Issue 1C), elk security habitat (Issue 1D), old-growth management areas (Issue 1E), and water yield (Issue 2). These issues are described in more detail in Chapter 1 of the Final EIS (pp. 18-21). To address these concerns, the Forest Service created Alternatives 3 and 4.

A 45-day comment period was held after the Draft EIS was completed. The comment period began on September 3, 2004, and closed on October 19, 2004. Nine comment letters were received during the comment period and three letters from governmental agencies (USDOT, EPA, ODFW) were received after the close of the comment period. Again, the main issues of concern related to wildlife habitats. An overriding theme in several comments related to LOS stands and effects to goshawk habitat. Other wildlife concerns related to connectivity corridors, elk security habitat, snag retention, future snag recruitment, and management indicator species.

Several comments related to fuels treatment were also contained in the comment letters. These comments suggested that small wood should be utilized rather than burned and that opening the forest canopy will increase instead of decrease fire hazard as stated in the Draft EIS.

The expected comments related to the NEPA process, range of alternatives, unit-by-unit soils analysis, noxious weed spread, cumulative effects (esp. related to livestock grazing), and water quality were also received.

The Response to Comments Appendix (Appendix E) identifies a variety of comments, including all substantive comments, and provides a response. Every comment was read and considered, even though Appendix E does not provide a response for every comment.

## ***Forest Plan Consistency***

Federal regulations (36 CFR 219.10(e)) require that permits, contracts, cooperative agreements, and other activities carried out on the Ochoco National Forest be consistent with the Ochoco National Forest Land and Resource Management Plan, as amended (Forest Plan). Accordingly, I have reviewed my decision against Forest Plan direction.

While I believe Alternative 2 modified to be consistent with long-term management objectives as discussed in the Forest Plan, as amended, there are three aspects of Alternative 2 modified that are inconsistent with existing direction. Three Forest Plan amendments would be needed to implement Alternative 2 modified. The three amendments are described below.

### ***Amendment 1***

The Eastside Screens (aka Regional Forester's Forest Plan Amendment No. 2) contain standards that indicate commercial harvest is not permitted when LOS is below the HRV. The project area is below the HRV for both multi-strata and single-strata LOS. Because Alternative 2 modified includes 152 acres of commercial harvest within LOS stands, a Forest Plan amendment is needed. These commercial harvest activities are designed to reduce stand density, improve growth of the residual trees, and reduce potential mortality resulting from inter-tree competition. Commercial thinning would more quickly restore historic seral/structural stage conditions and improve growing conditions for larger trees than no action, noncommercial thinning alone, or prescribed fire alone. Commercial thinning also decreases the probability of stand replacement fires and decreases the severity of the impacts. While there may be short-term decreases in stand densities and wildlife species dependent on those higher density stands would have reduced habitat, the longer-term maintenance of LOS into the future is desirable. Habitat for those species that are dependent on more open forest canopy conditions would be improved. No trees greater than 21 inches dbh would be cut and removed in any area except in isolated cases for safety reasons or for road construction.

Timing – The Forest Plan has been in effect since 1989 and is scheduled to begin the revision process in 2007. This amendment is occurring during the second decade of the plan period and is less likely to be significant. The commercial harvest treatments in Alternative 2 modified are expected to be implemented within the next 5 years.

Location and Size – Approximately 152 acres would be treated out of the 880 acres of currently mapped LOS within the 37,974-acre project area. All LOS stands that are treated would remain LOS. The majority of acres treated would change from multi-strata LOS to single-strata LOS.

These stands would continue to have an uneven-aged (uneven-sized) structure. All treatments retain options for future management of LOS. Most of the LOS treatments occur within the General Forest Management Area.

Goals, Objectives, and Outputs – There would be no change in the long-term relationships between the levels of goods and services projected by the Forest Plan Final EIS and the impacts of implementing this alternative because of the small number of acres treated and the objectives of the treatments (to maintain LOS in the long term).

Management Prescription – The amendment applies only to this project area and alternative and would not apply to future decisions within the project area. The amendment does not alter the desired future condition of the land or resources or the anticipated goods and services to be produced. Only a small acreage would be treated and options for future management of LOS would be maintained.

