Bandit II
Environmental Assessment

Lookout Mountain Ranger District
Ochoco National Forest
Crook County, Oregon

USDA Forest Service

Responsible Official
Arthur J. Curries
District Ranger
Lookout Mountain Ranger District

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Send comments to:

Rob Rawlings, Project Leader
Lookout Mountain Ranger District
3160 NE Third Street
Prineville, OR 97754

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CHAPTER 1
PURPOSE OF AND NEED FOR ACTION

Introduction

This Environmental Assessment (EA) describes an analysis of vegetation treatments, including commercial timber harvest, in the Marks Creek Watershed and Veazie Creek Subwatershed (Lower Ochoco Creek Watershed), Lookout Mountain Ranger District, Ochoco National Forest. The Bandit II Project Area encompasses approximately 39,200 acres. This chapter describes the proposed action, discusses the purpose and need, and summarizes the public involvement process to date.

Similar management activities were previously considered in the same area as part of the original Bandit EA (May 2001) and Decision Notice (January 2002). The Forest Supervisor withdrew the original Bandit Decision Notice on February 12, 2002. The proposed action is based on Alternative 5 from the January 7, 2002, Bandit Decision Notice and EA.

Proposed Action

The Forest Service is proposing to conduct forest vegetation management activities on approximately 11,300 acres within the Bandit II Project Area. The proposed activities include commercial timber harvest (2,375 acres), precommercial thinning (5,395 acres), natural fuels underburning (5,450 acres), activity fuels underburning (4,573 acres), handpiling (410 acres), and riparian and hardwood enhancement (149 acres). All acreage figures are approximate. Chapter 2 includes a complete description of all activities included in the Proposed Action (Alternative 2).

Commercial timber harvest would be done using tractor and helicopter logging systems and would produce an estimated volume of 4.8 MMBF (million board feet). Road management activities include the construction of 2.2 miles of new system roads, 1.4 miles of temporary roads and reconstruction of 9.8 miles of existing road. Some existing roads would be decommissioned (8.8 miles) and another 17.3 miles would be closed (inactivated).

Purpose of and Need for Action

The purpose of the proposed action is to improve forest vegetation by moving toward conditions that are sustainable and provide habitat diversity. Other purposes include contributing to riparian management objectives, increasing the number of acres with potential for non-lethal fire, maintaining the visual character along the U.S. Highway 26 corridor, and providing economic benefits to the economy.

The need for action is based on the analysis, conclusions, and management recommendations documented in the Marks Creek Watershed Analysis (1998) and the Addendum to the Marks Creek

Watershed Analysis (2002). The current abundance and distribution of forested vegetation is outside the historic range of variability (HRV). Natural processes, including fire regimes and endemic insect infestations, have been altered by past management practices such as fire suppression, timber harvest, and road construction.

The Marks Creek Watershed Analysis describes the composition and structure of forested stands and how these stands have been altered by changes in the ecological processes. The Bandit II Project Area is comprised of the Marks Creek watershed (38,813 acres) and a small portion (387 acres) of the Veazie Creek subwatershed. Vegetation conditions and trends within the Veazie Creek subwatershed are similar to those in the Marks Creek watershed.

Major aspects of the vegetative changes include:

The species composition of many forest stands has shifted from fire-tolerant species to fire-intolerant species. In general, ponderosa pine and larch dominance has declined and western juniper, Douglas-fir, and grand fir dominance has increased.

The amount of forested area dominated by large structure (trees greater than 21 inches dbh) has been reduced below historic conditions. Many stands that were once dominated by large trees have been replaced by stands in which pole and/or medium-sized trees (5-20 inches dbh) are the dominant feature. Stands of large trees with an open "park-like" nature were abundant historically; today, they are relatively scarce. Currently, there is a surplus of the LOS multi-strata condition and a deficit of the LOS single-strata condition.

Stand densities have increased. Most of this increase has occurred in the form of smaller-sized understory trees. Fire exclusion has allowed the development of shade-tolerant understory trees while at the same time selective harvest and vegetative competition have decreased the abundance of large, overstory trees.

The risk of catastrophic (stand replacement) fire has increased because fuel loadings are higher, stands are heavily stocked with smaller trees, and fuel arrangements are more continuous than those found under historic conditions.

The current trends within the project area indicate that without active management most of the major departures from the historic conditions will continue to increase. The forest vegetation across the landscape has been altered to the point that many natural disturbance agents can no longer function within their historic roles. Today, there is an elevated risk of experiencing disturbances such as stand replacement wildfire and epidemic insect and disease outbreaks on a scale which rarely occurred before. Many of the vegetative components are so far out of balance that it may take 100 years or more to return all of them to their former ranges of abundance. The fundamental capability of the system is still largely intact and with careful management can support historic vegetative conditions.

There is a need to increase the amount of forested area dominated by fire-tolerant species such as ponderosa pine and larch.

There is a need to maintain and enhance stands dominated by late and old structure (LOS) characteristics and to move closer towards levels of historic abundance.

There is a need to reduce stand density, reduce fuel loadings, and interrupt the continuous arrangement of fuel.

Project Location

The Bandit II Project Area is located about 20 miles northeast of Prineville, Oregon. U.S. Highway 26 bisects the project area.

The project area is comprised of approximately 39,200 acres primarily within the Marks Creek watershed. Marks Creek flows into Ochoco Creek, approximately 6 miles above Ochoco Reservoir, and is a part of the Deschutes/Crooked River Basin. Elevations range from 5,985 feet above sea level on Wildcat Mt. (western edge of project area) to 3,360 feet where Marks Creek joins Ochoco Creek.

There are several tracts of private land (2,325 acres) within the project area boundary.

Decision to be Made

Based on this analysis, the Responsible Official will decide whether to conduct vegetation management, road management, and riparian enhancement activities within the Bandit II Project Area.

In making the decision, the Responsible Official will look at the context and intensity of the selected alternative and determine whether the activities will significantly affect, either individually or cumulatively, the quality of the human environment. The Responsible Official will consider factors relating to the Purpose of and Need for Action and public comments when making the decision. Specific questions the Responsible Official will consider when evaluating alternatives include:

1. Has the density and species composition of timber stands been modified so that development of these stands will be towards a balance of seral/structural stages as described by the historic range of variability? Are forested stands shifting toward dominance by fire-tolerant species such as ponderosa pine and western larch? Is the dominance of Douglas-fir and grand fir declining?

2. Has the overall amount of LOS been maintained? Has the amount of single-strata LOS been increased? Has stand density been reduced to remove competitive stress on large trees? Do the management activities result in more large trees being maintained over time, as well as encouraging the development of additional large trees?

3. Have stand densities been reduced to decrease the amount of fuels? Has the amount of fuel loading been reduced? Does the number of acres that support non-lethal (low intensity) fire been increased?

4. Will the changes in forest vegetation aid in restoring wildlife habitat relationships?

5. Has the visual character of forested stands along U.S. Highway 26 been maintained or restored? Have stand densities and species composition been altered to better reflect the historic range of variability?

6. Do the proposed management activities contribute to meeting Riparian Management Objectives (RMOs) contained in the Inland Native Fish Strategy (USDA Forest Service 1995b)? Do the proposed management activities in Riparian Habitat Conservation Areas increase or maintain shade, accelerate development of large woody debris (LWD), and reestablish and rehabilitate cottonwood and aspen stands? Will road closures reduce the amount of surface erosion and sediment delivery?

7. Does the selected alternative provide economic benefits to communities such as jobs? Are commercial wood products provided?

8. How well have public comments been considered during the analysis process? Do comments submitted during the 30-day comment period provide any new information relevant to the proposed activities that has not been considered?

Relationship to the Forest Plan

This document is tiered to the Ochoco National Forest Land and Resource Management Plan (Forest Plan) and its accompanying Final Environmental Impact Statement 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).

Lands in the project area fall within 12 management allocations. They are:

MA-F3 Mill Creek Wilderness - Protect the Wilderness ecosystems. Manage use to maintain a natural setting and preserve solitude. (Forest Plan, p. 4-52.)

MA-F5 Research Natural Area - Allow natural processes to occur for research purposes. (Forest Plan, p. 4-56.)

MA-F6 Old Growth - Habitat will be provided for wildlife species dependent upon old-growth stands. (Forest Plan, p. 4-58.)

MA-F7 Summit Historic Trail - Protect the existing integrity of the Summit Trail. Enhance and interpret significant segments for public enjoyment and education. Pristine segments will be managed to protect,

interpret, and preserve their historic qualities. (Forest Plan p. 4-60.)

MA-F13 Developed Recreation - 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.)

MA-F14 Dispersed Recreation - Provide and maintain a near-natural setting for people to utilize while pursuing outdoor recreation experiences. (Forest Plan, p. 4-72.)

MA-F16 Bandit Springs Recreational Area - Provide dispersed, nonmotorized recreational opportunities within a setting where most management activities (timber harvest) are generally not evident to the casual observer. Periodic manipulation of vegetation to meet recreation and visual objectives for the area will be apparent to the user. Timber stands will be managed to develop and maintain resistance to catastrophic events that would detract from the recreational experience. (Forest Plan, pp. 4-76 and 4-77.)

MA-F20 Winter Range - Manage for big game winter range habitat. (Forest Plan, p. 4-82.)

MA-F21 General Forest Winter Range - Manage for timber production with management activities designed and implemented to recognize big game habitat needs. (Forest Plan, p. 4-84.)

MA-F22 General Forest - Produce timber and forage while meeting the Forest-wide standards and guidelines for all resources. (Forest Plan, p. 4-86).

MA-F25 U.S. Highway 26 Visual Corridor - Maintain and enhance the scenery for travelers along U.S. Highway 26. (Forest Plan, p. 4-93.)

MA-F26 Visual Management Corridors - 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 Plan, p. 4-95.)

RHCA The INFISH delineated Riparian Habitat Conservation Areas (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.

Public Involvement

Scoping and public involvement are ongoing processes used to invite public participation and to obtain input on the scope of the analysis, alternatives to be evaluated, and issues to be addressed.

The scoping process for this EA was initiated in February 2002. Letters were sent to individuals, organizations, tribal governments, and other governmental agencies. This letter included a description of the proposed action and the purpose and need for the project. This letter also identified that the Forest Service previously considered this proposal in the original Bandit EA as Alternative 5. All of the comments previously submitted during the preparation of the original Bandit EA (May 2001) and Decision Notice (January 2002) have been considered during this new analysis and have been included in the project record. Seven letters, one e-mail, and four telephone calls were received in response to the February 2002 scoping effort.

This project has been included in the quarterly schedule of projects (SOP) since Spring 2002.

Issues

Based on a review of past documents and public and internal Forest Service scoping input, three concerns stated during the scoping process and raised during the previous analysis process were utilized in developing alternatives to the proposed action.

Non-commercial Alternative

One concern used to develop an alternative to the proposed action was derived from comments related to emphasizing "restoration" only activities. One commenter stated that ecological restoration rather than commercial motivations must drive the analysis. Another commenter requested that an alternative emphasizing natural processes be developed and given fair and adequate consideration. As noted in Chapter 2, Alternative 3 was developed with an emphasis on non-commercial restoration activities. Alternative 3 does not include any commercial timber harvest or any road construction activities. The original Bandit EA also included a "restoration" only alternative. Alternative 3 in this analysis differs from that in the original Bandit EA and includes only those precommercial thinning activities that could be implemented without creating unnecessary risks to maintaining forest stands. This change was made to make this alternative more practical to implement. Areas where precommercial thinning activities would leave high amounts of fuel on the ground were eliminated, because underburning would have a high likelihood of damaging the remaining trees. Most precommercial thinning and all underburning activities within the Hash Rock fire perimeter were also eliminated.

Post-fire Salvage Logging

Several commenters requested that the Forest Service refrain from proposing any logging in burned areas.

Alternative 4 was developed in part to address concerns over post-fire salvage logging. This alternative eliminates all commercial timber harvest, both green-tree and salvage, within the Hash Rock Fire perimeter.

Bandit Springs Recreation Area

Concerns were raised that the current proposal for commercial timber harvest in the Bandit Springs Recreation Area was unchanged from earlier proposals. As described in Activities and Comments Associated with the Original EA and DN section, several changes were made to the proposed commercial timber harvest in the Bandit Springs Recreation Area. Alternative 4 in this EA was developed in part to address this concern. The amount of commercial timber harvest proposed in the Bandit Springs Recreation Area in Alternative 4 has been reduced to 48 acres.

Alternative 2 proposes 382 acres of commercial timber harvest in the recreation area, while Alternative 3 does not include any commercial timber harvest.

Activities and Comments Associated with the Original EA and DN

The scoping process for the original Bandit EA was initiated in December 1999. Adjacent landowners were invited to attend a meeting in April 2000 and Representatives from the Ranger District attended a Nordic Club Meeting in November 2000. Responses gathered during these efforts revealed concerns related to maintaining healthy forest conditions, economics, fuel loadings, the amounts and kinds of activities in the Bandit Springs Recreation Area, the amount of commercial timber harvest, riparian enhancement, open roads, general wildlife populations, and providing wood products to the community. These scoping comments were used to concentrate the original analysis on issues that were important.

A 30-day comment period on the original Bandit EA began in May 2001 and field tours were held on June 6 and June 13, 2001. Comments related to these efforts focused on activities in the Bandit Springs Recreation Area, cumulative impacts, fire ecology, livestock grazing, noxious weeds, road building, fire salvage, socio-economics, soils, water quality, wilderness areas, roadless areas, unroaded areas, wildlife, and compliance with laws such as the National Environmental Policy Act and the National Forest Management Act. Responses to these comments were prepared and attached to the January 2002 Decision Notice. These comments also resulted in several changes to the preferred alternative (Alternative 5 in the original EA). The following paragraphs summarize how these earlier public comments were considered.

Proposed activities in the Bandit Springs Recreation Area received numerous comments. During the previous alternative development phase, the interdisciplinary team determined that these comments could be addressed by adding specific design elements common to all alternatives. These design elements were included in the original EA (p. 22) and have been retained in the "new" EA. During the 30-day comment period, many comments were raised over past activities and whether the current proposals would comply with Forest Plan direction. Some commenters believed that the Bandit Springs Recreation Area should be withdrawn from any commercial timber harvest activity. The interdisciplinary team carefully reviewed all proposed activities within the Bandit Springs Recreation Area. To respond to these comments, commercial timber harvest was eliminated in all or parts of Units

725, 728, 740, 742, 751, and 752. The logging system for the remaining portion of Unit 728 was changed to helicopter. Road construction (1.9 miles of new and temporary road) was also eliminated. All of these changes, except one, were carried forward into the proposed action for this EA (Bandit II). The logging system for the remaining portion of Unit 728 in the proposed action (Alternative 2) has been changed back to tractor. This change was made because the steep portions of the unit have been eliminated, Road 2600-270 already provides roaded access, the area has previously been harvested using a tractor logging system, and a network of skid trails is already in place. Alternative 4 in this EA does not include Unit 728 because it is inside the perimeter of the Hash Rock fire and is within the Bandit Springs Recreation Area

Several comments related to road construction and commercial timber harvest were raised throughout the previous analysis. During the scoping process, commenters stated that Alternative 2 proposed too much road construction at the expense of wildlife habitat and water quality. Water quality was identified as a key issue and Alternatives 3, 4, and 5 were designed to address this issue in different ways. Alternative 3 would not construct any roads, while Alternatives 4 and 5 proposed about 1/3 of the amount of road construction that was included in Alternative 2. During the May 2001 comment period, commenters suggested that no new roads should be constructed and that tractor logging systems should not be authorized. Some commenters were concerned that commodity production was emphasized over protection of other values in the project area. The interdisciplinary team carefully reviewed all proposed road construction and commercial timber harvest included in the preferred alternative (Alternative 5). In several units, the objective of increasing the amount of area dominated by fire-tolerant species (ponderosa pine and larch) and reducing stand density could be met without commercial timber harvest. Commercial timber harvest was eliminated in all or portions of Units 108, 110, 120, 127, 138, 139, 151, 154, 162, 163, 166, 182, 186, 191, 193, 195, 211, 301, 318, 502, 509, 515, 516, 535, 537, 540, 542, 551, 553, 568, 570, 574, 705, 740, and 742. Eliminating commercial timber harvest in all or portions of Units 151, 182, 318, 502, 535, 537, 542, and 740, also eliminated the connected road construction activities. Units 111, 524, 526, 527, and 728 were changed to helicopter logging systems in order to avoid road building. All of these changes were carried forward into the proposed action for the Bandit II project, except for Unit 728 as previously discussed.

Many comments were raised that relate to snags and down wood levels. Commenters were concerned that leaving only 2.25 snags per acre would not meet the needs of wildlife species, especially in burned areas. This level was selected based on information presented by Thomas et al. (1979). Commenters stated that leaving only 2.25 snags per acre might not be consistent with the current science related to snags. Bull et al. (1997) notes that the snag numbers presented by Thomas are not adequate and need to be adjusted upward. Bull et al. (1997) also noted "Ideally, data would be available on the exact number of snags required to support specific populations of primary and secondary cavity nesters. Unfortunately, this kind of information is not available." The original EA (p. 27) disclosed that snags would be retained at a minimum of 2.25 snags per acre. The Decision Notice noted that all snags (except for safety hazards) and down logs in all units except those within the Hash Rock Fire perimeter would be retained. The number of snags to be retained in the Hash Rock Fire perimeter was developed using guidelines contained in the Ochoco NF Viable Ecosystem Management Guide. Based on stand conditions, 3 to 11 snags per acre would be retained. This change was carried forward into the proposed action.

One commenter requested that hazardous trees along the Highway 26 corridor be removed. Hazardous trees were originally identified in conjunction with Oregon Department of Transportation (ODOT) personnel and some have since fallen across the highway. As discussed above, the original EA disclosed that safety hazards would be removed or felled as part of the Bandit project. This action has been carried forward into this project. The Forest Service will work in conjunction with ODOT to remove hazardous trees along the Highway 26 corridor.

Comments were also raised on the effects that the Hash Rock Fire had on this project. The original proposed action was developed and had been circulated for public input (scoping) prior to the Hash Rock Fire. Following the fire, the District Ranger directed the interdisciplinary team to review the Marks Creek Watershed Analysis and publications such as the Environmental Effects of Postfire Logging: Literature Review and Annotated Bibliography (USDA Forest Service, Pacific Northwest Region 2000) which includes references to the Beschta et al. (1995) and Everett (1995) commentaries. Specifically, the interdisciplinary team considered the effects of the proposed action combined with the effects of the Hash Rock Fire on wildlife, water quality, soils, and erosion potential. The interdisciplinary team was instructed to identify any changes that might be necessary to achieve resource objectives based on the changed condition in the fire area. This lead the team to reduce the amount of commercial timber harvest proposed within the fire perimeter as well as eliminating activities (commercial timber harvest, precommercial thinning, and underburning) within the Hamilton Creek drainage. These changes are consistent with Beschta's recommendation that salvage logging should be prohibited in sensitive areas. The amount of commercial timber harvest within the fire perimeter was reduced further in the Decision Notice to avoid sensitive sites and/or the need to construct roads. Again, these changes were carried forward into the proposed action for the Bandit II project.

Bandit II EA Scoping Comments

The scoping process for this EA was initiated in February 2002. Responses gathered during this effort revealed several concerns. The following discussion summarizes how these scoping comments have been considered in the preparation of this EA.

Bandit Springs Recreation Area

One commenter stated that he had made input during the previous EA and that his comments were unchanged because the proposed activities had remained unchanged.

As previously stated, several changes were made to the proposed activities in the Bandit Springs Recreation Area as part of the selected alternative in the Decision Notice (January 2002) that has since been withdrawn. All of these changes, except one, were carried forward into the new proposed action. In addition, most of the proposed commercial timber harvest was eliminated from Alternative 4 in part to respond to this concern. Alternative 4 includes only 48 acres of commercial timber harvest in the Bandit Springs Recreation Area, while the proposed action includes 382 acres.

Cumulative Impacts

Commenters stated that the EA should analyze direct, indirect, and cumulative impacts for soils, water quality, fragmentation, old growth, TES (Threatened, Endangered, and Sensitive) species, MIS (Management Indicator Species), and neotropical migratory birds. And, any cumulative effects analysis needs to include effects from wildfire, fire suppression efforts, livestock grazing, and past management actions. Concerns were also expressed that the Forest Service segmented what is essentially a single project into multiple smaller projects (Bandit II project, Mill Project EIS, Hash Rock Salvage Harvest project, Pick-Up Salvage Harvest project) and that impacts of all these events must be clearly addressed in the EA.

Cumulative effects are addressed throughout Chapter 3 of the EA. The cumulative effects discussions include the effects of past activities (such as timber harvest, road construction, the Hash Rock Fire, firefighting efforts, and fire rehabilitation actions) and ongoing activities (such as livestock grazing, noxious weed control activities, and recreation use). Cumulative effects have been described for soils, water quality, connectivity, late and old structure stands, TES species, MIS, and neotropical migratory birds. The cumulative effects discussions in Chapter 3 also include a consideration of the effects of reasonably foreseeable activities (such as culvert replacements) that overlap the project area, both in timing and location.

The Forest Service has not segmented proposed activities into multiple smaller projects. When activities are connected to each other, they must be considered in a single environmental analysis. Connected actions are those activities that cannot or will not proceed unless other actions are taken. The proposed activities in the Bandit II project area can proceed in the absence of the Pick-Up Salvage Harvest Project, Hash Rock Salvage Harvest, project and the Mill Project Timber Sales (Dry, Mule, and Rocky). The Pick-Up Salvage Harvest project partially overlaps the Bandit II project area but is not connected to the Bandit II project. The Mill Project Timber Sales are in the adjacent Mill Creek Watershed which is outside the project area boundary. The Hash Rock Salvage Harvest project is no longer being considered. All past and planned timber sales, including sales in the adjacent watershed, have been described in the cumulative effects analysis discussions where needed. For example, the effects discussion related to California wolverine describes the habitat condition in the project area and in the adjacent Mill Creek Watershed because the potential range for the wolverine extends beyond the project area boundary.

Economic Efficiency and Socio-economics

Some commenters were concerned over the high levels of helicopter logging in the proposed action and requested the Forest Service to carefully evaluate the need for helicopter logging. They stated that relying on expensive logging systems to remove low value products would result in work not getting accomplished. Another commenter noted that any commercial timber sales that are offered must be economically viable to operate and should not include any unnecessary restrictions like lopping slash to 12 inches or requiring seasonal closures for species that are not known to inhabit the area. Other

commenters stated ecological restoration, rather than commercial motivations must drive this process.

The Forest Service recognizes timber sales that are offered must be economically viable to operate. Offering viable timber sales is important because it assists in achieving resource objectives and supporting local economies by creating jobs. If timber sales receive no bids, the needed work must be accomplished in another fashion. On the other hand, designing a project based solely on economic harvest opportunities would preclude many areas from being treated to accomplish resource objectives.

In order to make the Bandit II project economically viable while still achieving desired resource conditions, the proposed action (Alternative 2) was adjusted so that only two logging systems were considered instead of three. This would eliminate move in costs associated with a skyline logging system. A few low volume units (138, 192, 210, and 572) were changed to precommercial thinning and underburning because those activities would still meet resource objectives. The lower diameter limit for marking trees for commercial timber harvest was changed to 9 inches for ponderosa pine and 8 inches for Douglas-fir, instead of 7 inches as originally considered. Precommercial thinning activities will remove trees up to 9 inches dbh so that the objective of reducing stand density will still be met. The Forest Service recognizes that helicopter logging systems are expensive. In many cases, helicopter logging was selected in order to avoid expensive road building and/or adverse effects to fish and water quality. The interdisciplinary team also recognized that lopping slash to 12 inches might be excessive in some cases. Where fuel loadings are high and there is a high risk of stand replacement fire, lopping to 12 inches would be required to reduce this risk and help maintain residual trees. Seasonal restrictions related to wildlife and their habitats have been carefully considered. The EA does not require any seasonal restrictions for wolverines or lynx. These changes have also been incorporated into Alternative 4.

Commenters stated that logging may be an important sector of the economy, but the public is generally opposed to logging mature and old-growth forests.

The proposed activities do not include logging of late and old structure trees (live trees 21 inches diameter at breast height or larger).

Other commenters stated that timber harvest may not be needed to support local communities and wanted to know where community income is derived from. Some commenters wanted to know what communities would benefit from commercial timber harvest because the demand for lumber near the Bandit II project area has been reduced as a result of mill closures in Prineville. One commenter noted it is of the utmost importance that the Forest Service provide saw timber and were concerned mills in Gilchrist and John Day face an uncertain future because of log supply. This commenter also stated there is a demand for products produced from wood and letting this resource go to waste because of fire, disease, insects, and other causes of mortality, is an unwise use of the renewable resource.

The lumber and wood products sector, including secondary wood products, is a large contributor to the economic well being of the Crook County area. According to the 2000 census, the three largest

employment sectors in Crook County were trade (1,640), lumber and wood products (1,510), and government (1,180). The 2000 census also notes that the economy of Crook County has lagged behind the State of Oregon as a whole because of its overall low economic diversity, dominated by one manufacturing sector industry (lumber and wood products) and one wholesale trade sector company (Les Schwab). The 2001 Central Oregon Area Profile prepared by the Economic Development for Central Oregon organization reports on the primary industries in central Oregon. Important industries in central Oregon included primary and secondary wood products in Crook County and secondary wood products in both Deschutes and Jefferson Counties. The demand for timber products has not decreased because of mill closures in Prineville; two commenters from the local community expressed their desire to see timber offered for sale. Offering timber for sale provides job opportunities in communities where sawmills continue to operate such as John Day and Gilchrist, along with the potential local employment associated with logging operations. The actual benefit to the economy will depend on the market value of the timber when sold, the actual logging costs, and the location where logs are milled. These items are speculative and cannot be predicted with accuracy, because it is not known where logs will be milled and what market conditions will be at the time timber is offered for sale.

Some commenters thought the project would damage social and economic uses and values associated with natural forests for the benefit of the timber industry, even though non-timber uses and values may be far more important to local communities and the regional economy. Commenters thought the opportunity costs of the logging program, including the value of forgone uses on areas logged plus the benefits associated with alternative uses of timber sale funds should be evaluated on a project basis. They requested an impartial analysis of both market and nonmarket values associated with each alternative.

The Forest Plan included a net public benefits analysis that considered the present net value, market and nonmarket values, costs, net receipts, returns to the treasury, and noncash benefits. Both priced and nonpriced outputs and effects were considered. The EA does not include a similar analysis because the scope and scale of the project area is not large enough to accurately or adequately analyze projected demand and supply potential for goods and services.

Firefighting Activities

Commenters were concerned over the suppression activities related to the Hash Rock Fire. They wanted to know how many miles of firelines were constructed and how much fire retardant was used. They were also interested in the location of firelines and whether firelines crossed any streams. Several commenters stated the effects of firelines and retardant use must be disclosed and discussed in the cumulative effects analysis. Finally, commenters wanted to know how firelines would be rehabilitated and how fire retardant would be cleaned from the area.

During suppression efforts related to the Hash Rock Fire, a total of 35 miles of bulldozed (machine) and 6 miles of hand firelines were constructed. Of the total, 9.2 miles of bulldozed (2.1 miles were on existing roads) and 2.7 miles of hand firelines are within the Bandit II project area. Rehabilitation of

firelines occurred in the fall of 2000. Fireline rehabilitation activities included one or more of the following: (1) spreading berms back across the fireline, (2) smoothing the area to the natural level of the terrain, (3) installing waterbars, (4) discouraging use by covering newly established lines with brush, limbs, or other native material in a naturally-appearing arrangement, and (5) seeding firelines with a mix appropriate to site potential. Also, fire rehabiliation included removing all trash, garbage, flagging, and litter. Firelines crossed streams a total of 15 times: 14 bulldozed and 1 hand fireline. Six of the bulldozed lines were at existing stream crossings, the remaining eight were new crossings.

A total of 109,000 gallons of fire retardant were used during the Hash Rock Fire suppression efforts. An estimated 20,000 gallons were used in the Bandit II project area. There are no plans to clean the retardant from the project area because it consists primarily of ammonium polyphosphate, a commonly used agricultural fertilizer.

Chapter 3 contains a discussion of the cumulative effects of the Hash Rock Fire and the fire suppression efforts.

Grazing

Commenters were concerned about livestock grazing in the project area and in the recently burned area. One commenter noted that he personally observed livestock in the burned area in spite of the fact that the Forest Service stated the area would be rested from grazing. He wanted to know if livestock would be allowed to graze in the area during the 2002 grazing season. Commenters were concerned that livestock grazing would be allowed to continue in areas that are already open to grazing and wanted to know what effects were caused by grazing.

Livestock are authorized to graze lands throughout the project area, with the exception of the Research Natural Area. As stated, the Forest Service will not authorize livestock grazing in the fire area until vegetation has been re-established. The burn area was monitored during the fall and winter following the fire. Based on that evaluation, grazing was not authorized for the Big Pasture in the Mill Creek Allotment and numbers of livestock and season of use were altered within the Wildcat Allotment during the 2001 grazing season. The numbers of livestock permitted within the Wildcat Allotment during the 2002 grazing season has again been reduced to allow for vegetative recovery in the fire area. During 2001, the permittee for the Wildcat Allotment (the area where cattle were observed) was required to keep livestock out of the high intensity burn areas in upper Hamilton Creek. However, there were cattle in the area and these cattle were trespassing from another allotment. The Forest Service has had discussions with the owner of the trespass cattle and will take further actions if trespass violations continue. As previously stated, the Forest Service has not and will not authorize livestock grazing in the high intensity burn area until the vegetation has been re-established.

Livestock grazing will continue to be authorized throughout the project area. The Ochoco National Forest is utilizing monitoring requirements from the Grazing Implementation Monitoring Module (ITT, 2000) in grazing allotments. These monitoring results provide a mechanism to annually review livestock

grazing and make adjustments. Adjustments can be identified and implemented as part of the annual operating plan for individual grazing allotments so that resource objectives will be met.

Reducing or eliminating livestock grazing would not be expected to change species composition or the density of trees and is outside the scope of the purpose and need for action relating to managing forest vegetation (i.e. trees). Another purpose relates to contributing to riparian management objectives. The interdisciplinary team recognized that livestock grazing could affect riparian enhancement projects. Specific activities such as piling slash to protect aspen seedlings from browse and fencing to protect newly planted willow and cottonwood have been identified as connected actions to ensure that riparian enhancement projects are successful. The effects of livestock grazing are addressed in the cumulative effects sections for water quality, fish habitat and riparian areas, and competing and unwanted vegetation, in Chapter 3.

The Allotment Management Plan for the Wildcat Allotment is scheduled to be updated in 2005. Changes to grazing regimes such as season of use and permitted numbers would be considered at that time.

Logging

Commenters were concerned that past clearcut logging in combination with new logging proposals would increase large openings across the Forest. Commenters wanted to know how many openings were allowed by the Forest Plan. Commenters wanted to know about recent sales and wanted to know what actions would be taken to reduce adverse effects from commercial timber harvest. Some commenters felt that helicopter logging systems should be required to minimize the adverse effects of logging. Others stated that relying on expensive, helicopter logging systems would result in not accomplishing needed work because of the low value of the product being offered.

There are no clearcuts proposed in the Bandit II project area. Small openings, up to 2-1/2 acres in size will be created in goshawk post-fledging areas to improve goshawk foraging opportunities. Commercial timber harvest and precommercial thinning activities are designed to reduce stand density by removing small to medium-sized trees (less than 21 inches dbh) from the understory. Understory thinning will not create large openings. The maximum size for created openings allowed by the Forest Plan is 40 acres, with some exceptions that allow openings as large as 60 acres. The Forest Plan does not contain a criterion that specifies a percentage limit for openings within individual project areas.

The Pick-Up Salvage Harvest is the only sold, but not harvested timber sale within the Bandit II project area. Harvest began in 2001 and should be completed by early summer 2002. Other recently logged sales include Marks and Harpo. Commercial harvest activities on these sales have been complete for 7 and 4 years respectively. One commenter asked for information concerning all sales within the past 15 years, in addition to the sales mentioned above, these older sales include McGinnis, Koch, Claypool, H&G, Thunder, Ace, and Felix. Post-sale activities such as animal damage control, slash disposal, precommercial thinning, and underburning are continuing in some of the Marks and Harpo units.

Noxious Weeds

Commenters raised concerns over noxious weeds and were interested in knowing what actions were being taken to control the spread of noxious weeds.

Chapter 3 includes a section on Competing and Unwanted Vegetation (Noxious Weeds). This section describes the weed species that are known to occur in and near the project area, the Ochoco NF strategy for managing noxious weeds, and the expected effects of each of the alternatives. Chapter 2 includes a description of the design elements that have been incorporated into each alternative to help reduce the potential for introduction and spread of noxious weeds.

Late and Old Structure (LOS) Stands

Commenters stated that it appeared large diameter fir and other trees may be harvested simply to encourage ponderosa pine, even though the project area historically may have been mixed-conifer forests. The Forest Service was urged to retain all late-successional and old-growth remnant stands within the project area.

Large diameter fir and other large diameter trees will be retained. None of the alternatives propose to remove live trees 21 inches dbh or greater. Alternative 2 proposes to remove some dead trees that are greater than 21 inches dbh inside the Hash Rock Fire perimeter. Alternative 2 proposes 707 acres of commercial timber harvest within multi-strata LOS stands, while Alternative 4 proposes 658 acres of commercial timber harvest within multi-strata LOS stands. These treatments would remove understory trees to reduce stand density, maintain existing large trees, and enhance development of additional large trees. Commercial timber harvest would change multi-strata LOS stands to single-strata LOS stands. All LOS stands in the project area would remain.

Purpose and Need

Commenters stated the purpose and need should focus on rehabilitating the forest ecosystem and rehabilitation must go beyond road closures and mitigation for damage being done by the current project. Some commenters supported the purpose of managing forest stands and believe that overstocked stands resulting from fire suppression may benefit from carefully tailored thinning. Others thought the Forest Service should refrain from tampering with the existing condition absent scientific finding that timber harvest is "*required*" to aid the development of forest habitat. Two commenters thought it was important to provide commercial timber products, while another stated the purpose and need could be met more efficiently through means other than commercial timber harvest. Finally, some commenters felt that the Forest Service might be attempting to achieve a range of conditions that may not match historical conditions.

The purpose of and need for action (earlier in this Chapter) was primarily derived from two sources: (1) management area goals and objectives contained in the Forest Plan and (2) findings in the Marks Creek

Watershed Analysis. As stated, the purpose of the proposed action is to improve forest vegetation and move toward conditions that are sustainable and provide habitat diversity. Natural processes, including fire regimes and endemic insect infestations, have been interrupted by past management practices such as fire suppression, timber harvest, and road construction. The proposed management actions have been designed to restore forest stands and emulate natural disturbance processes.

The objective of the project is to manage forest stands toward conditions that approach the variety and abundance which occurred historically. This variety included both young and old stands, stands dominated by ponderosa pine (i.e. open, park-like), and multi-storied, dense stands of mixed-conifer forests. Managing for a variety of conditions would support natural processes and a diversity of wildlife habitats that are resistant to catastrophic disturbances.

In response to comments, this EA considers a range of alternatives that includes and excludes commercial timber harvest activities. Alternatives 2 and 4 include commercial harvest activities, while Alternative 3 includes a combination of precommercial thinning and underburning activities. All of the action alternatives were designed to meet the purpose of and need for action.

Recent Court Decisions

One commenter stated that the Forest Service has already been directed, as a result of recent litigation on the Hash Rock Fire Salvage project, to prepare an EIS for this project.

In the recent League of Wilderness Defenders - Blue Mountains Biodiversity Project et al. v. Harv Forsgren et al. lawsuit, the Judge did not require the Forest Service to prepare an EIS for this project or for the Hash Rock Fire Salvage project. In his Opinion and Order, the Judge found that the plaintiffs successfully raised serious questions going to the merits of the litigation and granted a preliminary injunction. The judge also noted that the plaintiffs raised serious questions regarding whether an EIS should have been prepared, but stopped short of requiring the Forest Service to prepare an EIS for the Hash Rock project. The Judge's January 30, 2002, Opinion and Order does not specifically mention nor does it require the Forest Service to prepare an EIS for the Bandit II project.

Roadless Areas

Commenters were concerned with the location of proposed road construction activities and wanted to know if roads would be constructed in inventoried, uninventoried, or unroaded roadless areas. Commenters also wanted to know how the Forest Service was proceeding with timber harvest in light of new roadless area rules.

This area does not contain any inventoried roadless area or any uninventoried, unroaded areas. The interdisciplinary team used the definition of unroaded areas from the Forest Service Manual (FSM) 7710, Transportation Atlas, Records, and Analysis (published in the Federal Register on January 12, 2001). The manual identifies "Contiguous unroaded areas of more than 1,000 acres that are contiguous

to ... Congressionally designated wilderness areas... These areas of 1,000 acres or more must have a common boundary of considerable length, be at least one-quarter mile in width, and provide important corridors for wildlife movement or extend a unique ecological value of the established inventoried area."

The proposed timber harvest activities do not fall under the "new" management of inventoried roadless area policy (December 14, 2001) because they are not within an inventoried roadless area.

Roads

Commenters were interested in knowing about road densities and what was included in the calculation of road densities. Commenters also wanted to know what the likelihood of closing roads was and what would happen if the planned closures did not occur. Commenters wanted to know the method of closure and success rate in closing roads. Commenters were also interested in how road construction activities relate to the roads analysis process.

The road density calculations contained in Chapter 3 are for open road density. The open road density is the number of miles of open roads in a given area divided by the total square miles of the area. This calculation includes both main and spur roads, but does not include closed roads. Currently, the open road density is 2.61 miles per square and is below the Forest Plan standard of 3.0 miles per square mile. The Transportation System (Roads) discussion in Chapter 3 includes a discussion of the current open road density and the open road density following proposed road construction and closure activities.

All planned road closures would take place over the next several years. Several methods are used to close roads and include installing barriers, earth berms, logs, boulders, and/or gates. The effectiveness of road closures depends on several factors including, location, topography, surrounding vegetation, and closure method. Currently, 63.0 miles in the Bandit II project area are managed in a closed condition. The roads analysis for the Bandit II project area found there were 7.8 miles of ineffective road closures; about 12% of the road closures in the project area are not effective. Additional efforts will be made to reinforce these closures.

The roads analysis process is used to help make informed road management decisions. A roads analysis was completed for the Bandit II project area and is contained in Appendix B to this EA.

Salvage Logging

Several comments stated that the Forest Service should refrain from salvage logging, while others felt that salvage logging should be done quickly so that burnt timber did not go to waste or lose value. Some commenters stated that there was considerable controversy surrounding post-fire salvage logging. One commenter stated that there was scientific controversy over whether salvage is appropriate, that an EIS was needed, and referred the Forest Service to the Beschta Report.

Several groups felt that if salvage logging were to continue, the Agency needed to read and incorporate

the findings of the Beschta report. Other commenters felt that the clear intent of the Beschta report was no action, which was "only one side of a coin." One commenter stated that the Forest Service should disclose the findings of the Everett Report (1995) and the Environmental Effects of Postfire Logging: Literature Review and Annotated Bibliography, PNW-GTR-486 (USDA Forest Service, 2000). Some commenters stated that there was no scientific literature that supported salvage logging, but there was substantial literature, such as the Beschta Report, that explain the negative impacts. Other comments stated logging should be prohibited on severely burned sites such as Bandit because of erosion, sediment, and the accompanying loss of soil nutrients.