## ***Amendment 2***

The Eastside Screens contain standards that indicate timber harvest should be deferred in connective corridors when all the criteria for connective corridors cannot be met. A Forest Plan amendment is needed to implement Alternative 2 modified to allow commercial harvest within connective corridors which reduces canopy closure below 50 percent. Within the project area, not all stands in connective corridors meet the canopy closure requirements and not all corridors meet the minimum width of 400 feet. Connective corridors within the project area represent the best connections given the existing conditions resulting from physical restrictions such as ridges, meadows, and previous harvest practices. Timber harvest treatments in Alternative 2 modified in stands with canopy closures greater than 50 percent are designed to maintain existing large trees and promote development of additional large trees. Treatments will help develop LOS conditions in corridors and would improve connectivity in the long term. Stand densities in the understory would be reduced to increase the health and vigor of remaining trees.

Alternative 2 modified includes 198 acres of commercial thinning (individual tree selection prescription) in connective corridors. Canopy closures in these stands would be reduced below 50 percent.

Timing – The Forest Plan has been in effect since 1989 and is scheduled to begin the revision process in 2007. This amendment is occurring during the second decade of the plan period and is less likely to be significant. The commercial harvest treatments in Alternative 2 modified are expected to be implemented within the next 5 years.

Location and Size – The project area contains 800 acres of connective corridors. Alternative 2 modified would include commercial harvest on 198 acres within connective corridors. The commercial harvest retains options for future management of connective corridors. Treatments would maintain existing large trees and would promote the development of additional large trees.

Goals, Objectives, and Outputs – There would be no change in the long-term relationships between the levels of goods and services projected by the Forest Plan Final EIS and the impacts



of implementing this alternative because of the few acres being treated and the objectives of the treatments (to maintain LOS in the long term).

Management Prescription – The amendment applies only to this alternative in this project area and would not apply to future decisions. The amendment does not alter the desired future condition of the land or resources or the anticipated goods and services to be produced. Only a small acreage would be treated and options for future management of connective corridors would be maintained.

### **Amendment 3**

The Forest Plan contains contradictory direction related to old-growth management areas. The Forest Plan describes that prescribed fire will normally not be applied in old growth, but where it can be supported by research, directives, and desired condition, it can be utilized following appropriate environmental analysis (Forest Plan, p. 4-136). Additionally, when unacceptable damage to resources on adjacent lands or to the old growth resource could occur from insects or diseases, prescribed fire may be used to reduce stand densities and competition that will increase the resiliency of residual large diameter trees (Forest Plan, p. 4-152). However, under habitat management, the Forest Plan (p. 4-251) states that vegetation management would not be allowed until further research is available on the needs of the dependent species.

The Friday Creek Old Growth Management Area (OG-D3-09) contains a mosaic of site potential ranging from juniper woodland to Douglas-fir. A small patch of late and old structure is present on the eastern side in the Douglas-fir plant association group. The remaining area has variable species composition and structure but does not contain sufficient large trees to meet the LOS criterion. The area contains both multi-strata and single-strata canopy conditions. Stocking of seedling, sapling, and poles was reduced as a result of thinning activities prior to adoption of the Forest Plan. Past thinning activities reduced ladder fuels but left excessive surface fuels. Stocking is high for the site potential with the result that growth is slow and trees are susceptible to bark beetle mortality. Loss of large trees would probably occur before additional trees grow larger than 21 inches dbh. An active goshawk nest is located on the northern edge near Friday Creek. Much of the area has been identified as a goshawk post-fledging area.

The Florida Creek Old Growth Management Area (OG-D3-12) contains site potential identified as dry grand fir and Douglas-fir. The overstory is a mixture of ponderosa pine and Douglas-fir. Small patches meeting the LOS criterion for large trees occur within this old growth management area. This stand is dense with three well-defined canopy layers. Due to the existing high density, mortality of large trees has been increasing in recent years. Surface fuel loading is variable but overall high levels coupled with ladder fuels create high fire hazard. Fire ignition within this area during hot, dry, windy conditions would be difficult to stop and would result in loss of old-growth habitat.

A Forest Plan amendment is needed to allow 521 acres of prescribed fire within these two old-growth management areas. There would be 239 acres treated in Friday Creek and 282 acres treated in Florida Creek. Prescribed fire treatments would reduce surface and ladder fuels.

Timing – The Forest Plan has been in effect since 1989 and is scheduled to begin the revision process in 2007. This amendment is occurring during the second decade of the plan period and is less likely to be significant. The prescribed fire treatments in Alternative 2 modified are expected to be implemented within the next 1-5 years.

Location and Size – The project area contains four allocated old growth management areas. These allocated old growth management areas encompass 1,370 acres. Alternative 2 modified allows prescribed fire treatments on 521 acres within two of the four allocated areas. Prescribed fire activities would reduce surface and some ladder fuels to reduce the risk of high-intensity wildfire. This helps to promote old-growth characteristics and resiliency in the long term. Prescribed fire activities would retain options for future management of the two affected Old Growth Management Areas.

Goals, Objectives, and Outputs – There would be no change in the long-term relationships between the levels of goods and services projected by the Forest Plan and the impacts of implementing the alternative because the treatments would maintain old-growth characteristics over time.

Management Prescription – The amendment applies only to this alternative of this project and would not apply to future decisions within the project area. This amendment applies to a one-time use of prescribed fire in the Florida and Friday Creek Old Growth Management Areas. The amendment does not alter the desired future condition of the land or resources or the anticipated goods and services to be produced.

In all other respects, I find this decision to be consistent with the Forest Plan, as amended, and with the requirements of the National Forest Management Act. The selected alternative is consistent with the seven management requirements listed in 36 CFR 219.27.

1. The design criteria and resource protection measures in Chapter 2 (Final EIS, pp. 34-43) include measures for resource protection.
2. Vegetative manipulation has been proposed to achieve multiple resource goals and move vegetative conditions toward the historic range of variability.
3. Timber harvest will only occur on lands suitable for timber production.
4. No even-aged management practices are proposed.
5. Special attention has been given to riparian areas. Alternative 2 modified includes activities within RHCAs. These activities are designed to maintain or improve existing shade conditions by thinning conifers to promote deciduous trees and shrubs, to promote development of large-size trees by reducing competition, and to enhance long-term recruitment of large wood within riparian areas. (Final EIS, pp. 124-126).
6. Alternative development considered and design criteria and resource protection measures include measures to protect, enhance, or minimize effects to soil and water resources. Water yield was determined to be a key issue and the effects on water yield were carefully considered. Several of the modifications to Alternative 2 were to reduce potential effects to water resources (see Appendix 1).
7. Management prescriptions have been designed to enhance the diversity of plant communities. Thinning and underburning in the upland vegetation have been designed to

maintain and increase fire-tolerant species such as ponderosa pine and larch. Thinning in aspen stands will increase diversity in riparian areas. Increasing diversity in the vegetation will also contribute to increased diversity of animal communities.

## *Findings Required by Other Laws and Regulations*

In reviewing the Final EIS and the activities included in Alternative 2 modified, I have concluded that my decision is consistent with the following laws, requirements, and policies.

**National Environmental Policy Act:** NEPA establishes the format and content requirements of environmental analysis and documentation. The entire process of preparing this environmental impact statement was undertaken to comply with NEPA.

**National Historic Preservation Act.** A cultural resource inventory has been completed for the project area. On January 7, 2005, the Ochoco National Forest completed the “Project Review for Heritage Resources under the Terms of the 2004 Programmatic Agreement” with the Oregon State Historic Preservation Officer (SHPO). The activities in the selected alternative have been designed to have No Effect or No Adverse Effect to cultural resource sites through both protection and avoidance.

**Endangered Species Act.** Biological Evaluations (BEs) have been prepared to document possible effects of proposed activities on threatened and endangered species in the project area. There are no endangered species known or suspected to occur on the Ochoco National Forest. Threatened species that are known or suspected to occur on the Ochoco National Forest include bull trout, mid-Columbia River steelhead, northern bald eagle, and Canada lynx. Potential effects to these species were analyzed and the analysis is summarized in the BEs (February 1, 2005 Wildlife BE and December 2004 BE for Aquatic Species) and in the Final EIS (pp. 115-128). The analysis documents that there would be no effect to bull trout or mid-Columbia River steelhead. The project may affect, but is not likely to adversely affect northern bald eagle and Canada lynx. Consultation with the U.S. Fish and Wildlife Service has been completed.