The public debate surrounding post-fire salvage logging was demonstrated by the contradictory comments that were received (i.e. don't log and log quickly). The public debate on post-fire salvaging logging is also recognized in PNW-GTR-486. That report notes proponents are primarily land managers who have a strong tendency to do some form of active management. Opponents argue that the salvage logging causes damage to burned sites. In order to respond to these comments, the salvage logging included as part of the proposed action was retained and an alternative was developed that does not include any commercial timber harvest in the Hash Rock Fire perimeter.

Members of the interdisciplinary team reviewed the Beschta et al. Report (1995), the Everett Report (1995), and PNW-GTR-486 as suggested. In addition, other documents were also reviewed. They included the 1995 Forest Health and Timber Harvest on National Forests in the Blue Mountains of Oregon (Johnson et al.), the undated Ice review of the Beschta Report, the 1999 Proceedings of the NCASI West Coast Regional Meeting (Ice and Beschta), the 1995 Forest Service Research Review of the Beschta et al. report (also referenced as the Conard et al. review), and the Evaluating the Effectiveness of Postfire Rehabilitation Treatments report (RMRS-GTR-63, Robichaud et al. 2000). All of these documents are on file at the Lookout Mountain Ranger District. Specific information about how the individual resource specialists considered these documents are contained in the reports they prepared for this project. These reports were used in the preparation of the environmental consequences discussion contained in Chapter 3. These reports are contained in the project analysis file.

The interdisciplinary team considered the Beschta report to be an opinion paper, not scientific literature. Several other documents support this conclusion. The 2000 Literature Review and Annotated Bibliography (PNW-GTR 486) described the Beschta report as "commentary." Eight scientists from the Forest Service Research Branch (USDA Forest Service 1995a) conducted an evaluation and peer review of the Beschta report. These scientists expressed reservation about the tone, specificity, and general application of many of the recommendations. Susan Conard, a Forest Service research scientist, noted "that it does not really merit a true scientific peer review, as it is not a scientifically written paper." Conard also noted that a major concern for her was that no basis was given for most findings or recommendations. George Ice, a Research Forest Hydrologist, in his review found that many of the assumptions and opinions were either incorrect or unsubstantiated.

The Beschta et al. report (1995) does include some broad recommendations that the interdisciplinary team considered to be worthwhile as they relate to the site conditions in the Bandit II project area. Specifically, the following recommendations were used to aid in developing the proposed action.

(1) *Existing condition should not be used as "baseline" or "desired" conditions.* The desired condition for the entire project area, not just the portion that was burned, was derived from the Forest Plan and the recommendations contained in the Marks Creek Watershed Analysis. The existing condition was used during the effects analysis as the baseline to describe how proposed activities would move toward the desired condition.

(2) *No management activity should be undertaken which does not protect soil integrity.* The Forest Plan, as well as regional standards for soils, identify that managers should strive to reduce compaction and displacement and that a minimum of 80 percent of a total activity area should remain in a non-compacted, non-displaced condition, as realistically possible, 1 year after any land management activity. All activities were designed to comply with these standards.

(3) *Salvage logging should be prohibited in sensitive areas.* Sensitive areas were described as severely burned sites, erosive sites, fragile soils, roadless areas, riparian areas, steep slopes, or any site where accelerated erosion is possible. The majority of the severely burned sites within the project area are within the Mill Creek Wilderness and the Hamilton Creek drainage; salvage logging is not proposed in either of these areas. Salvage logging was not proposed on erosive sites (i.e. landslide terrain), fragile soils, or riparian areas. There are no roadless areas in the project area. Where salvage logging is proposed on slopes greater than 30 percent, helicopter logging systems were designated to minimize the amount of ground disturbance and potential to accelerate erosion.

(4) *On portions of the post-fire landscape determined to be suitable for salvage logging, limitations aimed at maintaining species and natural recovery processes should apply.* Most of the areas where salvage logging is proposed burned at low to moderate intensity and live vegetation is still present. All live trees greater than 21 inches dbh will be retained. Many standing dead trees greater than 12 inches will be removed; however, snags will be retained individually or in clumps to provide habitat for wildlife. Retaining snags also contributes to future down wood. Some live trees will be removed depending on the number and size of live trees within the harvest units. Commercial timber harvest activities are proposed in areas where the fire burned at low intensity (less than 30% mortality of the overstory trees) and stand densities are still higher than desired.

(5) *Because of the wide range of chronic ecological effects associated with road building, the building of new roads in the burned landscape should be prohibited.* The amount and location of proposed road construction, including construction of temporary roads, across the entire project area was carefully reviewed. There are several existing roads within the Hash Rock Fire perimeter and no road construction is needed to access areas proposed for salvage logging.

(6) *Active reseeding and replanting should be conducted only under limited conditions.* The proposed planting activities within the fire perimeter are on areas that are susceptible to erosion. Deciduous (hardwood) species (willow, cottonwood, aspen, etc.) and conifers would be planted in areas along Reilly, McGinnis, East Fork Hamilton, and West Fork Hamilton Creeks in order to help stabilize

streambanks and reduce potential erosion.

In January 2000, the Forest Service' Pacific Northwest Research Station issued a general technical report titled "Environmental Effects of Postfire Logging: Literature Review and Annotated Bibliography" (PNW-GTR 486) that gathered the limited scientific information on post-fire logging into one document. PNW-GTR-486 reviewed and discussed the existing body of scientific literature on logging following wildfire. In the conclusions, the authors noted there is scientific evidence that both lends support to and discourages post-fire salvage logging. They recommend caution and believe that like most practices, post-fire logging is certain to have a wide variety of effects, depending on where the site lies in relation to other post-fire sites, site characteristics, logging methods, and fire intensity. Johnson et al. (1995) noted "There is relatively little environmental/ecological risk on the National Forests in the Blue Mountains from salvage and restoration treatments, which use low-impact logging and roading methods, undertaken in the context of Forest Plans, watershed analysis, East-side screens, PACFISH and an active monitoring/review." The scientific literature does not provide a clear answer as to whether post-fire salvage logging is harmful, neutral, or benign, and depends on the type of activity (such as tractor v. helicopter logging) and the resource (such as soils or snag habitat) that was studied. The scientific literature does provide the land manager with evidence that caution should be used when designing post-fire salvage logging projects. In this case, caution was used in designing the proposed salvage logging activities included in Alternative 2. This is demonstrated by excluding riparian areas and the Hamilton Creek area from salvage logging, using helicopter logging to reduce ground disturbance, and avoiding road building within the fire perimeter.

Soils

Commenters were concerned about the effects tractor logging has on soils and wanted to know how much of the planning area was in a compacted condition. Other areas of concern included soil types, areas that are highly susceptible to erosion, and what mitigation measures would be used to curb adverse impacts to soils. One commenter noted that Klock (1990), Marston and Haire (1990), and Minshall et al. (1994) acknowledge that erosion, sedimentation, and the accompanying loss of soils nutrients are issues in salvage logging operations.

The effects of the proposed activities on soils are described in Chapter 3 of the EA. The Soils Scientist and other members of the interdisciplinary team completed a unit-by-unit assessment of detrimental soil conditions during the preparation of this analysis. That assessment is summarized in the discussion of expected effects to the soils resource contained in Chapter 3. Chapter 2, design elements common to all alternatives, includes a discussion of the "mitigation" measures that will be used to lessen adverse impacts to soils.

The referenced reports related to erosion and loss of soil nutrients were reviewed. Klock (1995) noted that traditional tractor logging systems in a post-fire environment resulted in more soil disturbance and erosion than advanced logging systems (helicopter, skyline, over-snow tractors). The findings reported by Klock (1995) are widely known and are considered to be general knowledge. The study by Marston

and Haire (1990) was conducted in Yellowstone National Park on glacial till and volcanic terrain. Marston and Haire (1990) found that postfire logging had little effect on runoff, soil loss, litter, or organic matter when compared to burned areas that were not logged. The Marston and Haire study provides evidence that salvage logging can occur without causing unacceptable levels of erosion and nutrient loss. The Minshall et al. (1994) paper is a letter written to former President Clinton on fire and salvage logging. This letter is an opinion paper, not scientific literature, and did not provide the interdisciplinary team with any relevant information specific to the proposed action.

Watersheds and Riparian Areas

Commenters were concerned that proposed activities would increase sediment within the watershed and wanted to know if there were any water quality limited streams in the project area. Commenters also wanted to know if RHCAs included all intermittent streams, seeps, springs, and unstable and potentially unstable areas. Commenters were also interested in knowing if timber sale activities were proposed on steep slopes within riparian areas and if there were any creek crossings. One commenter asked if there were any meadows in the project area.

The effects of the proposed activities on water quality, including sediment, are described in Chapter 3. The team recognized that timber harvest activities, including salvage logging, could increase erosion (sediment delivery) and damage soils (primarily compaction and displacement). Commercial timber harvest activities were designed to minimize (not eliminate) both sediment delivery and soil damage. Specific items the team considered when designing activities included soil type and erosion potential, steepness of slopes, proximity to streams, type of logging system, and existing soil damage. Activities were designed to reduce the potential amount of sediment delivery. Numerous design elements (see Chapter 2) will mitigate potential adverse impacts. There are several creeks and streams within the project area. The only stream on the 303(d) list of water quality limited waterbodies is Marks Creek.

RHCAs are defined in the Inland Native Fish Strategy (USDA Forest Service 1995b). RHCAs include areas around streams or waterbodies, including ponds, lakes, reservoirs, wetlands, intermittent streams, landslides, and landslide-prone areas. As described in Chapter 2 under the individual alternative descriptions, some timber harvest will occur within RHCAs. Timber harvest within RHCAs would not planned occur on steep slopes.

There are several meadows within the project area. U.S. Highway 26 runs through the most recognizable one, Spears Meadow.

Wildlife

Commenters were concerned about threatened, endangered, sensitive, state-listed, and management indicator species in the project area. They also wanted to know if there were any dispersal corridors or ecologically significant units in the project area. Concerns were also raised over the effect on old-growth dependant species. One commenter asked if there were deer, elk, marten, lynx, or wolverine found in the

project area.

Chapter 3 of the EA includes a description of the effects related to threatened, endangered, and sensitive species. The bald eagle is the only federally listed species known to occur on the Ochoco National Forest. There are eight wildlife species on the Regional Forester's sensitive species list that are known or suspected to occur on the Ochoco National Forest. They are Peregrine falcon, bufflehead, upland sandpiper, western sage grouse, gray flycatcher, tricolored blackbird, pygmy rabbit, and California wolverine. The list of Regional Forester's sensitive species includes species that are designated by the State of Oregon as threatened or endangered (see November 28, 2000, Regional Forester letter (File Code 2670) re: Updated Regional Forester's Sensitive Animal List).

Management indicator species are also discussed in Chapter 3. Pileated woodpecker was picked as an indicator for species that require mature forest and old-growth habitat. Primary cavity excavators and the common flicker were selected to represent species that utilize snags and old-growth juniper habitat. Based on the Viable Ecosystems Management Guide (Simpson et al. 1994) two species of guild specialists, the white-headed and pileated woodpeckers, were identified for measuring effects on primary cavity excavators. Brook and rainbow trout were selected to represent aquatic habitats. The expected effects to these species are described in Chapter 3.

No areas have been specifically identified as dispersal corridors; however, there are connective corridors linking allocated old-growth and Late and Old Structure Stands greater than 100 acres in size. The effects on these connective corridors and the number of acres treated within them are discussed in Chapter 3. There are no areas that have been identified as ecologically significant units in the project area.

The project area is used by deer and elk. The project area contains habitat for marten and wolverine. The project area does not contain habitat for lynx. Surveys for marten, wolverine, and lynx did not detect the presence of any of these species. Chapter 3 of the EA includes a discussion of the expected effects on big game habitat and on wolverine.

CHAPTER 1
CHAPTER 2
CHAPTER 3 Part A
CHAPTER 3 Part B
CHAPTER 3 Part C
LIST OF PREPARERS

R.A. Jensen

CHAPTER 2
ALTERNATIVES

This chapter contains four parts: 1. A description of the process used to formulate alternatives, 2. Alternatives considered but eliminated from detailed study, 3. A description of each alternative considered in detail, and 4. A comparison of the alternatives.

Process Used to Formulate Alternatives

The process used in developing the alternatives began with a review of the purpose of and need for action by the interdisciplinary team. The interdisciplinary team also relied on comments received during the scoping process and applicable direction in the Forest Plan.

Alternatives Considered but Eliminated from Detailed Study

Two alternatives that were previously considered have been eliminated from detailed study.

The first was an alternative that focused simply on meeting the desired vegetation condition contained in the Marks Creek Watershed Analysis and described in the purpose of and need for action. This alternative would have moved toward the desired condition faster than any other alternative but would have cause unacceptable levels of sediment delivery. The road construction and reconstruction activities that would be needed to remove merchantable trees from the National Forest would result in increased levels of sediment entering streams in the short term (about 5 years while harvest operations were occurring) and possibly the long term (more than 20 years). These increased amounts of sediment would cause adverse effects to redband trout and may violate the Clean Water Act. In addition to concerns over water quality and effects to fish species, numerous commenters also raised concerns over effects to wildlife, fragmentation of wildlife habitat, and effects to recreation use. This alternative was the proposed action (Alternative 2) in the original Bandit EA.

The second alternative that was eliminated from detailed study would have avoided short-term impacts to water quality and habitat for wildlife species such as the pileated woodpecker and the northern goshawk. This alternative would avoid commercial timber harvest in RHCAs (Riparian Habitat Conservation Areas), pileated woodpecker feeding habitat, goshawk PFAs (Post-Fledging Areas), and connectivity corridors. This alternative also would avoid precommercial thinning in RHCAs. This alternative was eliminated because it severely restricted activities designed to improve habitat conditions. This alternative was Alternative 4 in the original Bandit EA.

Alternatives Considered in Detail

Alternative 1 (No Action)

Alternative 1 is the no action alternative. Commercial timber harvest, associated activities, and other vegetation treatments would not occur. Riparian enhancement projects would not occur. Ongoing uses in the project area, such as road maintenance, treatment of noxious weeds, livestock grazing, and recreation use, would continue. Restoration projects, such as culvert replacements that were authorized in other documents, would be implemented.

Alternative 2 (Proposed Action)

This alternative is the proposed action. Proposed activities were designed to meet the purpose of and need for action as described in Chapter 1. The alternative maps on pages 25-26 display the proposed management activities.

Commercial timber harvest including:

Thinning (HTH) - 413 acres, and
Salvage Harvest (HSV) - 140 acres, and
Improvement Cutting (HIM) - 1,822 acres.

Commercial timber harvest would be done using tractor (1,212 acres) and helicopter (1,163 acres) logging systems. Commercial timber harvest includes 140 acres of salvage (primarily dead tree) harvest and 200 acres of green (live tree) harvest within the Hash Rock Fire perimeter. All acreage figures are approximate. An estimated 4.8 MMBF of timber would be harvested.

Other management activities including:

Precommercial Thinning (PCT) - 5,395 acres,
Natural Fuels Underburning - 5,450 acres,
Activity Fuels Underburning - 4,573 acres,
Activity Fuels Handpiling - 410 acres,
Activity Fuels Grapple Piling - 54 acres, and
Hardwood Enhancement and Riparian Planting (RIP) - 149 acres.

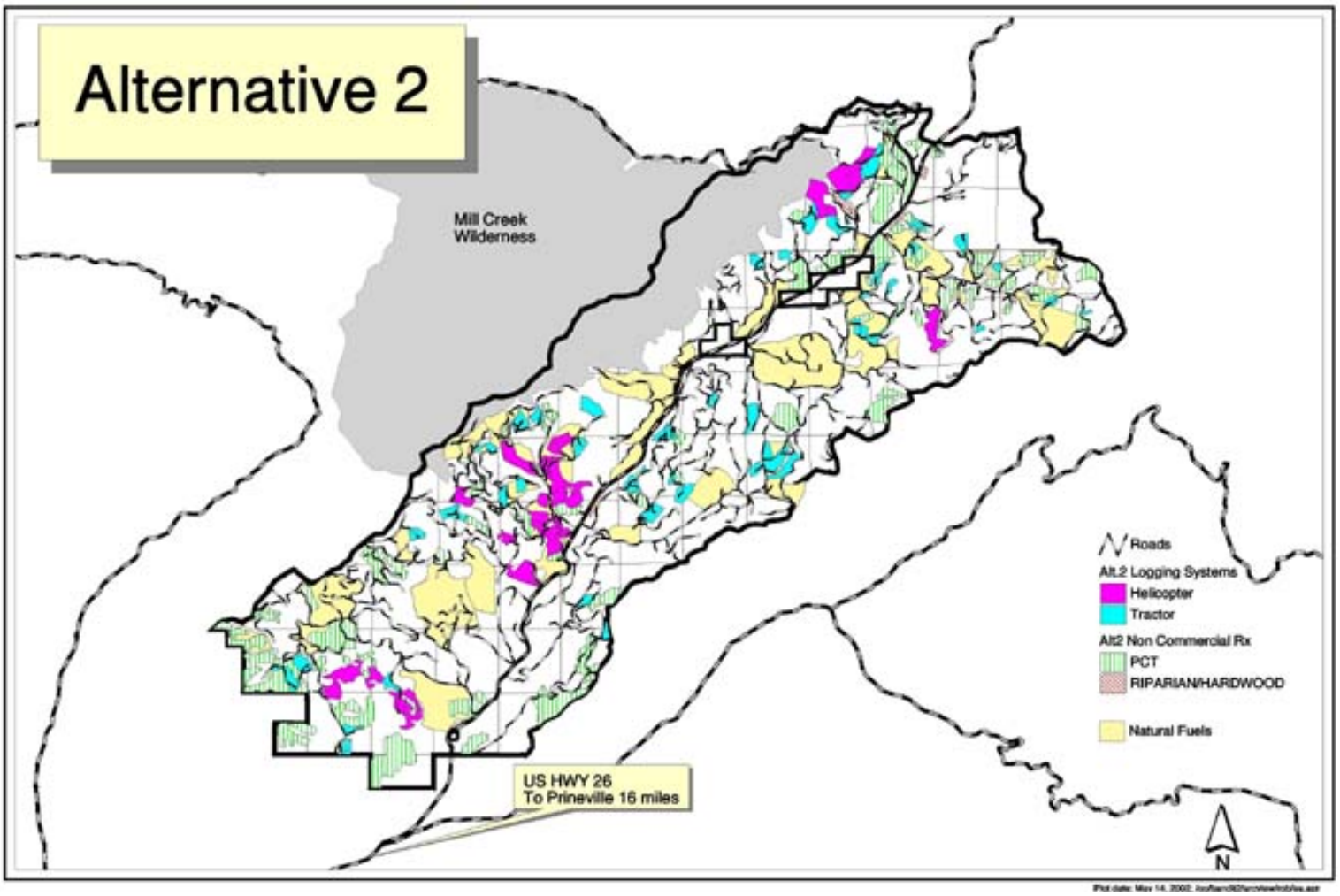
Road management would consist of:

New Construction - 2.2 miles,
Reconstruction or surfacing - 9.8 miles,
Temporary construction - 1.4 miles,
Reuse existing temporary roads - 4.7 miles
Inactivation - 17.3 miles, and
Decommission - 8.8 miles.

Seventy-one (71) acres of commercial timber harvest and 233 acres of precommercial thinning would occur within Riparian Habitat Conservation Areas (RHCAs). RHCA widths vary dependent on stream class as shown below:

Class IV (includes springs and wetlands less than 1 acre) - 50 feet
Class III (includes springs and wetlands 1 acre or larger) - 150 feet
Class I and II - 300 feet.

Alternative 2 activity map



Alternative 2 road map

There would be no commercial timber harvest inside RHCAs within the Hash Rock Fire perimeter. Outside of the Hash Rock Fire perimeter, no-harvest buffers will be used to ensure compliance with shade and large woody debris requirements, to maintain root strength that contributes to bank stability, and to reduce potential sediment delivery. Outside of the Hash Rock Fire perimeter, commercial harvest would not occur within the following distances from streams:

Class IV (includes springs and wetlands less than 1 acre) - 50 feet
Class III - 100 feet
Class I and II -
    Helicopter Logging System - 100 feet
    Tractor Logging System - 200 feet
Wetlands greater than 1 acre
    Tractor Logging System - 100 feet

Hardwood enhancement and riparian improvement activities would occur on 149 acres within the project area, primarily in RHCAs. Treatments include commercial timber harvest and precommercial thinning within aspen stands to reduce aspen competition with conifers; piling slash and fencing to protect aspen seedlings from browse; hardwood and conifer planting; headcut repair (Cornez and Little Hay Creeks); and planting and matting to stabilize a landslide area and reduce sediment delivery.

Alternative 3

This alternative was developed in response to public comments concerning a desire for an alternative with no commercial

harvest that emulates natural disturbance processes. Under this alternative, natural fuels underburning and precommercial thinning are emphasized. Precommercial thinning activities are proposed to ensure that the desired species composition (more ponderosa pine and larch, less fir and juniper) is retained. No commercial timber harvest or new road construction would occur. The alternative maps on pages 28-29 display the proposed activities.

Management activities including:

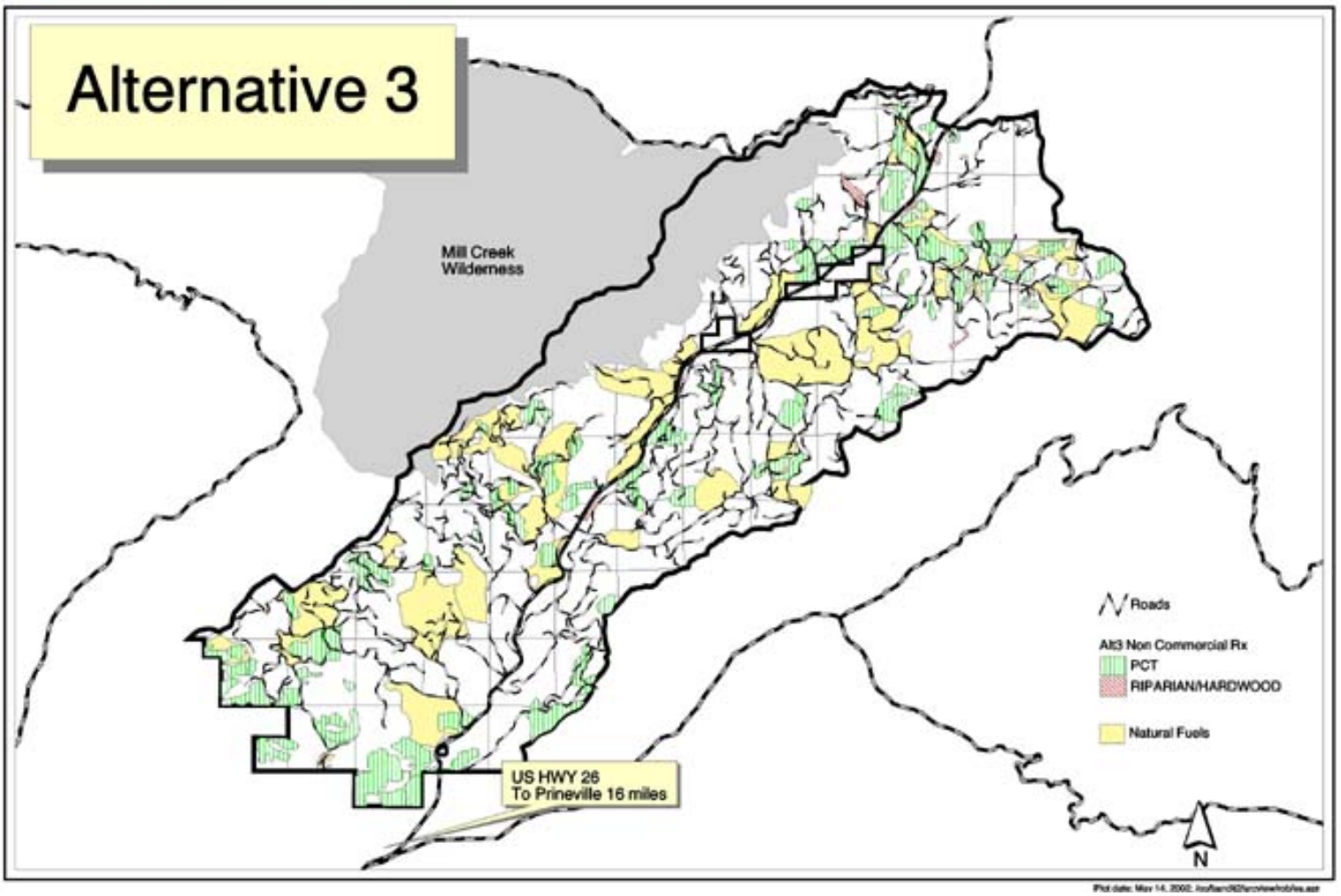
Natural Fuels Underburning - 5,676 acres,
Precommercial Thinning (PCT) - 4,180 acres
Activity Fuels Underburning - 3,545 acres,
Activity Fuels Handpiling - 737 acres, and
Hardwood Enhancement and Riparian Planting (RIP) - 149 acres.

Road management would consist of:

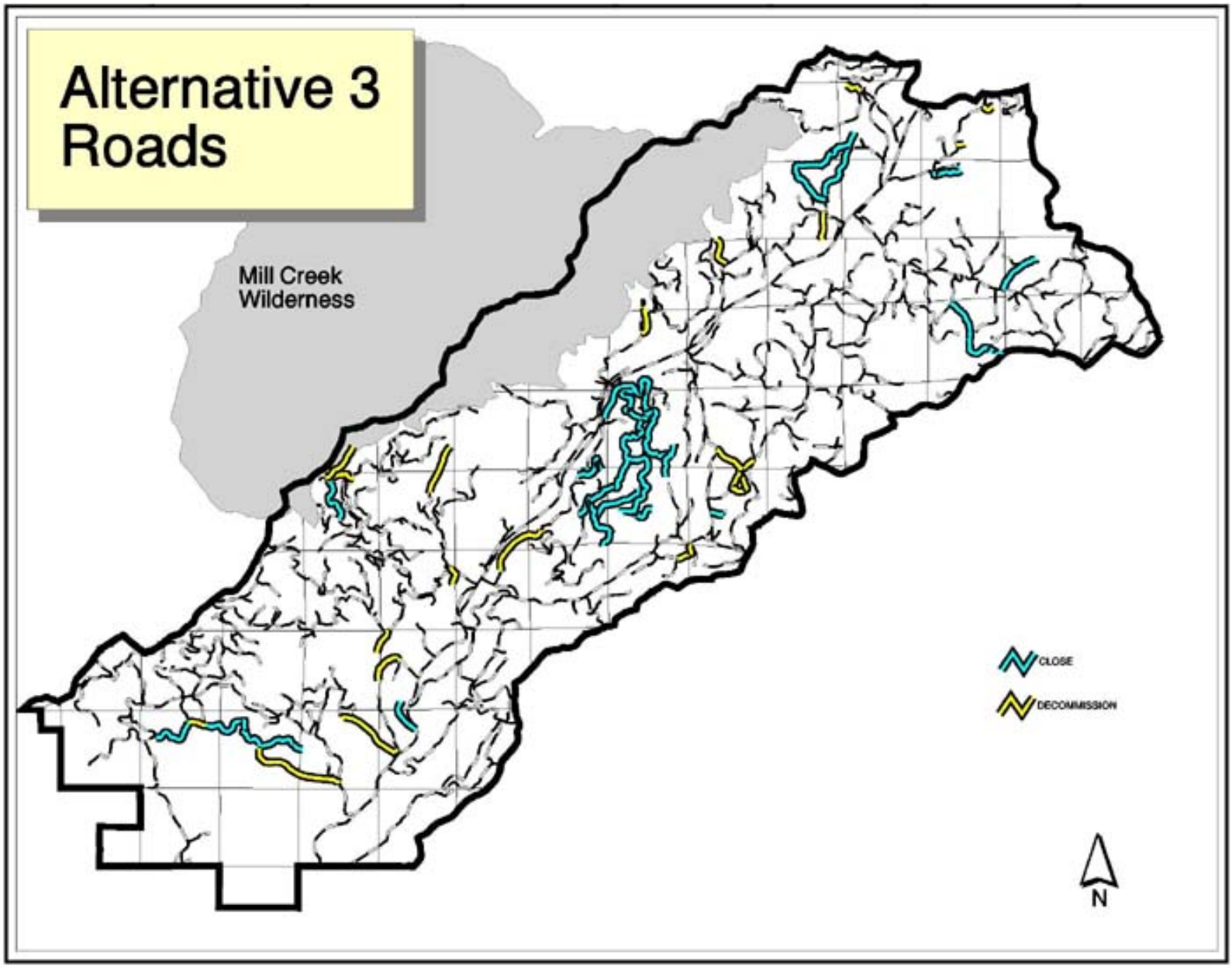
Inactivation - 17.3 miles, and
Decommission - 8.8 miles.

Hardwood enhancement and riparian improvement activities would occur on 149 acres within the project area, primarily in RHCAs. Treatments include conifer thinning within aspen stands to reduce aspen competition with conifers; piling slash and fencing to protect aspen seedlings from browse; hardwood and conifer planting; headcut repair (Cornez and Little Hay Creeks); and planting and matting a landslide area to reduce sediment.

Alternative 3 activity map



Alternative 3 road map



Three hundred thirty-three (333) acres of precommercial thinning would occur within RHCAs.

Alternative 4

This alternative was developed in response to public comments requesting that salvage harvest not occur and that commercial timber harvest not occur in the Bandit Springs Recreation Area. Commercial timber harvest, both salvage and green-tree, would be avoided within the Hash Rock Fire perimeter. No new or temporary road construction would occur in the Hash Rock Fire perimeter or in the Bandit Springs Recreation Area. The alternative maps on pages 31-32 display the proposed management activities.

Commercial timber harvest including:

Thinning (HTH) - 412 acres, and
Improvement Cutting (HIM) - 1,569 acres.

Commercial timber harvest would be done using tractor (1,067 acres) and helicopter (914 acres) logging systems. All

acreage figures are approximate. An estimated 3.8 MMBF of timber would be harvested.

Other management activities including:

Precommercial Thinning (PCT) - 5,118 acres,
Natural Fuels Underburning - 5,434 acres,
Activity Fuels Underburning - 4,351 acres,
Activity Fuels Handpiling - 410 acres, and
Hardwood Enhancement and Riparian Planting (RIP) - 149 acres.

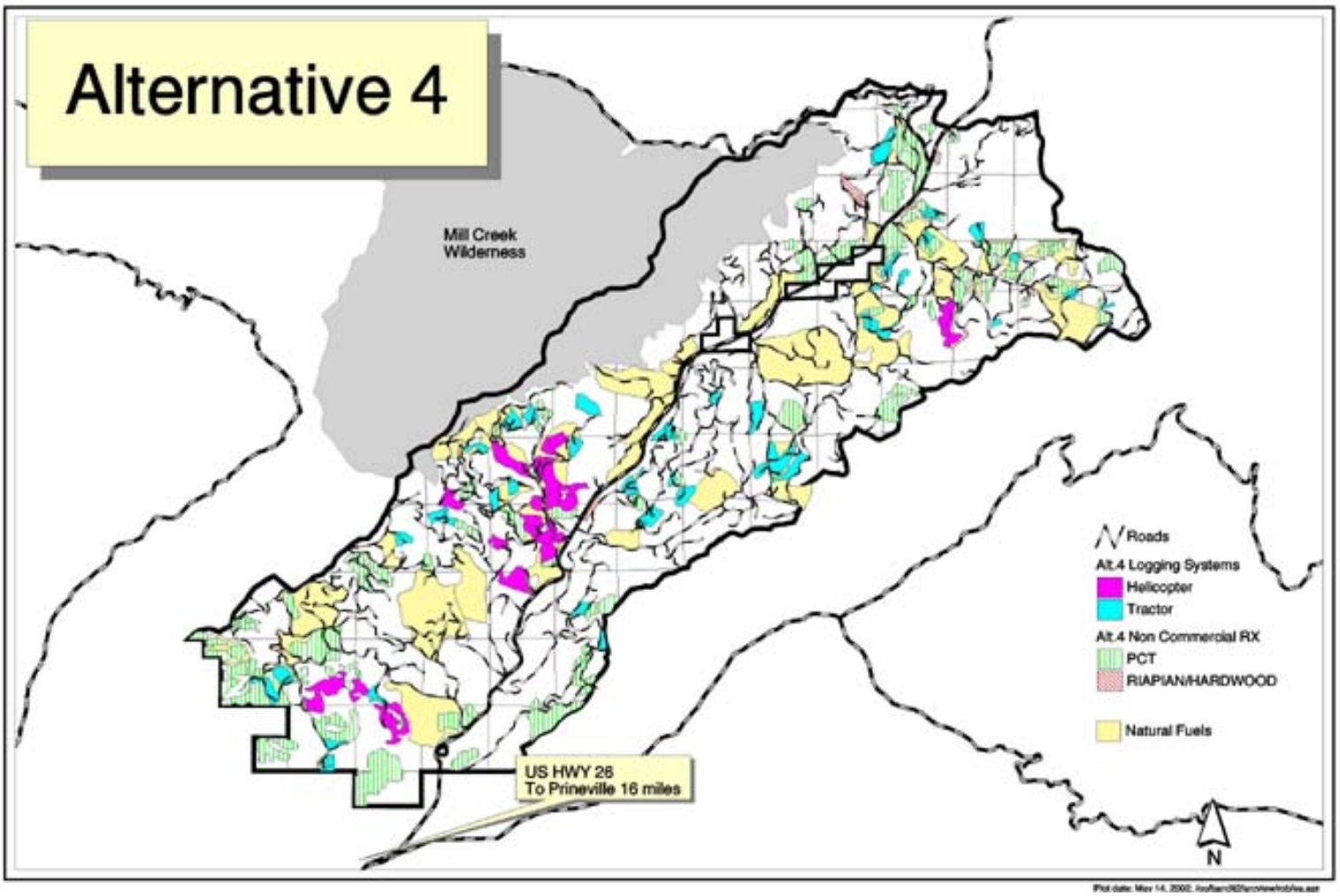
Road management would consist of:

New Construction - 2.2 miles,
Reconstruction or surfacing - 9.3 miles,
Temporary construction - 1.4 miles,
Reuse existing temporary roads - 3.9 miles
Inactivation - 17.3 miles, and
Decommission - 8.8 miles.

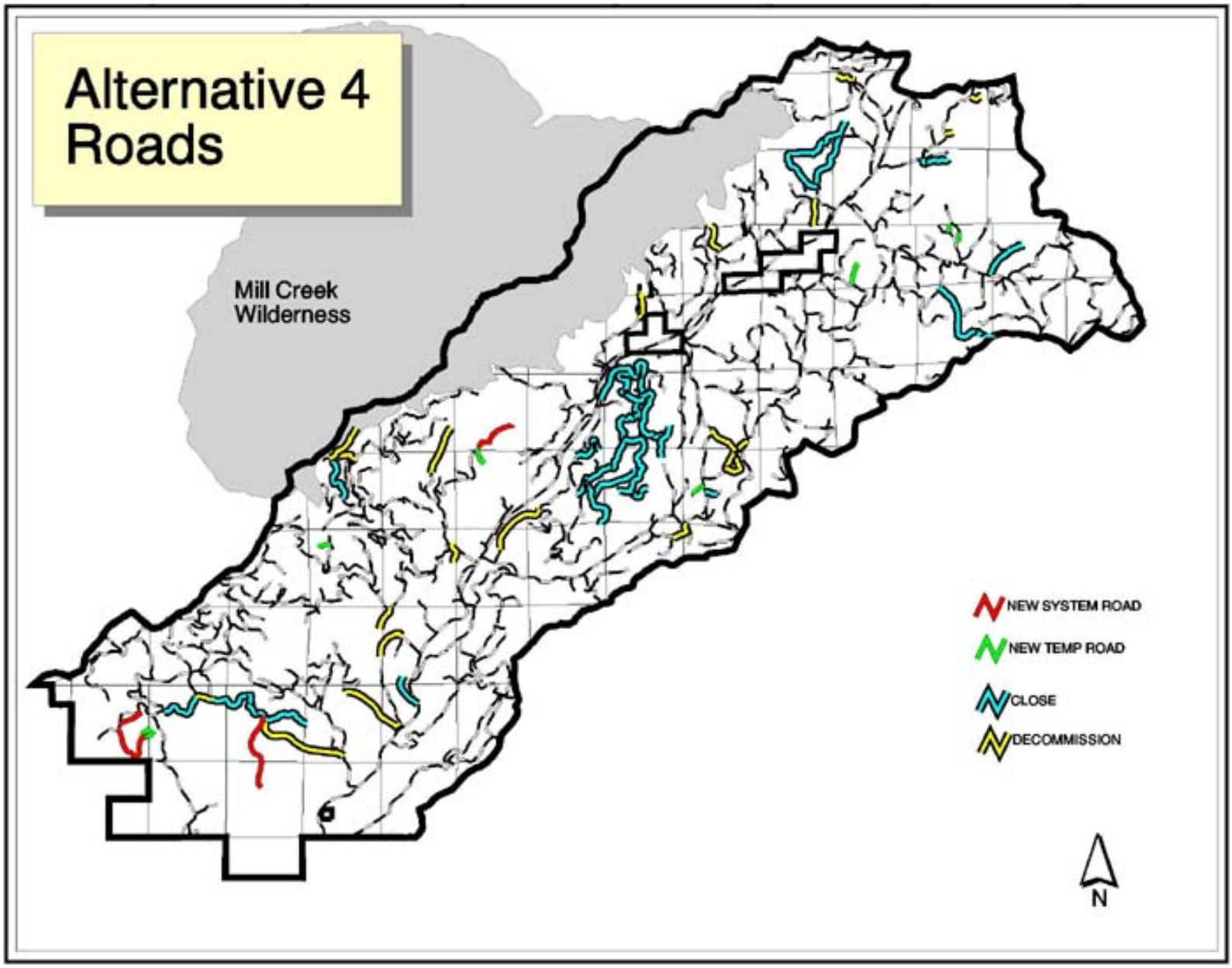
Sixty-nine (69) acres of commercial timber harvest and 233 acres of precommercial thinning would occur within RHCAs. RHCA harvest restrictions identical to those described in Alternative 2 will be used to ensure compliance with Riparian Management Objectives.

Hardwood enhancement and riparian improvement activities would occur on 149 acres within the project area, primarily in RHCAs. Treatments include commercial timber harvest and precommercial thinning within aspen stands to reduce aspen competition with conifers; piling slash and fencing to protect aspen seedlings from browse; hardwood and conifer planting; headcut repair (Cornez and Little Hay Creeks); and planting and matting to stabilize a landslide area and reduce sediment delivery.

Alternative 4 activity map



Alternative 4 road map



Mitigation Measures for Alternatives 2 and 4

During wet periods, commercial road use will not contribute to siltation outside the roadway. For example, suspension of use may occur when road use is contributing to sediment detachment and transport, i.e. rutting 1 - 2 inches deep, muddy ditch water.

Erosion control devices, such as straw bales or sediment traps, would be placed at designated road/stream crossings to reduce sediment delivery to streams. The District Fisheries Biologist or Hydrologist will coordinate specifications and locations.