**Clean Air Act.** The selected alternative is designed to be consistent with the Clean Air Act. The Oregon Department of Environmental Quality (DEQ) is responsible for assuring compliance with the Clean Air Act. In 1994, the Forest Service, in cooperation with the DEQ, the Oregon Department of Forestry and the Bureau of Land Management, signed a Memorandum of Understanding (MOU) to establish a framework for implementing an air quality program in Northeast Oregon. The MOU includes a prescribed fire emission limit of 15,000 tons of PM 10 per year for the national forests of the Blue Mountains (Malheur, Ochoco, Umatilla, and Wallowa-Whitman). (PM 10 are particulate matter that measure 10 microns in diameter or less, and are small enough to enter the human respiratory system.) All prescribed burning on these forests is coordinated with the DEQ through the State of Oregon smoke management program. All prescribed fire treatments authorized by this Record of Decision would be conducted in compliance with the State of Oregon Smoke Management System and would meet smoke management objectives for total emissions.

**Clean Water Act.** The selected alternative will comply with the Clean Water Act. This Act establishes a non-degradation policy for all federally proposed projects. The selected alternative meets anti-degradation standards through planning, application, and monitoring of Best Management Practices (BMPs). The Environmental Protection Agency has certified the Oregon Forest Practices Act and regulations as BMPs. The State of Oregon has compared Forest Service practices with the State practices and concluded that Forest Service practices meet or exceed State requirements. Site-specific BMPs have been designed to protect beneficial uses. Chapter 2 of the Final EIS lists the design criteria and resource protection measures that are common to all action alternatives. A number of these measures are BMPs. Appendix D of the Final EIS describes the application of water quality BMPs and lists the BMPs that will be utilized to implement the activities in Alternative 2 modified.

The Final EIS documents the analysis of effects to streams listed on the 2002 state 303(d) list of Water Quality Limited Water Bodies for summer water temperature. These streams are: Bear, Cow, Klootchman, Deer, and Shotgun Creeks. Implementation of the selected activities should not result in any measurable increase in water temperatures in any fish-bearing or non-fish bearing perennial stream in the project area. Commercial timber harvest and noncommercial thinning activities were designed so that they do not reduce shade. There is a possibility that conifer thinning in aspen stands will cause short-term reductions in shade. However, these slight reductions in shade should not result in any measurable increase in water temperature because the area affected is small. There is a potential to increase water temperature in intermittent non-fish bearing streams (Class IV) when they are flowing, but this should not result in a violation of state water quality standards because these streams go dry before peak water temperatures occur in the project area.

## **Implementation**

### *Implementation Date*

If no appeals are filed within the 45-day time period, implementation of this decision may occur on, but not before, 5 business days from the close of the appeal filing period. When appeals are filed, implementation may occur on, but not before, the 15th business day following the date of disposition of the last appeal.

### *Administrative Review or Appeal Opportunities*

This decision is subject to administrative review (appeal) pursuant to 36 CFR 215. Individuals or organizations who submitted substantive comments during the comment period specified at 215.6 may appeal this decision. The notice of appeal must meet the appeal content requirements at 36 CFR 215.14.

Any appeal must be filed (regular mail, fax, e-mail, hand-delivery, or express delivery) with the Regional Forester, USDA Forest Service, Pacific Northwest Region, ATTN: 1570 Appeals, P.O. Box 3623, 333 SW First Avenue, Portland, Oregon 97208-3623. Appeals submitted via fax should be sent to (503) 808-2255. Appeals can be filed electronically at: *appeals-pacificnorthwest-regional-office@fs.fed.us*.

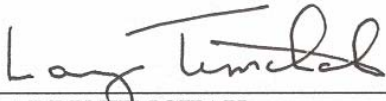
The office hours for those submitting hand-delivered appeals are 8:00 am - 4:30 pm Monday through Friday, excluding holidays.

Appeals, including attachments, must be filed within 45 days from the publication date of the legal notice announcing this decision in the *The Bulletin* newspaper, Bend, Oregon. Attachments received after the 45-day appeal period will not be considered. The publication date in the *The Bulletin* is the exclusive means for calculating the time to file an appeal. Those wishing to appeal this decision should not rely upon dates or timeframe information provided by any other source.

Electronic appeals must be submitted as part of the actual e-mail message, or as an attachment in plain text (.txt), Microsoft Word (.doc), rich text format (.rtf), or portable document format (.pdf). E-mails submitted to e-mail addresses other than the one listed above, or in formats other than those listed, or containing viruses, will be rejected. It is the responsibility of the appellant to confirm receipt of appeals submitted by electronic mail.