Relief drainage would be placed above designated road/stream crossings to reduce sediment delivery to streams. The District Fisheries Biologist or Hydrologist will coordinate specifications and locations.

New native surface and temporary roads would be constructed with relief drainage. Drainage would be fully functional when roads are decommissioned (obliterated) or inactivated (closed).

Design Elements Common To All Action Alternatives

Many elements and features of the action alternatives (2 - 4) are similar. They are described here to avoid repetition. Many of these design elements for RHCAs and Water Quality/Fisheries are intended to meet the requirements set forth in the Forest Plan for protection of water quality in the State of Oregon through planning, application, and monitoring of Best Management Practices (BMPs).

Air Quality/Private Land Interface

Use signing and public notice when burning during hunting season or other times when public use of the area is high. Burning operations would follow Oregon Department of Transportation (ODOT) safety requirements.

All burning operations would be in accordance with Oregon State Smoke Management Guidelines. 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.

Private landowners within the Marks Creek watershed will be notified approximately 14 days in advance of beginning any burning activities adjacent to their lands.

Cultural Resources

Known cultural resource sites and the qualities which make them eligible to the National Register of Historic Places would be protected from or avoided by proposed activities.

If a cultural/heritage resource site is discovered or disturbed during harvest operations, efforts would be made to avoid any further disturbance. Site-specific mitigation would be determined if sites could not be avoided, and consultation with the Oregon State Historic Preservation Office (SHPO) would occur prior to resuming activities.

Noxious Weeds

Conduct a weed identification workshop for Forest Service personnel who would be preparing, implementing, and/or administering the proposed activities.

Avoid or minimize disturbance within or adjacent to existing noxious weed infestations or develop a control plan to prevent their expansion. For example, avoid weed-infested areas for camps, staging areas, landings, or parking areas.

Avoid machine or hand piling of slash within 200 feet of U.S. Highway 26 and the first 1/4-mile of roads connected to U.S. Highway 26. Along Forest Road 2610 this criteria extends for the first 1/2-mile. Exceptions proposed to address risk adjacent to private land will be coordinated through the District Botanist.

Mineral material (i.e. gravel) used for road and landing construction or reconstruction must be obtained from weed free sources.

Document all noxious weed infestations identified during implementation.

Include a noxious weed locator map in the project file to assist in avoidance and monitoring.

Conduct pre- and post-project surveys to document existing infestations and to evaluate the effects of the project on noxious weeds.

Inform and include the District noxious weed coordinator in project implementation (including transportation planning). Road closures would be coordinated with the District noxious weed coordinator to ensure that any new noxious weed sites are inventoried.

To reduce the transport or spread of noxious weeds, ground-disturbing equipment would be certified to be clean of all plant or soil material that may result in the establishment or spread of noxious weeds. The Forest Service Timber Sale Administrator would certify that equipment is clean of plant and soil material before the equipment enters the project area.

Revegetate temporary roads, primary skid trails, and landings concurrent with post-sale activities. Seeds that are used to revegetate disturbed areas would be certified as "All States Noxious Weed Free" by an approved testing laboratory. When practical, revegetate using native species.

Encourage retention of desirable vegetation on road shoulders, cuts, fills, ditches, and drainages.

Straw bales that are used in sediment traps will be acquired from fields that produce weed-free seed for the grain or grass seed industry.

Range/Minerals

Livestock fences, cattle guards, and other structural range improvements would be protected and/or returned to their pre-harvest condition after harvest 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

Restrict commercial timber haul on holiday weekends (i.e., Memorial Day, 4th of July, Labor Day) and during the opening weekends of deer and elk hunting seasons.

Treatments adjacent to heavily used dispersed recreation sites will be designed to compliment the recreational experience.

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

Avoid allowing industrial (contractor) camps at heavily used dispersed campsites.

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.

Commercial harvest, burning, and road closure activities would be coordinated with holders of special use permits, as needed. Efforts would be made to minimize conflicts between recreation permittees and commercial harvest, thinning, and

burning activities.

Bandit Springs Nordic Trail System

Commercial timber harvest activities would be restricted and trails cleared of slash between Thanksgiving Day and March 30. The sale administrator may waive this seasonal restriction only when there is not snow of sufficient depth for cross-country skiing. This restriction applies only to units 736, 738, 750, 772, 774, and 776.

Ski trails will be cleared of all slash each year prior to the ski season. Slash will be cleared for a minimum of 10 feet on each side of the trail (for a minimum width of 20 feet). This includes ski trails that pass through landing areas.

Trees containing blue or orange diamond or other trail markers would not be cut.

Boundary tags and tree marking paint would be placed so that visibility from ski trails is minimized.

Boundary tags, markers, and flagging will be removed after completion of post-sale activities.

Feather edges and/or layout irregular shaped boundaries around trails and trail corridors. Avoid geometric shapes and lines not in character with the existing landscape. Activities are designed to appear as a natural occurrence when viewed in the Foreground.

Ochoco Divide Sno-Park, Road 27, and Road 2630

Commercial timber harvest activities would be restricted between Thanksgiving and March 15. The sale administrator may waive this seasonal restriction only when there is no snow.

Corral Flat Dispersed Camping Area

Logging slash would be removed from the permitted horse trails 2 weeks prior to the annual endurance ride. The annual endurance ride occurs during the third weekend in July.

Commercial harvest operations would be restricted for 1 week in July each year during the annual endurance ride. There would be a 1/4-mile no commercial harvest buffer along the endurance ride trail that begins the Wednesday before the endurance ride and continues until the Tuesday following the event.

RHCAs

Ground-based machinery for logging 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. This includes units 102 and 112 which both use existing roads within RHCAs. Other possible situations that may be approved include:

1. Pulling cable (winch lining) from an existing road in an RHCA.
2. Using existing roads as landings in RHCAs to facilitate the obliteration of existing skid trails that are contributing to resource damage.
3. Designating crossings at Class IV streams to reduce additional road building.

No machine (i.e. bulldozer) firelines would be constructed within any RHCAs during underburning activities.

Fire prescriptions for RHCAs will provide for a mosaic of burned and unburned material to retain infiltration while

attaining other Riparian Management Objectives.

To meet mosaic and intensity objectives, fire may be purposely ignited within RHCAs under heavy fuels conditions. 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.

Avoid locating industrial (contractor) camps in RHCAs.

Precommercial 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.

Treatments within RHCAs would retain higher stocking densities than the surrounding uplands.

Treatments would not remove vegetation that is contributing to bank stability.

Treatments would reduce competition around large trees.

Treatments would encourage the growth of deciduous hardwoods, when present.

Sensitive Plants

Areas would be designated to protect habitat for yellow lady's slipper (Cypripedium parviflorum). Slash piling and underburning would be avoided in these areas unless approved by the District Botanist. Treatment areas that contain potential yellow lady's slipper habitat would be reviewed prior to implementation by the District Botanist. Potential yellow lady's slipper habitat occurs in Units 515, 516, 518, 526, 542, and 718.

To protect sensitive species associated with riparian areas, no slash piling or ground-based equipment would be used within RHCAs, or other 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 that have been approved by the District Botanist. Potential habitat for Peck's lily occurs in Units 120, 142, 303, 304, 502, 503, 504, 505, 506, 510, 512, 513, 524, 530, 531, 532, 535, 537, 540, 545, 551, 735, and 740.

Avoid ground-disturbing activities on nonforest balds (scablands) to protect primary habitat for sensitive ricegrass species (Achnatherum hendersoni and A. wallowensis). Exceptions can occur on existing roads, or other areas that have been approved by the District botanist. Potential habitat for ricegrass species occurs in Units 111, 119, 141, 142, 749, and 750.

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. Skid trails would avoid ephemeral draws and scab flats. Skid trails, landings, and roads would be designed to limit the cumulative extent of activities.

After harvest activities are completed, soil monitoring will evaluate the need for soil tilling. Chapter 3 discloses the anticipated amount of soil tilling that would be needed. Tilling is expected to occur in Units 154, 162, 163, 173, 181, 193,

198, 300, 301, 302, 303, 304, 311, 503, 504, 509, 510, 515, 516, 518, 524, 526, 527, 531, 532, 543, 545, 553, 565, 567, 568, 570, 572, 573, 574, 704, 705, 718, 725, 728, 735, 736, 738, 750, and 772.

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.

Visual/Scenic Resources

Within scenic view allocations, treatment prescriptions and marking guidelines will be coordinated with a Landscape Architect. Scenic view allocations include the Bandit Springs Recreation Area (MA-F16), the U.S. Highway 26 Visual Corridor (MA-F25), travel corridors along Forest Roads 27, 2210, and 2630 (MA-F26 and MA-F7), and developed recreation sites (MA-F13).

In Foreground retention areas, boundary tags would be placed to minimize visibility (for example, on the back side of trees). Foreground retention areas include the U.S. Highway 26 corridor, corridors along Forest Roads 27 and 2630 and portions of Forest Road 2210, and the Bandit Springs Recreation Area.

In Foreground retention areas, trees within 75 feet of the primary travel corridor would be cut to minimize stump heights. For commercial timber harvest, stumps would not exceed 6 inches in height. For precommercial thinning activities, stumps would not exceed 8 inches in height. Primary travel corridors include U.S. Highway 26, Forest Roads 27 and 2630, portions of Forest Road 2210, and designated trails (including trails in the Bandit Springs Recreation Area).

In Foreground retention areas, where practical, design and locate new skid trails and landings at least 300 feet from primary travel corridors. Landings would be revegetated within 1 year of use.

Tree marking paint within 75 feet of the highway right-of-way would be applied to minimize visibility from U.S. Highway 26. Along other roads and trails within Foreground retention areas, tree marking paint within 75 feet of the road/trail edge would be applied to minimize visibility from the road/trail.

Reduce ground disturbance within Foreground viewing areas to lessen soil contrast that may adversely affect scenic quality. Methods to reduce ground disturbance in these areas may include, but are not limited to, treatment on frozen ground or packed snow, helicopter logging, or winch line pulling.

Underburning activities in the Foreground areas would be designed to avoid scorching more than 1/3 of the live crown of dominant and codominant trees. Activities such as pruning of lower branches may be used to guard against high crown fire.

Slash created by management activities within the U.S. Highway 26 corridor would be burned or lopped within 1 year of the activity.

Water Quality/Fisheries

New roads will be inactivated (hydrologically closed) when timber harvest operations are completed.

Newly constructed roads within RHCAs would not parallel streams.

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).

Newly constructed and reconstructed roads with stream crossings would have adequate relief drainage prior to reaching the stream channel (specifics will be included in the Sale Implementation Plan). In some areas, sediment traps or other structures would be placed to catch sediment.

Dust abatement on haul roads would occur to help meet water quality standards.

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 are not available, slash, straw bales, rock aprons, or other filtering structures would be installed.

Wetlands and streams would be managed using RHCAs as specified in INFISH.

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, that 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.

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 is completed.

Streams requiring classification or reclassification would be coordinated through the Hydrologist or Fisheries Biologist prior to marking.

The placement of new landings within RHCAs and ephemeral draws would be avoided. Existing landings may be reused in order to facilitate obliteration.

To maintain ground cover and reduce potential sediment delivery, natural fuels (underburning) treatment in the Wildcat Creek and Salmon Creek subdrainages would occur at least 1 year before or 3 years after commercial timber harvest.

Wildlife

To maintain old-growth juniper habitat for the common flicker, no live or dead juniper over 12 inches dbh will be cut.

Goshawk

A 400-acre post fledging area (PFA) will be established around each known nest site. Activities occurring within PFAs must retain or improve habitat capable of allowing young goshawks to fledge from the nest site. This management would retain LOS characteristics and enhance younger stands towards this condition. Conduct commercial harvest operations, precommercial thinning, and underburning within PFAs during the period October 1 through March 1. No management activities, included underburning activities, would occur inside the 30-acre nest stand.

There would be a seasonal restriction (March 1 to September 30) on commercial harvest operations, precommercial thinning, and underburning within approximately 1/2-mile of an active nest. This may also be applied to hauling operations if nests are within the immediate proximity of the haul route. This seasonal restriction may be waived on an annual basis if a nest inventory determines that breeding is not active. This restriction applies to Units 38, 40, 46, 54, 212, 300, 302, 303,

304, 310, 317, 318, 562, 565, 718, 722, 723, 725, 727, 728, 732, 733, 735, 736 (southern portion), and 775.

Other Raptors

Nest Sites - For the primary zone within 330 feet of nest site, maintain existing habitat characteristics. For the secondary zone (between 330 and 660 feet) around a nest site, modified treatments are permitted. Modified treatments are intermediate treatments between that required in the primary zone and that normally prescribed outside the whole protection zone. Operations would be restricted for both primary and secondary zones between March 1 and August 1. Underburning would not be allowed within 330 feet of the nest site. This seasonal restriction may be waived on an annual basis if a nest inventory determines that breeding is not active. Currently, there are no units that would be affected. This restriction would apply only if a nest is discovered near management activities.

Winter Range

There will be no activities involving heavy/power equipment within big game winter range areas from December 1 through April 30, unless coordinated through the District Wildlife Biologist. This seasonal restriction applies to Units: 47, 52, 100, 102, 104, 108, 111, 112, 113, 122, 124, 125, 137, 138, 140, 141, 142, 155, 158, 202, 209, 310, 311, 312, 313, 314, 316, 317, and 318.

Snags/Down Logs

Retain all snags (except for safety hazards) and down logs in all units except those within the Hash Rock Fire perimeter. Snag retention in the Hash Rock Fire perimeter will be at levels determined using guidelines from the Viable Ecosystem Management Guide. This ranges from 3 to 11 snags per acre. Snags would be left in clumps and scattered throughout the units. For the remaining units, the silvicultural prescriptions will identify that no snags are to be marked other than snags that pose a safety hazard outside of RHCAs. Snags that pose a safety hazard within RHCAs will be felled and would be left on site or managed for in-stream large wood.

Down wood levels would be retained at an average of 14.7 pieces per acres (pieces must be at least 6 feet in length and be a minimum of 12 inches in diameter at the small end).

Existing down logs would be maintained within goshawk fledging areas, pileated feeding habitat, and connective habitat. There would be no direct ignition of large woody debris in these areas. Burning in these areas would be coordinated with the District Wildlife Biologist.

Monitoring Common to All Action Alternatives

Stream temperature monitoring is in place on 7 creeks within the Marks Creek Watershed. Temperature monitoring will continue.

Two water quality monitoring stations have been established in the Marks Creek Watershed: Marks Creek above Little Hay Creek and Wildcat Creek above U.S. Highway 26. Discharge, TSS (total suspended solids), and turbidity will continue to be measured.

Selected stream reaches adjacent to precommercial thinning and/or commercial timber harvest units (no less than 2) will have pre- and post-treatment shade monitoring to verify that thinning and harvest guidelines are not reducing shade.

A total of 10 percent of the units and roads (including effectiveness of road closures) will be monitored at the end of the first season and at completion of commercial timber harvest to verify that soil and water quality BMPs are implemented and

to verify their effectiveness.

Post-project monitoring, including mineral material sources, will be accomplished to identify new noxious weed infestations while they are small.

A total of 10 percent of the underburning units will be monitored at the end of the first season and at completion of burning to ensure that down logs remain.

A total of 10 percent of the underburning units will be sampled after the first season and at completion of activities to measure residue profiles and to determine effective ground cover for the protection of soils. This will include sampling within RHCAs.

All burning operations will be in accordance with Oregon Smoke Management Guidelines. Preburn calculations will be taken to measure PM10 emissions. Smoke columns and inversions will also be monitored to measure effects on air quality.

A total of 10 percent of the commercial timber harvest units will be monitored after harvest operations to ensure that objectives for upland vegetation have been met.

A total of 10 percent of the commercial timber harvest units within connectivity corridors and goshawk PFAs will be monitored to ensure that wildlife habitat components have been retained.

Table 2-1. Comparison of the Alternatives

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Acres Treated				
Total Acres Treated*	0	11,299	10,005	10,907
Commercial Timber Harvest	0	2,375	0	1,982
Precommercial Thinning (PCT)	0	5,395	4,180	5,118
Activity Fuels Underburning	0	4,573	3,545	4,351
Natural Fuels Underburning	0	5,450	5,676	5,434
Logging System (Acres)				
Tractor	0	1,212	0	1,067
Helicopter	0	1,163	0	914
Silvicultural Prescription (Acres)				
Improvement (HIM)	0	1,822	0	1,569
Comm. Thinning (HTH)	0	413	0	412

Salvage Harvest (HSV)	0	140	0	0
Road Management (Miles)				
Construction	0	2.2	0	2.2
Reconstruction	0	9.8	0	9.3
Temporary Roads	0	1.4	0	1.4
Decommission	0	8.8	8.8	8.8
Inactivation	0	17.3	17.3	17.3
LOS Acres				
Timber Harvest	0	707	0	658
Bandit Springs Recreation Area Acres				
Timber Harvest	0	382	0	48
PCT Only	0	199	234	217
Underburning Only	0	103	103	103
Harvest Acres Within Hash Rock Fire Perimeter				
Salvage (HSV)	0	140	0	0
Improvement (HIM)	0	200	0	0
RHCA Acres				
Timber Harvest	0	71	0	69
PCT Only	0	233	333	233
Goshawk Post Fledging Area Acres				
Timber Harvest	0	142	0	76
PCT Only	0	166	221	183
Pileated Feeding Habitat Acres				
Timber Harvest	0	102	0	102
PCT Only	0	57	92	57
Connective Habitat Acres				
Timber Harvest	0	103	0	93
PCT Only	0	427	545	427

Other				
Volume (MMBF)	0	4.8	0	3.8
Jobs Created	0	144	25	122

Acres are approximate. Totals may not be exact due to rounding.

*The total acres treated figure is not a sum of all management activities. Many acres that are commercially harvested will also be precommercially thinned. All activity fuels underburning acres overlap commercial timber harvest or precommercial thin acres.

CHAPTER 1
CHAPTER 2
CHAPTER 3 Part A
CHAPTER 3 Part B
CHAPTER 3 Part C
LIST OF PREPARERS

CHAPTER 3
AFFECTED ENVIRONMENT
and
ENVIRONMENTAL CONSEQUENCES

(Part A)

Introduction

This chapter provides information concerning the existing (affected) environment and the expected environmental effects (consequences) of the alternatives. The effects of the proposed activities are discussed for the following resource areas.

Air Quality
Big Game Habitat
Competing and Unwanted Vegetation (Noxious Weeds)
Fire Ecology
Fish Habitat and Riparian Areas
Heritage Resources
Late and Old Structure (LOS) Stands
Management Indicator Species
Neotropical Migratory Birds
Natural Disturbance Agents (Insects & Disease)
Recreation
Roads (Transportation System)
Socio-Economics
Soils
Threatened, Endangered, and Sensitive Species
Upland Vegetation
Visual Quality
Water Quality
Wildlife Habitat with LOS Characteristics

The environmental effects related to each of these resource areas are discussed immediately following the presentation of the baseline condition (affected environment). The environmental effects sections provide the scientific and analytical basis for the comparison of alternatives. These sections present the expected effects on the physical, biological, social, and economic environments associated with the implementation of the alternatives. The expected environmental consequences to each resource area are disclosed, including the direct, indirect, and cumulative effects. Effects are quantified where possible.

Direct environmental effects are defined as those occurring at the same time and place as the initial action. Indirect effects are those that are a result of the action, but occur later in time or are spatially removed from the activity. Cumulative effects result from the incremental effects of actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions

Affected Environment

The project area encompasses National Forest System (NFS) lands within the Veazie Creek subwatershed (Lower Ochoco Creek Watershed) and both NFS and private lands within the Marks Creek Watershed. The project area encompasses approximately 39,200 acres in Crook and Wheeler Counties, Oregon. This area is located in the Ochoco Mountains, which are the westernmost extension of the Blue Mountains of central and northeastern Oregon. These mountains form a system of ranges loosely connecting the Cascades, Sierra Nevada, and Siskiyou Mountains with the Northern Rockies in Idaho and Montana. Elevations range from 3,360 feet where Marks Creek joins Ochoco Creek to 5,985 feet at Wildcat Mountain.

In 1998, the Ochoco National Forest completed the Marks Creek Watershed Analysis (1998). This watershed analysis describes the composition and structure of forested stands and how these stands have been altered by changes in ecological processes. The watershed analysis document was updated in 2002 to summarize changes in environmental conditions from the Hash Rock Fire. Changes in conditions were compared to the existing conditions described in the Marks Creek Watershed Analysis (1998). The fire effects were primarily in the Upper Marks Creek Subwatershed.

In August and September 2000, the Hash Rock Fire burned approximately 18,275 acres within Crook County, Oregon. The Hash Rock Fire burned approximately 4,600 in the Marks Creek Watershed. In the Marks Creek Watershed, the fire primarily affected the McGinnis, Reilly, Cornez, and Hamilton Creek drainages. The fire burned at varying intensities. Approximately 9.2 miles of dozer fireline and 2.7 miles of hand fireline were constructed within the Marks Creek Watershed. About 20,000 gallons of fire retardant were applied in the watershed.

The Marks Creek drainage runs from roughly northeast to southwest. The terrain is varied with well-defined drainages and prominent ridgelines. The landscape includes numerous tributary streams interspersed with riparian meadows, diverse forest and woodland vegetation, and scablands.

The climate is characterized by low precipitation and humidity, large daily temperature fluctuations, and high evaporation rates. Summers are typically hot and dry with highs up to 100 degrees Fahrenheit. Winters are usually cool and moist with lows of 0 - 10 degrees Fahrenheit. Prevailing winds are out of the southwest.

The project area is roughly bounded to the north by the Ochoco Divide Research Natural Area, to the west by the Mill Creek Wilderness Area, and to the east by the boundary between the Marks Creek and

Ochoco Creek Watersheds.

The main access into the watershed is U.S. Highway 26, which parallels Marks Creek though the entire project area. There about 218 miles of roads (including classified, unclassified, decommissioned, and temporary roads) in the project area.

There are several ongoing uses that occur throughout the project area. These activities are related to administrative, commercial, and recreation uses. Administrative uses include activities such as road maintenance and fire suppression. Commercial uses include livestock grazing and haul, rock haul, and mining. Recreation uses include wildlife viewing, hunting, fishing, sightseeing, camping, cross-country skiing, hiking, biking, horseback riding, and rockhounding.

There are 2,325 acres of privately owned lands within the project area. These ownerships are used as both year round and seasonal residences. Mt. Bachelor Academy, a youth instructional facility, is located within the project area.

Environmental Consequences

Air Quality

Air quality can be affected by both wildfire and underburning. National Ambient Air Quality Standards have been developed and include standards for total suspended particulates (solid material contained in smoke). PM 10 is particulate matter that measures 10 micrometers in diameter or less. PM 2.5 is particulate matter that measures 2.5 micrometers or less. CO is carbon monoxide. Table 3-1 displays the amount of emissions produced by particular fire and fuels activities within the last 5 years in the project area. Emissions from the 2000 Hash Rock Fire are included in the wildfire category. This fire accounts for 4,600 acres and nearly all of the emissions in the wildfire category.

Table 3-1. Emissions Produced in the Project Area Within the Last 5 Years

Fire Type	Acres Burned	PM 10 (lbs)	PM 2.5 (lbs)	CO (lbs)
Activity Fuels	440	85	75	603
Machine Pile	415	53	46	406
Natural Fuels	1,660	125	110	886
Wildfire	4,613	692	609	4,927
Total	7,128	955	840	6,822

Wildfire has produced 72 percent of the emissions from the project area during the last 5 years.

This area is generally influenced by south/southwest winds in the valley, turning more westerly on the ridge tops from early to late afternoon. Inversions are common in the lower elevations and tend to dissipate by mid-morning. Populated areas that potentially could have impacts from underburning are the private lands along Marks Creek.

Alternative 1

Underburning activities would not occur under the Bandit planning effort. There would be no emissions produced as a result of implementing this alternative.

Alternatives 2, 3, and 4

Underburning activities would be conducted under the State of Oregon Smoke Management System to track smoke produced and would be coordinated with adjacent National Forests to meet smoke management objectives for total emissions.

Underburning activities would be conducted under favorable smoke dispersal conditions to limit impacts to Class 1 airsheds and urban areas. Persistent inversion conditions, which would increase the potential for smoke pooling in valleys, would be avoided during underburning activities.

Underburning activities would be implemented over a period of about 10 years. Thinning slash would be left to settle for 5-10 years before activity fuels underburning. Table 3-2 displays the estimated total annual emissions over the 10-year implementation period for underburning activities included in each of the alternatives.

Table 3-2. Estimated Total Annual Emissions (in total tons)

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Alt. 1										
PM 10	0	0	0	0	0	0	0	0	0	0
PM 2.5	0	0	0	0	0	0	0	0	0	0
CO	0	0	0	0	0	0	0	0	0	0
Alt. 2										
PM 10	148	163	142	232	137	84	84	17	17	17
PM 2.5	131	146	127	207	122	75	75	15	15	15
CO	1,261	1,397	1,216	1,982	1,171	720	720	144	144	144

Alt. 3 PM 10	133	133	133	111	111	89	89	89	0	0
PM 2.5	119	119	119	99	99	79	79	79	0	0
CO	1,118	1,118	1,118	932	932	745	746	746	0	0
Alt. 4 PM 10	80	180	185	185	70	70	70	99	30	30
PM 2.5	71	161	165	165	62	62	62	89	27	27
CO	682	1,534	1,577	1,577	597	597	597	852	256	256

Alternative 2 would produce an estimated 11,005 tons of total suspended particulates (TSP) over the 10-year implementation period. Alternatives 3 and 4 would produce 9,135 and 10,413 tons, respectively.

Underburning activities would reduce the amount of fuel in the project area. With a reduction in fuel levels, the intensity of wildfires and the amount of emissions they produce would be reduced.

Cumulative Effects Common to All Alternatives

In 1994, the Forest Service in cooperation with the Oregon Department of Forestry, Oregon Department of Environmental Quality, 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 Burn emission limit of 15,000 tons of PM 10 per year for the Blue Mountain National Forests (Malheur, Ochoco, Umatilla, and Wallowa-Whitman).

Wildfire and underburning activities (associated with the Harpo Timber Sale) in the project area would produce some emissions in addition to the proposed action alternatives. Based on the average number of acres burned by wildfire each year (excluding Hash Rock Fire), and by estimating the type and amount of underburning activities remaining to be completed on Harpo Timber Sale and other natural fuels projects, an estimated 142 acres would burn each year with an estimated emission of 12.2 tons of PM 10 for the next 5 years.

The emissions produced from proposed activities under any of the alternatives would be less than three percent of the total emission limit per year.

Big Game Habitat

Both mule deer and elk are present throughout the watershed and use it year-round. The intensity of use varies by season; higher elevations receive less use during the winter and lower elevations are used

throughout the year. Rutting, calving, and fawning occur throughout the watershed, particularly near wet areas, seeps, and springs.

The project area is part of the Ochoco Management Unit, designated by the Oregon Department of Fish and Wildlife (ODFW). The elk population is currently above the ODFW herd management objective and the deer populations are below the herd management objective. Hunting is a popular fall activity in this area.

A model was developed to measure the effectiveness of habitat for elk. The Habitat Effectiveness Index (HEI) evaluates the potential to support elk based on a correlation between the quality and quantity of cover and the open road density of a given area. HEI addresses the management of habitat conditions only and does not address population size. The Forest Plan identifies a desired percent cover of 9 for ponderosa pine and 43 for mixed conifer and a desired HEI value of 28 in General Forest (MA-F22); a desired percent cover of 7 for ponderosa pine and 26 for mixed conifer and a HEI value of 6 in General Forest Winter Range (MA-F21); and a desired percent cover of 8 for ponderosa pine and 26 for mixed conifer and a HEI value of 6 in Winter Range (MA-F20), for the second decade. The HEI model was used to analyze and describe the effectiveness of habitat for big game in the project area.

Currently, the project area is below the desired HEI value for General Forest and above the desired HEI values for Winter Range and General Forest Winter Range. Percent cover in the General Forest and General Forest Winter Range management allocations is currently below the desired Forest Plan levels. The Hash Rock Fire reduced cover on 260 acres. The Hash Rock Fire did not change the HEI value because of the relatively small number of acres affected. Table 3-3 displays the current HEI value for the project area.

Open road densities for the winter range allocations vary by season, with a goal of 1.0 mile per square mile from December 1 to May 1. During this time, locked gates and CFR closure orders restrict access to winter range.

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

Management Area (MA)	Cover % MA	Summer Open Road Density mi./sq. mi	Winter Road Density mi./sq. mi	HEI	LRMP HEI Goal (2nd Decade)
General Forest	18	2.93	2.93	14	28
General Forest Winter Range	16	2.41	1.0	16	6
Winter Range	23	1.62	1.0	20	6

Tables 3-4, 3-5, and 3-6 display changes by alternative for General Forest, General Forest Winter Range, and Winter Range areas.

Table 3-4. HEI General Forest

	LRMP Goal	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Cover (acres)		2,898	2,761	2,856	2,761
Open Road Den. (mi./sq. mi.)	3.0	2.9	2.7	2.7	2.7
Percent Cover	26	18	17	18	17
HEI Value	28	14	15	15	15

Table 3-5. HEI General Forest Winter Range

	LMRP Goal	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Cover (acres)		376	370	370	370
Open Road Den. (mi./sq. mi.)					
Summer	3.0	2.4	2.2	2.2	2.2
Winter	1.0	1.0	1.0	1.0	1.0
Percent Cover	26	16	16	16	16
HEI Value	6	16	16	16	16

Table 3-6. HEI Winter Range

	LRMP Goal	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Cover (acres)		625	471	533	471
Open Road Den. (mi./sq. mi.)					
Summer	3.0	1.6	1.4	1.4	1.4
Winter	1.0	1.0	1.0	1.0	1.0
Percent Cover	10	23	17	20	17
HEI Value	6	20	15	19	15

General Forest

The existing condition and all action alternatives are below the desired HEI value. The existing amount of cover would be reduced under all action alternatives. The existing open road densities would also be reduced under all action alternatives. The action alternatives offset cover reductions, increasing the HEI value and moving closer toward the desired condition by reducing open road densities.

Both elk and deer use throughout the project area is expected to continue. Big game animals would be temporarily displaced during harvest, thinning, and burning operations.

General Forest Winter Range and Winter Range

All alternatives maintain HEI above the desired value. All of the action alternatives slightly reduce the amount of cover but also reduce the amount of summer open road density so that HEI values are maintained above desired values.

The HEI model indicates that the winter range areas are in good condition from the standpoint of percent cover and winter open road densities. In General Forest Winter Range, cover is below desired levels, and would not be reduced.

Seasonal road closures would continue to be implemented to protect wintering big game. The action alternatives also include seasonal restrictions on management activities to prevent disturbance to big game during the winter.

Other planned activities in the project area (precommercial thinning and fire rehabilitation actions) would temporarily displace elk and deer while activities are occurring. None of the activities are expected to have long-term effects on deer or elk populations or use in the project area.

Competing and Unwanted Vegetation (Noxious Weeds)

Noxious weeds are aggressive, non-native plants capable of degrading environmental quality. 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 (USDA/ USDI 1997). Plants are designated "noxious" by the Secretary of Agriculture or state agencies.

Noxious weed infestations are often associated with roads, camping sites, mineral material sources, livestock trails, logging units (especially regeneration harvests), and other areas with soil disturbance. However, they are not limited to only disturbed sites. New weed infestations have been documented in areas that have had relatively little disturbance. Known noxious weed populations in and near the project area include the following species:

spotted knapweed (*Centaurea maculosa*)	St. John's Wort* (*Hypericum perforatum.*)
diffuse knapweed (*C. diffusa*)	Mediterranean sage (*Salvia aethiopis*)
Russian knapweed (*C. repens*)	medusahead (*Taeniatherum asperum*)
yellow starthistle (*C. solstitialis*)	sulfur cinquefoil (*Potentilla recta*)
whitetop (*Cardaria draba*)	morning glory (*Convolvulus arvensis*)

leafy spurge (*Euphorbia esula*)

Dalmatian toadflax (*Linaria dalmatica*)

butter and eggs (*Linaria vulgaris*)

Scotch broom (*Cystisus scoparius*)

Scotch thistle (*Onopordum acanthium*)

hound's-tongue (*Cynoglossum officinale*)

teasel* (*Dipsacus sylvestris*)

Canada thistle (*Cirsium arvense*)

*not listed as noxious by State of Oregon, but considered an invasive, non-native weed on the Ochoco NF due to potential for displacing native vegetation.

Most weeds have been present in the area for at least a decade, and may continue to spread and infest new sites within the project area. Most weed populations are located along road corridors, indicating introduction and spread is primarily due to vehicles, although livestock, wildlife, contaminated hay, water, and windblown seed are other sources. Many areas with noxious weeds have had road construction and prior timber harvest. This has increased the potential for introduction and spread by removing vegetation and exposing soils, which creates an ideal seedbed for noxious weeds. These areas become less susceptible to noxious weeds as vegetation recovers.

The Hash Rock Fire killed vegetation and removed surface organic material from soils, increasing susceptibility to noxious weed infestation. Fire suppression activities, notably fireline construction and off-road vehicle use, have further increased susceptibility. The area within the fire perimeter has had more than 1 year of vegetative recovery and will continue to become less susceptible to noxious weeds as recovery continues.

The Ochoco NF is currently managing noxious weeds under the 1995 and 1998 Integrated Weed Management Plans and Environmental Assessments/Decision Notices. Weed management includes five strategies for managing unwanted vegetation: no action, prevention, early treatment, correction, and maintenance. Treatments depend on the species, size of infestation, and location. They can include chemical, cultural, mechanical, and biological controls. Monitoring of known infestations, establishment of biological controls, and survey for undiscovered weed populations is ongoing.

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 starthistle, the threshold for control is one plant. For other noxious species the strategy is monitoring only. The 1995 and 1998 Noxious Weed Environmental Assessments/Decision Notices limits herbicide use to knapweed and a few other species. No feasible 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.

The potential for introduction of noxious weeds due to road construction and logging activities is much greater than other activities because of the degree of soil disturbance and removal of vegetation by log skidding and road and landing construction. Such sites may take years to recover from susceptibility to noxious weeds; competitive seeding reduces this risk. Logging equipment (skidders, bulldozers, feller

bunchers, etc.) is also more likely to introduce noxious weeds because equipment may be transported from site to site with noxious weed seed or plant parts attached. Cleaning equipment of all soil and plant material reduces this risk.

The risk assessment considers prevention measures, including project-wide design elements (e.g. requiring clean equipment) and site-specific measures (omission of unit 707) to reduce risk for introduction and spread of noxious weeds. The assessment also considers post-project weed monitoring, to detect infestations while they are small and early treatment strategies can be implemented.

Alternative 1

Alternative 1 is the baseline for comparison. Alternative 1 has no potential for directly increasing the risk of introduction and spread of noxious weeds above current levels due to soil disturbance by commercial harvest, road management activities, and noncommercial treatments. Conversely, there would be no activities conducted which would lessen the likelihood of stand replacement events such as the Hash Rock Fire from occurring in the future. Early treatment, correction, and maintenance strategies have already been implemented in the project area. These strategies would continue to be implemented as described in the 1995 and 1998 Integrated Noxious Weed Management Plans.

Alternative 3

Alternative 3 emphasizes vegetative restoration and does not include any commercial timber harvest or road construction. This alternative would have a slightly higher risk than Alternative 1 because it includes natural and activity fuels underburning which can increase susceptibility to invasion by noxious weeds. Underburning removes vegetation and exposes soils, thereby increasing weed risk. Alternative 3 has a moderate-low risk for introduction and spread of noxious weeds because it does not include any road or landing construction activities. This is a difference when compared to Alternatives 2 and 4, because heavily impacted sites like landings may take years to recover from susceptibility to weed introduction and spread. Road closures would also occur which reduces risk by reducing vehicle traffic. Early treatment, correction, and maintenance strategies would continue to be implemented in the project area.

Alternatives 2 and 4

These alternatives include commercial timber harvest, road construction, and other activities that increase the risk of introducing and spreading noxious weeds. Alternative 2 has the highest amount of ground disturbance and the highest risk; it also proposes harvest within the perimeter of the Hash Rock Fire. Alternative 2 has a moderate-high risk while Alternative 4 has a moderate risk. Following commercial timber harvest activities, road closures and competitive seeding would reduce the susceptibility to noxious weeds. Increased risk from ground disturbance would be partially offset by reduced vehicle use in areas where roads are closed.

Table 3-7. Summary of Noxious Weed Risk, by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Risk of Noxious Weed Introduction/Spread	No Additional Risk above current level	Moderate -High	Moderate -Low	Moderate

Alternatives 2 and 4 are ranked closely because there is relatively little difference in anticipated ground disturbance. Notable differences between these alternatives are timber harvest within the Hash Rock Fire perimeter. Alternative 2 includes harvest within the Hash Rock Fire perimeter which is still susceptible to noxious weeds. Alternative 4 does not include any harvest within the Hash Rock Fire perimeter. Alternative 2 also includes higher amounts of road reconstruction activities.

The action alternatives were designed with prevention and early treatment strategies to reduce the potential spread of existing weed infestations and to reduce the risk of new infestations. The strategies that are included in all alternatives are identified as design elements in Chapter 2. If prevention measures are not adequate to prevent the introduction and spread of noxious weeds, early treatment would be implemented under existing or future noxious weed management plans.

Strategies include retaining some of the existing clumps of dense trees and minimizing additional ground disturbance by using existing skid trails, landings, and roads. To maximize prevention during commercial timber harvest and road construction activities, equipment would be certified as clean. Inactivation and decommissioning of newly constructed roads and competitive seeding would reduce the potential for weeds to become established on those sites. Increased risk from ground disturbance on roads would be partially offset by reduced vehicle use in areas where roads are closed.

Cumulative Effects Common to All Alternatives

Early treatment, correction, and maintenance strategies are already implemented in the area due to existing weed infestations. These strategies will continue. Any weed treatment would be completed under the existing Integrated Weed Management Plans. Since 1996, known populations of specific weeds have been treated with herbicide and manual controls. Monitoring indicates that where treatment has occurred, the density of noxious weeds is decreasing.

New infestations are likely in the Bandit II Project Area, regardless of the alternative chosen, including no action. Weeds will continue to be introduced by vehicles, livestock, wildlife, windborne seed, and other sources.

The Integrated Weed Management Plans for the Ochoco National Forest are currently being updated. Based on that analysis, the existing strategies for control of noxious weeds may be modified. Modifications may include expanding weed treatments areas and beginning treatments on newly identified infestations. Other modifications include changing treatments between chemical, cultural,

mechanical, or biological control methods. Monitoring has indicated that some weed control treatments are effective and these treatments will be continued. The effects of modifying weed control strategies will be disclosed in that environmental analysis.

Fire Ecology

The most common natural disturbance that has had an effect on vegetation in the project area is lightning-caused fire. Fire has been a disturbance factor in the Ochoco Mountains for thousands of years. Fire suppression over the last 90 years has eliminated most of the naturally occurring, low-intensity fires. As a result, the amount of fuel loadings and the density of forest stands have increased. This has also changed the fire severity regimes.

The concept of fire severity regimes combines the elements of fire frequency and fire intensity. As fires occur more frequently, fire intensity is reduced because there is less fuel to support the fire. In contrast, low fire frequency allows fuel to accumulate so, when a fire does occur, there is increased likelihood that the intensity would be high.

Though high fire intensities can result in damage to vegetation, wildlife, soils, and other elements of the ecosystem, they have and will continue to occur. Determining the historic occurrence of these types of fire regimes can be estimated by using the Historic Range of Variability (HRV) for the various seral/ structural stages described in the Ochoco NF Viable Ecosystems Management Guide (Simpson et al. 1994).

In August 2000, lightning sparked the Hash Rock Fire. The fire originated west of the project area in the Mill Creek Watershed. The fire crossed the western border of the project area near Buck Creek to the south and McGinnis Creek to the north, and burned down slope towards U.S. Highway 26. Approximately 4,600 acres burned within the project area. Table 3-8 displays the fire severity regime, HRV, and the burn severities from the Hash Rock Fire.

Table 3-8. Bandit Historic and Hash Rock Fire Severities for Burned Area

Fire Severity Regime	HRV (%)	Hash Rock Severities (%)
Non-lethal	42 - 93	65
Mixed	5 - 21	12
Stand Replacement	12 - 27	23

Topographical features, burnout operations, and past management activities contributed to Hash Rock Fire severities being within the historic range of variability. Past management activities include commercial and precommercial thinning, and natural and activity-created fuels underburning. The area

of stand replacement fire that occurred within the watershed is located primarily within the Mill Creek Wilderness where past management activities were minimal.

Table 3-9 below displays the HRV and the fire severity regimes for the entire project area before and after the Hash Rock Fire.

Table 3-9. Bandit Fire Severity Regimes before and after Hash Rock Fire

Fire Severity Regime	HRV (%)	Pre Hash Rock Fire (%)	Post Hash Rock Fire (%)
Non-lethal	42 - 93	14	17
Mixed	5 - 21	56	52
Stand Replacement	12 - 27	30	31

The Hash Rock Fire resulted in an increase in the amount of area that supports non-lethal and stand replacement fire regimes. The area that would support a mixed severity regime was decreased. The increase in the area that would support stand replacement fires is attributed to the increase in the grass/ forb/shrub stage. The vegetation associated with this stage is susceptible to rapid fire spread and the above ground portions of the plants are easily killed by fire.

Alternative 1

The current mix of fire severity regimes as displayed in Table 3-10 would be maintained for the near future. The percent of forested area within the non-lethal fire severity regime is below HRV, the amount within the mixed and stand replacement severity regimes are above HRV. Over time, the amount of forested acres within the mixed and stand replacement fire regimes are expected to increase as fuel continues to accumulate. This increase would continue until a disturbance such as a wildfire occurs or a management activity such as underburning is proposed and implemented.

Precommercial thinning and underburning activities associated with the Marks and Harpo Timber Sales would reduce stand density and have been included in the existing fire severity regimes. There are no other planned activities that would affect fire severity regimes in the project area.

Alternatives 2, 3, and 4

All of the action alternatives would increase the percent of forested area within the non-lethal fire severity regime and reduce the percent of forested area within the mixed and stand replacement fire severity regimes as displayed in Table 3-10. Susceptibility of the landscape to a large-scale, stand-replacement wildfire would be reduced. These changes are a result of reductions in stand density and reductions in fuel loadings. Underburning activities would also interrupt the continuous arrangement of

fuel. Changes in the amount of forested areas in all fire severity regimes would remain outside the HRV.

Precommercial thinning and underburning activities associated with the Marks and Harpo Timber Sales would reduce stand density and have been included in the existing fire severity regimes. There are no other planned activities that would affect fire severity regimes in the project area.

Table 3-10 displays the HRV for the project area, along with the existing percent of the forested area within each fire severity regime. The effect of the alternatives in changing the percent of forested area within each fire severity regime is also displayed.

Table 3-10. HRV, Existing Fire Severity Regimes, and Changes to Fire Severity Regimes

Fire Severity Regime	HRV - % Forested area	Alt. 1 Existing (%)	Alt. 2 (%)	Alt. 3 (%)	Alt. 4 (%)
Non-Lethal	42 - 93	17	22	20	22
Mixed	5 - 21	52	48	50	48
Stand Replacement	12 - 27	31	30	31	30

Fish Habitat and Riparian Areas

There are 121 miles of stream in the Marks Creek Watershed and 1 mile of stream in the Veazie Creek subwatershed portion of the project area: 112 miles are on National Forest System lands and 10 miles are on private lands. Salmonid fisheries in the project area are limited by habitat quantity and quality. Field observations of stream channels indicate increased width/depth ratio, decreased sinuosity, increased slope, increased bar deposition, accelerated bank erosion, increased sediment supply, decreased sediment-transport capacity, decreased meander/width ratio, and channel aggradation (rise in the level of the stream bed) have occurred over the last several decades. When comparing data from Bottom Line Surveys and Level II Surveys to desired conditions in the Inland Native Fish Strategy, the stream system lacks pools, lacks small and medium class large woody debris (LWD), temperatures exceed desired levels, the width/depth ratio is too high, sediment is too high, and bank erosion is too high.

Based on site analysis of geomorphology, vegetation, and the observed hydrologic regime, the primary sources of disturbance in the last 100 years within the project area appear to have been historic livestock grazing (greatest impacts prior to 1960), previous timber harvest practices, and road construction in proximity to streams.

In August and September 2000, the Hash Rock Fire burned about 4,600 acres in the Marks Creek Watershed. The fire burned at varying intensities in the McGinnis, Cornez, Reilly, and Hamilton Creek drainages. Approximately 13 miles of stream were inside the fire perimeter. The Hash Rock Fire

reduced the amount of riparian vegetation along many of these stream miles.

Surface erosion has increased sediment delivery to streams. Historically, beaver dams, forest duff and litter, tree stands, alluvial deposits, large woody debris, and "edge" areas between scabs and forested stringers trapped sediment and held water so that it was released over an extended period of time. Beaver trapping, changes in riparian vegetation species and amount, and road construction have reduced or eliminated these "interceptors." The effect has been to simplify aquatic habitat and increase runoff and flood frequencies.

Long-term sustainability of aquatic species is directly linked to the quality and quantity of water moving through the project area. Prior to the construction of dams on the Crooked, Deschutes, and Columbia Rivers, there were summer steelhead and spring chinook runs, and all major tributaries had resident fish populations. Since then, populations of some species have declined or disappeared. The 7-day maximum average temperatures in Marks Creek average 65 to 77 degrees F. This exceeds the State water quality temperature standard of 64 degrees F. Naturally occurring temperatures in some tributaries also exceeded State standards. In the summer, stream temperatures often reach levels that retard the growth of and stress redband trout. Beaver trapping, road construction, changes in riparian vegetation, along with recreational use, have led to erosion, compaction, and displacement of soils, which in turn have hastened the flow of water through the drainage system.

Fish distribution throughout the watershed is limited by (1) stream flow, (2) both man-made and natural barriers, (3) stream gradient, and (4) rearing and spawning habitat quality and quantity. These low quality salmonid habitat areas are concentrated within lower gradient, broader valley reaches within the watershed.

Alternative 1

There would be no short-term impacts to streams and aquatic organisms because there would be no additional management activities (commercial harvest, road building, etc.) at this time. Sediment input into streams through new timber harvest or new road construction would not occur. Sediment input is expected to increase for 1-6 years in areas burned during the Hash Rock Fire because the fire reduced ground cover and vegetation. Sediment would decrease as vegetation recovers.

There is increased risk of higher levels of insect and disease mortality which may reduce stream shading. If this mortality is light to moderate it may be beneficial (i.e., natural thinning) and reduction in stream shade would be small. Dead trees which fall into or adjacent to stream channels would add to the channel stability, catch sediment, and provide cover and structure. 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. With higher fuel loadings wildfire would burn at high intensity and reduce stream shading and long-term potential for large woody debris recruitment.

The existing 51.8 miles of roads within RHCAs would remain and the sediment they produce would

continue. Because of the impacts of sediment from existing roads, it could take decades for Alternative 1 to move towards attaining Riparian Management Objectives for aquatic species and their habitat.

The distribution of fish throughout the watershed would continue to be limited. Aquatic and riparian habitats where streams are degraded may not improve over time without treatment. Populations of salmonids (redband trout) and associated aquatic species would not begin to increase until channel structure improves and water temperatures decrease.

Cumulative Effects Common to All Alternatives

Within the Hash Rock Fire perimeter, sediment delivery to the tributaries flowing into Marks Creek has increased from both surface erosion and in-channel sources resulting from fire-induced increases in runoff. Fine sediment production will return to pre-fire levels in the first 1-6 years after the fire. Channels may widen to accommodate the higher flows resulting in increased amounts of bank erosion. Sediment due to the Hash Rock Fire is expected to enter the stream systems until the vegetation reestablishes and the stream channels stabilize. Mass wasting may be a chronic problem for several years on some tributaries as the roots of fire-killed trees deteriorate and landslides are reactivated. Width/depth ratios could potentially change. With increased width/depth ratio, more surface area is exposed to solar radiation. Streamside vegetation becomes less effective in providing shade as channels widen.

Portions of McGinnis, Hamilton, Reilly, and Cornez Creeks are within the perimeter of the Hash Rock Fire. Some large woody debris was lost in the burned riparian areas in McGinnis, Reilly, and Cornez Creeks. Upper Hamilton Creek had high intensity burns which removed most of the large woody debris and killed most of the trees. Large wood recruitment will occur as some of the dead and dying trees fall into the creeks.

As a result of the fire, several rehabilitation activities have been proposed and implemented separate from this analysis. These projects include headcut repair, large woody debris placement, riparian planting, road decommissioning and inactivation, culvert replacement, tilling, and trail reconstruction. Many of these activities will contribute small amounts of sediment in the areas where they take place. Site-specific mitigation measures will be implemented to minimize sediment production. These mitigation measures include the timing of activities (during low flow periods so water flow will not move soil) and the number of activities that will be allowed to occur at any given time. These activities are designed to reduce the predicted increase in flows and sediment delivery (soil movement) as a result of removal of woody vegetation and root stabilizing plants. Firelines and stream crossings from the Hash Rock Fire suppression efforts are not expected to contribute additional sedimentation to the streams as they were recontoured where needed, drainage on road surfaces was improved, and areas were seeded where needed.

Other reasonably foreseeable activities within the Marks Creek watershed would also improve stream habitat. These activities are: replacement of Little Hay Creek bridge, installing a fish ladder over a dam on a private pond located on Marks Creek, and changes in riparian utilization standards for livestock

grazing.

Portions of the Pick-Up Salvage Harvest are within the Marks Creek Watershed. The amount of sediment delivery from this salvage harvest is so small that the proposed activities should not result in any measurable increase in turbidity or sediment delivery.

The distribution of fish throughout the watershed will continue to be limited by existing barriers (such as undersize culverts) to fish passage. The Ochoco National Forest is actively working on identifying and replacing culverts that need to be replaced to accommodate high-flow runoff (floods) and remove barriers to fish passage.

Alternative 2

Alternative 2 was developed with an emphasis on moving toward conditions that are sustainable and provide habitat diversity. It includes management in RHCAs to enhance riparian conditions and move toward attaining riparian management objectives. Commercial timber harvest (71 acres), precommercial thinning (233 acres), and natural fuels underburning (only incidental amounts) would occur within RHCAs.

Water quality/hardwood improvement projects would occur on 149 acres within the project area. These improvement projects include conifer thinning within aspen stands, hardwood and conifer planting, headcut repair, and fencing. Planting and matting would occur on 0.5 acres in a landslide area near the 3350-200 road. These activities would help to stabilize soils and reduce the potential for sediment delivery.

Short-term increases in sediment would occur from road construction (0.1 miles), reconstruction (less than 0.1 miles), decommission (3.7 miles), and inactivation (2.8 miles) activities within RHCAs. However, long-term surface erosion and sediment delivery would be reduced with the removal (decommission) of 3.7 miles of road within RHCAs. Road decommissioning and inactivation would also reduce bank erosion at stream crossings and allow for stream channels to maintain function. Sediment would continue to come from the remaining 48.1 miles of road within RHCAs.

Two headcuts, on Cornez and Little Hay Creeks, would be repaired to reduce sediment production. Headcut repair activities have a high potential for short-term, localized sediment delivery. This lasts only while activities are ongoing (usually 2-3 days). These activities would occur during the low flow season (generally July to October). Headcut repair activities result in a decrease in sediment delivery within 1 year after activities are complete.

Aquatic habitats would improve. Commercial harvest and precommercial thinning within RHCAs 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. Removing smaller trees (less than 20 inches dbh) would increase the growth rates of the remaining trees because there

would be less competition for nutrients, sunlight, and water. Increased growth rates would result in growing larger trees over time. Hardwood enhancement and riparian planting would help to improve vegetative diversity, increase shade, and improve streambank stability. These activities would contribute to meeting RMOs. Reducing sediment delivery would also contribute to meeting RMOs. As the amount of large woody debris increases other stream characteristics would improve, such as increases in the quantity and quality of pools, protection of woody species, lower water temperatures, reduced sediment, and contribute to bank stability.

Road reconstruction activities would replace some culverts that are fish passage barriers and increase the amount of habitat available to fish. However, the distribution of fish throughout the watershed would continue to be limited by existing barriers to fish passage. Populations of salmonids (redband trout) would begin to increase when the channels become stable and water temperatures decrease. Stream channels that were channelized may move towards their historic channel type with the increase of large woody material within RHCAs.

Alternative 3

Under this alternative, no commercial timber harvest activities or road construction activities would occur.

Precommercial thinning within RHCAs (333 acres) is designed to maintain or improve existing shade conditions and enhance long-term RMOs. Precommercial thinning within RHCAs would increase potential for large wood recruitment. Precommercial thinning activities in this alternative would not remove as many trees as the other action alternatives. Removing small trees would increase the growth rates of the remaining trees because there would be less competition for nutrients, sunlight, and water. Alternatives 2 and 4 remove more trees, would better reduce competition, and would result in larger increases in growth rates. Increased growth rates would result in growing larger trees over time. Increasing the amount of large woody material would result in an increase in pools, an increase in shade, and a decrease in temperature. Natural fuels underburning (incidental amounts) is designed to retain large wood and riparian vegetation.

Water quality/hardwood improvement projects would occur on 149 acres within the project area. These improvement projects include conifer thinning within aspen stands, hardwood and conifer planting, and fencing. Planting and matting would occur on 0.5 acres in a landslide area near the 3350-200 road to help stabilize soils and reduce the potential for sediment delivery.

Two headcuts, on Cornez and Little Hay Creeks, would be repaired to reduce sediment production. Headcut repair activities have a high potential for short-term, localized sediment delivery. This lasts only while activities are ongoing (usually 2-3 days). These activities would occur during the low flow season (generally July to October). Headcut repair activities result in a decrease in sediment delivery within 1 year after activities are complete.

Vegetation treatment in RHCAs would improve aquatic habitat. Long-term sediment production would be reduced with the removal (decommission) of 3.7 miles of road and closure (inactivation) of 2.8 miles of road within RHCAs. Sediment input would continue from the remaining 48.1 miles of road within RHCAs.

Short-term increases in sediment would occur from road decommissioning (3.7 miles) and inactivation (2.8 miles) activities. The amount of sediment delivery would decrease as vegetation regrows on these areas.

The distribution of fish throughout the watershed would continue to be limited by existing barriers to fish passage. Populations of salmonids (redband trout) would begin to increase when the channels become stable and water temperatures decrease. Stream channels that were channelized may move towards their historic channel type with the increase of large woody material within RHCAs.

Alternative 4

Under this alternative, commercial timber harvest, both salvage and green-tree, would be avoided within the Hash Rock Fire perimeter. No new or temporary road construction would occur within the Hash Rock Fire perimeter or in the Bandit Springs Recreation Area. Alternative 4 includes management in RHCAs to enhance riparian management objectives, similar to Alternative 2. Commercial harvest (69 acres), precommercial thinning (233 acres), and natural fuels underburning (only incidental amounts) would occur within RHCAs.

Water quality/hardwood improvement projects would occur on 149 acres within the project area. These improvement projects include conifer thinning within aspen stands, hardwood and conifer planting, headcut repair, and fencing. Planting and matting would occur on 0.5 acres in a landslide area near the 3350-200 road to help stabilize soils and reduce the potential for sediment delivery.

Short-term increases in sediment would occur from road construction (0.1 miles), reconstruction (less than 0.1 miles), decommission (3.7 miles), and inactivation (2.8 miles) activities within RHCAs. However, long-term sediment would be reduced with the removal (decommission) of 3.7 miles of road within RHCAs. Road decommissioning and inactivation would also reduce bank erosion at stream crossings and allow for stream channels to maintain function. Sediment would continue to come from the remaining 48.1 miles of road within RHCAs.

Two headcuts, on Cornez and Little Hay Creeks, would be repaired to reduce sediment production. Headcut repair activities have a high potential for short-term, localized sediment delivery. This lasts only while activities are ongoing (generally 2-3 days). Headcut repair activities result in a decrease in sediment delivery within 1 year after activities are complete.

Aquatic habitat would improve. Commercial harvest and precommercial thinning within RHCAs 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. Removing smaller trees (less than 20 inches dbh) would increase the growth rates of the remaining trees because there would be less competition for nutrients, sunlight, and water. Increased growth rates would result in growing larger trees over time. Hardwood enhancement and riparian planting would help to improve vegetative diversity, increase shade, and improve streambank stability. These activities would contribute to meeting RMOs. Reducing sediment delivery would also contribute to meeting RMOs. Increases in the amount of large woody debris would improve other stream characteristics such as increases in quantity and quality of pools, protection of woody species, lower water temperatures, reduced sediment, and contributions to bank stability.

Road reconstruction activities would replace some culverts that are fish passage barriers and increase the amount of habitat available to fish. However, the distribution of fish throughout the watershed would continue to be limited by existing barriers to fish passage. Populations of salmonids (redband trout) would begin to increase when the channels become stable and water temperatures decrease. Stream channels that were channelized may move towards their historic channel type with the increase of large woody material within RHCAs.

Heritage Resources

A variety of heritage properties are present within the project area. Archaeological evidence suggests there was seasonal use of the uplands for over 10,000 years by both Great Basin and Plateau cultural groups. The Ochoco Mountains are within the historic ancestral domain of the Confederated Tribes of the Warm Springs Reservation. Evidence of early livestock management (old stock driveways), Forest Service administration, and early transportation routes are also present.

Alternative 1

This alternative does not propose any new management activities. Forest stands would not be treated and levels of natural fuels would continue to accumulate. The risk of wildfire would continue increasing over times as fuels continue to accumulate. This alternative would not result in disturbance to prehistoric and historic sites; however, high intensity fires would affect both the physical materials and features of sites and cultural plants. Fires could potentially remove wooden structures and high-intensity fires and the associated suppression activities could negatively affect prehistoric sites and artifacts. Cultural plants would be at greater risk of loss from wildfires. Existing uses like recreation, hunting, camping, and grazing would continue to potentially affect all sites in the project area. The risk to sites from ongoing uses would be the same under all alternatives. Implementation of existing projects like the Hash Rock Fire rehabilitation efforts, Pick-Up Salvage Sale, and Marks and Harpo precommercial thinning would continue with project specific cultural resource management objectives and are not expected to affect heritage resources.

Alternative 2

Alternative 2 includes commercial harvest, road construction and reconstruction, precommercial thinning, and underburning activities that have the potential to affect 13 known historic sites. These known sites include the Historic Summit Trail, early transportation routes and trails, stock driveways, a lookout site, a wooden structure, scribed aspen, lithic scatters, and range improvements. Historic sites are known to occur in four tractor logging system units, two helicopter logging system units, ten precommercial thinning units, and three riparian enhancement units. Design elements have been identified and would be implemented to avoid adversely impacting historic sites and the qualities which make these sites eligible to the NRHP (National Register of Historic Places). The values associated with historic sites would be protected; however, there is still some risk that commercial harvest and road construction activities may affect known and undiscovered sites. If a site is discovered or disturbed during harvest operations, efforts would be made to avoid any further disturbance. Site-specific mitigation would be determined if sites could not be avoided, and consultation with the Oregon State Historic Preservation Office (SHPO) would occur prior to resuming activities. This alternative has the highest risk of affecting historic sites because it includes more management activities than the other action alternatives.

Alternative 2 also includes commercial harvest of trees from a stand with carved aspen. Layout and design activities have been designed to protect carved aspen from damage during commercial harvest activities. Slash would be handpiled away from carved aspen.

Alternative 3

This alternative includes precommercial thinning and natural fuels underburning activities that have the potential to affect 12 historic sites. These known sites include the Historic Summit Trail, early transportation routes and trails, stock driveways, a lookout site, scribed aspen, lithic scatters, and range improvements. Design elements have been identified and would be implemented to avoid adversely impacting historic sites and the qualities which make these sites eligible to the NRHP.

Precommercial thinning would occur in a stand with carved aspen. Conifer trees larger than 12 inches dbh would be retained. To protect carved aspen from fire, precommercial thinning slash would be handpiled away from carved aspen.

Alternative 4

This alternative includes commercial harvest, road construction and reconstruction, precommercial thinning, and underburning activities that would have the potential to affect 11 known historic sites. These known sites include the Historic Summit Trail, early transportation routes and trails, stock driveways, a lookout site, scribed aspen, lithic scatters, and range improvements. Historic sites are known to occur in four tractor logging system units, ten precommercial thinning units, and three riparian enhancement units. Design elements have been identified and would be implemented to avoid adversely impacting historic sites and the qualities which make these sites eligible to the NRHP. The values associated with historic sites would be protected; however, there is still some risk that commercial

harvest and road construction activities may affect known and undiscovered sites. If a site is discovered or disturbed during harvest operations, efforts would be made to avoid any further disturbance. Site-specific mitigation would be determined if sites could not be avoided, and consultation with the Oregon State Historic Preservation Office (SHPO) would occur prior to resuming activities. This alternative has the second highest risk of affecting historic sites.

This alternative includes commercial harvest of trees from a stand with carved aspen. Layout and design activities have been designed to protect carved aspen from damage during commercial harvest activities. Slash would be handpiled away from carved aspen.

Late and Old Structure (LOS) Stands

Late and old structure (LOS) stands are an important vegetative condition specifically identified in the Regional Forester's Forest Plan Amendment 2 (Eastside Screens). The amendment defines LOS as those vegetative structures in which large trees are a common feature. It goes on to identify two different structural conditions, multi-strata and single-strata. The amendment provides guidance to analyze and manage LOS stands.

The Ochoco National Forest's Viable Ecosystem Management Guide (VEMG) describes a seral/ structural matrix for characterizing forest vegetation, including LOS, within Plant Association Groups (PAGs). The Viable Ecosystems model was used to characterize the existing landscape and to provide a method to compare existing conditions to historical conditions. A more detailed description of the VEMG model, PAGs, and seral/structural stages is included in the Upland Vegetation section later in this chapter.

Existing vegetation conditions were derived from an analysis of satellite imagery. Polygons were identified which met the VEMG criteria for size/structure class 5 (trees greater than 21 inches dbh). Seral status, Early (E), Mid (M), and Late (L), is also identified. The difference between multi- and single-strata LOS was derived from canopy closure. The "a" designation denotes denser multi-strata conditions (generally greater than 55 percent canopy closure), while the "b" designation describes less dense single-strata conditions. The amount of each LOS type was then compared to its corresponding Historic Range of Variability (HRV). This comparison determined which of the scenarios outlined in the Eastside Screens is applicable to the Bandit project. Table 3-11 displays the results of this comparison.

Table 3-11. Comparison of Existing LOS to the HRV

PAG	Multi-strata LOS	Single-strata LOS	Eastside Screens
Moist Grand Fir	Above HRV	Below HRV	Scenario A
Dry Grand Fir	Above HRV	Below HRV	Scenario A

Douglas-fir	Above HRV	Below HRV	Scenario A
Mesic ponderosa pine	Within HRV	Below HRV	Scenario A
Xeric ponderosa pine	Within HRV	Below HRV	Scenario A

Historically, natural disturbance agents such as wildfire maintained much of the area in single-strata, lower-density conditions where large trees of fire-tolerant species were common. Today that condition is rare. Much of the historic LOS stands have been converted to other structural stages because of wildfire suppression over the last several decades. Of the LOS stands that remain, most are in a non-historic condition. Stand densities have increased, understory structure has developed, and the occurrence of fire-intolerant species has increased. The multi-strata condition is now within or above the historic range for all PAGs, while the single-strata condition is now below the historic range. Overall, the total amount of existing LOS is below historic abundance. All PAGs fall within Scenario A of Eastside Screens. Scenario A allows for LOS stages that are within or above the HRV to be moved into LOS stages that are below HRV. Under Scenario A, no net loss of LOS is allowed and all live trees 21 inches dbh and larger are to be retained. Open park-like conditions are to be maintained where they existed historically and the development of large diameter open canopy structure is to be encouraged.

The information displayed below includes all potential LOS stand acres within the project area. The Ochoco National Forest has also identified a minimum patch size of 5 acres that must be met in order to fit within the current LOS definition. There is a small amount (less than 50 acres) of LOS stands that have not been included because they are less than 5 acres in size.

Tables 3-12 to 3-16 display the existing amounts of both single and multi-strata LOS stands for each PAG by seral/structural stage (S/S). Table 3-17 summarizes, by PAG, the total amount of both single and multi-strata LOS stands within the project area.

Table 3-12. Moist Grand Fir PAG

Multi-strata LOS			**Single-strata LOS**		
S/S stage	**HRV %**	**Existing %**	**S/S stage**	**HRV %**	**Existing %**
E5a	1-5	7.6	E5b	4-14	1
M5a	5-10	21.1	M5b	20-40	12.3
L5	5-15	22			
Total (%)	**11-30**	**50.7**	**Total (%)**	**24-54**	**13.3**
Total (acres)	**154-421**	**711**	**Total (acres)**	**337-758**	**186**

Table 3-13. Dry Grand Fir PAG

Multi-strata LOS			Single-strata LOS		
S/S stage	**HRV %**	**Existing %**	**S/S stage**	**HRV %**	**Existing %**
E5a	2-5	12.6	E5b	33-58	3
M5a	2-5	9.1	M5b	13-28	8
L5	5-15	4.8			
Total (%)	**9-25**	**26.5**	**Total (%)**	**46-86**	**11**
Total (acres)	**1768-4910**	**5203**	**Total (acres)**	**9,034-16,890**	**2160**

Table 3-14. Douglas-fir PAG

Multi-strata LOS			Single-strata LOS		
S/S stage	**HRV %**	**Existing %**	**S/S stage**	**HRV %**	**Existing %**
E5a	2-5	7.7	E5b	43-58	0.9
M5a	1-3	12.4	M5b	3-14	1.4
L5a	1-7	3.5	L5b	1-3	0.4
Total (%)	**4-15**	**23.6**	**Total (%)**	**47-75**	**2.7**
Total (acres)	**329-1234**	**1939**	**Total (acres)**	**3867-6171**	**222**

Table 3-15. Mesic Ponderosa Pine PAG

Multi-strata LOS			Single-strata LOS		
S/S stage	**HRV %**	**Existing %**	**S/S stage**	**HRV %**	**Existing %**
E5a	0-1	0	E5b	0-1	0
M5a	0-1	1.1	M5b	0-5	0
L5a	1-5	2.3	L5b	59-79	0.2
Total (%)	**1-7**	**3.4**	**Total (%)**	**59-85**	**0.2**
Total (acres)	**22-151**	**73**	**Total (acres)**	**1271-1832**	**4**

Table 3-16. Xeric Ponderosa Pine PAG

Multi-strata LOS			Single-strata LOS		
S/S stage	**HRV %**	**Existing %**	**S/S stage**	**HRV %**	**Existing %**
E5a	0-1	0	E5b	0-5	0
M5a	0-1	0.7	M5b	1-5	0
L5a	1-3	3.3	L5b	24-44	0
Total (%)	1-5	4.0	Total (%)	25-54	0
Total (acres)	26-130	104	Total (acres)	650-1404	0

Table 3-17. Total Amount of LOS in the Project Area

	Multi-strata LOS		Single-strata LOS	
PAG	**HRV (acres)**	**Existing (acres)**	**HRV (acres)**	**Existing (acres)**
Moist Grand Fir	154-421	711	337-758	186
Dry Grand Fir	1,768-4,910	5,203	9,034-16,890	2,160
Douglas-fir	329-1,234	1,939	3,867-6,171	222
Mesic Ponderosa Pine	22-151	73	1,271-1,832	4
Xeric Ponderosa Pine	26-130	104	650-1,404	0
Total	2,299-6,846	8,030	15,159-27,055	2,572

The Vegetation Dynamics Development Tool (VDDT) model (Beukema and Kurz 1996) was used to predict the future amount of LOS. Predictions have been made for each alternative. The predictions display the projected amounts of LOS at 10 and 30-year intervals as a result of implementing the proposed alternatives. These projections include changes from natural growth and succession, as well as endemic levels of disturbance (insects and disease). These projections do not include catastrophic events such as a large-scale wildfire or insect epidemics. They also do not include assumptions about future management except for continued fire suppression. None of the alternatives cause an LOS stage to go from above or within HRV to below HRV.

Alternative 1

No harvest, precommercial thinning, or underburning would occur. LOS stand development within the project area would be determined by existing stocking and species composition. LOS that develops

through natural growth and succession would tend towards mid or late-seral species composition and multi-strata characteristics. These conditions are already within or above the HRV for all PAGs. The rate at which stands develop large tree character would be hampered by densely stocked conditions and slow growth rates. On drier sites, such as the ponderosa pine PAGs, stand stagnation may preclude the attainment of the large tree component. Large trees within existing LOS stands would continue to be susceptible to mortality from competition with understory trees and the accompanying increase in risk to loss due to insects, disease, and wildfire. Overall, there would be a slight increase in total LOS stands over time. Tables 3-21 to 3-23 display the projected amounts of LOS over time.

Alternative 2

This alternative proposes commercial harvest on 707 acres within existing multi-strata LOS stands. Precommercial thinning and underburning would also occur on additional acres within LOS stands, including stands with both single and multi-strata conditions. Many of the acres proposed for commercial harvest would also be precommercially thinned and underburned. Activities would focus on the removal of understory trees to reduce stand density, to maintain existing large trees, and to enhance the development of additional large trees. No live trees 21 inches dbh or larger would be harvested. Pine and larch would be favored for retention. Some existing snags would be removed from within the Hash Rock Fire perimeter. Snag retention within the Hash Rock Fire perimeter would range from 3 to 11 snags per acres. Existing snags outside the fire perimeter would not be removed unless they are hazardous to logging operations.

Commercial harvest and precommercial thinning would generally move multi-strata LOS stands to or towards single-strata LOS stands, although the stands would continue to be uneven-aged. Precommercial thinning without commercial harvest would move about 550 acres of multi-strata LOS to single-strata LOS. This would occur in LOS stands which are predominately two-storied with a layer of small (<9inch dbh) trees beneath a large tree overstory. There would be an immediate increase in the amount of single-strata LOS stands and a corresponding reduction in the amount of multi-strata LOS stands. The overall amount of LOS stands would not change immediately due to harvest. The amount of multi-strata LOS stands would not be reduced below HRV. Reduction in stand density would reduce competitive stress and increase stand resiliency. This would result in more large trees being maintained over time, as well as encourage the development of additional large trees (Cochran et al. 1994). The risk of catastrophic loss due to disturbance agents would be reduced. Single-strata conditions are more likely to be sustained over time than the current multi-strata conditions. Single-strata stands have fewer trees and there is less competition for nutrients than in multi-strata stands. Single-strata stands also tend to have lower fuel loadings and a higher percentage of fire-tolerant tree species so that wildfires that do occur, occur at lower intensities. The abundance of early-seral species would be maintained and enhanced in the long term. This alternative would move 1,259 acres of multi-strata LOS stands to single-strata LOS stands. Treated stands would become more resilient to natural disturbance agents.

Alternative 3

This alternative proposes no commercial harvest. Precommercial thinning would focus on the removal of understory trees to reduce stand density and remove understory trees. No live trees 12 inches dbh or larger would be removed. Primarily fire-intolerant species would be targeted for removal. Existing large snags and downed logs would not be removed. Precommercial thinning would move 702 acres of multi-strata LOS stands to single-strata. This would occur in stands which are predominately two-storied. Reductions in stand density would reduce competitive stress and result in more large trees being maintained over time. Treated stands would become more resilient to natural disturbance agents.

Alternative 4

This alternative proposes commercial harvest on 658 acres within existing multi-strata LOS stands. Precommercial thinning and underburning would also occur on additional acres within LOS stands, including stands with both single and multi-strata conditions. Many of the acres proposed for commercial harvest would also be precommercially thinned and underburned. Activities would focus on the removal of understory trees, to reduce stand density, improve stand resiliency, maintain existing large trees, and enhance the development of additional large trees. No live trees 21 inches dbh and larger would be harvested. Primarily fire-intolerant, late-seral species would be targeted for removal. Existing snags would not be removed unless they are hazardous to logging operations.

Commercial harvest and precommercial thinning would generally move multi-strata LOS stands to or towards single-strata LOS, although the stands would continue to be uneven-aged. Precommercial thinning without commercial harvest would move about 560 acres of multi-strata LOS to single-strata LOS. This would occur in LOS stands which are predominately two-storied with a layer of small (<9inch dbh) trees beneath a large tree overstory. There would be an immediate increase in the amount of single-strata LOS stands and a corresponding reduction in the amount of multi-strata LOS stands. The overall amount of LOS stands would not change immediately due to harvest. The amount of multi-strata LOS stands would not be reduced below HRV. Reduction in stand density would reduce competitive stress. This would result in more large trees being maintained over time, as well as encourage the development of additional large trees. The risk of catastrophic loss due to natural disturbance agents would be reduced. Single-strata conditions are more likely to be sustained over time than the current multi-strata conditions. The abundance of early-seral species would be maintained and enhanced in the long term. This alternative would move 1,217 acres of multi-strata LOS stands to single-strata LOS stands. . Treated stands would become more resilient to natural disturbance agents.

Tables 3-18 and 3-19 display the changes in multi and single-strata LOS stands immediately after treatment for all alternatives. Single-strata LOS stands would continue to be below the HRV for all PAGs, while multi-strata LOS stands would continue to be above or within the HRV.

Table 3-18. Multi-strata LOS Stand Changes due to Treatment (in acres)

PAG	Current Status	Alt 2	Alt 3	Alt 4

		Change	Status	Change	Status	Change	Status
MGF	Above	-38	Above	-17	Above	-36	Above
DGF	Above	-825	Within	-433	Within	-785	Within
DF	Above	-345	Above	-230	Above	-345	Above
MPP	Within	-30	Within	-22	Within	-30	Within
XPP	Within	-21	Within	0	Within	-21	Within

Table 3-19. Single-strata LOS Stand Changes due to Treatment (in acres)

PAG	Current Status	Alt 2		Alt 3		Alt 4	
		Change	Status	Change	Status	Change	Status
MGF	Above	+38	Below	+17	Below	+36	Below
DGF	Above	+825	Below	+433	Below	+785	Below
DF	Above	+345	Below	+230	Below	+345	Below
MPP	Within	+30	Below	+22	Below	+30	Below
XPP	Within	+21	Below	0	Below	+21	Below

Table 3-20 displays the predicted percentages of LOS stands that would occur within the project area over time. Under all alternatives, the amount of multi-strata LOS stands does not drop below HRV for any PAG at any of the predicted times. Conversely, the amount of single-strata LOS stands remains below HRV under all alternatives.

Table 3-20. Predicted Percentages of LOS Over Time

PAG	Years After Implementation	LOS Type	HRV (%)	Alt. 1	Alt. 2	Alt. 3	Alt. 4
MGF	0	multi	11-30	50.7	48.0	49.5	48.1
		single	24-54	13.3	16.0	14.5	15.9
	10	multi		49.2	46.3	47.3	46.6
		single		13.0	17.0	14.7	16.1
	30	multi		46.3	43.6	45.6	44.8
		single		13.2	16.7	14.0	15.1
DGF	0	multi	9-25	26.5	22.3	24.3	22.5
		single	46-86	11.0	15.2	13.3	15.0

	10	multi		27.8	24.8	25.8	24.9
		single		10.2	14.2	11.9	14.0
	30	multi		30.1	27.7	28.5	27.8
		single		6.7	12.2	10.4	11.3
DF	0	multi	4-15	23.6	19.4	20.8	19.4
		single	47-75	2.7	6.9	5.4	6.9
	10	multi		23.9	20.9	21.6	21.2
		single		3.0	7.1	5.7	6.9
	30	multi		25.1	22.9	22.7	23.7
		single		2.9	5.8	4.6	5.4
MPP	0	multi	1-7	3.4	2.0	2.4	2.0
		single	59-85	0.2	1.6	1.2	1.6
	10	multi		3.9	3.3	3.5	3.0
		single		0.5	2.0	1.2	2.0
	30	multi		5.8	5.3	6.0	5.5
		single		1.1	2.8	1.7	2.4
XPP	0	multi	1-5	4.0	3.2	4.0	3.2
		single	25-54	0	0.8	0	0.8
	10	multi		4.7	4.1	4.7	4.3
		single		0.3	1.4	0.5	1.1
	30	multi		6.2	5.7	5.9	5.4
		single		0.4	1.8	0.6	1.4

The projections for the action alternatives include only the management actions associated with that alternative. They do not include any future management such as continued underburning, thinning, or other activities that could occur in the future. Thus, the predicted amounts of multi-strata LOS tend to increase with time as succession and stand growth continue without management intervention. Conversely, the amount of single-strata LOS decreases over time. It is probable that, with future management, these trends would be reversed in all of the action alternatives, particularly in the 30-year projections.

Table 3-21. Projected Amounts (acres) of LOS, Year 0

PAG	Alt. 1	Alt. 2	Alt. 3	Alt. 4

	Multi	Single	Multi	Single	Multi	Single	Multi	Single
MGF	711	186	673	224	694	203	675	223
DGF	5,203	2,160	4,378	2,984	4,770	2,611	4,417	2,945
DF	1,939	222	1,594	567	1,709	443	1,594	567
MPP	73	4	43	35	51	25	43	34
XPP	104	0	83	21	104	0	83	21
Total	8,030	2,572	6,771	3,831	7,328	3,282	6,812	3,790

Table 3-22. Projected Amounts (acres) of LOS, Year 10

PAG	Alt. 1		Alt. 2		Alt. 3		Alt. 4	
	Multi	Single	Multi	Single	Multi	Single	Multi	Single
MGF	690	182	650	238	664	206	654	226
DGF	5,458	2,003	4,869	2,788	5,065	2,336	4,889	2,749
DF	1,964	246	1,718	584	1,775	468	1,742	567
MPP	84	11	71	43	75	26	65	43
XPP	122	8	107	36	122	13	112	29
Total	8,318	2,450	7,415	3,689	7,701	3,049	7,462	3,614

Table 3-23. Projected Amounts (acres) of LOS, Year 30

PAG	Alt. 1		Alt. 2		Alt. 3		Alt. 4	
	Multi	Single	Multi	Single	Multi	Single	Multi	Single
MGF	650	185	612	234	640	196	628	212
DGF	5,909	1,315	5,438	2,395	5,595	2,042	5,458	2,218
DF	2,063	238	1,882	477	1,866	378	1,948	444
MPP	125	24	114	60	129	37	119	52
XPP	161	10	148	47	153	16	140	36
Total	8,908	1,772	8,194	3,213	8,383	2,669	8,293	2,962

Totals may not be exact due to rounding.