## Contact Person

For additional information concerning this decision or the Forest Service appeal process, contact Bryan Scholz, Project Team Leader, Lookout Mountain Ranger District, at 3160 NE Third Street, Prineville, OR 97754 or (541) 416-6500.



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LARRY TIMCHAK  
Forest Supervisor  
Ochoco National Forest

4-23-05

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DATE

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Appendix 1. Modifications to Alternative 2.

<b>Unit</b>	<b>Road</b>	<b>Change</b>
29	1700200S2 1700200	Do not construct 0.3 miles of new system road along the edge of a scabland to prevent concentrating water flows. Add 1.5 miles of road reconstruction and relocate end of road outside of the RHCA. Reduce commercial timber harvest by 16 acres.
50	1610050T1	Reduce amount of temporary road construction by 0.2 miles near a Golden Eagle nest. Changing temporary road construction eliminates two stream crossings. Reduce commercial timber harvest by 25 acres.
103	1700000S2	Do not construct 2.0 miles of new system road. Road has the potential to increase hydraulic network because of stream crossings. Also, the road would be expensive to build because of terrain. (Also Unit 195). Reduce commercial timber harvest by 70 acres.
162.1	1610075S1	Relocate road away from goshawk nest stand, which increases road construction by 0.3 miles.
195	1700000S2	Do not construct 2.0 miles of new system road. Road has the potential to increase hydraulic network because of stream crossings. Also, the road would be expensive to build because of terrain. (Also Unit 103). Reduce commercial timber harvest by 55 acres.
203	1700170	Decommission 0.3 miles of road that are in wet areas to reduce potential sediment delivery..
317	1700302NS	Drop unit. Within newly discovered goshawk post-fledging area (PFA). Reduce commercial timber harvest, noncommercial thinning, and grapple piling by 77 acres. Reduce amount of road construction by 0.1 miles.
318	1700305	Drop unit. Within newly discovered goshawk PFA. Reduce commercial timber harvest by 55 acres. Reduce noncommercial thinning and burning by 57 acres. Reduce amount of reconstruction by 0.4 miles.
329	None	Drop unit. Within newly discovered goshawk PFA; likely within nest stand. Reduce noncommercial thinning and burning by 27 acres.
364	1750385SI	Potential to affect active headcut. Reduce commercial timber harvest by 28 acres. Reduce amount of road construction by 0.2 miles.
384	1600100S1	Potential to exacerbate active and treated headcuts. Reduce commercial harvest by 79 acres. Reduce road construction by 0.3 miles.
390	None	Potential to exacerbate active headcut. Reduce commercial harvest and grapple piling by 44 acres.
401	1700180	After activities are complete, close 0.3 miles of road on the east end, instead of decommission. This road is likely to be used in the future.
411	1600000T	Potential to exacerbate treated headcuts. Reduce commercial harvest by 33 acres. Reduce temporary road construction by 0.3 miles.
419	None	Drop unit. Underburning activities in this unit are connected to Unit 384. Reduce burning by 4 acres.

<b>Unit</b>	<b>Road</b>	<b>Change</b>
473	1750110 1750130NS	Drop unit. Within Hamer Creek PFA. Would render goshawk PFA unsuitable. Reduce commercial harvest by 84 acres and reduce noncommercial thinning and burning by 111 acres. Reduce amount of reconstruction by 0.6 miles and amount of new construction by 0.4 miles.
483	None	Potential to exacerbate headcut. Reduce commercial harvest and grapple piling by 19 acres.
484.1	None	Drop unit. Within Hamer Creek PFA. Would render goshawk PFA unsuitable. Reduce commercial harvest by 28 acres and reduce noncommercial thinning and burning by 38 acres.
512	None	Drop unit. Within Deer Creek PFA. Would render goshawk PFA unsuitable. Reduce noncommercial thinning and burning by 3 acres.
533	None	Drop unit. Within Deer Creek PFA. Would render goshawk PFA unsuitable. Also, potential to exacerbate headcuts. Reduce commercial harvest and grapple piling by 140 acres. Reduce noncommercial thinning by 188 acres and burning by 48 acres.
563	1600206	Decommission 0.5 miles of road in RHCA to reduce potential sediment delivery.
578	None	Drop commercial harvest. Within Deer Creek PFA. Connected to Unit 533. Potential to exacerbate headcuts. Reduce commercial harvest by 14 acres and reduce noncommercial thinning and burning by 23 acres.