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 picked as an indicator of riparian and aquatic habitat. Pileated woodpecker was picked an indicator for species that require mature forest and old-growth habitat. Primary cavity excavators and the common flicker were selected to represent species that utilize snags and old-growth juniper habitat, respectively.

BROOK AND RAINBOW TROUT

In the past, brook and rainbow trout have been stocked by the Oregon Department of Fish and Wildlife. They are no longer stocked in streams in the project area. Brook and rainbow trout habitat requirements are similar to redband trout and they would be found in the same stream systems if stocking still occurred. Effects to brook and rainbow trout habitat would be the same as the effects described for redband trout habitat in the section on threatened, endangered, and sensitive species.

PILEATED WOODPECKER

Effects to this species are described in the wildlife habitat with LOS characteristics section.

PRIMARY CAVITY EXCAVATORS

The Viable Ecosystems Management Guide identifies two species of guild specialists, the white-headed and pileated woodpeckers, for measuring effects on primary cavity excavators. This discussion focuses on effects to the white-headed woodpecker; effects to pileated woodpecker are discussed in the wildlife habitat with LOS characteristics section (later in this Chapter). The white-headed woodpecker prefers open areas with an overstory of large pine and snags. The pileated woodpecker prefers dense, multi-strata, fir-dominated habitat. Current conditions in the project area favor the pileated woodpecker over the white-headed woodpecker; primary reproductive habitat for the pileated woodpecker is within the historic range of variability (HRV). White-headed woodpecker habitat is currently 13,346 acres below the HRV, which reflects past overstory removal harvest, fire suppression, and the current overstocked stand conditions.

The Hash Rock Fire burned approximately 4,600 acres within the project area. The majority of these acres were affected by low-intensity fire which tended to thin young trees from the understory and consume some of the large wood on the forest floor. It also killed an unspecified number of trees that will become future snags and down logs. The fire did burn moderate to hot in three locations in the Hamilton, Reilly, and McGinnis Creek drainages. In these locations, there were 20 to 30-acre hotspots that killed most of the overstory trees. The fire did not affect any of the three allocated old-growth areas (MA-F6) in the project area.

Table 3-24. White-Headed Woodpecker Habitat (in acres)

	HRV low	HRV high	Existing
Primary Reproductive Habitat	19,638	33,868	6,292

Alternative 1

The no action alternative would maintain habitat for the pileated woodpecker and other species that utilize dense, multi-strata, fir-dominated habitats (generally, multi-strata LOS stands). There would be a continued decline in white-headed woodpecker habitat. Primary reproductive habitat for the white-headed woodpecker consists of open, pine-dominated stands (generally, single-strata LOS stands). Single-strata LOS stands are currently being invaded by fir and are well below historic abundance. This alternative would not move towards the HRV for the white-headed woodpecker. This alternative would maintain the existing acres of fir-dominated understories and the trend toward dense, fir-dominated habitats would continue.

Alternative 2

This alternative includes commercial harvest, precommercial thinning, and underburning. Commercial harvest and precommercial thinning treatments would remove trees less than 21 inches dbh and promote and maintain large ponderosa pine and western larch. All existing snags (except safety hazards) would be retained in all units except those within the Hash Rock Fire perimeter. Units within the Hash Rock Fire perimeter have an abundance of snags due to fire-related mortality. Snag retention within the Hash Rock Fire units would be at levels determined using guidelines from the Viable Ecosystems Management Guide. This ranges from 3 to 11 snags per acre. Where possible, snags would be designated in clumps and would be left throughout the units. Snags within RHCAs would not be harvested. Snags within RHCAs that pose a safety hazard are to be felled and left on site or used for in-stream large wood.

Alternative 2 would increase the amount of white-headed woodpecker primary reproductive habitat by 2,022 acres. The total amount of white-headed woodpecker habitat would continue to be below the HRV. This alternative would help reverse the downward habitat trend for the white-headed woodpecker. Of the action alternatives, this alternative has the greatest potential for creating/maintaining habitat for the white-headed woodpecker in the long term. This alternative would not fragment allocated old-growth areas that are currently being "managed" for wildlife species associated with old growth and mature forests.

Alternative 3

This alternative does not include any commercial timber harvest or road construction activities. This alternative would precommercially thin 4,180 acres and underburn an additional 5,676 acres. Existing snags would be maintained.

Alternative 3 would increase the amount of white-headed woodpecker habitat by 1,282 acres. The total amount of white-headed woodpecker habitat would continue to be below the HRV. This alternative would help reverse the downward habitat trend for the white-headed woodpecker.

Alternative 4

This alternative includes commercial harvest, precommercial thinning, and underburning. Commercial harvest and precommercial thinning treatments would primarily thin fir and some pine (less than 21 inches dbh) and feature the dominance of large ponderosa pine and western larch. All existing snags (except safety hazards) will be retained in all units. Snags within RHCAs that pose a safety hazard are to be felled and left on site or used for in-stream large wood.

Alternative 4 would increase the amount of white-headed woodpecker habitat by 1,913 acres. The total amount of white-headed woodpecker habitat would continue to be below the HRV. This alternative would help reverse the downward habitat trend for the white-headed woodpecker. Of the action alternatives, this alternative has the second highest potential for creating/maintaining habitat for the white-headed woodpecker. This alternative would not fragment allocated old-growth areas currently being "managed" for pileated woodpeckers and other species associated with old-growth and mature forests.

Table 3-25. White-Headed Woodpecker Habitat by Alternative (in acres)

	HRV low	**HRV high**	**Acres Post Treatment**	**Acres in 10 years**	**Acres in 30 years**
Alternative 1	19,638	33,868	6,292	6,391	5,082
Alternative 2	19,638	33,868	8,314	8,293	7,592
Alternative 3	19,638	33,868	7,574	5,984	6,725
Alternative 4	19,638	33,868	8,205	6,398	7,308

Cumulative Effects

Historically, there were fewer multi-storied, fir-dominated stands and more single-storied, pine-dominated stands in the pine, Douglas-fir, and dry grand fir PAGs. In the moist, cool sites (moist grand fir PAGs), high crown closures and multi-layered canopies were historically common. Based on HRV, many of the future drier forested sites across the entire Ochoco National Forest will be dominated by pine rather than fir. In the moist, cool environments, shade-tolerant firs will dominate. Open, pine-dominated stands would be more suitable for use by those species such as the white-headed woodpecker, while the denser, fir-dominated stands will be managed for conditions that are suitable for the pileated woodpecker. Allocated old growth areas would continue to be managed to provide habitat for closed canopy, multi-layered old-growth associated species such as the pileated woodpecker.

NORTHERN (COMMON) FLICKER

The northern flicker is a MIS for old-growth juniper habitat. The HRV for old-growth juniper habitat in the project area ranges from 0-19 acres. Currently, there are 12 acres of old-growth juniper habitat. None of the alternatives would modify the existing amount of old-growth juniper habitat. All juniper trees greater than 12 inches dbh would be retained. Effects to this species have not been discussed because none of the alternatives propose to alter habitat. None of the alternatives would have an affect on large juniper tree habitat that is suitable for nest excavation.

CHAPTER 1
CHAPTER 2
CHAPTER 3 Part A
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CHAPTER 3 Part C
LIST OF PREPARERS

CHAPTER 3
AFFECTED ENVIRONMENT
and
ENVIRONMENTAL CONSEQUENCES

(Part B)

Neotropical Migratory Birds

Partners In Flight (PIF) is a cooperative effort involving partnerships among federal, state, and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, the academic community, and private individuals. PIF lead the effort to complete a series of Bird Conservation Plans for the continental United States (Altman 2000). PIF Landbird Conservation Planning provides the framework to develop and implement landbird conservation strategies by recommending conservation actions that may prevent the need for listings under the Endangered Species Act. These plans included priority setting, establishment of objectives, necessary conservation actions, and evaluation criteria necessary for bird conservation.

The PIF Bird Conservation Plan is being used to address the requirements contained in Executive Order (EO) 13186, January 10, 2001, Responsibilities of Federal Agencies to Protect Migratory Birds. Section 3(E)(6) of that EO states agencies shall ensure that environmental analyses evaluate the effects of proposed actions on migratory birds, with emphasis on species of concern. The PIF plan provides a method for analyzing effects upon neotropical migratory birds through the use of guidelines for priority habitats and bird species by subprovince. The conservation plan does not directly address all landbird species, but instead uses numerous "focal species" as indicators to describe the conservation objectives and measure project effects in different priority habitats for the bird community found there.

The PIF Bird Conservation Plan defines priority habitats and focal species by subprovince. The Ochoco National Forest is within the Blue Mountains subprovince. Table 3-26 lists the priority habitats and PIF focal species for the Blue Mountains subprovince.

Table 3-26. Blue Mountains Subprovince Priority Habitats and Focal Species

Priority Habitats	Focal Species for the Blue Mts. Province
Dry Forest	White-headed woodpecker, flammulated owl, chipping sparrow, Lewis' woodpecker
Mesic Mixed Conifer	Townsend's warbler, Vaux's swift, varied thrush, MacGillivary'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

Habitat effects were modeled for nine species associated with Dry Forest and Mesic Mixed Conifer priority habitats based on the vegetative stages derived from the Viable Ecosystems Management Guide. Since this model addresses upland forest vegetation only, species that require specialized habitats such as riparian vegetation, meadows, shrublands, aspen, or alpine are discussed separately. Effects to the white-headed woodpecker were previously discussed under the Management Indicator Species section.

FOCAL SPECIES ASSOCIATED WITH DRY FOREST AND MESIC MIXED CONIFER

The existing amount of priority habitats has been compared to the balance of conditions that existed historically within the project area. Of the nine species analyzed, five are currently above the minimum amount of historic habitat abundance and four are below. Generally, there is a relative shortage of habitat for those species associated with lower density and/or early-seral forest conditions. Conversely, denser, mid- to late-seral conditions are at or above historic abundance. These trends are primarily the result of past management practices and the exclusion of fire. Table 3-27 provides a comparison of the existing and historic habitat amounts in the project area.

Table 3-27. Comparison of Existing and Historic Focal Species Habitat Acres

Species	Minimum Historic Acres	Existing Acres	Status
Flammulated owl	18,886	11,256	Below minimum
Vaux's swift	3,500	3,770	Within range
Chipping sparrow	18,886	15,578	Below minimum
Lewis' woodpecker	18,687	6,306	Below minimum
Varied thrush	3,598	6,188	Within range
MacGillivary's warbler	5,832	8,076	Within range
Olive-sided flycatcher	18,791	14,328	Below minimum
Townsend's warbler	1,694	3,617	Within range
Hermit thrush	7,130	7,911	Within range

Tables 3-28 through 3-31 display the amounts of habitat projected to occur in the project area for each of the nine species by alternative. Each alternative was projected 10 and 30 years into the future using the VDDT model (see upland forest vegetation section of this document for a discussion of the VDDT model).

Table 3-28. Focal Species Habitat Projections for Alternative 1 (in acres)

Species	Minimum Historic	Existing*	10 years	30 years
Flammulated owl	18,886	11,256	9,472	6,441
Vaux's swift	3,500	3,770	5,383	7,791
Chipping sparrow	18,886	15,578	15,353	12,779
Lewis' woodpecker	18,687	6,306	6,654	5,219
Varied thrush	3,598	6,188	7,554	9,596
MacGillivary's warbler	5,832	8,076	7,271	6,119
Olive-sided flycatcher	18,791	14,328	14,109	11,123
Townsend's warbler	1,694	3,617	4,066	4,780
Hermit thrush	7,130	7,911	8,793	10,049

*This alternative does not propose any treatments that would directly modify the existing amount of habitat therefore post-treatment acres (see tables below) equals existing acres.

Table 3-29. Focal Species Habitat Projections for Alternative 2 (in acres)

Species	Minimum Historic	Existing	Post Treatment	10 years	30 years
Flammulated owl	18,886	11,256	14,465	12,328	9,811
Vaux's swift	3,500	3,770	3,409	4,869	7,079
Chipping sparrow	18,886	15,578	18,867	17,895	15,845
Lewis' woodpecker	18,687	6,306	8,328	8,518	7,716
Varied thrush	3,598	6,188	5,534	7,018	9,060
MacGillivary's warbler	5,832	8,076	7,523	6,834	6,342
Olive-sided flycatcher	18,791	14,328	17,694	16,747	14,185
Townsend's warbler	1,694	3,617	3,265	3,815	4,713
Hermit thrush	7,130	7,911	7,386	8,245	9,584

Table 3-30. Focal Species Habitat Projections for Alternative 3 (in acres)

Species	Minimum Historic	Existing	Post Treatment	10 years	30 years
Flammulated owl	18,886	11,256	13,491	8,600	8,701
Vaux's swift	3,500	3,770	3,669	4,652	7,113
Chipping sparrow	18,886	15,578	17,898	13,773	14,705
Lewis' woodpecker	18,687	6,306	7,588	6,218	6,849
Varied thrush	3,598	6,188	5,838	6,799	9,058
MacGillivary's warbler	5,832	8,076	7,929	7,201	6,509
Olive-sided flycatcher	18,791	14,328	16,693	12,598	13,144
Townsend's warbler	1,694	3,617	3,516	3,536	4,644
Hermit thrush	7,130	7,911	7,911	8,094	9,824

Table 3-31. Focal Species Habitat Projections for Alternative 4 (in acres)

Species	Minimum Historic	Existing	Post Treatment	10 years	30 years
Flammulated owl	18,886	11,256	14,316	9,071	6,441
Vaux's swift	3,500	3,770	3,430	4,533	6,986
Chipping sparrow	18,886	15,578	17,817	14,354	15,203
Lewis' woodpecker	18,687	6,306	8,219	6,629	7,448
Varied thrush	3,598	6,188	5,569	6,652	8,798
MacGillivary's warbler	5,832	8,076	7,548	7,030	6,164
Olive-sided flycatcher	18,791	14,328	17,545	13,141	13,530
Townsend's warbler	1,694	3,617	3,277	3,410	4,920
Hermit thrush	7,130	7,911	7,418	7,780	9,191

Species whose habitat is currently below historic abundance (flammulated owl, chipping sparrow, Lewis' woodpecker, varied thrush, olive-sided flycatcher)

Alternative 1

The no action alternative would not directly change the existing amount of habitat. Under this alternative there would be a continued decline in habitat abundance for these species as denser, mid to late-seral forest conditions continue to increase. In the long-term, Alternative 1 results in the least amount of habitat for all species except flammulated owl.

Alternatives 2, 3, and 4

The activities proposed in these alternatives result in increases in habitat due to stand density reduction and the favoring of early-seral species. In all cases, the amount of habitat stays below the historic range of abundance. Alternative 2 increases the amount of habitat the most for all species, followed by Alternatives 4 and 3, respectively. In the long-term, Alternative 2 results in the greatest amount of habitat for all species concerned, generally followed by Alternatives 4 and then 3.

Species whose habitat is currently within or above historic abundance (Vaux's swift, varied thrush, MacGillivary's warbler, Townsend's warbler, hermit thrush)

Alternative 1

This alternative would not directly change the amount of habitat for these species. The amount of habitat would stay above historic abundance levels. In the long-term, this alternative would result in the most habitat of all the alternatives for these species associated with denser, mid to late-seral conditions.

Alternatives 2, 3, and 4

The action alternatives include treatments that would cause a short-term reduction in the amount of habitat for all of these species. Habitat for most species would stay above minimum historic levels, with the possible exception of Vaux's swift. Alternatives 2 and 4 could potentially reduce habitat for this species slightly (less than 3%) below the minimum historic abundance for a short period of time. This would only occur if all proposed treatments were completed within a 3-year timeframe; however, activities are expected to be completed over a 10-year period. Within 10 years, the amount of Vaux's swift habitat increases to historic levels for both Alternatives 2 and 4. In the long term, habitat for all species is above minimum historic abundance levels.

SPECIES ASSOCIATED WITH SPECIALIZED HABITATS

The upland sandpiper is a Region 6 Regional Forester's Sensitive Species and its habitat is not affected by the project proposals because there is no or only low probability habitat in the project area. The Vesper sparrow inhabits steppe shrublands found at lower elevations and there are no steppe shrublands within the project area. The gray-crowned rosy finch inhabits alpine habitats that also do not occur within this project area. Therefore, the proposed activities would have no effect to these species or their habitats.

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 action alternatives include riparian restoration activities involving headcut repair, the planting of hardwoods and conifers, and thinning in

aspen stands. Fencing is also proposed to protect hardwoods from browse damage. These activities are planned to occur on or adjacent to 149 acres of riparian habitats. All action alternatives are identical in the area and amount of restoration planned. The action alternatives would increase or improve these habitats and are more beneficial to these species than the no action alternative.

The red-naped sapsucker is a bird that uses aspen-dominated vegetation and riparian woodlands similar to the vireo, veery, and willow flycatcher. The action alternatives include aspen restoration activities primarily involving thinning of conifers which are competing with aspen and fencing protection of young aspen suckers so that browsing does not kill them. These activities are planned to occur on 46 acres of aspen habitats. All action alternatives are identical in the area and amount of restoration planned. The action alternatives would maintain or improve habitat for this species and are more beneficial to this species than the no action alternative.

Natural Disturbance Agents (Insects and Disease)

Past management practices, including fire suppression and timber harvest, have favored the development of stands which are now considered to be out of balance with their historic conditions. Historically (100 + years ago) stands in the project area would have commonly had more ponderosa pine and western larch and less grand fir and Douglas-fir. They would have been more open and single storied than the multi-storied stands of today. These open, single-storied stand conditions were maintained by frequent, low-intensity fires. The natural disturbance agents found in the project area have always been present; however, the degree to which they now affect the area can be considered to be a reflection of the ecosystem's health and resiliency. Some of the major natural disturbance agents of concern are listed below.

Bark beetles - Western and mountain pine beetles, as well as engraver beetles, benefit from many of the stand conditions which are currently over abundant when compared to their historic ranges. Increased stand density and the development of understories reduce tree vigor and lessen the ability of trees to withstand bark beetle attack (Graham and Knight 1965). Large diameter mature ponderosa pine is of particular concern. This stand component, already deficient in many PAGs, is commonly removed from overly dense stands by bark beetle attack.

Defoliating insects - From approximately 1987 to 1992, the project area, along with the rest of the Ochoco Mountains, experienced an outbreak of western spruce budworm which caused substantial amounts of tree damage and/or mortality in nearly all stands in which grand fir and Douglas-fir are major components. In 1992 the Marks Creek watershed was targeted as a "forest health" concern due to this defoliation and the Marks and Harpo Timber Sales were prepared to harvest some of the dead and damaged trees. Attributes that contribute to high susceptibility to defoliating insects are: (1) increased amount of later seral host species such as fir, (2) increased stand densities, and (3) the development of multi-storied stand structures (Carlson and Wulf 1989). All three of these conditions exist today in amounts that are above their historic levels.

Dwarf mistletoe - These parasitic plants are of particular concern to ponderosa pine, western larch, and Douglas-fir. High stand densities and multiple canopy layers contribute to high levels of mistletoe infection. Dwarf mistletoe can occasionally kill trees outright. Its most serious impact is to contribute to overall loss of vigor and increased susceptibility to attack by other disturbance agents (Hawksworth and Shaw 1987). Dwarf mistletoe can also limit the ability of a small tree to grow into a large tree. Past timber harvest practices and fire suppression has resulted in increased levels of mistletoe occurrence within the project area.

Root disease - Armillaria root disease and laminated root rot are two diseases of concern within the area. They are most evident within high-density stands and stands with a major component of later seral species. The Moist and Dry Grand Fir PAGs are where the most of the disease activity can be found, especially in areas where stands conditions combine to reduce stand vigor. These diseases can kill trees directly, and often work in conjunction with insects to create pockets or patches of mortality. Historically, these disease centers were usually small and contributed to stand diversity. As species composition changes to late seral and stands become more dense, the incidence of and susceptibility to root disease infection increases (Hagle and Shaw 1991). The tendency, without disturbance, is for infection centers to be repopulated with host tree species and for infections to perpetuate and intensify.

The susceptibility of the landscape to natural disturbance agents has been evaluated by examining the abundance of those vegetative stages that have a high risk factor associated with them. An overabundance of these conditions indicates a corresponding loss of resiliency. As the amount of high-risk stages increases, the landscape becomes more and more susceptible to large-scale, high-intensity disturbances which may have rarely, if ever, occurred in the past. Increasing the risk associated with insects and disease results in a corresponding increase in the susceptibility to large-scale stand replacement wildfire. Table 3-32 displays the stages used to identify stands at high risk to disturbance and their historic range of abundance (HRV). A more detailed description of the VEMG model, PAGs, and seral/structural stages is included in the Upland Vegetation section later in this chapter.

Table 3-32. High Risk Stages by PAG

PAG	High Risk Stages	HRV (Acres)
Moist GF	E5a, M5a, L3, L4, L5	239 - 702
Dry GF	E4a, E5a, M4a, M5a, L3, L4, L5	3,141 - 9,031
Douglas-fir	E3a, E4a, E5a, M4a, M5a, L4a, L5a	493 - 2,219
Mesic PP	E4a, E5a, M4a, M5a, L3a, L4a, L5a	22 - 237
Xeric PP	E4a, E5a, M4a, M5a, L3a, L4a, L5a	52 - 260
	Total Historic Range of Variability	3,947 - 12,449

Alternative 1

Currently, there are 15,374 acres within the Bandit II Project Area that are in stages rated as high risk. These conditions now exceed the HRV by an estimated 2,925 acres. Under this alternative, no actions are proposed which would reduce susceptibility of these acres to insect and disease. Vegetative development would continue and is dependent on the conditions and successional trends which currently exist. Many of the stages which become more abundant in the future have high risk factors associated with them (high density, abundance of late-seral species, etc). This alternative would result in the highest amount of high-risk conditions over time. By year 30, about 57 percent of the project area would be in high-risk conditions, increasing the likelihood of large-scale insect and disease infestations. Table 3-33 displays the acres of high risk associated with each alternative.

Alternative 2

The activities included in this alternative reduce the amount of high risk by 2,920 acres. There would be 12,454 acres remaining in the high-risk stages. This is close to the upper abundance of the HRV. Commercial harvest and precommercial thinning treatments would reduce stand densities, increase the relative abundance of early-seral species, and reduce susceptibility to insects and disease (Filip et al. 1990). This alternative results in the least amount of high-risk conditions over time and improves the resiliency of the project area the most. By year 30, approximately 50 percent of the area would be in high-risk conditions.

Alternative 3

The activities included in this alternative reduce the amount of high risk by 2,079 acres. There would be 13,295 acres remaining in the high-risk stages, about 850 acres above the HRV for these conditions. Precommercial thinning would reduce stand densities, increase the relative abundance of early-seral species, and would move stands closer to their historic conditions. This alternative results in fewer high-risk conditions over time than Alternative 1 but not as much as the other action alternatives. By year 30, approximately 52 percent of the area would be in high-risk conditions.

Alternative 4

The activities included in this alternative reduce the amount of high risk by 2,864 acres. There would be 12,510 acres remaining in the high-risk stages. This is slightly (61 acres) above the upper range of historic abundance. Commercial harvest and precommercial thinning would reduce stand densities, increase the relative abundance of early-seral species, and would move stands closer to their historic conditions. Resiliency would be increased in treated areas. This alternative results in fewer high-risk conditions over time than Alternative 1 but not as much as alternative 2. By year 30, approximately 51 percent of the area would be in high-risk conditions.

Table 3-33. Acres in High-Risk Condition

Alternative	Year 0	Year 10	Year 30
1	15,374	17,893	22,414
2	12,454	15,351	19,460
3	13,295	15,915	20,229
4	12,510	15,334	19,808

The 10 and 30-year projections include only the activities associated with each alternative. They do not include any future management such as continued underburning or thinning. Thus, the acres of high risk increase with time as succession and stand growth continue without management intervention. It is probable that, with future management, the amount of high-risk acres would continue to decrease in all of the action alternatives, particularly in the 30-year projections.

Recreation

There are several recreation sites within the project area: Ochoco Divide Campground, White Rock Campground, White Fir Camp, Bandit Springs Ski Trails, Ochoco Divide Snow Park, Corral Flat Dispersed Camping Area, and Wildcat Trail trailhead. The project area also encompasses a portion of the Mill Creek Wilderness and many unnamed dispersed sites.

Recreation use in the project area includes wildlife viewing, hunting, fishing, sightseeing, camping, hiking, biking, cross-country skiing, horseback riding, snowmobiling, rockhounding, and off-highway vehicle use.

This section has been divided into five topics including Bandit Springs Recreation Area, Camping Areas, Snow Parks, Trails, and Wilderness. Changes to the visual character of the scenery are described in the Visual Quality section later in this chapter.

BANDIT SPRINGS RECREATION AREA

The Bandit Springs Recreation Area is located near Ochoco Divide between the Mill Creek Wilderness and U.S. Highway 26. The area is a popular cross-country ski area and contains several miles of cross-country ski trails. Some trails coincide with existing roads that are closed to motorized vehicles from December 1 to March 30 each year. The Forest Plan emphasis for the area is to provide a variety of dispersed, nonmotorized recreational opportunities within a setting where most management activities are generally not evident to the casual observer. Forest Plan direction specifies that periodic manipulation of the vegetation, including timber harvest, will occur to develop and maintain resistance to catastrophic events which would detract from the recreational experience. Treatments will be apparent to the users of the area.

Many of the forest stands in the area feature large diameter ponderosa pine with developing understories

of fir, pine, and larch. The Forest Plan notes that ponderosa pine areas should be managed for a combination of multi-storied stands and open, park-like stands. Mixed conifer areas should be managed to maintain a mix of species with an emphasis on maintaining western larch.

Approximately 975 acres of the Bandit Springs Recreation Area was burned in the Hash Rock Fire. Intensities varied from high-intensity stand replacement fire to low-intensity underburning. Most of the high-intensity fire occurred adjacent to and south of McGinnis Creek.

Alternative 1

This alternative does not include any vegetative treatments. The recreational experience would not be directly affected by harvest or non-harvest activities. Understories would continue to develop and increase the amount of multi-storied conditions. The amount of open, park-like stands of ponderosa pine would continue to decrease. Stand densities would continue to increase placing additional stress on older overstory trees. Shade-tolerant grand fir would continue to become more abundant, while ponderosa pine and larch dominance would decrease. Fuel loadings, including small understory trees, would continue to increase. Susceptibility to wildfire and/or insects and disease would not be decreased and would continue increasing over time. Dense, multi-storied stands are susceptible to disturbance and, as these conditions increase over time, additional stand replacement wildfires would be expected to occur. In the long term, scenic quality would be degraded as open stands of large diameter ponderosa pine become less abundant. Riparian and upland vegetation along McGinnis Creek would recover from the Hash Rock Fire at a rate dependent totally on natural regeneration. Riparian vegetation would recover unaided by hardwood planting and aspen improvement projects.

Alternative 2

This alternative includes 382 acres of commercial harvest and 199 acres of precommercial thinning designed to develop or maintain resistance to catastrophic events. Forest stands would move toward conditions that are more sustainable and resistant to stand-replacement wildfire, or large-scale insect and disease outbreaks. Commercial harvest and precommercial thinning activities would focus on reducing small trees from the understory. Large trees would be retained. Stand densities would be decreased, single-storied open conditions would become more abundant, and fire tolerant ponderosa pine and larch would be maintained. Competitive stress within stands would be reduced which would increase growth rates and encourage the development of more large trees over time. More of the older, larger diameter trees would be maintained over time. Stand resiliency would be increased and the likelihood of disturbances like the Hash Rock Fire would be reduced. A variety of stand conditions, including both ponderosa pine and mixed conifer, would be retained in the Bandit Springs Recreation Area.

Approximately 140 of the harvest acres would be salvage within the perimeter of the Hash Rock Fire. Salvage harvest would remove some of the dead trees. Planting of both hardwoods (cottonwood, willow, etc.) and conifers (ponderosa pine and larch) would occur in the severely burned area adjacent to McGinnis Creek. Planting would improve water quality and accelerate the recovery of riparian

vegetation. Planting would reduce the amount of time needed for trees to become re-established in this area. As trees become re-established less blackened vegetation would be seen.

Natural fuels underburning (103 acres) would be used to maintain or reduce fuel loadings and reduce the abundance of small understory trees. Reducing or maintaining low fuel loadings would increase the resistance to catastrophic wildfire events. This was demonstrated during the Hash Rock fire, when the Hash Rock Fire essentially stopped at the boundary of the 1995 Mill Creek Prescribed Natural Fire (PNF). The Mill Creek PNF effectively reduced the intensity and rate of spread of the Hash Rock Fire (Owens 2001).

Recreational users would be affected as activities occurred. Cross-country skiers and other winter users would see evidence of vegetation treatments, such as slash. These users would not be displaced or disturbed because commercial timber harvest activities would be restricted between Thanksgiving and March 30. In addition, slash would be removed from ski trails each year prior to the ski season. Users outside of the winter season 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 noise, dust, smoke, and logging-related traffic, if they are present when these activities occur. In the long term, scenic quality would be enhanced as more large ponderosa pines develop and views of open, park-like stands become more frequent. Design elements (see Chapter 2) have been incorporated to reduce impacts to recreational users. These include timing of activities to avoid the high-use winter season, minimizing stump heights so stumps are less visible, placing boundary tags and marking paint on the back side of trees or removing them after treatment so that visibility is minimal, and clearing ski trails of slash.

Alternative 3

This alternative includes 234 acres of precommercial thinning designed with similar objectives as described for Alternative 2. Activities would focus in stands which have abundant numbers of small (less than 12 inch dbh) trees. Small tree densities would be decreased, single-storied open conditions would become more abundant, and fire-tolerant ponderosa pine and larch would be maintained. Stand resiliency would be increased where treatment occurs and the likelihood of disturbances like the Hash Rock Fire would be reduced, although not to the same extent as Alternatives 2 and 4. Multi-storied stands which contain a large component of mid-sized fir trees (9 to 20 inches dbh) would not be treated. Competitive stress within these stands would not be reduced, nor would stand susceptibility to catastrophic disturbance. These are usually the stands with the highest stocking levels and the stands that are most at risk from disturbances. Precommercial thinning was not proposed within these stands because it would generate a fuel loading which could not be treated without creating unacceptable damage to the residual trees. Additionally, precommercial thinning alone would not remove enough competitive stress to achieve resource objectives.

Within the Hash Rock Fire perimeter, no salvage or other harvest would occur. Dead trees would be left to decay and fall over time. No dead trees would be removed, although over time hazard trees would

need to be periodically cut down where they are adjacent to roads used by the public. Trails that pass through or adjacent to the burned area would experience more fallen trees across them than in Alternative 2. Planting along McGinnis Creek would occur as described under Alternative 2.

Natural fuels underburning (103 acres) would occur as discussed in Alternative 2 to maintain or reduce fuel loadings and reduce the abundance of small understory trees. Reducing or maintaining low fuel loadings would increase the resistance to catastrophic wildfire events.

Recreational users would be affected as activities occurred. Cross-country skiers and other winter users would see evidence of vegetation treatments, such as slash. These users would not be displaced or disturbed because activities would be restricted between Thanksgiving and March 30. In addition, precommercial thinning slash would be removed from ski trails each year prior to the ski season. Users outside of the winter season 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 noise, dust, smoke, and activity-related traffic, if they are present when these activities occur. In the long term, scenic quality would be enhanced as more large ponderosa pines develop and views of open, park-like stands become more frequent. Design elements (see Chapter 2) have been incorporated to reduce impacts to recreational users. These include timing of activities to avoid the high-use winter season, minimizing stump heights so stumps are less visible, placing boundary tags on the back side of trees or removing them after treatment so that visibility is minimal, and clearing ski trails of slash.

Alternative 4

This alternative includes 48 acres of commercial harvest and 217 acres of precommercial thinning. No harvest would occur within the perimeter of the Hash Rock Fire. Precommercial thinning would focus on stands which have abundant numbers of small (less than 9 inch dbh) trees. Small tree densities would be decreased, single-storied open conditions would become more abundant, and fire-tolerant ponderosa pine and larch would be maintained. Stand resiliency would be increased where treatment occurs and the likelihood of disturbances like the Hash Rock Fire would be reduced, although not to the same extent as Alternative 2. One stand which contains a large component of mid-sized fir trees (9 to 20 inches dbh) would be treated. Competitive stress within this stand would be reduced, as would susceptibility to catastrophic disturbance. About 194 acres of the multi-storied stands proposed in Alternative 2 would not be treated. These would not move towards more open, pine-dominated conditions, nor would their susceptibility to disturbance be decreased.

Within the Hash Rock Fire perimeter, no harvest would occur. Dead trees would be left to decay and fall over time. No dead trees would be removed, although over time hazard trees would need to be periodically cut down where they are adjacent to roads used by the public. Trails that pass through or adjacent to the burned area would experience more fallen trees across them than in Alternative 2. Planting along McGinnis Creek would occur as described under Alternative 2.

Natural fuels underburning (103 acres) would occur as discussed in Alternative 2 to maintain or reduce fuel loadings and reduce the abundance of small understory trees. Reducing or maintaining low fuel loading levels would increase the resistance to catastrophic wildfire events.

Recreational users would be affected as activities occurred. Cross-country skiers and other winter users would see evidence of vegetation treatments, such as slash. These users would not be displaced or disturbed because activities would be restricted between Thanksgiving and March 30. In addition, slash would be removed from ski trails each year prior to the ski season. Users outside of the winter season 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 noise, dust, smoke, and logging-related traffic, if they are present when these activities occur. In the long term, scenic quality would be enhanced as more large ponderosa pines develop and views of open, park like stands become more frequent. Design elements (see Chapter 2) have been incorporated to reduce impacts to recreational users. These include timing of activities to avoid the high-use winter season, minimizing stump heights so stumps are less visible, placing boundary tags and marking paint on the back side of trees or removing them after treatment so that visibility is minimal, and clearing ski trails of slash.

Table 3-34. Acres of Treatment within the Bandit Springs Recreation Area

Activity	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Commercial Harvest	0	382	0	48
Precommercial Thinning	0	199	234	217
Hardwood and Conifer Planting	0	50	50	50
Natural Fuels Underburning	0	103	103	103

Cumulative Effects

Approximately 60 acres of the Harpo Timber Sale are within the Bandit Springs Recreation Area. These were harvested using shelterwood prescriptions with some of the units designed as telemark ski runs accessible from the established ski trail routes. Prior to harvest, these stands were stocked predominately with grand fir and Douglas-fir and had been severely affected by insects and disease. Large diameter ponderosa pine and larch trees were left in these units where they existed. Post-sale slash disposal (activity fuels underburning) has not been completed in one unit; underburning is expected to occur in 2002. These units are currently open and lightly stocked. One unit will be planted with ponderosa pine in 2003. The Pick-up Salvage Harvest Sale will affect summer users for 1 to 2 days while log removal occurs. Approximately 150 of the 975 acres that burned in the Hash Rock Fire were of stand replacement intensity, leaving behind scattered large, diameter trees. These areas will be monitored for natural regeneration. The rest of the Hash Rock Fire area was burned at low to moderate intensity with variable stand effects. Those areas not proposed for treatment in this project will recover naturally, there

will be visual evidence of the Hash Rock fire (blackened vegetation, fire killed trees) for decades to come.

CAMPING AREAS

Ochoco Divide Campground is a popular, heavily used site within a mature stand of predominantly ponderosa pine just off U.S. Highway 26. It is located 30 miles northeast of Prineville at the summit of Ochoco Pass. This concessionaire-operated campground provides 28 campsites with potable water and garbage service. The primary use season is May 1 through September 15. Most visitors arrive late in the evening and continue on their trip in the morning, so the area is quiet during the day. The stand within and surrounding the campground is developing a dense understory of primarily grand fir. This is causing the decline of the mature ponderosa pine overstory.

White Rock Campground is a primitive camp within a stand of mostly grand fir at the edge of Mill Creek Wilderness approximately 31 miles east of Prineville at the end of Forest Road 3350-300. There are two campsites with tables, fire rings, and a toilet. This campground also serves as the trailhead for the Wildcat Trail. Most use at this site is people accessing the Wildcat Trail. The season of use is from late May through early November. Hunters usually occupy this area during the latter months of the use season. There is also a popular rockhounding area near this campground. Fireline construction during the Hash Rock Fire increased potential rockhounding activities in the area because experience has shown that when ground-disturbing activities occur, thundereggs and agates are brought to the surface.

White Fir Camp is used primarily by rockhounders during early spring/summer and hunters during late fall. This site is located off the Forest Road 3350 near a popular rockhounding site. There are two campsites with tables, fire rings, and a toilet. There are two popular rockhounding sites near this camp.

Corral Flat is a dispersed camping site that is primarily used by equestrian enthusiasts. Annual Special Use Permit (SUP) events such as Poker Rides are staged at this area. The Prineville Ridge Riders have a 5-year endurance ride SUP that authorizes use of non-system trails that connect to the camping area. The trails consist of a 20 and 30-mile loop. On the average there are 90 riders who participate in this ride. This site is located approximately 27 miles east of Prineville off Forest Road 2630. The open meadows and large ponderosa pine draw users to this area. In addition to Corral Flat, there are numerous other dispersed camping sites throughout the project area.

Crystal Spring Organization Camp is under SUP to the Missionary Baptist Church. The permit covers 31.7 acres near Crystal Creek off Forest Road 2210. The organization site is used by the permittee and made available to other church, youth, or non-profit organizations for encampments or meetings.

Alternative 1

There would be no direct effect on camping sites in the project area. Use of these sites is not expected to change. Over time, the visual character of the areas would change as understory trees are allowed to

grow and stands become denser. Large diameter ponderosa pine would become less common.

Alternatives 2 and 4

Treatment would improve the long-term health of timber stands adjacent to the above camping areas; however, short-term impacts (3-5 years) to the affected camping areas (whether developed and/or dispersed) from commercial harvest activities would include increased noise from helicopters, and dust from logging operations; increased traffic for log hauling; reductions in visual quality from logging slash, stumps, and post-logging treatments; slash from precommercial thinning treatments; smoke and blackened ground and vegetation from underburning activities. Some dispersed site users may be temporarily displaced due to loss of access during harvest activities. This could increase camping use at other dispersed sites. Using developed campgrounds and heavily used dispersed sites for industrial camps would not be allowed. Visual evidence of treatment activities may be apparent to the casual forest visitor at or near some of these camping areas.

Ground disturbance associated with tractor logging systems and road construction activities can increase the potential for rockhounding because agates and thundereggs will be easier to locate after the ground is disturbed. The amount of rockhounding activities at popular areas near White Rock Campground and White Fir Camp is expected to increase because additional agates and thundereggs would be exposed.

Precommercial thinning in the Ochoco Divide campground would affect campground users. Users would be temporarily displaced while thinning activities are occurring (2-3 weeks). Slash (up to 1 year) and small stumps (up to 5 years) would be visible. Thinning would reduce the grand fir understory and highlight ponderosa pine. Over time, large ponderosa pine trees would be more apparent.

Alternative 3

Precommercial thinning and underburning activities would have short-term impacts on users such as noise from thinning activities, smoke during underburning, and visible blackened ground and vegetation. This alternative has no commercial harvest or road building. Visual evidence of treatment activities may be apparent to the casual forest visitor at or near some of these camping areas.

Precommercial thinning in the Ochoco Divide campground would affect campground users. Users would be temporarily displaced while thinning activities are occurring (2-3 weeks). Slash (up to 1 year) and small stumps (up to 5 years) would be visible for a short time. Thinning would reduce the grand fir understory and highlight ponderosa pine. Over time, large ponderosa pine trees would be more apparent.

SNOW PARKS

Ochoco Divide, Bandit Springs, and Marks Creek Snow Parks are near or adjacent to the Bandit Springs Recreation Area. These parks require Sno-Park permits (between November 15 and April 30), are paved, and have toilets.

Alternative 1

There would be no direct or indirect effects to the snow parks. Use at these sites is expected to continue.

Alternatives 2, 3, and 4

Unit 502 is adjacent to the Ochoco Divide Snow Park. This precommercial thinning unit is designed to reduce competition on an aspen stand. The primary use period falls under the Bandit Springs Recreation Area closure period from Thanksgiving to March 15. Management activities would be conducted outside of the primary use season. Visual evidence, such as slash and small stumps, would be apparent for 3 to 5 years. There would be no other direct or indirect effects to the snow parks. Use at these sites is expected to continue.

TRAILS

There are approximately 19.9 miles of designated trails within the project area. Six miles of trail are located within the Mill Creek Wilderness. Effects on Wilderness trails are discussed under the Wilderness heading. The remaining miles of designated trails are located outside of the Wilderness area and are described below.

The Bandit Springs Recreation Area encompasses 1,580 acres and is located between the Mill Creek Wilderness and U.S. Highway 26. It is a popular cross-country ski area. There are 9.4 miles of established cross-country ski trails within or near this area: the Ponderosa Loop, the McGinnis Creek Loop, and Ochoco Way. In August and September 2000, the Hash Rock fire burned approximately 6.2 miles of trail.

The Snow Park Tie Trail is a 2.5-mile long snowmobile trail that connects Ochoco Divide Snow Park with the Marks Creek-Independent Mine Trail. Two miles of the 6.3-mile long Marks Creek-Independent Mine snowmobile trail is within the project area.

Other, user-created, trails exist in and around the project area.

Alternative 1

There would be no effects to the trails or trail use in the project area. Trail maintenance activities would continue.

Alternatives 2, 3 and 4

All of the action alternatives include some management activities near or adjacent to trails. Trails that lie within or adjacent to commercial harvest units would be impacted directly from logging operations and

post-harvest activities including noise, dust, logging traffic, altered scenery from slash treatment or thinning treatments, timber falling, and skid trails especially in tractor logging units. To lessen the impacts to designated ski trails there would be limited times to conduct logging operations. Prior to the use season, any logging slash on designated ski trails would be removed. To lessen the impacts on the Bandit Springs Endurance Ride held the third weekend in July; those portions of the permitted trails that are within the project area would have all slash pulled back from the trail 2 weeks prior to the event.

Cumulative Effects for All Alternatives

A reasonably foreseeable action that will affect trail use is the Pick-up Salvage Harvest Sale. Trail users will be temporarily displaced (1 to 2 days) while log removal occurs in the Bandit Springs Recreation Area. Another action that will affect trail use in the project area includes restoration associated with the Hash Rock Fire. This involves the removal of a culvert on the ski trail that crosses McGinnis Creek. This culvert will be removed and the road contoured so that skiers can cross the creek. This work will be conducted outside the winter use period so that cross-country skiers are not displaced. Access to users, such as hikers, may be temporarily denied while the culvert is replaced and the road contoured. Other restoration activities are not expected to affect recreation users.

WILDERNESS

The Mill Creek Wilderness encompasses 17,400 acres; 3,668 acres are within the project area. The Mill Creek Wilderness is the largest wilderness on the Ochoco National Forest and is the most heavily used. Use is primarily due to easy access and proximity to the City of Prineville. Elevations range from 3,725 to 6,640 feet above sea level. The terrain varies from the rugged, rocky cliffs of Desolation Canyon to the flat meadows of Bingham Prairie. Spectacular rock outcrops are present at Twin Pillars and Whistler point. Many users accessing the eastern 1/3 of the Wilderness camp or park at White Rock Campground and hike or ride horseback on the Wildcat Trail. There are also several dispersed campsites along the eastern boundary that receive heavy use during the fall hunting months. Other dispersed campsites exist within the Wilderness area and are primarily located at springs, along streams, adjacent to meadows, or other attractive and accessible features. Management emphasis for this area is to protect the wilderness ecosystem and to manage use to maintain a natural setting and preserve solitude.

In August and September 2000, the Hash Rock Fire burned 14,236 acres of the Mill Creek Wilderness, including 2,846 acres within the Marks Creek Watershed. The Hash Rock Fire damaged approximately 15.5 miles of trail in the Mill Creek Wilderness.

Alternative 1

There would be no direct or indirect effects to the wilderness area. Recreation users would continue to access and enjoy the wilderness area.

Alternative 2

There would be no direct effects to the Mill Creek Wilderness. Where commercial harvest units border the wilderness, users may encounter evidence (adjacent to or within 1/4-mile of wilderness boundary) of logging operations (approx. 125 acres) and post-logging treatments such as noise (chainsaws, logging equipment, and helicopters), stumps, slash piles, smoke, and blackened vegetation. Similar evidence of thinning and underburning activities would also be apparent. Alternative 2 has the most effects when compared to Alternatives 3 and 4, because it includes treatments on more acres near the wilderness. Over time, the health of remaining trees would be improved, which in turn, would improve scenic quality. Roads that are constructed or reconstructed within 1/4-mile of the wilderness boundary would be closed to minimize illegal motorized access into the wilderness area. Recreation users would continue to access the wilderness.

Alternative 3

There would be no direct effects to the wilderness area. Where precommercial thinning units border the wilderness, indirect effects include noise and visual evidence from thinning (approx. 25 acres) and underburning (approx. 680 acres) activities such as chainsaw noise, smoke, and blackened vegetation. Over time, the health of remaining trees would be improved, which in turn, would improve scenic quality. No road construction or commercial harvest would occur.

Alternatives 4

There would be no direct effects to the wilderness area. This alternative includes about 12 acres of harvest and 15 acres of precommercial thinning near the wilderness boundary. Users may encounter indirect effects such as noise and visual evidence (adjacent to or within 1/4-mile of wilderness boundary). This includes chainsaw noise, slash piles, smoke, and blackened vegetation. Over time, the health of remaining trees would be improved, which in turn, would improve scenic quality.

Cumulative Effects for All Alternatives

Separate from the Bandit project, the Forest Service is reconstructing 15.5 miles of trail within the Mill Creek Wilderness, including 7 miles of the 8-mile Wildcat trail. There could be possible trail closures during reconstruction activities and recreational users would be temporarily displaced.

Roads (Transportation System)

Forest development roads provide access to National Forest System lands and are classified as arterial, collector, and local roads. Arterial roads serve large land areas and primarily provide the main access into the Ochoco National Forest. Arterial roads usually connect to public highways and other collector roads, and collect traffic from forest local roads. Local roads connect collector, arterial, or public highways, and provide minor linkage with other roads.

Nearly all of the existing forest development road system has evolved from the demand for access to natural resources. Maintenance and reconstruction requirements of the existing system depend mainly on the volume of timber hauled and, to a lesser extent, recreational use. The amount of future construction is anticipated to continue to be dependent primarily on the need to manage vegetation using commercial timber harvest. Minor new construction for other resource purposes (such as access to a new trail head or campground) may occur. Road use in the watershed is comprised of administrative, commercial, recreational, and tribal use.

The goal for the transportation system is to support resource activities and to serve multiple needs rather than individual planning proposals. Traffic is managed, as needed, to control access due to structural limitations of the road, safety, or to meet resource objectives. Traffic safety will exist for all roads on the transportation system. Safety of traffic using forest development roads is ensured through restrictions. The full range of traffic management strategies currently in use include prohibiting traffic to unrestricted use by all vehicle types. Signs are used to inform the public of the reason for restrictions on forest development roads.

A roads analysis was conducted for the project area in March 2002 (see Appendix B). There are 218.2 miles of roads (including system, unclassified, and decommissioned) in the project area. There are 195.2 miles of Forest Development or System roads being managed and maintained within the project area, 14.9 miles of decommissioned roads, and 8.1 miles of unclassified roads. Decommissioned roads, although not considered part of the transportation system, are being tracked and monitored for long-term need and resource effects. Although many of these roads have revegetated, they are usually visible on the ground because the roadbeds have compacted soil conditions. Unclassified roads are temporary or user-created roads that are not intended for long-term use. They are tracked so they may be closed/ rehabilitated or converted to other uses. Within the project area, 132.3 miles of system road are currently open and 78 miles are closed or decommissioned. Table 3-35 summarizes the total roads within the project area. The Roads Analysis contains information on road classifications, segment lengths, maintenance levels, and condition. The roads analysis also contains road management recommendations that were developed based on human/administrative needs and resource concerns. All of the road decommission/inactivation activities included in the action alternatives are consistent with recommendations contained in the roads analysis.

The Road Description report in the analysis file contains lists of the specific roads, by route number, scheduled for construction, reconstruction, inactivation, and decommissioning. Chapter 2 includes maps, by alternative, showing temporary and new construction, inactivation, and decommissioning activities.

Alternative 1

No new construction, temporary construction, or reconstruction would occur; subsequently, there would be no costs associated with this alternative. No road inactivation or decommissioning would occur at this time. The current open road density of the project area, including open unclassified roads, is 2.61 miles per square mile. The current mix of open and closed roads would not change. The existing amount of

roads is displayed in Table 3-35. Ongoing road maintenance activities would continue to occur.

The current uses of the transportation system would not change. Administrative use traffic would continue. Additional logging-related traffic would not occur at this time. Other commercial uses such as rock haul and cattle haul would continue. Personal uses, such as access for recreation or tribal access for gathering, would not change in the short term.

Table 3-35. Existing Road System (miles) in the Project Area By Subwatershed*

	Lower Marks Subwatershed	Upper Marks Subwatershed	Veazie Creek Subwatershed	Total
Forest Development Roads				
Open	67.5	64.7	0	132.2
Closed	24.0	38.6	0.4	63.0
Subtotal	91.5	103.3	0.4	195.2
Decommissioned Roads				
Subtotal	6.8	8.1	0	14.9
Unclassified Roads				
Open	1.0	0.2		1.2
Closed	3.8	2.8	0.3	6.9
Subtotal	4.8	3.0	0.3	8.1
Total for All Roads				
Total All Roads	103.1	114.4	0.7	218.2

Alternative 2

New construction, reconstruction, temporary construction, and other road management activities would occur at the levels displayed in Table 3-36. The costs associated with road management activities in this alternative are also contained in Table 3-36. All newly constructed roads would be inactivated (closed) when harvest and other activities are complete. Some currently open roads would be inactivated or decommissioned (obliterated). The total amount of existing roads in the watershed would increase. Ongoing road maintenance operations would occur, as well as additional maintenance related to commercial timber operations.

The current uses of the transportation system would change. Administrative use traffic would continue. Logging-related traffic would occur within the project area. 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 operations. When logging activities are completed, some areas would be closed to vehicular access.

Overall, vehicular access in the Bandit II Project Area would be reduced because roads would be inactivated or decommissioned. When all road management activities are complete, the open road density in the project area would be reduced to 2.26 miles per square mile.

Table 3-36. Amount and Cost of Road Management Activities for Alternative 2

Activity	Amount (miles)	Cost/Mile ($)	Total Cost ($)
Construction	2.2	22,000	48,400
Reconstruction light	6.9	4,500	31,000
Reconstruction heavy	2.9	12,000	34,800
Temporary construction	1.4	1,500	2,100
Temporary reuse	4.7	200	940
Inactivation	17.3	2,500	43,250
Decommission	8.8	6,000	52,800
		Grand Total	213,290

Alternative 3

No new construction, reconstruction, or temporary construction would occur. Some currently open roads would be inactivated or decommissioned (see Table 3-37). The costs associated with road management activities are also contained in Table 3-37.

The current uses of the transportation system would change as roads are inactivated and decommissioned. Administrative use traffic, commercial traffic, and personal uses would continue.

Overall, vehicular access in the Bandit Project Area would be reduced. The open road density in the project area would be reduced to 2.26 miles per square mile.

Table 3-37: Amount and Cost of Road Management Activities for Alternative 3

Activity	Amount (miles)	Cost/Mile ($)	Total Cost ($)
Inactivation	17.3	2,500	43,250
Decommission	8.8	6,000	52,800
		Grand Total	96,050

Alternative 4

New construction, reconstruction, temporary construction, and other road management activities would occur at the levels displayed in Table 3-38. The costs associated with road management activities are also contained in Table 3-38. All newly constructed roads would be inactivated (closed) when harvest and other activities are complete. Some currently open roads would be inactivated or decommissioned (obliterated). The total amount of existing roads in the watershed would increase. Ongoing road maintenance operations would occur, as well as additional maintenance related to commercial timber operations.

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 Bandit II Project Area would be reduced because roads would be inactivated or decommissioned. When all road management actions are complete, the open road density in the project area would be 2.26 miles per square mile.

Table 3-38. Amount and Cost of Road Management Activities for Alternative 4

Activity	Amount (miles)	Cost/Mile ($)	Total Cost ($)
Construction	2.2	22,000	48,400
Reconstruction light	6.4	4,500	28,800
Reconstruction heavy	2.9	12,000	34,800
Temporary construction	1.4	1,500	2,100
Temporary reuse	3.9	200	780

Inactivation	17.3	2,500	43,250
Decommission	8.8	6,000	52,800
		Grand Total	210,930

Cumulative Effects for All Alternatives

Currently, the Ochoco National Forest is considering long-term access/transportation needs across the entire Forest. It is likely that road management and maintenance will change in the near future (3-10 years). Maintenance would likely occur at greater intervals and some areas may be accessible only by high clearance (4x4) vehicles.

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 Bandit II 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 (inactivating) or reconstructing roads. Many of these recommendations have not been proposed for implementation at this time. It is reasonably foreseeable that some of these recommendations will undergo environmental analysis and implementation. Road decommissioning and closure activities, such as culvert removal to improve fish passage and rehabilitation to lessen sediment input and improve water quality, are expected to occur.

Socio-Economics

For the purposes of describing socio-economics effects on the local economy, the local economy was considered to be Crook County, even though Crook County would not realize all the contributions. The effects to the local economy are based on the estimated number of jobs created.

The number of timber-related jobs was calculated by using figures from the FY 1998 TSPIRS Report, Account 3. This report displays the number of jobs created or maintained per million board feet (MMBF) harvested and the amount of timber harvested across the entire Ochoco National Forest. Based on these factors, an average of 25 jobs was created or maintained for each MMBF of timber harvested. Precommercial thinning and handpiling is usually completed using contract workers. Based on past local thinning contract production rates, an estimated 4 jobs are created for every 1,000 acres of precommercial thinning and 10 jobs for every 1,000 acres of handpiling. Underburning activities are generally accomplished using permanent and seasonal Forest Service employees. Although these activities contribute to the creation of jobs, they have not been included in this analysis.

Alternative 1

No proposed activities would be implemented and no jobs would be created. There would be no benefits

to the local economy. This alternative may have negative impacts to the local economy because timber-related jobs would not be maintained.

Alternatives 2, 3, and 4

There would be contributions to the local economy. Table 3-39 displays the expected number of timber and precommercial thinning related jobs that would be created or maintained. The estimated jobs would occur over several (3 -7) years as timber is harvested and/or precommercial thinning and handpiling occurs. Indirect benefits from employment would also contribute to the local economy.

There would also be some benefits to the local economy from activities not related to commercial timber harvest or precommercial thinning. These benefits include spending and employment.

Table 3-39. Jobs Created or Maintained

Type of Jobs	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Timber Harvest	0	117	0	98
Precommercial Thinning	0	22	17	19
Handpiling	0	5	8	5
Total	0	144	25	122

Soils

The project area contains a wide variety of soils. Soils in the project area could be affected by erosion, compaction, and/or displacement. The potential for effects to soils is directly related to the number of acres proposed for treatment and the treatment method. For discussions on erosion (i.e., sediment) see the water quality section later in this chapter.

In order to maintain site productivity, the Forest Plan includes a standard for soil compaction and displacement. At a minimum, at least 80 percent of the total activity area should be in a non-compacted/ non-displaced condition within 1 year of any land management activity. The standards are applied at an individual scale such as a unit of a timber sale. The Soils Report for this project more fully describes the soil standard and can be found in the project file.

Detrimental soil conditions result from compaction, displacement, and charring. Compaction is the packing together of soil particles by exerting force at the soil surface and a resulting increase in soil density. Roads, log landings, and skid trails are typically areas that are detrimentally compacted during commercial timber harvest activities. Displacement is the movement or rearrangement of the soil so that normal processes are affected. Displaced soils are often loosened and are more susceptible to erosion. Roads, log landings, and skid trails are typically areas that are detrimentally displaced during

commercial timber harvest activities. Soil charring can occur when concentrations of fuels are burned and the soil becomes superheated. This causes loss of organic matter and hydrophobic soil conditions can result from the cooked waxes and resins in the surface ash layer. Typically, charring occurs on landings where large piles (concentrations) of slash are burned. Burning of hand and grapple piles does not typically result in detrimental charring because of the small pile size.

Tractor (ground-based) logging systems have the highest amount of soil impacts and can result in exceeding the soil standard 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. Skid trails on an average of 100-foot spacing contribute roughly 10-15 percent detrimental 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 per entry; this does not include any mitigation or other measures to reduce potential impacts, nor does it include existing levels of detrimental disturbance. Past harvest practices have often led to unacceptable amounts of detrimental soil conditions.

Helicopter logging systems are used on steeper slopes, in areas where road building is difficult or expensive, and/or in areas where tractor logging would cause unacceptable resource effects. The economic costs are higher for this type of logging and the impact to the soil resource are much lower. Overall detrimental disturbance averages 2 to 5 percent per entry, primarily on roads and landings.

Grapple piling of slash is used to reduce fuel loadings in harvest units to a level low enough that subsequent underburning can be achieved without undesirable stand effects. The objective is to lessen fuel loading and break up fuel continuity, not remove all fuel from a site. Grapple piling is achieved using boomed equipment that is required to stay on previously disturbed areas. Fuels objectives can be achieved with little or no additional soil impacts.

Yarding with tops attached (YTA) is another treatment to reduce fuel loadings in harvest units. This treatment results in lower fuel amounts inside the harvest unit by concentrating slash at the log landings. This requires larger landings and more intense heat results when the landing piles are burned, producing more charred soil. Since the landings are situated most often on top of old

landings and disturbed areas from prior activities, this usually does not result in a net increase in detrimental soil conditions. For tractor harvest units, YTA skid trails are somewhat wider due to the sweeping action of the limbs.

Recent monitoring results on the Ochoco National Forest (Blackbear Timber Sale) show that detrimental soil conditions can be kept within acceptable levels using tractor logging systems. A copy of these monitoring results is attached to the Soils Report in the project file. This requires that design criteria be carefully followed and that tilling opportunities be carefully evaluated. Reuse of existing detrimentally disturbed areas can result in little or no additional impacts to soils.

Several other types of treatments are also proposed which generally do not result in detrimental soil impacts. These treatments include: precommercial thinning, planting/hardwood enhancement, natural fuels underburning, activity fuels underburning, and activity fuels handpiling and burning. Soil disturbance that may result from these activities is limited in scale, and of such a light intensity, that no detrimental compaction, displacement, or charring is expected. These activities do not involve the use of heavy equipment such as bulldozers. No measurable detrimental effects to the soil resource are expected from these activities under any alternative. These activities and individual activity units have been analyzed and are discussed in the Soils Report.

Soil tilling is a rehabilitation treatment proposed to alleviate detrimental compaction. It is feasible in deeper ash soils on slopes of 30 percent or less. Heavy equipment is used and rehabilitation will be focused on skid trails and landings which are excess to current and future management needs.

Table 3-40. Acres of Treatment by Alternative

	Alt. 1	**Alt. 2**	**Alt. 3**	**Alt. 4**
Tractor Harvest	0	1,212	0	1,067
Helicopter Harvest	0	1,163	0	914
Precommercial Thinning	0	5,395	4,180	5,118
Grapple Piling	0	54	0	54
Hand Piling	0	410	737	410
Yard Tops Attached	0	531	0	519
Activity Fuels Underburning	0	4,573	3,545	4,351
Natural Fuels Underburning	0	5,450	5,676	5,434
Soil Tilling*	0	70-130	0	56-103

*Tilling was prescribed as a range for each individual unit. The actual amount of tilling will be based on post-activity monitoring.

The existing condition of the soils resource was determined by the Forest soil scientist and other members of the interdisciplinary team. A combination of local knowledge, walk-through transecting, and aerial photo interpretation were used to determine existing soil disturbance classes for each unit. This unit-by-unit evaluation of existing soils condition was completed and is contained in the project file (May 29, 2002, Soils Report, Appendix A). This unit-by-unit evaluation includes an assessment of all activity units, both harvest and non-harvest. Existing disturbance was quantified to the nearest ten percent bracket (0-10, 10-20, etc.), estimates were made as to tilling potential based on soil type and slope, and unit-specific mitigations identified where needed to ensure compliance with the soil standard. Tables 3-41, 3-42, and 3-43 summarize the results of this analysis by alternative. The evaluation of

existing conditions revealed that up to 57 percent of the acres included in commercial harvest units currently exceed 20 percent detrimental soil conditions.

Table 3-41. Alternative 2 Summary of Existing Soil Conditions (number of proposed units)

	Existing Detrimental Disturbance Class				
Activity	**0-10%**	**10-20%**	**20-30%**	**30-40%**	**40%+**
Harvest	10	23	46	8	4
Precommercial Thinning	9	19	79	18	1
Natural Fuels Underburning	1	10	22	5	5

Table 3-42. Alternative 3 Summary of Existing Soil Conditions (number of proposed units)

	Existing Detrimental Disturbance Class				
Activity	**0-10%**	**10-20%**	**20-30%**	**30-40%**	**40%+**
Harvest	0	0	0	0	0
Precommercial Thinning	5	26	76	19	0
Natural Fuels Underburning	1	10	22	5	5

Table 3-43. Alternative 4 Summary of Existing Soil Conditions (number of proposed units)

	Existing Detrimental Disturbance Class				
Activity	**0-10%**	**10-20%**	**20-30%**	**30-40%**	**40%+**
Harvest	10	19	39	7	4
Precommercial Thinning	6	19	79	18	1
Natural Fuels Underburning	1	10	22	5	5

Ectomycorrhizae are an important fungal component of temperate forests. These mostly symbiotic fungi species infect host species of trees. 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. Partial removal harvest treatments, precommercial thinning, and underburning have little effect on these fungal associations as long as there are live host tree species throughout the stand (Richards 1976 and Ingram 1997). No substantial effects to the soil mycorrhizal communities are expected from the proposed activities.

Alternative 1

This alternative proposes no management actions which would affect the soil resource. Existing natural processes would continue. No road decommissioning or inactivation would occur. No soil tilling 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 and biopedoturbation (soil disturbance by organisms such as rodents, insects, arthropods, and various worms). These natural processes can take 10 to 50 years to fully restore damaged ash soils, while clayey residual soils may recover in 1-2 years due to shrinking and swelling actions.

Alternative 2

This alternative includes the most commercial timber harvest, as well as the most use of tractor logging systems. This alternative has the greatest potential to increase the amount of detrimental soil conditions. Approximately 57 percent of the acres proposed for harvest currently exceed the 20 percent detrimental soil conditions standard. The remaining 43 percent currently have less than 20 percent of the area in a detrimental condition. This alternative has unit-specific mitigations and practices identified which will ensure that activities meet the regional soil standard (see Appendix C, Unit Specific Mitigation and Practices for Soil). This alternative would create approximately 7 additional acres of detrimental soil conditions due to construction of new and temporary roads. Approximately 15.8 acres of existing roads would be decommissioned. Implementation of this alternative would result in approximately 70 to 130 acres of tilling to alleviate detrimental soil compaction. This alternative would result in a net decrease in the amount of area which exceeds 20 percent detrimental soil condition. Implementation of this alternative would comply with the regional soil standard.

Alternative 3

This alternative has the least potential to increase the amount of detrimental soil disturbance. No soil tilling would be performed. Existing natural processes would continue. Recovery of existing soil compaction would proceed at a natural rate. Approximately 15.8 acres of existing roads would be decommissioned. Some small areas of detrimental charring may occur under fuel concentrations, but would be limited in scope and expected to be less than 5 percent of the treated acres. This alternative would result in no net increase in the amount of area which exceeds the 20 percent detrimental soil condition standard. Implementation of this alternative would comply with the regional soil standard.

Alternative 4

This alternative proposes less harvest and less use of tractor logging systems than Alternative 2. Approximately 46 percent of the acres proposed for harvest currently exceed 20 percent detrimental soil conditions. This alternative has unit-specific mitigations and practices identified which would ensure that activities meet the soil standards (see Appendix C, Unit Specific Mitigation and Practices for Soils). This alternative would create approximately 7 additional acres of detrimental soil conditions due to construction of new and temporary roads. Approximately 15.8 acres of existing roads would be decommissioned. Implementation of this alternative would result in approximately 56 to 103 acres of

tilling to alleviate detrimental soil compaction. This alternative would result in a net decrease in the amount of area which exceeds the 20 percent detrimental soil condition standard. Implementation of this alternative would comply with the regional soil standard.

Cumulative Effects

Analysis of the entire project area indicates that approximately 16 percent of the area has soils that are detrimentally damaged. Existing damage is primarily related to past harvest activities, road building, and activities on private land. There was a slight increase (10 acres) in soil damage due to firelines built during the suppression of the Hash Rock Fire. Rehabilitation of all firelines has been completed. Other rehabilitation efforts associated with the Hash Rock Fire include culvert removal, road closure, and riparian/hardwood planting. None of these activities are expected to increase the amount of detrimental soil conditions across the project area.

The most recently logged sales in the project area, Marks and Harpo, have had the harvest activities complete for 7 and 4 years, respectively. Some post-sale precommercial thinning is still occurring outside of any proposed Bandit treatment units. These activities are not expected to result in any additional detrimental soil conditions in the project area.

The Pick-Up Salvage Sale (scheduled for completion in 2002) will remove already downed trees utilizing existing roads, skid trails, and landings. It will not contribute additional detrimental effects on the soil resource in the project area.

CHAPTER 1
CHAPTER 2
CHAPTER 3 Part A
CHAPTER 3 Part B
CHAPTER 3 Part C
LIST OF PREPARERS

CHAPTER 3
AFFECTED ENVIRONMENT
and
ENVIRONMENTAL CONSEQUENCES

(Part C)

Threatened, Endangered, and Sensitive Species

Appendix A contains a summary of the effects determination for all threatened, endangered, and sensitive species.

AQUATIC SPECIES

Bull trout (*Salvelinus confluentus*) and Mid-Columbia River steelhead trout (*Onchorhynchus mykiss spp.*) are the only federally listed threatened or endangered aquatic species known or suspected to occur on the Ochoco National Forest. Bull trout were not addressed further because there is no habitat in the project area. Steelhead trout were not addressed further because downstream blockages at dams do not provide fish passage facilities.

There are five sensitive aquatic species that are known or suspected to occur on the Ochoco National Forest: redband trout (*Onchorhynchus mykiss spp*.), Malheur mottled sculpin (*Cottus bairdi*), West Slope cutthroat trout (*Onchorhynchus clarki*), Columbia spotted frog (*Rana luteiventris*), and Mid-Columbia River spring chinook salmon (*Onchorhynchus tshwaytscha*). Spring chinook salmon is not present within the project area because downstream blockages at dams do not provide fish passage facilities. Malheur mottled sculpin are present only in some streams on the Emigrant Creek Ranger District in Harney Basin and West Slope cutthroat trout have not been found in the project area.

Redband trout are discussed because there is habitat and they are present in the project area. Chinook salmon Essential Fish Habitat (EFH) is discussed below because federal agencies need to consult with the National Marine Fisheries Service on actions that may adversely affect chinook salmon EFH. Effects to chinook salmon EFH would be similar to the effects described for redband trout because redband trout and chinook salmon could occupy the same stream systems. Columbia spotted frogs breed in very shallow water in flooded meadows, or in water at the edges of pools and ponds. They are discussed because habitat exists within the project area.

The existing condition of aquatic resources does not currently meet Riparian Management Objectives. Redband trout populations are currently depressed reflecting degraded habitat conditions within the project area. However, existing populations are generally in fair condition, based on age distribution and condition factors (ODFW 1991). The combination of habitat modification, low summer flows, high summer stream temperatures, lack of suitable riparian vegetation, and increased sediment has an effect on the fish habitat and populations of redband trout in the project area.

<u>Alternative 1</u>

This alternative would not have a direct impact on redband trout, Columbia spotted frogs, or chinook salmon EFH because ground-disturbing activities would not occur. Sediment input into streams through new timber harvest or new road construction would not occur. Existing sources of sediment (roads and headcuts) would not be reduced. Riparian vegetation would recover unaided by hardwood planting and aspen improvement projects. Large woody recruitment would not be improved. The factors (sediment, stream temperature, etc.) affecting current habitat conditions would not change.

Alternative 2

This alternative would produce some localized effects to habitat for redband trout, Columbia spotted frog, and chinook salmon EFH from increased sediment yield. Sediment is likely to enter streams in the short term, primarily during road management activities, but would be reduced in the long term. Activities that would produce short-term increases and long-term reductions in sediment include hydrologically closing and decommissioning roads and repairing headcuts. A more detailed discussion of the effects to fish habitat is included earlier in this chapter. Silvicultural treatments were designed to avoid potential sediment delivery from the proposed activities. Commercial harvest, precommercial thinning, and underburning activities within the RHCAs are expected to promote large stand structure and improve large woody debris recruitment over the long term. Hardwood enhancement and riparian planting would help to improve vegetative diversity, increase shade, and improve streambank stability.

This alternative may impact individuals or habitat for redband trout and Columbia spotted frog, but would not likely contribute to a trend towards federal listing or loss of viability to the population or species. This alternative is not likely to adversely affect chinook salmon EFH.

Alternative 3

This alternative would produce some localized effects to habitat for redband trout, Columbia spotted frog, and chinook salmon EFH from increased sediment yield from road closure activities. Sediment is likely to enter streams during road management activities (inactivating and decommissioning roads) and headcut repair, but would be reduced in the long term. A more detailed discussion of the effects to fish habitat is included earlier in this chapter. Precommercial thinning and underburning activities within the RHCAs are expected to promote large stand structure and improve large woody debris recruitment over the long term. Hardwood enhancement and riparian planting would help to improve vegetative diversity, increase shade, and improve streambank stability.

This alternative may impact individuals or habitat for redband trout and Columbia spotted frog, but would not likely contribute to a trend towards federal listing or loss of viability to the population or species. This alternative is not likely to adversely affect chinook salmon EFH.

Alternative 4

This alternative would produce some localized effects to habitat for redband trout, Columbia spotted frog, and chinook salmon EFH from increased sediment yield. Sediment is likely to enter streams in the short term, primarily during road inactivation and decommissioning and headcut repair, but would be reduced in the long term. A more detailed discussion of the effects to fish habitat is included earlier in this chapter. Silvicultural treatments were designed to avoid potential sediment delivery from the proposed activities. Commercial harvest, precommercial thinning, and underburning activities within the RHCAs are expected to promote large stand structure and improve large woody debris recruitment over the long term. Hardwood enhancement and riparian planting would help to improve vegetative diversity, increase shade, and improve streambank stability.

This alternative may impact individuals or habitat for redband trout and Columbia spotted frog, but would not likely contribute to a trend towards federal listing or loss of viability to the population or species. This alternative is not likely to adversely affect chinook salmon EFH.

PLANTS

No threatened or endangered plant species are known or suspected to occur on the Ochoco National Forest or Crooked River National Grassland. There are 26 sensitive plant species that are known or suspected to occur on the Ochoco National Forest or Crooked River National Grassland. Twelve sensitive plant species are described below because they are known to

occur or have potential habitat in the project area (see Table 3-44). Apendix A includes a complete list of all sensitive plant species known or suspected to occur on the Ochoco National Forest.

Road construction and timber harvest activities can increase soil disturbance and compaction, and can result in habitat alteration which negatively affects some sensitive plant populations and their habitat. Ground disturbance can also facilitate the introduction and spread of aggressive, non-native noxious weeds that can also impact sensitive plant species.

Table 3-44. Sensitive Plant Species Known to Occur or With Potential Habitat

Species	Habitat
Henderson's ricegrass *Achnatherum hendersonii*	Nonforest/Scabland
Wallowa ricegrass *Achnatherum wallowaensis*	Nonforest/Scabland
Ascending moonwort *Botrychium ascendens*	Riparian
Crenulate moonwort *Botrychium crenulatum*	Riparian
Mingan's moonwort *Botrychium minganense*	Riparian
Mountain moonwort *Botrychium montanum*	Riparian
Twin-spike moonwort *Botrychium paradoxum*	Riparian
Pinnate moonwort *Botrychium pinnatum*	Riparian
Peck's mariposa lily *Calochortus longebarbatus* var *peckii*	Riparian/meadow
Interior sedge *Carex interior*	Riparian
Porcupine sedge *Carex hystericina*	Riparian
Yellow lady's slipper orchid *Cypripedium parviflorum*	Riparian/Moist Forest

Alternative 1

There would be no ground-disturbing activities. Existing habitat for all 12 sensitive species listed above would be maintained. There would be no impact to sensitive plant habitats or populations in the project area at this time. Existing chronic sources of sediment would continue to degrade riparian habitat over time

Alternative 2

Sensitive Species Associated with Riparian Habitats

This alternative avoids mechanical disturbance of high probability habitat for the six *Botrychium spp*., *Calochortus longebarbatus* var. *peckii*, *Carex hystericina*, and *C. interior*. To minimize mechanical disturbance in RHCAs, ground-based equipment would be restricted to existing roads, skid trails, landings, and designated stream crossings

Seeding of native or non-native upland grasses would take place on decommissioned or inactivated roads, including those in RHCAs, to stabilize soils and reduce potential for noxious weed introduction or spread. This activity is not expected to result in a measurable increase of risk to *Calochortus longebarbatus* var. *peckii,* since most of this habitat is already occupied by stable populations of native and non-native grasses. Non-native grasses on highly disturbed sites can more effectively establish and compete with some noxious weeds, such as teasel, which appears to be a greater threat to *Calochortus longebarbatus* var. *peckii* in some areas. Habitat for *Botrychium spp*., *Carex hystericina,* and *C. interior* is very moist. Seeding of upland grasses is not likely to expand into this habitat and affect these species.

Activities such as road management (construction, reconstruction, inactivation and decommission), precommercial thinning, aspen treatments, hardwood planting, and underburning activities that occur within the RHCAs may harm individual *Calochortus longebarbatus* var. *peckii*, *Botrychium spp*., *Carex hystericina*, and/or *C. interior* plants or their habitats. However, these activities are unlikely to affect viability of populations. Therefore, no impacts are expected that would likely 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.

Most of the suitable habitat for *Cypripedium parviflorum* is associated with upland portions within RHCAs. Where activities within RHCAs are proposed, treatments would maintain partial shade, limit equipment use, and maintain large wood on these sites. Additionally, harvest unit layout, underburning, and post-sale tilling in these areas would be reviewed by the district botanist to minimize loss of suitable habitat. Seeding of native or non-native upland grasses would take place on portions of decommissioned or inactivated roads, including those in this habitat, to stabilize soils and reduce potential for noxious weed introduction or spread. Though some habitat may be impacted by implementation of this alternative, viability of Cypripedium parviflorum would be maintained. Therefore, no impacts are expected that would likely contribute to a trend towards federal listing or a loss of viability of this sensitive plant species.

Sensitive Species Associated with Nonforested/Scabland Habitats

This alternative avoids ground-disturbing activities on non-forest balds (scablands) which provide the primary habitat for *Achnatherum hendersonii* and *A. wallowaensis*. Therefore, no impact to *Achnatherum hendersonii* or *A. wallowaensis* habitat or populations would be expected.

Alternative 3

Sensitive Species Associated with Riparian Habitats

This alternative avoids mechanical disturbance of high probability habitat for the six *Botrychium spp*., Calochortus longebarbatus var. *peckii*, *Carex hystericina*, and *C. interior*. Except for existing roads and selected crossings, no ground-based equipment would be used in any RHCAs.

Seeding of native or non-native upland grasses would take place on portions of decommissioned or inactivated roads, including those in RHCAs, to stabilize soils and reduce potential for noxious weed introduction or spread. This activity is not expected to result in a measurable increase of risk to *Calochortus longebarbatus* var. *peckii*, since most of this habitat is already occupied by stable populations of native and non-native grasses. Non-native grasses on highly disturbed sites can more effectively establish and compete with some noxious weeds, such as teasel, which appears to be a threat to *Calochortus longebarbatus* var. *peckii*. Habitat for *Botrychium spp.*, *Carex hystericina*, and *C. interior* is very moist. Seeding of upland grasses is not likely to expand into this habitat and affect these species.

Activities such as road inactivation and decommission, precommercial thinning, aspen treatments, hardwood planting, and underburning activities that occur within the RHCAs may harm individual *Calochortus longebarbatus* var. *peckii*, *Botrychium spp*., *Carex hystericina*, and/or *C. interior* plants or their habitats. However, these activities are unlikely to affect viability of populations. Therefore, no impacts are expected that would likely 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.

This alternative includes no road construction or timber harvest that could affect *Cypripedium parviflorum* or its habitat. Underburning has the potential to reduce large wood in *Cypripedium parviflorum* habitat. Underburn units containing potential habitat have been identified. These units would be reviewed prior to burning and design elements would be implemented to maintain viability of this species. *Cypripedium parviflorum* habitat is generally avoided in underburning activities. Therefore, no impacts are expected that would likely contribute to a trend towards federal listing or a loss of

viability of *Cypripedium parviflorum*.

Sensitive Species Associated with Nonforested/Scabland Habitats

This alternative avoids ground-disturbing activities on non-forest balds (scablands) which provide the primary habitat for *Achnatherum hendersonii* and *A. wallowaensis*. Therefore, no impact to *Achnatherum hendersonii* or *A. wallowaensis* habitat or populations would be expected.

Alternative 4

Sensitive Species Associated with Riparian Habitats

This alternative avoids mechanical disturbance of high probability habitat for the six *Botrychium spp.*, *Calochortus longebarbatus* var. *peckii*, *Carex hystericina*, and *C. interior*. Except for existing roads, landings, skid trails and selected crossings, no ground-based equipment would be used in any RHCAs.

Seeding of upland, native or non-native grasses would take place on decommissioned or inactivated roads, including those in RHCAs, to stabilize soils and reduce potential for noxious weed introduction or spread. This activity is not expected to result in a measurable increase of risk to *Calochortus longebarbatus* var. *peckii*, since most of this habitat is already occupied by stable populations of native and non-native grasses. Non-native grasses on highly disturbed sites can more effectively establish and compete with some noxious weeds, such as teasel, which appears to be a greater threat to *Calochortus longebarbatus* var. *peckii*. Habitat for *Botrychium spp.*, *Carex hystericina*, and *C. interior* is very moist. Seeding of upland grasses is not likely to expand into this habitat and affect these species.

Activities such as road management (construction, reconstruction, inactivation, and decommission), precommercial thinning, aspen treatments, hardwood planting, and underburning activities that occur within the RHCAs may harm individual *Calochortus longebarbatus* var. *peckii*, *Botrychium spp.*, *Carex hystericina*, and/or *C. interior* plants or their habitats. However, these activities are unlikely to affect viability of populations. Therefore, no impacts are expected that would likely 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.

Most of the suitable habitat for *Cypripedium parviflorum* is associated with upland portions within RHCAs. Where activities within RHCAs are proposed, treatments would limit equipment use and maintain large wood on these sites. Additionally, harvest unit layout, underburning, and post-sale tilling in these areas would be reviewed by the district botanist to minimize loss of suitable habitat. Seeding of native or non-native grasses would take place on portions of decommissioned or inactivated roads to stabilize soils and reduce potential for noxious weed introduction or spread. Though some habitat may be impacted by implementation of these alternatives, viability of *Cypripedium parviflorum* would be maintained. Therefore, no impacts are expected that would likely contribute to a trend towards federal listing or a loss of viability of *Cypripedium parviflorum.*

Sensitive Species Associated with Nonforested/Scabland Habitats

This alternative avoids ground-disturbing activities on non-forest balds (scablands) which provide the primary habitat for *Achnatherum hendersonii* and *A. wallowaensis*. Therefore, no impact to *Achnatherum hendersonii* or *A. wallowaensis* habitat or populations would be expected.

WILDLIFE

There is one federally listed wildlife species known to occur on the Ochoco National Forest: the Northern bald eagle

(*Haliaeetus leucocephalus*). The Ochoco National Forest is also within the listing range for the Canada lynx (*Lynx canadensis*). There are eight wildlife species on the Regional Forester's sensitive species list that are known or suspected to occur on the Ochoco National Forest. They are: Peregrine falcon (*Falco peregrinus anatum*), bufflehead (*Bucephala albeola*), upland sandpiper (Bartramia longicauda), western sage grouse (*Centrocercus urophasianus*), gray flycatcher (*Empidonax wrightii*), tricolored blackbird (*Agelaius tricolor*), pygmy rabbit (*Brachylagus idahoensis*), and California wolverine (*Gulo gulo*). The project area contains potential habitat for bald eagle, gray flycatcher, and wolverine. These species are discussed below.

Seven species were not addressed because there is no or only low probability habitat in the project area. Effects to the Canada lynx (one of the seven) will not be discussed because there are no identified Lynx Analysis Units (LAUs) on the Ochoco National Forest. On May 29, 2001, the Ochoco National Forest received concurrence from the U.S. Fish and Wildlife Service that implementation of any activities contained within the Ochoco National Forest Land and Resource Management Plan, as amended, is not likely to adversely affect the Canada lynx outside of an existing LAU. At the time this consultation took place there were and continue to be no identified LAUs on the Ochoco National Forest.

Alternative 1

There would be no ground-disturbing activities that would affect threatened, endangered, or sensitive species or their habitat within the project area. Therefore, there would be no effect to any threatened, endangered, or sensitive wildlife species known to occur or with potential habitat in the project area.

Alternatives 2, 3, and 4

Bald Eagle - The project area does not contain any known nests or roost sites. If bald eagles are present when management activities are occurring, they could easily avoid logging, precommercial thinning, or underburning operations. A determination of may affect, not likely to adversely affect was reached for all action alternatives because incidental foraging use occurs in the project area.

Gray Flycatcher - Gray flycatcher is present within the project area. This bird primarily uses juniper and big sagebrush habitats with well-developed shrub understories. Commercial timber harvest and precommercial thinning activities would reduce tree canopy closure and allow more light to reach the forest floor. This would improve habitat over time by allowing shrub understories to develop because of increased sunlight. The underburning activities would likely cause a decrease in habitat amount (up to 310 acres) by reducing shrub composition in juniper woodlands and in the dry ponderosa pine vegetation types. These activities are unlikely to cause a loss of viability for this bird or a long-term trend toward federal listing as either endangered or threatened. This bird is both widely distributed across its range and populations are presently increasing. Based upon an analysis of breeding bird survey routes in Oregon, the Breeding Bird Atlas (Adamus et al. 2001) shows gray flycatcher populations are presently increasing. The project area is located on the fringe of this bird's preferred habitat core. Lower elevations found below the Ochoco National Forest boundary are the core reproductive habitats for the gray flycatcher. A determination of may impact individuals or habitat was reached for all action alternatives because the commercial timber harvest, precommercial thinning, and underburning activities would alter habitat within the project area.

California Wolverine - Wolverines may use the area and the amounts of human disturbance related to the proposed activities are likely to alter their movement patterns. The amount of wolverine use in the area is expected to be low because the project area contains only low quality habitat due to high road densities, heavy commercial and recreational use, and the lack of denning habitat (isolated, densely forested north-facing slopes). There is an inclusion of part of the adjacent Mill Creek Wilderness within the project area; it is a long, narrow strip adjacent to the northwest boundary of the project area. The potential habitat in the wilderness within the project area is dominant southeast aspect and is not suitable for denning or high quality foraging habitat. The entire wilderness area contains the potential for wolverine use because of the low amount of human disturbance. Portions of the Mill Creek Wilderness in the adjacent Mill Creek Watershed contain habitat, including the presence of denning habitat. The quality of habitat in the wilderness was reduced to low probability as result

of the Hash Rock Fire. The fire reduced canopy structure and consumed the majority of downed wood. However, the effects of the fire may be offset by the increase in big game carrying capacity due to increased forage production for elk. An increase in elk populations could provide an increased winter carrion source. A determination of may impact individuals or habitat was reached for all action alternatives.

Upland Vegetation

The Ochoco National Forest has defined eight plant association groups (PAGs) for upland forest and woodland sites. These groups contain plant associations of similar biophysical environments and disturbance regimes. Six PAGs occur within the project area. Non-forest plant associations also occur in the project area. These include steppe, shrublands, grasslands, meadows, and rock. Table 3-45 displays the acres of each PAG within the project area.

Table 3-45. Acres by Plant Association Group in the Project Area*

Plant Association Group	Total Acres	% of Bandit Area
Moist Grand fir	1,403	3.6
Dry Grand fir	19,633	50.0
Douglas-fir	8,219	21.0
Mesic Ponderosa Pine	2,155	5.5
Xeric Ponderosa Pine	2,600	6.6
Western Juniper Woodland	1,920	4.8
Nonforest	3,313	8.4
Total	39,243	

*The total acres listed here vary from those contained in the Marks Creek Watershed Analysis. The project area also includes NFS lands in the Veazie Creek subwatershed.

The Ochoco National Forest's Viable Ecosystem Management Guide (VEMG) describes a seral/structural matrix for characterizing forest vegetation within each of the plant association groups. The Viable Ecosystem model also provides a means comparing existing to historical conditions. The Ochoco NF matrix has three seral stages based on species composition (early, mid, late), and each of these is subdivided into five size/structural conditions (grass/forb/shrub, seedling/sapling, pole, small trees, large trees). This matrix can accommodate up to fifteen cells and each cell represents a different seral (E, M, L) and size/structural (1-5) condition. The grass/forb/shrub condition is only reflected in the early-seral condition. An example matrix is shown in Table 3-46.

Table 3-46. Viable Ecosystem Seral/Structural Matrix

	Early	Mid	Late
Grass/forb/shrub	E1	N/A	N/A
Seed/sapling (1-4.9" dbh)	E2	M2	L2
Pole (5-8.9" dbh)	E3	M3	L3
Small (9-20.9" dbh)	E4	M4	L4
Large (21"+ dbh)	E5	M5	L5

Matrix cells can be further subdivided to reflect relative differences in tree density. Subscripts "a" and "b" are used to denote high density multi-strata (generally above 55% canopy closure) and low density single-strata (below 55% canopy closure), respectively. For example, L4a describes a late-seral species composition, small-sized trees, at a high-density level. The total number of vegetative stages can vary by PAG, ranging from 7 to 20 stages. The six PAGs in the project area comprise 103 different seral/structural stages.

The existing seral/structural stages within the project area were compared to the Historical Range of Variability (HRV) for these conditions. Based on this comparison, 39 seral/structural stages are within the HRV, 35 are above, and 29 are below. Some of the more important departures from the HRV are listed below:

1. The exclusion of fire as a disturbance agent, along with past harvest practices, has fostered changes in species composition. In general, today there is relatively more western juniper, Douglas-fir, and grand fir and less ponderosa pine and western larch.
2. Overall, stands dominated by large trees (size class 5) are deficient on the landscape. Stands of large trees with an open "park-like" nature were abundant historically; today, they are relatively scarce. Multi-story dense stands dominated by large trees are within or above their historic levels of abundance. Fire exclusion and past harvest have been the major causes of change. Many stands, which were once dominated by large trees, have been replaced by stands in which pole and/or small sized trees (size classes 3 and 4) are the dominant feature.
3. Increases in stand densities have created more multi-storied stands than occurred historically. Fire exclusion has allowed the development of shade-tolerant understories while at the same time selective harvest and overstory removal have decreased the abundance of large tree overstories.

Tables 3-47 through 3-52 display the HRV, the existing seral/structural conditions, and the current departure from HRV for each PAG. They also display the amount of each stage that would result from implementation of Alternatives 2, 3, and 4.

Table 3-47. Moist Grand Fir PAG Seral/Structural Stages

S/S Stage	HRV Acres		Alt. 1 (Existing) (acres)	Alt. 2 (acres)	Alt. 3 (acres)	Alt. 4 (acres)
	Low	High				
E1	28	140	251	250	250	250
E2	28	140	32	32	32	32
E3a	28	140	6	4	4	4
E3b	0	28	15	17	17	17
E4a	42	182	4	4	4	4
E4b	28	140	1	10	1	10
E5a	14	70	107	98	107	98
E5b	56	196	14	24	14	22
M2	14	70	0	0	0	0
M3	14	70	43	43	43	43
M4a	126	323	0	0	0	0
M4b	14	140	152	145	152	145
M5a	70	140	296	267	279	268
M5b	281	561	173	201	189	201

L2	0	14	0	0	0	0
L3	14	70	0	0	0	0
L4	70	210	0	0	0	0
L5	70	210	309	309	309	309

Table 3-48. Douglas-fir PAG Seral/Structural Stages

S/S Stage	HRV Acres		Alt. 1 (Existing) (acres)	Alt. 2 (acres)	Alt. 3 (acres)	Alt. 4 (acres)
	Low	High				
E1	0	164	115	115	115	115
E2	0	82	395	395	395	395
E3a	0	82	1964	1463	1603	1463
E3b	0	82	674	1233	1085	1225
E4a	0	164	962	773	797	773
E4b	411	1644	107	304	271	304
E5a	164	411	633	526	559	526
E5b	3534	4767	74	271	140	271
M2	0	82	0	0	0	0
M3	0	82	1068	1019	1027	1027
M4a	82	164	164	148	148	148
M4b	329	1151	600	608	616	608
M5a	82	247	1019	814	871	822
M5b	247	1151	115	222	263	222
L2	0	82	0	0	0	0
L3	0	82	0	0	0	0
L4a	82	575	0	0	0	
L4b	82	247	0	0	0	0
L5a	82	575	288	255	279	247
L5b	82	247	33	74	41	74

Table 3-49. Dry Grand Fir PAG Seral/Structural Stages

S/S Stage	HRV Acres		Alt. 1 (Existing) (acres)	Alt. 2 (acres)	Alt. 3 (acres)	Alt. 4 (acres)
	Low	High				
E1	0	393	2140	2140	2140	2140
E2	0	393	609	609	609	609
E3a	0	196	1571	1119	1257	1158

E3b	0	982	1099	1826	1649	1787
E4a	196	982	1846	1433	1571	1453
E4b	1963	4908	452	1080	707	1021
E5a	393	982	2474	1924	2120	1983
E5b	6479	11387	589	1453	962	1394
M2	0	393	39	39	39	39
M3	0	393	2219	1944	1983	1963
M4a	196	982	39	39	39	39
M4b	785	3730	2199	1983	2199	2003
M5a	393	982	1787	1590	1708	1590
M5b	2552	5497	1571	1531	1649	1551
L2	0	196	0	0	0	0
L3	0	196	59	59	59	59
L4	982	1963	0	0	0	0
L5	982	2945	942	864	942	844

Table 3-50. Mesic Ponderosa Pine PAG Seral/Structural Stages

S/S Stage	HRV Acres		Alt. 1 (Existing) (acres)	Alt. 2 (acres)	Alt. 3 (acres)	Alt. 4 (acres)
	Low	High				
E1	0	43	11	24	24	24
E2	0	22	60	47	47	47
E3b	0	22	45	45	45	45
E4a	0	22	11	9	9	9
E4b	0	22	13	13	13	13
E5a	0	22	0	0	0	0
E5b	0	22	0	0	0	0
M2	0	22	0	0	0	0
M3	0	22	433	401	399	401
M4a	0	22	254	205	181	205
M4b	0	108	19	22	22	22
M5a	0	22	24	19	22	19
M5b	0	108	0	2	2	2
L2	0	43	9	9	9	9
L3a	0	22	284	190	216	190

L3b	22	216	683	810	787	810
L4a	0	22	99	60	69	60
L4b	216	647	153	241	256	241
L5a	22	108	50	24	30	24
L5b	1271	1702	4	32	24	32

Table 3-51. Xeric Ponderosa Pine PAG Seral/Structural Stages

S/S Stage	HRV Acres		Alt. 1 (Existing) (acres)	Alt. 2 (acres)	Alt. 3 (acres)	Alt. 4 (acres)
	Low	High				
E1	130	390	13	29	29	29
E2	0	52	73	57	57	57
E3b	0	52	55	55	55	55
E4a	0	26	13	10	10	10
E4b	0	130	16	16	16	16
E5a	0	26	0	0	0	0
E5b	0	130	0	0	0	0
M2	0	52	0	0	0	0
M3	0	52	523	484	481	484
M4a	0	26	307	247	218	247
M4b	26	130	23	26	26	26
M5a	0	26	29	23	26	23
M5b	26	130	0	3	3	3
L2	0	52	10	10	10	10
L3a	26	52	343	229	260	229
L3b	26	260	824	978	949	978
L4a	0	26	120	73	83	73
L4b	650	1170	185	291	309	291
L5a	26	78	60	29	36	29
L5b	624	1144	5	39	29	39

Table 3-52. Western Juniper Woodland PAG Seral/Structural Stages

S/S Stage	HRV Acres		Alt. 1 (Existing) (acres)	Alt. 2 (acres)	Alt. 3 (acres)	Alt. 4 (acres)
	Low	High				
E1	1632	1824	171	298	275	298

M2	19	96	15	15	15	15
M3	38	96	829	716	726	716
L4a	0	19	555	495	488	495
L4b	38	96	338	382	405	382
L5a	0	19	12	12	12	12
L5b	0	19	0	0	0	0

The current trends within the project area indicate that, without active management, many of the departures from HRV will continue to increase. The vegetation across the landscape has been altered to the point that many natural disturbance agents can no longer function within their historic roles. Today, there is an elevated risk of experiencing disturbances such as stand replacement wildfire and epidemic insect and disease outbreaks on a scale which rarely, if ever, occurred before. Successional trends, in the absence of management, will tend to favor a continued increase in late-seral and/or fire-intolerant species. Many of the vegetative components are so far out of balance that it may take 100 years or more to return all of them to their former ranges of abundance

The VDDT model (Beukema and Kurz 1996) was used to predict future distributions of each seral/structural stage for each PAG. It has been modified to incorporate the PAGs, successional pathways, and disturbance processes described in the VEMG. Predictions of landscape conditions within the project area have been made for post-treatment conditions (year 0) and for time periods of 10 and 30 years in the future. The output tables for these predictions are contained in the silviculture report in the project file.

The predictions incorporate endemic insect and disease disturbance. They do not include events such as insect epidemics or large-scale stand replacement wildfire. They also do not include assumptions concerning harvest or other management activities that may occur in the future, other than continued wildfire suppression.

Alternative 1

No commercial harvest, precommercial thinning, underburning, or conifer planting would occur. Vegetation would continue to develop within the project area in a manner determined by existing stocking and species composition. Many of the future seral/structural stages, which develop through natural growth and succession, would tend towards fir species composition and multi-strata characteristics. Many of these conditions are already within or above the HRV. The rate at which many stands develop large-tree character would be hampered by overstocked conditions. On drier sites, such as ponderosa pine PAGs, stand stagnation would become more common. Existing trees would continue to be weakened by competition in overly dense stands. The overall departure from the historic condition would slightly decrease in the next 30 years, as long as large-scale disturbances do not occur.

Alternative 2

This alternative includes 1,822 acres of improvement harvest, 413 acres of commercial thinning, 140 acres of salvage harvest, and 5,395 acres of precommercial thinning.

Improvement harvests would generally be used to move stands in a multi-strata condition to or towards a more open single-strata condition. Many stands would continue to be in an uneven-aged condition. Removing shade-tolerant species (i.e. fir) and reducing stand density would reduce competitive stress on the remaining trees. This would result in more large trees being maintained over time, as well as to encourage the development of additional large trees. Single-strata conditions are less vulnerable to many disturbance agents than multi-strata conditions and the risk of catastrophic loss would be reduced. The abundance of ponderosa pine and western larch would be maintained and enhanced in the long term.

Commercial thinning would generally be used in ponderosa pine stands where stocking density is currently too high. Treatment would target the smaller diameter and less vigorous trees for removal, while maintaining the single-strata characteristics. This would increase growth rates and encourage the development of large trees at a faster rate. In addition, reducing stocking density would improve tree vigor and reduce the incidence of insect and disease mortality.

Salvage harvest would occur in units that had a high amount of fire mortality. In these units there are scattered large ponderosa pine, western larch, and Douglas-fir that has survived. These would be left and the stands monitored for natural regeneration. Removal of the dead trees would not alter species composition or stocking levels, it would, however, reduce fuel loadings.

Precommercial thinning would remove a portion of the smaller diameter trees (<9 inches dbh) and reduce competitive stress on the remaining trees. Ponderosa pine and western larch would be selected for retention wherever possible. After treatment the trees would be less susceptible to mortality from insects, disease, and wildfire. Growth rates would be increased and large trees would develop at a faster rate. This treatment would promote stand conditions that would encourage development of single-strata LOS stands at an accelerated rate.

This alternative would move upland vegetation toward historic conditions at the fastest rate of all the alternatives. The overall departure from the historic condition would decrease over the next 30 years.

Alternative 3

This alternative includes 4,180 acres of precommercial thinning.

Precommercial thinning in this alternative would remove a portion of the smaller diameter trees (less than 12 inches dbh) and reduce competitive stress on the remaining trees. Ponderosa pine and western larch would be selected for retention whenever possible. Because trees greater than 12 inches dbh would not be removed, the amount of competition within some stands would be greater than in Alternatives 2 and 4. Treatment options in some stands may be limited by the amount of activity generated fuels. Since all of the cut trees would remain on site, more stands would require handpiling in order to reduce damage to the residual trees when slash is burned. Fuel loadings in other stands will be higher than if the cut trees were removed resulting in a condition of higher risk for wildfire until the slash is treated. Any disease in the existing overstory, such as dwarf mistletoe, would most likely be passed on to the understory trees. Success in meeting resource objectives would likely be lower in mixed conifer stands than in ponderosa pine stands. In mixed conifer stands, the amount of ponderosa pine and western larch to choose as leave trees is limited. In addition, the ability to move stands from multi-strata conditions, which are above historic abundance, to single-strata conditions, would be limited because mid canopy trees greater than 12 inches dbh would not be removed.

This alternative would move upland vegetation toward historic conditions the least amount of all the action alternatives. The overall departure from the historic condition would decrease over the next 30 years.

Alternative 4

This alternative proposes 1,569 acres of improvement harvest, 412 acres of commercial thinning, and 5,118 acres of precommercial thinning.

Improvement harvests would generally be used to move stands in a multi-strata condition to or towards a more open single-strata condition. Many stands would continue to be in an uneven-aged condition. Removing shade-tolerant species and reducing stand density would reduce competitive stress on the remaining trees. This would result in more large trees being maintained over time, as well as to encourage the development of additional large trees. Single-strata conditions are less vulnerable to many disturbance agents than multi-strata conditions and the risk of catastrophic loss would be reduced. The abundance of ponderosa pine and western larch would be maintained and enhanced in the long term.

Commercial thinning would generally be used in ponderosa pine stands where stocking density is currently too high. Treatment would target the smaller diameter and less vigorous trees for removal, while maintaining the single-strata characteristics. This would encourage the development of large trees at a faster rate. In addition, reducing stocking density would improve tree vigor and reduce the incidence of insect and disease mortality.

Precommercial thinning would remove a portion of the smaller diameter trees (<9 inches dbh) and reduce competitive stress on the remaining trees. Ponderosa pine and western larch would be selected for retention wherever possible. After treatment the trees would be less susceptible to mortality from insects, disease, and wildfire. Growth rates would be increased and large trees would develop at a faster rate. This treatment would promote stand conditions that would provide for single-strata LOS at an accelerated rate.

This alternative would move upland vegetation toward historic conditions at the second fastest rate of all the action alternatives. The overall departure from the historic condition would decrease over the next 30 years.

Cumulative Effects

The most recently logged sales within the project area are Harpo and Marks. Harvest activities on these sales have been complete for 4 and 7 years, respectively. Some post-sale precommercial thinning is still occurring. These units occur outside of any proposed Bandit treatment units. The objectives of the precommercial thinning are the same as those proposed for Bandit, i.e. removal of smaller trees to reduce stand density, favor ponderosa pine and western larch, and enhance the development of large trees. The Harpo/Marks activities have been included in the description of the existing condition.

The Pick-Up Salvage Sale is the only ongoing sale in the project area and will be completed in 2002. This sale removes only dead trees and would not contribute to cumulative effects on upland vegetation in the project area. Removing these trees will not alter species composition, stand density, or structure.

Visual Quality

The Forest Plan allocated some areas to visual management, including corridors along U.S. Highway 26 and recreation sites such as the Bandit Springs Recreation Area. The general emphasis in these areas is to maintain the natural-appearing character of the forest. There is an estimated total of 8,352 acres in the project area that are included in these visual management allocations. Approximately 5,585 acres are included in the U.S. Highway 26 Scenic Corridor and 1,580 acres are in the Bandit Spring Recreation Area. Other areas include developed recreation sites and travel corridors along Forest Road 27 and Road 2630.

The existing scenery has a variety of disturbed and undisturbed areas. Human-caused activities have altered the natural-appearing landscape. Diverse vegetation stands and species (with various age, size classes, and health conditions) can be found throughout the project area. These vegetation stands include: ponderosa pine, lodgepole pine, western larch, Douglas-fir, white fir, and riparian species. They provide strong diverse lines and textural and color patterns broken up only by occasional filtered-view openings into the foreground landscape.

Although the existing forest conditions may appear natural to a casual visitor, the forest conditions are not natural. Older trees are being suppressed by the densely stocked understory due to the change in fire regime caused by fire suppression. Densely stocked forest and canopy closure, due to the lack of low intensity fire regime, has led to the loss of the open, park-like ponderosa pine stands historically found within the area. Overstocked and dense stands in parts of the project area have led to serious fire risk. The natural processes can no longer function as they did historically because of these dense stand conditions.

The competition for available space, nutrients, and the encroachment from shade-tolerant understories is prevalent, especially along the travel and scenic corridors (within 1/4 mile). The depth-of-field view deep into the forest is restricted to mostly the immediate foreground area of the landscape due to the high level of vegetation density.

Alternative 1

Under this alternative, the existing vegetation within the project area would not be altered or changed by any management activity.

Scenery would remain essentially the same during the short-term duration (0-5 years) and may be adversely altered through time (5 years and beyond) as multi-strata conditions continue to increase. Encroachment by shade-tolerant species would continue and stand densities would continue to increase. Views of open, park-like stands of older and larger ponderosa pine would become less frequent.

Alternative 2

Approximately 3,110 acres (or 37 percent of the acres within the visual management allocations) would be treated to enhance both short and long-term scenic quality, through commercial thinning, precommercial thinning, and underburning activities. The proposed activities within visual management corridors would have short-term (0 to 5 years) adverse effects on scenery. Stumps, slash, and other evidence of management would be visible. However, the long-term enhancement of scenery, as well as moving toward sustainable vegetation conditions, is considered beneficial. Sufficient levels of residual trees would remain on site to meet desired conditions.

Management activities would occur within the U.S. Highway 26 Scenic Corridor, Bandit Springs Recreation Area, developed recreation sites, and travel corridors along Forest Road 27 and Road 2630 within Retention and Partial Retention visual management allocations. Commercial harvest and precommercial thinning would occur within densely stocked stands. Treatments would enhance and maintain scenery. The various vegetation treatments include removing understory trees. This would allow the development of more large ponderosa pine and views of large ponderosa pine would become more frequent.

"Filtered views" deep into the forested landscape, including views into the gentle rolling hills, would be created. This would enhance the existing scenery. Open, park-like stands of older structure ponderosa pine stands would be more readily seen along travel corridors. The "tunnel" effects currently found throughout the project area would be reduced and would become diversified with more openings in treated areas. After the short-term effects of treatment activities (disturbed soil, slash, scorched vegetation) have recovered, the diverse scenic views are expected to enhance a visitor's experience along these corridors.

Forest Plan direction for Scenic Resources would be met with the retention of residual trees, post-treatment clean up activities, implementation of design elements, and on-site monitoring. This alternative would enhance the visual quality on the more acres than any other alternative.

Alternative 3

Approximately 2,700 acres (or 32 percent of the acres within the visual management allocations) would be treated to enhance both short and long-term scenery, through precommercial thinning and underburning activities. Under this alternative, the effect on scenery is expected to be less than the other action alternatives since only small understory trees would be treated. This alternative places an emphasis on non-commercial activities.

The proposed activities within visual management corridors would have short-term (0 to 5 years) adverse effects on

scenery. Stumps, slash, and other evidence of management would be visible. However, the long-term enhancement of scenery, as well as moving toward sustainable vegetation conditions, is considered beneficial. Sufficient levels of residual trees would remain on site to meet desired conditions.

Management activities would occur within the U.S. Highway 26 Scenic Corridor, Bandit Springs Recreation Area, developed recreation sites, and travel corridors along Forest Road 27 and Road 2630 within Retention and Partial Retention visual management allocations. The long-term (20 years and beyond) scenic quality within the treatment areas may improve slightly or would remain essentially the same as the existing condition. Less alteration to scenery would occur under this alternative, since fewer acres are treated than Alternatives 2 and 4 and only smaller, less visible, understory trees would be removed.

The proposed treatment activities within visual management corridors would have short-term adverse effects on scenery. Alterations are expected to have a limited long-term enhancement of scenery. In the short term (5-10 years), residual stumps and slash following treatment activities would be visible and may alter scenic quality. In the long term, scenery within treated areas may improve slightly or would remain essentially the same as today because new small, understory trees would develop. Sufficient levels of residual trees would remain on site to meet the desired condition.

Much of the precommercial thinning throughout the project area is within the densely stocked stands. Only smaller understory trees would be removed. This would provide less development of larger trees than Alternatives 2 and 4. "Filtered views" would only be created in two-storied stands which do not have a mid-canopy layer. Fewer views of open ponderosa pine would be visible than in Alternatives 2 and 4. The retention of green trees following treatment would maintain scenery.

The Forest Plan direction would be met through retention of residual trees, post-treatment clean up activities, implementation of design elements, and on-site monitoring. This alternative would move less of the area toward the Desired Future Condition for Scenic Resources than the other action alternatives.

Alternative 4

Approximately 2,800 acres (or 34 percent of the acres within the visual management allocations) would be managed to enhance long-term scenic quality, through commercial thinning, precommercial thinning, and underburning activities. Management activities within visual management corridors are considered to have short-term (0 to 5 years) adverse effect on scenery due to slash and other evidence of treatment. However, the long-term enhancement of scenery,

as well as moving toward sustainable vegetation conditions, is considered beneficial. Sufficient levels of residual trees would remain on site to meet the desired condition.

Management activities would occur within the U.S. Highway 26 Scenic Corridor, Bandit Springs Recreation Area, developed recreation sites, and travel corridors along Forest Road 27 and Road 2630 within Retention and Partial Retention visual management allocations. Much of the proposed commercial and precommercial thinning would occur within densely stocked stands. Treatments would maintain and enhance scenery. The various vegetation treatments include removing understory and mid-canopy trees. This would allow the development of more, large ponderosa pine and views of large ponderosa pine would become more frequent.

The alteration of the existing scenery is expected to be comparable to Alternative 2, except that fewer acres would be treated in the Bandit Springs Recreation Area. "Filtered views" deep into the forested landscape, including views into the gentle rolling hills, and would enhance the existing scenery. The open, park-like stands of older structure ponderosa pine stands would be more readily seen along travel corridors. The "tunnel" effects currently found throughout the project area would be reduced and would become diversified with more openings in treated areas

Forest Plan direction would be met with the retention of residual trees, post-treatment clean up activities, implementation of

design elements, and on-site monitoring.

Water Quality

Stream turbidity is a primary indicator of water quality in forested ecosystems. There is normally a close correlation between turbidity and suspended sediment. The analysis focused on production of sediment because timber harvest and road construction activities can increase sediment delivery.

Effects to water quality are also discussed in relation to temperature and chemical input. This section also includes a display of the Equivalent Harvest Area (EHA). The primary indicators for water quality are also important indicators of fish habitat.

SEDIMENT

Prior to the Hash Rock Fire, the Marks Creek Watershed Analysis (1998) estimated that about 50 percent of the sediment in the streams on National Forest System lands was coming from in-channel erosion such as bank erosion, headcuts, and channel scour. Bottom Line Surveys indicate that about 3 percent of the stream reaches in the watershed have greater than 20 percent cutbank and about 17 percent have between 10 and 20 percent cutbank. In-channel erosion is expected to increase as a result of the Hash Rock Fire, probably by less than 15 percent. Channel destabilization can result from changes in peak flows, sediment load, and livestock impacts. Road alignment on U.S. Highway 26 has resulted in channelization of portions of Marks Creek. Sediment delivery from cutbanks and headcuts has been identified as a problem on Little Hay Creek. Headcuts have also been identified on Cornez Creek, McGinnis Creek, Wildcat Creek, and several unnamed tributaries of Marks Creek.

Much of the remaining sediment in the watershed comes from surface erosion and mass wasting. Approximately 75 percent of the sediment from surface erosion is estimated to come from roads (this does not include sediment resulting from the Hash Rock Fire). Ninety percent of the sediment delivered to stream channels from surface erosion occurs within 400 feet of the stream channel. Open road densities within 400 feet of stream channels are 3.7 miles per square mile in both the Lower and Upper Marks Creek subwatersheds. There are no open roads within 400 feet of a stream channel in the portion of the Veazie Creek subwatershed that is within the project area.

Effects to water quality are evaluated by comparing the relative erosion and sediment delivery rates of the alternatives based on the Relative Erosion Rate (RER) model. The RER model depicts risk of 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 a tool for comparing alternatives. Actual sediment delivery may be higher or lower than predicted depending on the amount of vegetative recovery before a storm event occurs and on storm intensity. Should a large runoff event occur, similar to the 25-50 year flood of January 1997, elevated sediment delivery may occur even if no proposed activities are accomplished.

The analysis was completed with the assumption that a timber sale would be offered in 2002. RER calculations assumed salvage harvest in Alternative 2 would occur in 2002. All other harvest activities, in Alternatives 2 and 4, are assumed to take place between 2003 and 2005. Effects from underburning are assumed to begin occurring in 2004. Non-commercial treatments (precommercial thinning, aspen treatments, and planting) and underburning activities are projected to be completed by 2012.

Table 3-53 shows the types and amounts of logging and road management activities for each alternative. Figure 1 shows the relative contribution of sediment from management activities and the Hash Rock Fire. Table 3-54 displays the total RER values predicted for each alternative.

Table 3-53. Types and Amounts of Harvest and Road Activities by Alternative

Alt.	Harvest (% Project Area)			Roads (miles)			
	Helicopter	Tractor	Total	New System	Recon	New Temp.	Total
1	0	0	0	0	0	0	0
2	3.0	3.1	6.1	2.2	9.8	1.4	13.4
3	0	0	0	0	0	0	0
4	2.3	2.7	5.0	2.2	9.3	1.4	12.9

Figure 1. Comparison of Potential Sediment Delivery
(Combined Road, Fire & Harvest Delivered Sediment to Show Relative Contribution)

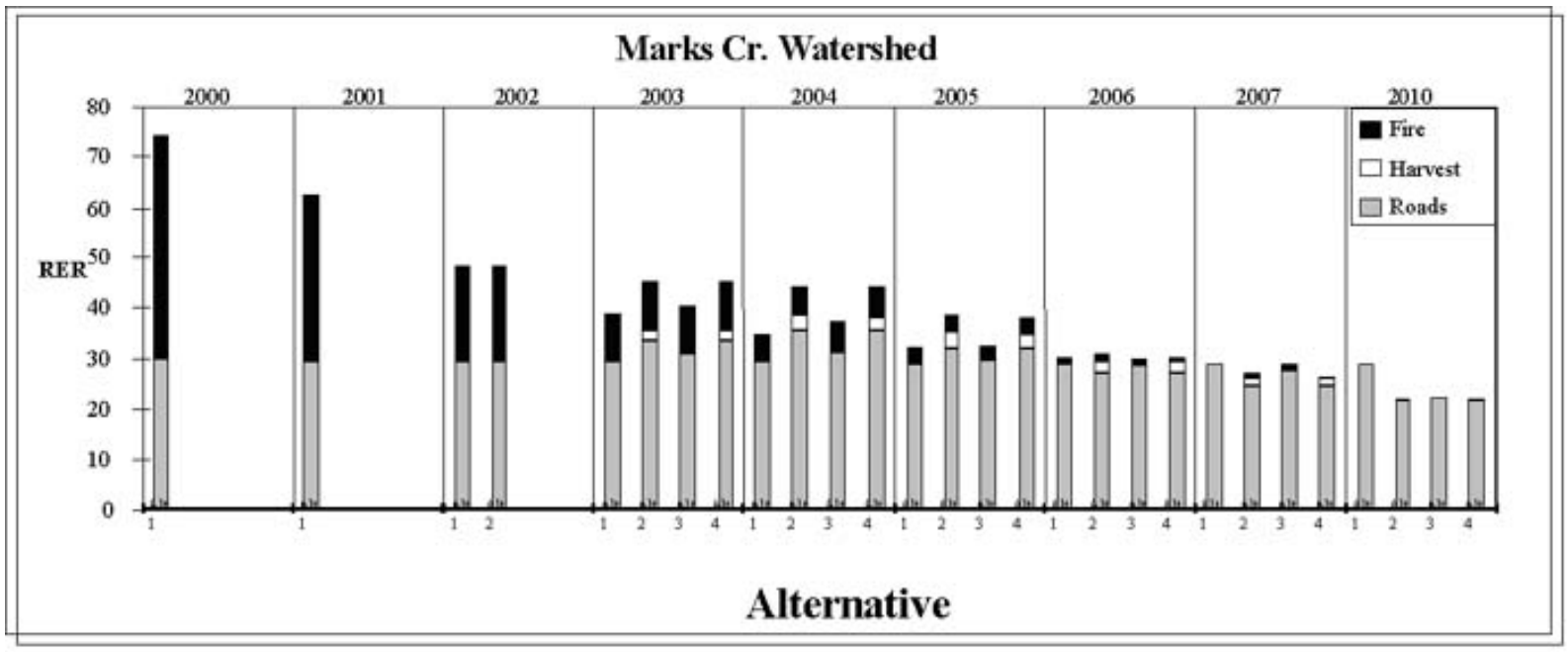

Table 3-54. Total RER Values by Alternative

Alt	2000	2001	2002	2003	2004	2005	2006	2007	2010
1	74.6	62.6	48.4	38.7	34.8	32.0	30.1	29.0	29.0
2	74.6	62.6	48.5	45.2	44.1	38.4	30.7	29.3	21.9
3	74.6	62.6	48.4	40.5	37.0	32.7	29.7	31.0	22.5
4	74.6	62.6	48.4	45.0	43.9	38.1	30.6	29.2	21.9

Alternative 1

No commercial harvest or road construction activities would occur. The existing amounts and sources of sediment would not change. The amount of open road (73.5 miles) and the existing open road densities within 400 feet of the stream channel would not change. Risk of surface sediment delivery from the Hash Rock Fire decreases rapidly and by 2007 has essentially decreased to pre-fire levels, although risk of sediment from mass wasting will continue. State water quality standards for turbidity would be met.

Alternative 2

The road construction and reconstruction proposed in this alternative has the potential to increase sediment delivery. Table 3-53 shows the types and amounts of logging and road management activities for each alternative. Ground-based equipment restrictions in RHCAs, maintaining effective ground cover, and the implementation of Best Management Practices (BMPs) would reduce the potential sediment delivery from harvest activities. Installing relief drainage, filter strips, and/or sediment traps (i.e. straw bales) would trap sediment before it reaches a stream channel. No commercial harvest, precommercial thinning, or underburning activities would occur within the Hamilton Creek drainage or the unnamed tributary to the west due to the amount of area in each that burned at high intensity. Commercial harvest, precommercial thinning, and hardwood and conifer planting would occur within the burned area. Potential sediment delivery from harvest in the burn area in 2002 would be negligible because there would be no harvest in any RHCAs, no new roads would be constructed, and all except 1 acre of tractor harvest would be more than 400 feet from a stream. By the time other harvest within the fire perimeter starts in 2003, potential fire-related sediment should primarily be limited to the high-intensity burn areas and these areas will be 75 percent recovered to pre-fire sediment delivery levels.

This alternative includes both design elements and mitigation measures (see Chapter 2) that would reduce sediment delivery. Mitigation measures include activities such as placing straw bale sediment traps at designated stream crossings; installing relief drainage structures at designated stream crossings; and installing relief drainage on new and temporary roads.

Approximately 26.1 miles of road would be closed (inactivated) or obliterated (decommissioned). Reductions in potential sediment from roads would begin in 2004 or 2005 and continue through 2010 (see Figure 1). The amount (miles) of open roads within 400 feet of stream channels would be reduced from 73.5 miles to 63.9 miles. A reduction of 9.6 miles. Open road densities within 400 feet of stream channels, would be reduced to 3.1 miles per square mile in the Upper Marks Creek subwatershed and to 3.3 in the Lower Marks Creek subwatershed. Road inactivation and decommissioning would result in a short-term increase in sediment from closure and restoration activities. Road closures are projected to reduce long-term, road-delivered sediment by 25 percent because effective ground cover would be established on roadbeds; effective ground cover reduces the amount of sediment movement.

Excluding the Hash Rock Fire effects, about 50 percent of the potential sediment increase comes from construction and reconstruction of roads. Special attention would be given to roads within 200 feet of streams and stream crossings during construction to assure adequate cross drainage and other measures are implemented to reduce sediment delivery and risk of failure.

Headcuts are elevating sediment delivery in the project area. Headcuts on Cornez and Little Hay Creeks would be repaired to reduce sediment production. Headcut repair activities have a high potential for short-term, localized sediment delivery. This lasts only while activities are ongoing. Headcut repair activities should result in a decrease in sediment delivery within 1 year after completion.

Alternative 2 has a higher short-term risk of producing surface-related sediment than Alternative 1. By 2006, both alternatives have essentially the same risk. In the long-term (2010 and beyond) all action alternatives carry essentially the same amount of risk. All action alternatives have lower risk than Alternative 1 because of road decomission and inactivation activities.. Alternative 2 would meet state water quality turbidity standards by implementing prescribed BMPs and design elements. Localized, short-term increases in sediment are expected as discussed above. However, no measurable increases in suspended sediment or turbidity at the subwatershed level are expected to result from this alternative.

Alternative 3

No commercial harvest or road construction activities would occur. No precommercial thinning or underburning would occur within the Hamilton Creek drainage or the unnamed tributary to the west due to the amount of area in each that burned at high intensity. Hardwood and conifer planting and precommercial thinning would occur within of the burned area. The amount of sediment produced by roads would be reduced. The amount (miles) of open roads within 400 feet of

stream channels would be reduced from 73.5 miles to 63.9 miles. Open road densities within 400 feet of stream channels, would be reduced to 3.1 miles per square mile in the Upper Marks Creek subwatershed and to 3.3 in the Lower Marks Creek subwatershed. Road inactivation and decommissioning would result in a short-term increase in sediment from closure and restoration activities. Overall, road closures are projected to reduce long-term, road-delivered sediment by 25 percent.

Headcuts are elevating sediment delivery in the project area. Headcuts on Cornez and Little Hay Creeks would be repaired to reduce sediment production. Headcut repair activities have a high potential for short-term, localized sediment delivery. This lasts only while activities are ongoing. Headcut repair activities should result in a decrease in sediment delivery within 1 year after completion.

Alternative 3 has a higher short-term risk of producing surface-related sediment than Alternative 1. By 2006, both alternatives have essentially the same risk. In the long-term (2010 and beyond) all action alternatives carry essentially the same amount of risk. All action alternatives have lower risk than Alternative 1. State water quality standards for turbidity would be met. Localized, short-term increases in sediment are expected as discussed above. However, no measurable increases in suspended sediment or turbidity at the subwatershed level are expected to result from this alternative.

Alternative 4

The road construction and reconstruction included in this alternative has the potential to increase sediment delivery. Table 3-53 shows the types and amounts of logging and road management activities for each alternative. The establishment of ground-based equipment restrictions in RHCAs, maintaining effective ground cover, and the implementation of BMPs would reduce the potential sediment delivery from harvest activities. No activities are proposed within the Hamilton Creek drainage or the unnamed tributary to the west due to the amount of area in each that burned at high intensity. No harvest would occur within the perimeter of the Hash Rock Fire. Hardwood and conifer planting and precommercial thinning would occur within the burned area.

This alternative includes both design elements and mitigation measures (see Chapter 2) that would reduce sediment delivery. Mitigation measures include activities such as placing straw bale sediment traps at designated stream crossings; installing relief drainage structures at designated stream crossings; and installing relief drainage on new and temporary roads.

Approximately 26.1 miles of road would be closed (inactivated) or obliterated (decommissioned). Reductions in potential sediment would begin in 2004 or 2005 and continue through 2010 (see Figure 1). The amount (miles) of open roads within 400 feet of stream channels would be reduced from 73.5 miles to 63.9 miles. Open road densities within 400 feet of stream channels, would be reduced to 3.1 miles per square mile in the Upper Marks Creek subwatershed and to 3.3 in the Lower Marks Creek subwatershed. Road inactivation and decommissioning would result in a short-term increase in sediment from closure and restoration activities. Road closures are projected to reduce long-term, road-delivered sediment by 25 percent.

Excluding the Hash Rock Fire effects, about 50 percent of the potential sediment increase in the Marks Creek Watershed comes from construction and reconstruction of roads. Special attention would be given to roads within 200 feet of streams and stream crossings during construction to assure adequate cross drainage and other measures are implemented to reduce sediment delivery and risk of failure.

Headcuts are elevating sediment delivery in the project area. Headcuts on Cornez and Little Hay Creeks would be repaired to reduce sediment production. Headcut repair activities have a high potential for short-term, localized sediment delivery. This lasts only while activities are ongoing. Headcut repair activities should result in a decrease in sediment delivery within 1 year after completion.

Alternative 4 has a higher short-term risk of producing surface-related sediment than Alternative 1. By 2006, all alternatives

have essentially the same risk. In the long-term (2010 and beyond) all action alternatives carry essentially the same amount of risk. All action alternatives have lower risk than Alternative 1. Alternative 4 would meet state water quality turbidity standards by implementing prescribed BMPs and design elements. Localized, short-term increases in sediment are expected as discussed above. However, no measurable increases in suspended sediment or turbidity at the watershed level are expected to result from this alternative.

Cumulative Effects for All Alternatives

The Hash Rock Fire has adversely affected water quality by increasing the amount of sediment delivery and increasing the potential to reactivate landslides. Some effects, such as potential for mass wasting, are chronic and are expected to last for several years. The Hash Rock Fire and existing road systems account for a large percent of the projected sediment (see Figure 1). Most of the fire-related sediment will originate in the Hamilton Creek area. Surface erosion from the Hash Rock Fire is expected to impair aquatic habitat on the west side of the Upper Marks Creek Subwatershed for 3 to 5 years after the fire. Increased sediment from reactivated landslides and bank erosion will be a chronic problem in the fire perimeter until vegetation becomes reestablished and plant roots restabilize. Increased sediment loads and flows may lead to channel type changes. The amount of cutbank is expected to increase due to fire intensity in riparian areas on the south end of the Hash Rock Fire. Cutbank and channel scour are also expected to increase due to projected increases in flow and sediment yield from the fire, especially in the Hamilton Creek drainage. Fire-related sediment effects into Marks Creek have been minor to date due to the lack of high-intensity storms and vegetative recovery. A larger runoff event, coupled with reactivated landslides or bank erosion in Hamilton Creek could affect Marks Creek a quarter to a third of the way into the Lower Marks Creek Subwatershed.

Several fire recovery activities are planned or have been implemented that will reduce the effects of the Hash Rock Fire on water quality and aquatic habitats. These activities include riparian planting, headcut repair, installing drainage structures on roads and trails, installing waterbars, replacing undersize culverts, armoring culverts, road maintenance, and road decommissioning. In many cases, these activities will have short-term, localized increases in sediment delivery. These short-term increases are expected to last from a few days to a few weeks. The timing of many of these activities will be controlled to lessen impacts.

Individual headcuts contribute small chronic amounts of sediment in the Marks Creek Watershed. Identified problem areas will be treated as funds become available. As these are repaired, chronic sediment delivery will be reduced.

Livestock in riparian areas can trample streambanks and remove streamside vegetation. This in turn causes streambank erosion. While livestock can affect upland sediment delivery, in the 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 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. Streamside vegetation would be maintained and would contribute to streambank stability. Livestock grazing in the Hash Rock Fire perimeter has been modified to allow vegetative recovery. In the Wildcat and Viewpoint pastures numbers of livestock have been reduced, the season of use restricted, and the permittee is required to keep cattle out of severely burned areas. Riparian enhancement activities include fencing and placement of slash to exclude cattle and protect plants until they become well established and can withstand browsing.

TEMPERATURE

The principal source of heat in streams in the project area is from the sun striking the stream surface (solar radiation). Shade from vegetation and topography are the primary factors regulating the amount of sun reaching the stream surface.

Vegetation providing shade may consist of trees, shrubs, grasses, sedges, and other plants. Shade functions generally occur within 100-200 feet of the channel (Beschta et al. 1987). Shade is not a factor along intermittent (Class IV) streams. Class IV streams carry water during spring runoff but do not flow during the warm summer months when water temperatures rise.

No measurable increase in water temperature resulting from management practices is allowed under state water quality standards when the peak water temperatures in a stream are over a floating 7-day maximum average of 64 degrees Fahrenheit. Marks Creek is on the State 303(d) list of Water Quality Limited Water Bodies for summer water temperature.

Little Hay and Nature Creeks have water temperatures below 64 degrees F and meet state standards. Loss of shade and potential channel widening resulting from the Hash Rock Fire along Hamilton Creek and the unnamed tributary to the west will raise water temperatures and will probably affect Marks Creek for an unknown distance below the confluence. The fire may also result in measurable increases in water temperature in McGinnis, Cornez, and Reilly Creeks.

Alternative 1

There would be no direct effects to stream shading or stream temperatures. No management activities would occur within RHCAs. There is some risk that future insect and disease mortality may reduce stream shading. 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 and help retain water for late season flows. This alternative is not expected to produce any measurable increases or decreases in the maximum water temperature. Riparian vegetation would recover unaided by hardwood planting and aspen improvement projects.

Alternative 2

This alternative proposes commercial harvest (71 acres), precommercial thinning (233 acres) within RHCAs, including thinning in aspen stands, and riparian planting. These activities would increase the vigor and composition of trees, shrubs, and other understory species. Silvicultural activities would encourage the development of large trees and reduce the risk of mortality from insects and disease. Existing stream shade would be maintained and would increase over time. Large woody debris recruitment for channel stability would also increase over time. Future shade would be enhanced because thinning would help individual trees maintain fuller crowns and increase growth rates. 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 this height would be thinned from units along perennial streams. Trees providing shade to the stream channel would not be cut with the exception of thinning to enhance aspen. In aspen enhancement areas, some conifer trees that provide shade may be removed; however, removing these trees is not expected to result in any measurable increase in stream temperature. No salvage of dead trees would occur in the RHCAs. Riparian planting would help to accelerate shade recovery, especially within the burned area.

This alternative is not expected to produce measurable increases or decreases in the maximum water temperature. Over time shade would increase, causing a decrease in water temperature.

Alternative 3

This alternative includes precommercial thinning activities (333 acres) within RHCAs. Trees that provide shade would not be removed, with the exception of thinning to enhance aspen. In aspen enhancement areas, some conifer trees that provide shade may be felled; however, this is not expected to result in any measurable increase in stream temperature. Riparian planting would help to accelerate shade recovery, especially within the burned area.

This alternative is not expected to produce measurable increases or decreases in the maximum water temperature. Over time shade would increase, causing a decrease in water temperature.

Alternative 4

This alternative proposes commercial harvest (69 acres), precommercial thinning (233 acres) within RHCAs, including thinning in aspen stands, and riparian planting. These activities would increase the vigor and composition of trees, shrubs, and other understory species. Silvicultural activities would encourage the development of large trees and reduce the risk of mortality from insects and disease. Existing stream shade would be maintained and would increase over time. Large woody debris recruitment for channel stability would also increase over time. Future shade would be enhanced because thinning would help individual trees maintain fuller crowns and increase growth rates. 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 this height would be thinned from units along perennial streams. Trees providing shade to the stream channel would not be cut with the exception of thinning to enhance aspen. In aspen enhancement areas, some conifer trees that provide shade may be removed; however, removing these trees is not expected to result in any measurable increase in stream temperature. No salvage of dead trees would occur in the RHCAs. Riparian planting would also help to accelerate shade recovery, especially within the burned area.

This alternative is not expected to produce measurable increases or decreases in the maximum water temperature. Over time shade would increase, causing a decrease in water temperature.

Cumulative Effects for All Alternatives

The Hash Rock Fire has adversely affected water quality by removing effective ground cover, removing live vegetation, and removing shade. Water temperatures in Hamilton, McGinnis, Cornez, and Reilly Creeks are expected to increase. These increases in water temperature are expected to last from a few to several years until vegetation becomes re-established and again provides shade to the stream channels. Fire rehabilitation activities include riparian planting which will reduce the amount of time needed for vegetation recovery. Livestock grazing in the Hash Rock Fire perimeter has been modified to allow vegetative recovery. In the Wildcat and Viewpoint pastures numbers of livestock have been reduced, the season of use restricted, and the permittee is required to keep cows out of severely burned areas.

Livestock grazing in the watershed has the potential to remove streamside vegetation and increase stream temperatures. New grazing utilization standards, that require a certain height of grasses and shrubs be left, are being implemented. These new standards allow for recovery of palatable woody vegetation. Recovery of this woody vegetation would help to ensure that shade is maintained and temperatures do not increase.

EHA

The Equivalent Harvest Area (EHA) model is used to approximate the effects of timber harvest activity and forest vegetative conditions within a given watershed. The EHA model tracks the rate of vegetation change (timber harvest and hydrologic recovery) and evaluates it against a threshold. EHA is defined as the area that, when harvested, produces hydrologic effects similar to 1 acre of clearcut. The EHA model does not measure direct effects but is based on the principle that reduced stand density will reduce interception and evapotranspiration and will increase snow accumulation. The probability of an event (flood) occurring can be increased by increasing the runoff efficiency of a drainage by road construction, increasing the snowpack by reducing the tree canopy, increasing snow melt rate through reductions in canopy closure, or increasing the amount of water available by removing vegetation. The EHA threshold established in the Forest Plan is used as a guideline for dispersing harvest within a given watershed based on potential increases in peak flow. 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 runoff event take place.

Measurable increases in flow are predicted to 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. During the development of the Forest Plan, it was decided, based on the watershed condition and the lack of an anadromous fishery, that a moderate increase in flow

presented an acceptable risk. Therefore, the EHA threshold was set at 30 percent for the Marks Creek Watershed. The level of mortality due to the Hash Rock Fire by itself should not produce a measurable effect on peak flows in the watershed; however, it is expected to affect the Hamilton Creek drainage for decades. Due to the amount of high-intensity burn in the Hamilton Creek drainage, no activities are proposed in that drainage or the unnamed tributary to the west.

EHA calculations assume salvage harvest in Alternative 2 would occur in the fall of 2002. All other harvest activities, in Alternatives 2 and 4, would take place between 2003 and 2005. Non-commercial treatments (precommercial thinning, aspen treatments, and planting) are projected to be completed by 2012. Natural fuels underburning is assumed to not remove enough canopy to produce a measurable increase in water yield. The effects of the alternatives on EHA from 2002 through 2010 are displayed in Table 3-55. The EHA values are shown for NFS lands within the Marks Creek Watershed. The Veazie Creek subwatershed is part of the Lower Ochoco Creek Watershed. The Forest Service manages about 2 percent of the Veazie Creek subwatershed and less than 1 percent of the Lower Ochoco Creek Watershed. These lands were evaluated using the same threshold used for Marks Creek. Due to the small percentage of area managed by the Forest Service, there should be negligible effects in the Veazie Creek subwatershed.

Table 3-55: EHA Calculations for the Marks Creek Watershed

	EHA (%)								
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Alt 1	18.83	17.95	17.29	16.34	15.34	14.44	13.68	13.11	12.71
Alt 2	18.83	18.70	18.78	18.57	17.87	17.26	16.43	15.76	15.25
Alt 3	18.83	18.13	17.63	16.86	16.02	15.26	14.46	13.83	13.37
Alt 4	18.83	18.62	18.62	18.33	17.64	17.03	16.21	15.55	15.05

All Alternatives

All Alternatives are under the Forest Plan threshold of 30 percent in the Marks Creek Watershed. EHA values for the Hamilton Creek drainage are over 60 percent for the period analyzed under all alternatives. Based on the EHA analysis, none of the alternatives would result in a measurable increase in flow.

CHEMICAL

Nutrient flushes resulting from the wildfire may affect water quality (Baker 1988 and Tiedeman et al. 1978). Calcium, magnesium, potassium, and nitrogen 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. Nutrients that do reach streams tend to be taken up by algae and other aquatic plants. DeByle and Packer (1972) found that sediment was the primary source for loss of nutrients. The loss of nutrients following the Hash Rock Fire would have been most pronounced in the first couple heavy rains after the fire in 2000 but may persist for several years. Fire-related nutrient loss should primarily come from high-intensity burn areas.

Fire retardant containing sodium ferrocyanide was used in the suppression of the Hash Rock Fire. Sodium ferrocyanide is not toxic because the cyanide is complexed with the sodium/iron molecule and is inert. When exposed to sunlight or extremely high temperatures, sodium ferrocyanide can break down and release cyanide-ions leading to the formation of hydrogen cyanide (HCN) which can affect aquatic organisms (Moor 1990). The local soils contain large amounts of iron and trace amounts of bound cyanide. Additional trace amounts of cyanide-ions would quickly become neutralized by bonding with the iron-rich soil. Direct application of fire retardant into streams can cause fish kills. It is estimated that about 20,000 gallons of fire retardant were applied in the Marks Creek watershed, mostly in the upper reaches of the McGinnis Creek drainage. There are no known retardant applications into any streams. No retardant plumes were seen encroaching on

flowing streams during stream surveys after the fire and no fish kills were observed. Live fish were observed in Marks, Hamilton, and McGinnis Creeks during stream surveys after the fire.

Alternative 1

No increase in nutrient delivery to streams would occur as result of this alternative.

Alternative 2

Burning activities on 10,487 acres would increase nutrients in streams in drainages where it occurs. The area actually burned should range from less than 10 percent in hand piled units to between 40 and 70 percent in underburned units.

Underburning would increase the potential for additional nutrients to enter streams. Underburning would only have a minimal impact on the project area because the surface vegetation, litter, and forest floor are only partially burned. Most of the increased available nutrients would be taken up by plants or bound to the soil, roots, or debris. Van Wyk (1982) found that nutrient release as a result of underburning did not persist beyond the first winter after underburning 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. This alternative proposes the largest amount of burning and has the greatest potential to increase nutrient input to streams. Burning activities would be implemented over several years.

Alternative 3

Burning activities on 9,958 acres would increase nutrients in streams in drainages where it occurs. The area actually burned should range from less than 10 percent in hand piled units to between 40 and 70 percent in under burned units. Underburning would increase the potential for additional nutrients to enter streams. Most of the increased available nutrients would be taken up by plants or bound to the soil, roots, or debris. Nutrient levels should return to pre-burn levels within 3 to 10 months after treatment. This alternative proposes the least amount of burning and has the least potential to increase nutrient input to streams. Burning activities would be implemented over several years.

Alternative 4

Burning activities on 10,249 acres would increase nutrients in streams within drainages where it occurs. The area actually burned should range from less than 10 percent in hand piled units to between 40 and 70 percent in under burned units. Underburning would increase the potential for additional nutrients to enter streams. Most of the increased available nutrients would be taken up by plants or bound to the soil, roots, or debris. Nutrient levels should return to pre-burn levels within 3 to 10 months after treatment. This alternative proposes about 250 less acres of burning than alternative 2 and has the second greatest potential to increase nutrient input to streams. Burning activities would be implemented over several years.

Cumulative Effects Common to All Alternatives

Nutrient levels in streams directly affected by the Hash Rock Fire would continue to recover to pre-fire levels. Increased nutrients released by underburning that reach streams would be taken up by algae and other aquatic plants and return to pre-treatment levels within 1 year. Because of past 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 Marks Creek Watershed. Britton (1991) found that a late summer underburn appeared to have little effect on the invertebrate fauna. There should be no measurable increase in cyanide above pre-fire background levels because any cyanide released from retardant would bind with iron in the soil, become inert, and would not move into streams.

Wildlife Habitat with LOS Characteristics

Forested ecosystems with late and old structure (LOS) characteristics provide habitat for species such as the northern goshawk and the pileated woodpecker. Timber harvest and associated activities can remove important LOS characteristics. Timber harvest activities can also contribute to loss of connectivity between habitat blocks. The effects to wildlife habitat with LOS characteristics are discussed in three parts: Northern Goshawk, Pileated Woodpecker, and Connective Habitat.

NORTHERN GOSHAWK

The northern goshawk is known to use interior forest habitats with LOS characteristics. Goshawk nesting home ranges cover approximately 400 acres (includes nest site, foraging areas, and post-fledging area) (USDA Forest Service 1995c). There are five known goshawk nest sites in the project area. A sixth nest site is suspected (Crystal Springs), but the exact location has not yet been located. Post-Fledging Areas (PFAs) have been established for all six nest sites. Treatment may occur within the PFAs, but outside the nest stands, to improve fledging habitat. Projects were designed to improve habitat and are based on Management Recommendations for the Northern Goshawk in the Southwestern United States (Reynolds et al. 1992). Ideally, goshawk habitat contains a mix of dense multi-storied stands for nesting with open, single or multi-storied stands for foraging.

The Hash Rock Fire burned in August and September 2000. Reilly Creek was the only PFA in the project area affected by the Hash Rock Fire. The PFA was impacted by low to moderate intensity fire. This should have positive effects on the foraging habitat within the PFA, by both reducing the density of understory trees and by recruiting new dead and down material from fire-killed trees. Approximately 10 acres of nesting habitat was impacted by moderate intensity fire. This will likely reduce its function as nesting habitat due to the loss of stand structure, cover, and down woody material.

Alternative 1

No commercial timber harvest, precommercial thinning, or underburning treatments would occur within goshawk PFAs. The existing amount and distribution of habitat would not be altered. During the short term (less than 30 years) goshawk use of habitats should not be affected. Over time, as additional understory trees develop, more stands would become unsuitable for goshawk foraging. Overstocking in these stands will also retard the advancement toward LOS and nesting habitat conditions.

The Hash Rock Fire burned at low to moderate intensity in the Reilly Creek PFA. The fire did remove some of the understory trees; however, the stands were not sufficiently thinned by the fire to allow optimum foraging use. Much of the Reilly Creek PFA continues to be dominated by a young pine and fir understory.

Alternative 2

This alternative includes 142 acres of commercial harvest and an additional 166 acres of precommercial thinning within PFAs. Commercial harvest would occur in the following PFAs: Claypool - 50 acres, Crystal Springs - 16 acres, Nature Creek - 18 acres, Reilly Creek - 58 acres. There would be no commercial harvest, precommercial thinning, or underburning in nest stands.

This alternative would restore foraging habitat and maintain and/or promote development of big trees for future LOS habitat. Thinning of overstocked stands would create new foraging habitat, while at the same time it would protect existing nesting habitat.

Natural fuels underburning activities would occur on 367 acres in the Crystal Spring and Jim Elliot PFAs. This would result in mortality to some of the understory trees. This would create a more open forest understory. Fire would consume some

down woody material; the amount of consumption would vary from site to site. Underburning activities are expected to create some down wood with new fire-killed trees. Underburning activities in goshawk habitat would occur in the spring to reduce consumption of down wood. There would be no direct ignition of large down wood.

Commercial timber harvest would remove some understory trees and leave all trees 21 inches dbh or larger. All existing snags (except for safety hazards) and down logs would be retained except in the portion of the Reilly Creek PFA within the Hash Rock Fire. Snag retention within the Hash Rock Fire area will meet the guidelines from the Viable Ecosystems Management Guide. This ranges from 3 to 9 per acre for the Reilly Creek PFA. Snags that pose a safety hazard within RHCAs would be felled and left on site or used for in-stream large wood. Where possible, snags would be designated in clumps and would be left throughout harvest areas.

Road densities would be decreased from existing levels. Reducing road densities generally would improve habitat conditions by decreasing potential disturbance.

Alternative 3

This alternative includes precommercial thinning and underburning activities. No timber harvest or road construction activities would occur. There would be 221 acres of precommercial thinning within PFAs: Claypool - 35 acres, Crystal Spring - 91 acres, Little Hay - 32 acres, Nature Creek - 12 acres, and Reilly Creek - 51 acres. Precommercial thinning would improve foraging habitat by creating a more open forest understory that is accessible to foraging goshawks. Thinning would also reduce competition with overstory trees and possibly accelerate the development of LOS habitat and future goshawk nesting trees.

Natural fuels underburning would occur on 367 acres in the Crystal Spring and Jim Elliot PFAs. This would result in mortality to some of the understory trees. This would create a more open forest understory. Fire would consume some down woody material; the amount of consumption would vary from site to site. Underburning activities are expected to create some down wood with new fire-killed trees. Underburning activities in goshawk habitat would occur in the spring to reduce consumption of down wood. There would be no direct ignition of large down wood.

Road densities would be decreased within the Reilly Creek, Claypool, and Nature Creek PFAs as in alternative 2. This would generally improve habitat conditions, by decreasing potential disturbance.

Alternative 4

Commercial harvest would be implemented within goshawk PFAs. There would be no commercial harvest or underburning activities in nest stands. Underburning within PFAs would protect large woody material. There would be 76 acres of commercial harvest with an additional 183 acres of precommercial thinning within PFAs. This harvest would occur in the following PFAs: Claypool - 50 acres, Crystal Spring - 16 acres, and Nature Creek - 10 acres. No commercial harvest would occur in the Reilly Creek PFA. Cover patches would be maintained in commercial harvest units.

Commercial timber harvest and precommercial thinning would increase foraging habitat by removing vegetation that inhibits goshawks from effectively foraging in the understory. The Reilly Creek PFA is currently overstocked with an understory of pine reproduction that would be reduced by thinning. Cover patches and large woody debris would be maintained in treatment units.

Underburning activities would occur on 367 acres in the Crystal Spring and Jim Elliot PFAs. This would result in mortality to some of the understory trees. This would create a more open forest understory. Fire would consume some down woody material; the amount of consumption would vary from site to site. Underburning activities are expected to create some down wood with new fire-killed trees. Underburning activities in goshawk habitat would occur in the spring to reduce consumption of down wood. There would be no direct ignition of large down wood. The loss of any down wood should be

offset by the creation of fire-killed trees. Commercial harvest would remove some understory trees and leave all trees 21inches dbh or larger. All existing snags (except for safety hazards) and down logs would be retained. Snags that pose a safety hazard within RHCAs would be felled and left on site or used for in-stream large wood.

Thinning of overstocked stands would create new foraging habitat, while at the same time protecting existing nesting habitat. Road densities would be decreased within the Reilly Creek PFA, as in Alternative 2, which generally would improve habitat conditions, by decreasing potential disturbance.

Cumulative Effects Common to All Alternatives

Precommercial thinning activities that are occurring under the Harpo and Marks Timber Sale decisions will remove some understory trees. This activity will help to improve goshawk foraging habitat. These precommercial thinning activities are occurring outside of the proposed treatment areas included in this EA and outside of all PFAs. Ongoing activities such as road maintenance are not expected to alter habitat conditions for goshawk. The Pick-Up Salvage EA includes removing three down trees in the Reilly Creek PFA. The Pick-Up Salvage decision includes a seasonal restriction so that goshawks are not disturbed during the nesting season. Removing three down trees is not expected to affect goshawk use in the Reilly Creek PFA. Restoration activities associated with the Hash Rock Fire will occur near the Reilly Creek PFA and are not expected to alter habitat conditions suitable for goshawks. Fire restoration includes activities such as riparian planting, headcut repair, culvert replacement, trail reconstruction, fence reconstruction, repair of water developments, road maintenance, and road decommissioning (obliteration).

PILEATED WOODPECKER

The pileated woodpecker is a Management Indicator Species (MIS) for old-growth habitat. The species uses all forest types, but prefers multi-storied, mixed-conifer forest. Its preferred forage species is true fir (*Abies spp.*). Its preferred nest trees are ponderosa pine and larch, typically in mixed-conifer forests. The Forest Plan allocated areas to old-growth management to provide habitat for wildlife species associated with old growth and mature forest habitat. These areas average 300 acres in size. The Forest Plan also identified that additional "feeding" areas, averaging 300 acres, would be located adjacent to these old-growth management areas. Bull and Holthausen (1993) recommend a home range size for the pileated woodpecker of 900 acres.

There are three allocated old-growth areas in the project area. The Hash Rock Fire did not burn in any allocated old-growth area or feeding areas. Pileated woodpeckers were present within all allocated old-growth areas in a 1991 survey. One old-growth area is located within the Nature Creek Research Natural Area (RNA). No timber harvest is allowed within this area and there will be no effect to that old-growth area. Outside the RNA, there is currently 800 acres of suitable habitat within and adjacent to the Jim Elliot Old-Growth Area No. 5. There is currently 700 acres of suitable habitat within and adjacent to the Stewart Springs Old-Growth Area No. 13. Table 3-56 identifies the recommended habitat components and the existing amount of habitat surrounding the allocated old-growth areas. Habitat components were measured within 1 mile of the habitat center. There is insufficient true-fir habitat at both sites to manage for a total of 900 acres of suitable habitat.

Bull and Holthausen (1993) recommend that pileated woodpecker territories contain the following habitat components:

25 percent old-growth (Hopkins 1992), remainder in mature stands,
75 percent true fir,
50 percent of stands with >60 percent canopy closure, and
40 percent of stands unlogged.

Table 3-56. Components of Potential Pileated Woodpecker Habitat Areas (measured within 1 mile of habitat center)

	Old-Growth	True fir	60% Canopy	Unlogged*	Total Acres
Recommended	225	675	450	360	900
Jim Elliot	500+	520	600+	500	800
Stewart Spring	400+	600	600	400+	700

*Includes selective/single-tree logging on most acres.

Alternative 1

This alternative would result in maintaining feeding areas adjacent to three allocated old-growth areas. Untreated areas would maintain high levels of canopy closure and snag habitat. Over time, stand health is expected to decline because of the stocking levels. Insects and diseases would be expected to contribute to mortality in these areas. As mortality occurs, there may be some loss in the overstory canopy. Declining stand health and insects would increase the foraging base. This alternative would maintain large blocks of preferred pileated habitat across the landscape. As displayed in Table 3-57, the amount of primary reproductive habitat within the project area would remain within the HRV.

Alternatives 2 and 4

These alternatives both include 102 acres of commercial harvest and an additional 57 acres of precommercial thinning within feeding areas. There would be no management activities within allocated old-growth areas. The commercial harvest would not reduce feeding habitat because commercial harvest would occur in areas dominated by pine in the mid and upper canopy levels. These areas would maintain the old-growth pine/larch components. These areas are not fir-dominated feeding habitat. Commercial harvest would maintain and enhance old-growth nesting habitat. Precommercial thinning would maintain feeding habitat and would improve the old-growth component of nesting habitat, by removing understory trees and reducing competition stress on overstory trees. Pileated woodpeckers are expected to continue using these territories.

Forest Plan management standards for feeding areas call for the retention of a minimum of 2 hard snags greater than 10 inches dbh per acre. These alternatives do not harvest any snags in feeding areas.

These alternatives would maintain large blocks of preferred habitat across the landscape. Table 3-57 displays the existing and expected amounts of primary reproductive habitat by alternative. Alternative 2 would reduce the amount of primary reproductive habitat in the project area by 361 acres. Alternative 4 would reduce it by 340 acres. In both alternatives, the amount of primary reproductive habitat would remain within HRV for the project area.

Alternative 3

This alternative includes 92 acres of precommercial thinning within feeding areas. The areas proposed for thinning are dominated by ponderosa pine and are not preferred feeding habitat. There would be no management activities within allocated old-growth areas. Precommercial thinning would reduce the amount of understory trees (up to 12 inches dbh). Forest Plan management standards for feeding areas call for the retention of a minimum of 2 hard snags greater than 10 inches dbh per acre. This alternative does not harvest any snags in feeding areas.

This alternative would maintain large blocks of preferred habitat across the landscape. Pileated woodpeckers are expected to continue using these territories. The amount of primary reproductive habitat within the project area would be reduced by 101 acres, but would remain within the HRV.

Currently, the amount of primary reproductive habitat in the project area is within the HRV. All of the proposed alternatives

maintain primary reproductive habitat within HRV. Table 3-57 displays the HRV for primary reproductive habitat, the existing amount, the amounts expected as a result of the action alternatives, and the amount expected over time as a result of these treatments.

Table 3-57. Pileated Woodpecker Primary Reproductive Habitat by Alternative (in acres)

Alternative	HRV Low	HRV High	Existing Acres	Acres Post Treatment	Acres in 10 yrs	Acres in 30 yrs
1	3,111	9,163	3,770	3,770	5,383	7,791
2	3,111	9,163	3,770	3,409	4,869	7,079
3	3,111	9,163	3,770	3,669	4,652	7,113
4	3,111	9,163	3,770	3,430	4,533	6,986

Cumulative Effects for All Alternatives

Observations on the Lookout Mountain Ranger District by biologists and other personnel indicate that pileated woodpecker populations are healthier now than any time back to the 1970's. These observations are supported by Breeding Bird Survey data for the Central Rocky Mountains Physiographic Region, which includes eastern Oregon and Washington (Altman 2000). This data indicates that populations of this species are increasing over the long-term (1966-1996) and short-term (1980-1996). Likewise, this increasing trend is true for Hammond's flycatchers and Townsend's warblers which have been identified as indicators of habitat preferred by the pileated woodpecker.

The Ochoco National Forest is being managed with an emphasis on moving stand conditions toward the Historic Range of Variability (HRV) as described in the Viable Ecosystem Management Guide. Historically, there were fewer multi-storied, fir-dominated stands and more single-storied, pine-dominated stands in the pine, Douglas-fir, and dry grand fir PAGs. In the moist, cool sites (moist grand fir and subalpine fir PAGs), high crown closures and multi-layered canopies were historically common. Based on HRVs, many of the future drier forested stands across the Ochoco National Forest would be dominated by pine rather than fir. In the moist, cool stands shade-tolerant firs will be the dominant tree species. Pine-dominated stands are less suitable for use by the pileated woodpecker, while fir-dominated stands are more suitable for the pileated woodpecker. Allocated old-growth areas will continue to be managed to provide habitat for old-growth associated species such as the pileated woodpecker.

The only other planned activities that would affect pileated woodpecker habitat in or near the project area are precommercial thinning and underburning activities related to the Harpo and Marks Timber Sales. These sales caused a reduction in pileated habitat. Precommercial thinning would reduce understory trees, including fir trees, and is occurring within units where harvest activities have already occurred. The reduction of pileated woodpecker primary reproductive habitat as a result of the Harpo and Marks Timber Sales has been included in the existing amount of habitat displayed in Table 3-57.

CONNECTIVE HABITAT

Connective habitat has been designated to meet the requirements of the Regional Forester's Forest Plan Amendment 2 (Eastside Screens). There are two connections designated between all allocated old-growth areas and old-growth/LOS stands larger than 100 acres. Designated corridors connect old-growth/LOS habitat in the project area with habitat in adjacent watersheds.

There were a total of 63 acres of connective habitat affected by the Hash Rock Fire; 53 of these acres were impacted by low-intensity fire (less than 10 percent crown reduction), the remaining 10 acres were impacted by 10-30 percent crown

reduction. The total effect to connective habitat within the project area was minimal. The acres affected by low-intensity fire likely lost some of the down wood component and were thinned by fire, i.e. some of the smaller-size trees (less than 9 inches dbh) were killed. The remaining 10 acres were more heavily affected by wildfire (some trees greater than 9 inches dbh were killed), but the scope of these 10 acres within the project area is minimal. The Hash Rock Fire did not affect any identified connections to the Mill Creek watershed (Mill Creek Wilderness). The Hash Rock Fire did not eliminate or sever any connectivity corridor.

Alternative 1

The effect of no management treatments would be the continuation of the existing stand dynamics in connective habitat. This includes the continued encroachment of fir understories with the potential for an increase in canopy closure, incidence of insects and disease, and stand mortality. If this trend continues, it would perpetuate the development of understory layers and contribute to denser stands, which in the short-term would increase the understory cover component. Over time, it would contribute to a less diverse mix of habitat types, stand density, and canopy cover and a loss of diversity of tree species mixes and forest floor vegetation. Existing connective habitat across the landscape would be maintained in the short term.

Alternative 2

This alternative includes 103 acres of commercial harvest and an additional 427 acres of precommercial thinning in connective habitat.

Commercial harvest and precommercial thinning in connective habitat would reduce understory cover; however, it is not expected to decrease the effectiveness of the understory component. Understory thinning would reduce competition stress on the overstory trees. Overstory trees and the canopy cover they contribute would be maintained and increased. Underburning is expected to have a minimal effect on connective habitat because of the spring burning and no direct ignition of large down wood. Down wood that might be consumed would be replaced by fire-killed trees. Connective habitat across the landscape would be maintained in the short term and managed to enhance development into future LOS.

Alternative 3

This alternative includes 545 acres of precommercial thinning within connective habitat.

Precommercial thinning in connective habitat would reduce understory cover; however, it is not expected to decrease the effectiveness of the understory component. Precommercial thinning would reduce competition stress on the overstory trees. Overstory trees and the canopy cover they contribute would be maintained and somewhat increased, although not as effectively as in Alternatives 2 and 4. Underburning is expected to have a minimal effect on connective habitat because of the spring burning and no direct ignition of large down wood. Down wood that might be consumed would be replaced by fire-killed trees. Connective habitat across the landscape would be maintained.

Alternative 4

This alternative includes 93 acres of commercial harvest and an additional 427 acres of precommercial thinning in connective habitat.

Commercial harvest and precommercial thinning in connective habitat would reduce understory cover; however, it is not expected to decrease the effectiveness of the understory component. Thinning trees in the understory would reduce competition stress on the overstory trees. Overstory trees and the canopy cover they contribute would be maintained and increased. Underburning is expected to have a neutral effect on connective habitat because of the spring burning and no direct ignition of large down wood. Down wood that might be consumed would be replaced by fire-killed trees. Connective

habitat across the landscape would be maintained in the short term and managed to enhance development into future LOS.

Cumulative Effects Common to All Alternatives

There are no other planned activities that would directly affect connective habitat in or near the project area. Historically, LOS stands were more abundant than they are today. Management focusing on moving towards the historic conditions will result in an increase in LOS across the landscape. The need to maintain designated connective habitat will decrease in the future as LOS stands become more continuous.

Prime Farmland, Rangeland, and Forestland

None of the proposed alternatives would have an impact on prime farmland, rangeland, or forestland because these types of lands do not occur in the project area.

Floodplains and Wetlands

The proposed alternatives would not have an impact on floodplains or wetlands (Executive Orders 11988 and 11990). There are no Wild and Scenic Rivers or ecologically critical areas in the project area.

Consumers, Civil Rights, Minority Groups, and Women

The proposed alternatives would not adversely affect consumers, civil rights, minority groups, or women. Contract provisions include non-discrimination requirements.

There are no disproportionately high or adverse human health effects on any identifiable low-income or minority population.

Irreversible or Irretrievable Commitment of Resources

Irreversible is a term that describes the loss of future options and applies primarily to the effects of use of nonrenewable resources, such as minerals and soils. 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 4 propose some level of road construction. Alternatives 2 and 4 also include the use of mineral materials for road construction and maintenance. Removing mineral material is also an irreversible action.

Irretrievable is a term that applies to the loss of production, harvest, or use of natural resources. 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 in the future.

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CHAPTER 3 Part C
LIST OF PREPARERS

Deschutes and Ochoco National Forests Website

http://www.fs.fed.us/centraloregon/manageinfo/nepa/documents/lookout/bandit2/chapter3c.html
Last Update: 6/14/02
R.A. Jensen

List of Preparers

Jim David	Soil Scientist
John Erwert	Fuels Technician
Katherine Farrell	Writer/Editor
Barb Franano	Fishery Biologist
Carrie Gordon	Geologist
Terry Holtzapple	Archeologist
Becky Kreachbaum	Silviculturist
Rodd Kubitza	Transportation Engineer
Mark Lesko	Botanist
Barb Mountz	Logging Systems Technician
Tom Mountz	Fuels Technician
Rob Rawlings	Team Leader
Jim Seymour	Hydrologist
Barb Smith	Recreation Technician
Ronnie Yimsut	Landscape Architect
Dave Zalunardo	Wildlife Biologist

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